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# **Cyclical Effects on Job-to-Job Mobility: An Aggregated Analysis on Microeconomic Data**

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## **ABSTRACT**

This paper analyses cyclical effects on job-to-job mobility using German data. The focus lies on the influence of the regional unemployment rate and the regional growth of the GDP. Job-to-job transitions are fragmented into external and internal movements. The innovation is to describe mobility using background information why the moves occur because the available empirical labour market literature is in deficit with analyzing the motive why these transitions occur with respect to the business cycle. External movements can be introduced by quits or forced by layoffs, the end of the contract, or other reasons such as bankruptcy of a firm. Internal transitions are classified as promotions and transfers. Our estimates show that job-to-job mobility is strongly affected by the business cycle. External movements are more likely in times of growing GDP and less probable when the unemployment rate increases. For internal transitions our results suggest that Eastern and Western Germany's workers differ in their mobility properties along the business cycle.

JEL-Classification: E32, J62, J63

Key Words: job-to-job mobility, internal and external moves, promotions, quits, lay-offs, business cycle

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# 1. Introduction

The search and the matching theory are the main economic strands of literature concerning labour market modelling. Both deliver theoretical aspects in understanding labour market dynamics. Tobin (1972) criticised the early search theory for the reason that job-to-job worker flows have not been addressed. And in fact, it has turned out that direct job-to-job movements play an important role in the labour market. A variety of literature which attempts to describe the labour market flows between unemployment, employment, and non-participation over the business cycle can be found. Job-to-job (JJ) worker flows have been insufficiently theoretically analysed. But some empirical studies highlight the importance of Tobin's criticism for the United States.

The focus of this study lies on analysing cyclical and individual determinants of internal JJ and external JJ transitions. By definition, the JJ flows are direct transitions: This implies that no spell of unemployment disturbs the move from one employment relationship to another.

External moves are caused by layoffs, quits, end of contracts, and other reasons. Layoffs are induced by the employer. Other external moves are forced by bankruptcy of the firm while quits are induced by the worker. Reasons as retirement decisions which lead an individual to leave the labour force and are not considered here.

Internal transitions are promotions or transfers within the same firm. Promotions are internal job moves in which workers improve either their income or improve their type of work. All remaining internal transitions are transfers by definition.

Concerning the JJ transitions, classical theory fails to describe the mechanisms in term of cyclical behaviour though actual search models contain on-the-job search which is a necessary extension to describe this labour market movements. Fallick and Fleischmann (2004) argue that about one half of new employment relationships result from job-to-job transitions.

According to business cycle theory vacancies rise in booms. On-the-job search and booms in conjunction are expected to affect either JJ movements and the labour market in a powerful way. Both vacancies –with respect to newly found workplaces– and quits by unsatisfied employed workers are expected to rise. This mechanism can cause large JJ movements. In recessions both, quits and vacancies, will be much smaller because quits will occur rarely with respect to the low number of vacancies.

Search and matching approaches claim that gross worker flows from employment to unemployment are countercyclical.

Most research in this field considers the starting statuses unemployment or out of the labour force which are excluded in our assignment. We focus on worker flows from employment to another status within the labour force. Exits and entrants into the labour force are ignored because the aim is to analyse how JJ within the temporary labour force work during the business cycle.

Insider-outsider-theory provides some evidence that there is a strong interaction between external JJ movements and transitions of new entrants. External JJ moves weaken the chance of being hired for unemployed workers as well as for new entrants who are out of the labour force. In this paper we focus on the behaviour of employed insiders and leave all other initial labour market statuses out. Furthermore only insiders are able to send the signal of acquired skills and labour experience. For this reason we concentrate on insiders.

The goal of this paper is to describe the worker flows –internal JJ, and external JJ– on an aggregated level by cyclical and individual components. To address the current preponderance of microeconomic modelling of transitions of workers, macroeconomic valuation is applied here. The reason for choosing macroeconomic modelling is that business cycle theory is a classic macroeconomic approach and literature lacks to emphasise the connection of labour market models and the business cycle. We want so show how cyclical behaviour affects the movements of workers within the labour force and control for some individual effects.

The paper proceeds as follows: Section 2 presents both, theoretical (section 2.1) and empirical (section 2.2) literature, related to this topic. In section 2.3 job-to-job transitions in conjunction with the business cycle are presented. Section 3 provides the data, its measurement and the calculation of the transition variables. Section 4 presents the empirical results of aggregated regressions. Section 5 concludes and highlights the results of the empirical section.

## 2. Related Literature

### 2.1. Theoretical Literature

The macroeconomic literature describes in detail that the business cycle affects the labour market in a powerful way. Recessions lead to a burst of separations on the labour market. This implies that a multiplicity of employed workers become unemployed. The employment to unemployment rate is shown to be strongly countercyclical. Blanchard and Diamond (1989, 1990) describe the counterpart called booms: A cyclical upturn will lead to many hirings. This yields in unemployed people becoming employed. Those worker flows have been addressed in many papers. This indicates that transitions into employment are procyclical, while transitions to unemployment are countercyclical. Moreover we expect in times of increasing hirings rising JJ mobility due to the greater number of vacancies.

Two important methodological microeconomic strands providing on-the-job search and job-to-job transitions are matching and search theoretical approaches.

Matching theory points out that the value of the match between the employer and the employee is crucial for the duration in the employment relationship. If the match is of high quality, both, firm and employee, are not willing to search for an alternative job or employee and as a consequence mobility will not occur. Inexperienced labour market entrants usually have to gain job experience in different jobs and sectors of the labour market until they will find a satisfactory match quality. Those workers exhibit high search preferences and external mobility and are not picked out as central in this analysis. This mobility is additionally affected by lower pronounced firm-loyalty. The tenure of younger workers is mostly shorter due to a mismatch regarding working conditions, productivity, possibilities of promotion or earnings.

As a result of incomplete information on the conditions of alternative workplaces the labour mobility is restricted to employees because they definitely cannot obtain a better match quality in another position or job.

Search theory emphasises the costs and benefits of searching. For employers the search for new workers is expensive because information about the applicant is often uncertain. Frequently the match quality or productivity of a worker can only be assessed during the

labour relationship. A phenomenon often observed is that applicants dupe abilities to the employer. Employers try to minimise this problem by hiring experienced workers who send out the signal of being familiar with the certain job. To minimise the amount of low-productive workers, access limitations for applicants are necessary for firms. Selection criteria such as tests, schooling degree, and selected social abilities are the most common. Most of the social abilities can be tested in interviews or assessment centres, which are very common nowadays. Gender or ethnical discrimination are also present in some firms and can be considered as covered selection criteria. These factors lessen the labour mobility with respect to the specific properties and qualifications of the different workers.

Pissarides (1994), Burdett (1978), and Davis and Haltiwanger (1999) derive models of on-the-job search of workers. They establish a theoretical background for worker flows from one employment relationship to another without a spell of unemployment. This class of models has been implemented and amplified by several others such as Eriksson and Gottfries (2000). It provides individuals the opportunity to search for “better” jobs during a spell of employment. Better jobs are defined by their quality of jobs, the workplace conditions, and to the largest extent by wages. Here, the match quality is affected by the worker’s point of view.

In recessions workers will accept each job offer and even accept a worse match quality in order to gain job experience and to avoid spells of unemployment. This is at least true under the assumption that the utility of employment exceeds the utility of unemployment. This skill-mismatch leads to a continuous search for alternative and better jobs. With a cyclical turnaround and increasing vacancies, these workers stand a better chance of finding a better job and are able to find new matches of better quality. This provides evidence that both, search effort and match quality, seem to be affected procyclically by the business cycle with respect to external labour mobility and JJ transitions.

The longer the tenure of a worker, the more unlikely an external move due to the firm-specific human capital she has accumulated in a certain job and the unprofitable application in other firms. But the longer the tenure -which indicates a high match quality- the more likely a transfer or promotion within the firm will be. Thus, the tenure can have a positive impact on internal transitions.

Internal movements like promotions can also stem on firm specific training. Training programs will increase the productivity of the workers. This will induce an employer to

promote a graduate of the trainee program to increase the responsibility of this worker. External mobility is less useful for workers with respect to the wage gains that can be achieved by the acquisition of firm-specific human capital and more responsibility within the firm. An alternative strategy is to reward a long tenure and to promote workers according to the time spent in the firm. This can lead to other effects because in this case the productivity is not longer the key element of the wage strategy. Other mechanisms for a promotion strategy which emphasise the combination of career advancements with human capital, productivity, and tenure of a worker are also prevalent.

## **2.2. Empirical Studies**

The attitude towards a lifetime job was wide spread in the past but not applied by all workers. Loyalty to a firm was as respectable in society as loyalty to the authorities. Nowadays empirical assignments show that loyalty towards a certain firm is absolutely decreasing. Only few workers are loyal to a firm for their own reasons but the majority of the workers is likely to respond to dissatisfactory situations with a job change. For the United States, there is evidence that "... workers perceive that the culture of lifetime jobs and joint employer-employee commitment was sacrificed during the recession ... of the early 1980s and 1990s." (Skuterud M. (2005, p. 5)) Today, workers identify themselves more by their skills instead of the firms they work for. This attitude causes workers to leave their current jobs in dissatisfactory situations and to search for alternative jobs if alternative jobs are available. Empirical studies for a variety of countries, including the U.S., the U.K., Denmark, and Germany, have found that job satisfaction reduces quits, quit intentions, and job search (Akerlof/Rose/Yellen (1988), Clark/Georgellis/Sanfey (1998), Clark (2001), Kristensen/Westergard-Nielsen (2004), Lévy-Garboua et al. (2004), Shields/Wheatley Price (2002), Böckerman and Ilmakunnas (2004), Cornelißen (2006)). Research conducted in Germany, presented in Cornelißen (2006), suggests that job search is driven not only by wages but also by job satisfaction and job characteristics, among which job insecurity is found to make job search more likely. This implies that in recessions on-the-job search increases due to rising job insecurity and the threat of layoffs. On the other hand, vacancies decrease in recessions and a lower payoff to job search, lower search efforts, and fewer quits as one might have expected. Skuterud (2005) showed for the recessionary periods in the early 1980s and 1990s that almost no quits occurred during this cyclical downturn.

Under the assumption that a worker generates a lower utility when he is unemployed he will not tend to execute a voluntary employer to unemployment transition. Due to the low frequency of vacancies and lower chances of succeeding in finding a new workplace, she will still work in the current job in spite of his dissatisfaction. Nevertheless, if the search for a new job is successful she will do a job-to-job move even in cyclical downturns. In booms and times of a numerous vacancies workers are better off finding new jobs. Hence dissatisfaction in the current job will lead to a burst of separations at least for those employees whose on-the-job search for a better job was successful. As a result vacancies, voluntary external moves and the search activity seem to be procyclical. Involuntary job-to-job moves are expected to increase in recessions.

Nagypál (2004a) provides strong empirical evidence for the United States that job-to-job transitions are numerous. Her findings emphasise the role of worker reallocation over the business cycle. She argues in contrary to commonly used models that in recessions the job finding rate has shrunken in contrary to a burst in the layoffs. “So while separations are acyclical, there is an important change in their composition over the business cycle, with separations shifting away from quits and towards layoffs in recessions.” (Nagypál (2004a, p. 18))

Nagypál claims that external JJ transitions should be relatively stable over the business cycle because fewer workers will quit their jobs in recessions because of the weak labour market but layoffs are increasing due to the downturn of the business cycle. In booms her argument for an external JJ is that workers anticipate the upswing and will quit if they find a better job. If external JJ transitions decline in recessions this can be due to the shift of quits to layoffs and JJ is less likely after a layoff. Nagypál calls this effect “composition effect”.

The “change in rate effect” specified by Nagypál describes that JJ rate is decreasing within each type of separation. A decline of each –layoffs, quits, end of contract and other reasons– can describe about one half in the overall change in the JJ transition rate as Nagypál points out.

Fallick and Fleischman (2004) argue that “..., despite the importance of EE [Employer-to-Employer] flows to our understanding of labour market and business cycle dynamics, until now the literature has lacked a comprehensive and representative measure of the size and character of these flows.” (Fallick and Fleischman (2004, p. 2)) These flows mentioned by Fallick and Fleischman are external JJ flows.



“Unfortunately, when matching business cycle models to the empirical facts, the literature has made little attempt to distinguish between a model’s implications for differences between expansions and recessions and its implications for changes within expansions or recessions, especially around cyclical turning points.” (Fallick and Fleischman (2004, p. 26))

To which extent the conflicting cyclical tendencies among internal and external JJ transitions are existent will be shown in this paper by applying aggregated data.

### **2.3. Job-to-Job (JJ) transitions and the business cycle**

This chapter focuses on expected correlations of the business cycle and the transitions from employment to unemployment or to another job.

Shimer (2003) emphasises the fact that vacancies are procyclical. This implies vacancies are numerous in cyclical upswings but uncommon in recessions.

Voluntary external JJ transitions, in other words quits, are expected to be procyclical because of the higher penetration of vacancies in booms than during recessions. The newly created workplaces can be a reason for workers to switch their job voluntarily without any spell of unemployment.

Layoffs or the end of contracts will lead to involuntary external moves. This involuntary external JJ rate weakens the rate at which workers will do an employment to unemployment transition because many employees build expectations about their job security and introduce on-the-job search to be aware of a spell of unemployment induced by a layoff. If the current job is not secure the workers are motivated to search on-the-job for alternative workplaces in order to avoid spells of unemployment.

These considerations highlight that on the one hand voluntary external moves such as quits are procyclical but on the other hand for layoffs the moves are expected to be countercyclical. External transitions are expected to be relatively stable over the business cycle with respect to a shift towards layoffs in recessions and towards quits in booms.

Nagypál (2004b) considers a model of on-the-job search with the feature that firms contact employed workers to reach higher benefits. Firms will recruit employed workers who have acquired specific skills in another firm. This poaching strategy is profitable for employers because hiring insiders who send the signal of experience or skills in specific industries promises a higher productivity. In comparison to unemployed outsiders insiders can obtain a

superior match quality by their individual as well as firm specific or industry specific human capital. This also comprises that the unemployed person will suffer from recessions periods because employers can be expected to reduce hirings of unemployed people but to keep hirings of the on-the-job searching employed stable. This suggests that external JJ transitions are relatively stable during the business cycle.

Internal JJ transitions qualified as promotions are expected to be independent of the business cycle. It is likely that promotions can be explained by human capital theory. Firms train their workers and afterwards promote the graduates. The accumulated firm specific human capital gained by the training qualifies the worker to be more productive.

Both -the firm and the worker- benefit from training and promotion and also derive a better match quality. This component of internal JJ transitions does not seem to be affected by cyclical influences.

Another component of the internal movers consists of workers performing a transfer within the firm. The influence of the business cycle is not a priori clear. During recessions many employment relationships will be terminated and restructuring will occur. Thus fewer workers have to maintain the productivity of the firm.

This leads to a reallocation of the tasks performed in the firm to the remaining workers and can be accompanied by further measures of re-organisational change. Hence a shift of the workload from the cancelled workers to the remaining workers occurs. This increases the productivity of the remaining employees. Workers may not be able to claim wage rises because their bargaining power in a recession is low and because they may anticipate a promotion or a wage rise in the future. In this empirical analysis, a redistribution of tasks without wage rises is qualified as transfer, and we expect transfers to increase during recessions. During booms, positional changes within the firm are more likely to be associated with a rise of the wage because the firms expand and create new jobs on the fundament of the current workforce. Internal moves will therefore be more likely to be promotions rather than transfers. Uunk et al. (2005) claim that larger firms promote workers more often than smaller ones due to the diversity of tasks. This indicates that the firm size influences such transitions. Generally firms are expected to profit from internal allocation of workers and are able to avoid shirking-effects which stems from background information of the worker's abilities during her job tenure.

In this assignment, individual and cyclical influences on internal JJ transition flows are analysed to gain information on the character of the JJ flows.

To turn the attention to gender, Clark (1997) shows a greater job satisfaction of females. Less JJ transitions will be executed by females in comparison to their male counterparts. Our data provides evidence for this: about 60% of the internal or external JJ movements are realised by males. Clark et al. (1996) report that job satisfaction is U-shaped regarding age. An argument they introduced is that middle-aged workers are able to assess their aspiration levels best. Older workers will lower their aspiration levels or leave the labour force while younger workers have to gain experience to learn more about their career opportunities. This consideration leads us to introduce the squared age into the estimation to take the expected U-shape into account. Clark, Oswald, and Warr (1996) report lower job satisfaction with respect to schooling. Both authors stress that this may be caused by higher expectations of the well educated people. We also expect a U-shaped effect for schooling. Moreover, match quality can approximately be described by the schooling variable because we expect a correlation between productivity and schooling, too. The individual characteristics described above allow to control for other effects not specified by cyclical influences approximately.

This paper provides aggregated evaluation of cyclical and individual influences on external JJ transitions. We can separate the driving forces quits, layoffs, end of contract, and other reasons as well as internal JJ transitions qualified as promotion and transfer.

## **3. Data and methodological problems**

### **3.1. Data set and variable description**

For Germany many individual datasets are available for the analysis of worker flows. The Microcensus provided by the Statistisches Bundesamt, the „IAB-Beschäftigtenstichprobe (IABS)“, the „Linked Employer-Employee-Datensatz“ surveyed by the IAB (LIAB)“, and the „German Socio-Economic Panel (GSOEP)“ are the most common ones to analyse the labour market dynamics. Each of these datasets is adequate regarding the analysis of work-biographies for individuals in Germany. The IABS and LIAB contain only individuals who are subject to the German social insurance contribution. In contrast the GSOEP contains individuals who are not restricted by being subject to the social insurance contribution. The main interest is in high frequency data on the labour market status of individuals. Data on monthly frequency can be gained or generated from all the GSOEP, LIAB, and the IABS. Thus this is not the prime criterion for the selection of the dataset. Individual information such as schooling, gender, age and the number of different employers is available in most datasets, too. The information whether an internal or an external move took place can best be derived using the GSOEP. This is the main reason for using this dataset. The possibility to distinguish between quits, layoffs, end of contracts, other external moves, promotions, and transfers within the same firm is the main reason to use this dataset.

In this paper especially the employment calendar files are used. Those are a monthly retrospective survey on the employment status from January 1983 to December 2004. The dummy variables full time employment, part time employment, vocational training, and unemployment are available on a monthly basis. Other variables of the calendar files such as retirement, maternity leave, school, college, military or civil services, housewife or housekeeping, short work hours, and second jobs are not used in this assignment because they describe the labour market status of people being out of the labour force. Short time working is defined as out of the labour force. The reason is that short time working is a combination of employment and unemployment. To avoid selection bias, we exclude this status here.

The variables full time employment, part time employment, and vocational training describe the “employment status” (whereas the “unemployment status” is described by the variable unemployed in the calendar files).

	employed <sub>t</sub>	unemployed <sub>t</sub>
calendar files	full time employed part time employed vocational training	unemployed

**Table 1: Description of the labour market status**

According to the definition presented in Table 1, the dummy variables employed<sub>t</sub> and unemployed<sub>t</sub> are generated for each period t.

Exogenous variables contain information on macro- and microeconomic level. The macroeconomic variable annual percentage change of regional real German GDP (Bruttoinlandsprodukt<sup>1</sup>) is published by the “Arbeitskreis Volkswirtschaftliche Gesamtrechnungen der Länder”. The official unemployment rate (UR) is taken from the Homepage Stat. Bundesamt and GENESIS Online. Both datasets are retrieved annually.

The monthly generated employment (and unemployment) dummy variables are the main focus of this research. If a person is not employed during a certain period of time the individual will remain unconsidered. These variables allow us to compute dummy mobility indicators such as and “job-to-job” (JJ) changes.

In this assignment two different JJ transitions are defined, namely the internal and the external movements. Each year the GSOEP questionnaire collects retrospective information on whether a job move has took place during the past year. More precisely, it is inquired whether a job was ended (JOBEND=1) or whether a new job was started (JOBSTART=1). If a jobend or a jobstart took place, it is surveyed in which month of the year the change took place. Therefore, the JOBEND and JOBSTART indicators can be constructed on a monthly basis.

If JOBSTART=1 it is also surveyed whether the new job was with a new employer (external move), or whether the new job was with the same employer (internal move). This allows the construction of dummy indicator variables for external and internal job-to-job moves at a monthly basis.

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<sup>1</sup> [http://www.vgrdl.de/Arbeitskreis\\_VGR/](http://www.vgrdl.de/Arbeitskreis_VGR/); Bruttoinlandsprodukt –preisbereinigt, verkettet– in Deutschland 1991 bis 2006 nach Bundesländern Veränderung gegenüber dem Vorjahr in %; Download: 11.Jun.2007

The internal transition can be described as employment status in two following periods. The movement can be either described by a jobstart in the current period or by a jobend in the period before. Additional information on annual basis is given by a generated variable called “intmover”. When a promotion or a transfer within the same firm occurred the variable intmover is 1. For further calculations we are able to distinguish between transfers and promotions.

External movements are defined in an analogous way. The only difference is the auxiliary variable “extmover”. Extmover contains quits, layoffs, the end of contracts or other external moves which can be distinguished. Without information on intmover or extmover JJ is calculated.

$$JJ_t = \begin{cases} 1 & \text{if } \left[ \text{employed}_t | \text{employed}_{t-1}; \text{jobstart}_t \text{ or } \text{jobend}_{t-1} \right] \\ 0 & \text{otherwise} \end{cases}$$

$$JJ\_int_t = \begin{cases} 1 & \text{if } \left[ \text{employed}_t | \text{employed}_{t-1}; \text{jobstart}_t \text{ or } \text{jobend}_{t-1}, \text{intmover} \right] \\ 0 & \text{otherwise} \end{cases}$$

$$JJ\_ext_t = \begin{cases} 1 & \text{if } \left[ \text{employed}_t | \text{employed}_{t-1}; \text{jobstart}_t \text{ or } \text{jobend}_{t-1}, \text{extmover} \right] \\ 0 & \text{otherwise} \end{cases}$$

Again, individuals who leave the labour force in t but are employed in t-1 remain unconsidered.

Not all movements are correctly recorded due to incorrect responses in the GSOEP. The GSOEP questionnaire is set up that only one jobstart and only one jobend can be recorded during a year. Individuals have to state the month in which the last jobend or jobstart occurred. This implies that if an individual has more than one job-to-job change during the year, only one change can be recorded, and the job-to-job moves are therefore likely to underestimate job-to-job transitions.

Another possibility of incorrect measurement are inconsistent responses in the annual questionnaire and the monthly calendar. If an individual states that he ended a job in one certain month and started a new job several months later, but in the calendar data he reports

being employed during the whole period, then the variable definition above implies that two job-to-job moves are reported.

These three generated dummy variables are the basis for the aggregated movements on the labour market. To aggregate the variables the means per month are calculated.

$$X_{kit} = \begin{cases} X_{JJ,it} \\ X_{JJ\_int,it} \\ X_{JJ\_ext,it} \end{cases} \quad \bar{X}_{kit} = \frac{\sum_{i=1}^{N_{kit}} X_{kit}}{N_{kit}} \text{ if } X_{kit} = \{0,1\}$$

and:  $N_{kit}$  are all observations of category  $k$  in period  $t$  being 0 or 1 for the corresponding individual  $i$ . The period of time  $t$  is given by January 1984 - December 2004.

The averages are calculated for each consecutive month and for all  $k= JJ, JJ\_int, JJ\_ext$  and they are designed to be the endogenous variables.

### 3.2. Unit root tests

Unit root tests are applied to take nonstationary processes into account. Nonstationary processes exhibit increasing variance over time and therefore cannot adequately be described by stationary variables. Variables containing a unit root are transformed into stationary ones by calculating the difference over time. An augmented Dickey Fuller test type is used for the endogenous variables and the choice of the lagged terms was based on the Schwarz Information Criterion (SIC). Using this dataset, a lag selection based on the Akaike Information Criterion (AIC) will lead to an identical choice of lags and consequently to the same results. Furthermore, a constant is included in the augmented Dickey-Fuller regression. The results indicate a stationary process for the internal job-to-job moves. All of the other endogenous variables contain unit roots and are integrated of order one because the 1<sup>st</sup> differences of the processes are stationary.

Variable	ADF - Test (SIC)	
	level	1 <sup>st</sup> difference
Monthly averages		
JJ	unit root	stationary
JJ_int	stationary	stationary
JJ_ext	unit root	stationary

**Table 2: Unit root properties of JJ, JJ\_int, JJ\_ext**

The first differences of the fractions of movers for all  $\bar{x}_k$  ( $k= JJ, JJ\_ext, JJ\_int$ ) are calculated as follows.

$$D\_kt = \bar{x}_{kt} - \bar{x}_{k,t-1}$$

Though the 1<sup>st</sup> differences of internal JJ transitions are not necessary we use it for the estimations.

If transfers contain a unit root and internal transitions are stationary, the problem is to find a cointegration relationship. This is solved by the linear combination of transfers and promotions. But both, promotion and transfers, are stationary in levels and therefore are not integrated. For the external transitions the only stationary process are the movements induced by the end of contracts. All the other external transition rates are integrated of order one. This implies that no problems with cointegration occur.

The following Table presents the descriptive statistics for the 1<sup>st</sup> differences of the monthly endogenous variables.

Variable	Mean	Std. Dev	Min	Max
D_JJ	0.001021	0.005655	-0.023940	0.026840
D_JJ_int	0.000194	0.000703	-0.002135	0.002742
D_JJ_ext	0.000230	0.001788	-0.007173	0.006970

**Table 3: Descriptive statistics of 1<sup>st</sup> difference monthly data**

The means of all variables are positive on average. This implies mobility is ascending in the sample used here.

Unit root tests for the regional macro indicators, annual percentage change of GDP, and UR, respectively based on lag selection via SIC conclude that the annual percentage change of the GDP is stationary as well as UR. The Fisher – ADF test refers to the augmented Dickey-Fuller (ADF) test type while Fisher – PP refers to a Phillips-Perron (PP) test type. The Fisher-PP test uses kernel correction for the autocorrelation and arrives at the same conclusion. The following Tables sum the panel unit root tests which have been applied to the unbalanced<sup>2</sup>

<sup>2</sup> Unbalanced in this sense is equivalent to the sample size of the two variables and the German reunification. UR is available for the Western states from 1984-2004. For the Eastern states the data is only available from 1991 onwards. For GDP Western data is available from 1983 to 2004 and Eastern from 1992 onwards. Unbalanced refers to the different sample size of the Eastern and Western data. Eastern data is missing for the years 1984-



regional data up. Literature about the applied panel unit root tests can be found in Levin, Lin and Chu (2002), Breitung (2000), and Im, Pesaran and Shin (2003). Maddala and Wu (1999), and Choi (2001) are introducing the Fisher test types.

Panel unit root tests Lag selection based on SIC Unbalanced data			
Variable	Test	level	1st difference
annual percentage change GDP	Levin, Lin, Chu t*	stationary	---
	Breitung t - stat	stationary	---
	Im, Pesaran, Shin W - stat	stationary	---
	Fisher - ADF	stationary	---
	Fisher - PP	stationary	---

**Table 4: Panel unit root tests for unbalanced annual percentage change GDP data**

Panel unit root tests Lag selection based on SIC Unbalanced data			
Variable	Test	level	1st difference
UR	Levin, Lin, Chu t*	stationary	---
	Breitung t - stat	stationary	---
	Im, Pesaran, Shin W - stat	stationary	---
	Fisher - ADF	stationary	---
	Fisher - PP	stationary	---

**Table 5: Panel unit root tests for unbalanced UR data**

All the tests combine elements of nonstationary data from time series analysis with larger datasets by using cross-sectional data. This feature was the main reason to apply these test types because other unit root tests suffer from less observations and thus from low power.

The tests conclude that both time series are stationary in levels and consequently they contain no unit roots. It might be possible that the stationarity results from using unbalanced data. Therefore subsamples are chosen in the way that balanced panels are obtained. The tests for the balanced panel unit root tests are displayed in the Appendix (Tables 12-17). A lag selection based on the AIC will not affect the stationary results presented above, although a higher lag order due to the lower penalty for the usage of degrees of freedom term is preferred. Even though the Breitung Panel unit root test for the balanced panel for all federal states from 1992-2004 and for the Eastern states of GDP (Tables 12 and 14) shows a unit root we follow the stationarity assumption for the level data because all other test results indicate level-stationary.

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1991 (UR) and for 1984-1992 (GDP) but the panel unit root tests are applied to all of the regions in Germany for the sample from 1984-2004.

Possibly critique can arise because of the double observance of Berlin. Data from West Berlin is available for all period while Eastern Berlin data is only available from 1991/ 1992 onwards and is equal to the Western data. Omitting Berlin in the panel unit root tests because of the duplex function will not affect the results presented above.

Survey information about schooling, age, region, working experience, and gender can account for individual characteristics while the macroeconomic variables are consulted to describe the business cycle.

The schooling variable is calculated as displayed in the Desktop Companion to the German Socio-Economic Panel (2005).

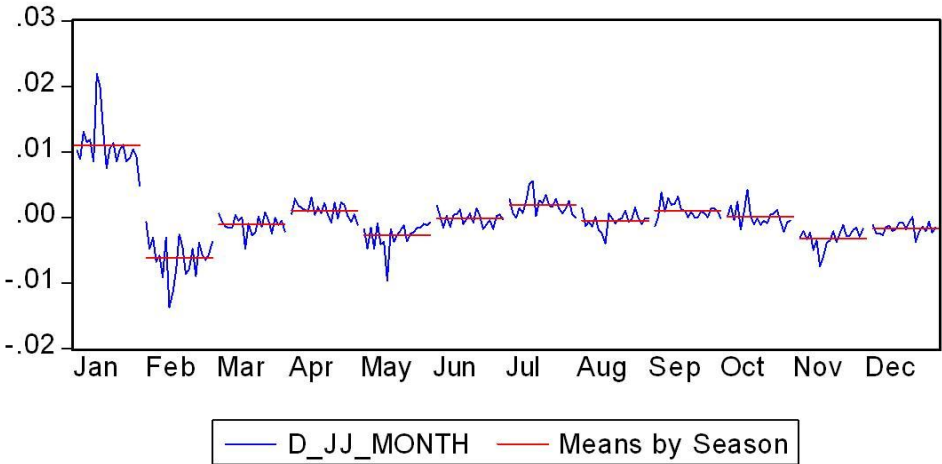
years of education	schooling + occupational training (in years)
<b>schooling</b>	
no degree =	7
lower school degree =	9
intermediary school =	10
degree of a professional college =	12
high school degree =	13
others =	10
<b>additional occupational training (includes universities)</b>	
apprenticeships =	1.5
technical school (including health) =	2
civil servants apprenticeships =	1.5
higher technical college =	3
university degree =	5

**Table 6: Calculation of education in years/ schooling (source: Desktop Companion to the German Socio-Economic Panel (2005))**

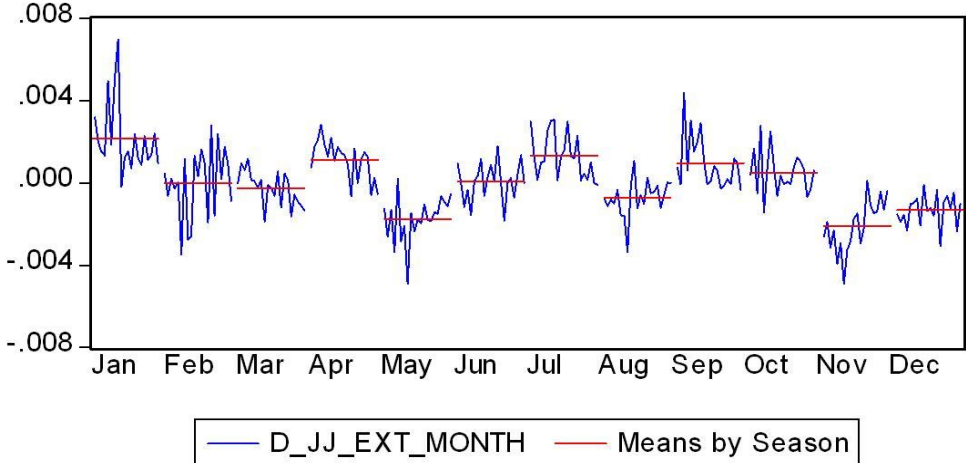
### 3.3. Heaping and aggregation problems

Because of the availability of some of the exogenous information on annual frequency the data is aggregated on annual basis. Heaping probably does affect the means by year. Heaping is commonly present in retrospective survey data. Durations are often of poor quality because individuals round the length of periods by episode-based questionnaires as Haandrikman et al. (2004) points out. Kraus and Steiner (1998) used the GSOEP data and analysed the effects of heaping in survival analysis. Both conclude that the heaping bias is not so acute for data of interest aggregated by annual means.

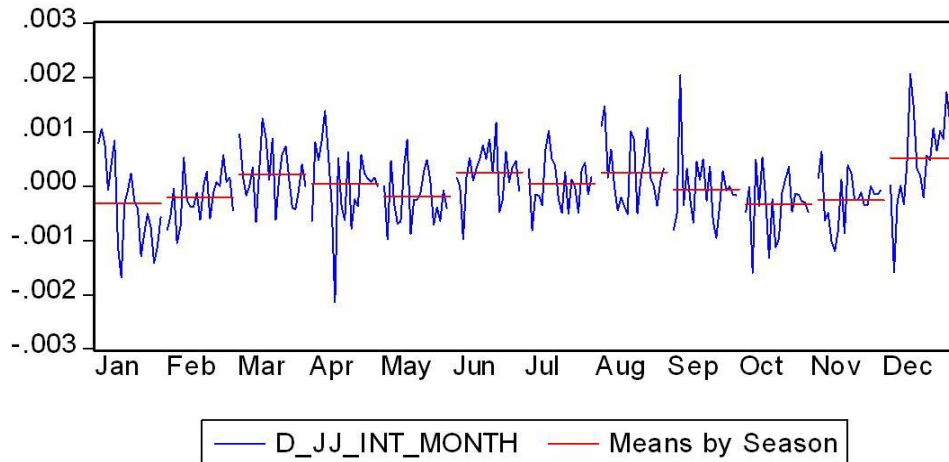
For the 1<sup>st</sup> differenced JJ data the following graphs show that heaping is less of a problem for external transitions. The means of the different months over time are about in the same corridor and only in January these transitions are only slightly stronger than in the remaining months. The stacked graph of internal transitions shows that internal transitions are on average more likely to be observed in December. In this month the highest average can be observed.



**Graph 1: Seasonal stacked graph by months for 1<sup>st</sup> differences of JJ (season = month)**



**Graph 2: Seasonal stacked graph by months for 1<sup>st</sup> differences of external JJ (season = month)**



**Graph 3: Seasonal stacked graph by months for 1<sup>st</sup> differences of internal JJ (season = month)**

We conclude that the means of the monthly data by year can be used to aggregate this data on annual frequency because the possible heaping effects occur every year and will not bias the variables towards one specific side. Thus the monthly data can be used to aggregate the data on an annual basis. The following graph shows the annual mean  $\bar{x}_{kmy}$  for the years from 1984 to 2004 of the monthly (month= 1, ..., 12) data described above. The mean per year is weighted by observations per month.

$$D_{k,y} = \frac{1}{\sum_{m=1}^{12} N_{m,y}} \sum_{m=1}^{12} I_{m,y} * D \bar{x}_{kmy}$$

$$\text{when } x_k = \begin{cases} x_{JJ} \\ x_{JJ\_int} \\ x_{JJ\_ext} \end{cases} \text{ and } m = \begin{cases} \text{January} \\ \text{February} \\ \text{March} \\ \text{April} \\ \text{June} \\ \text{July} \\ \text{August} \\ \text{September} \\ \text{October} \\ \text{November} \\ \text{December} \end{cases}$$

$I_{\tilde{y}}$  is an indicator variable for year  $\tilde{y}$  {1984; ...; 2004}:

$$I_y = \begin{cases} 1 & \text{if } \bar{x}_{kt} \neq 0 \wedge y = \tilde{y} \\ 0 & \text{else} \end{cases}$$

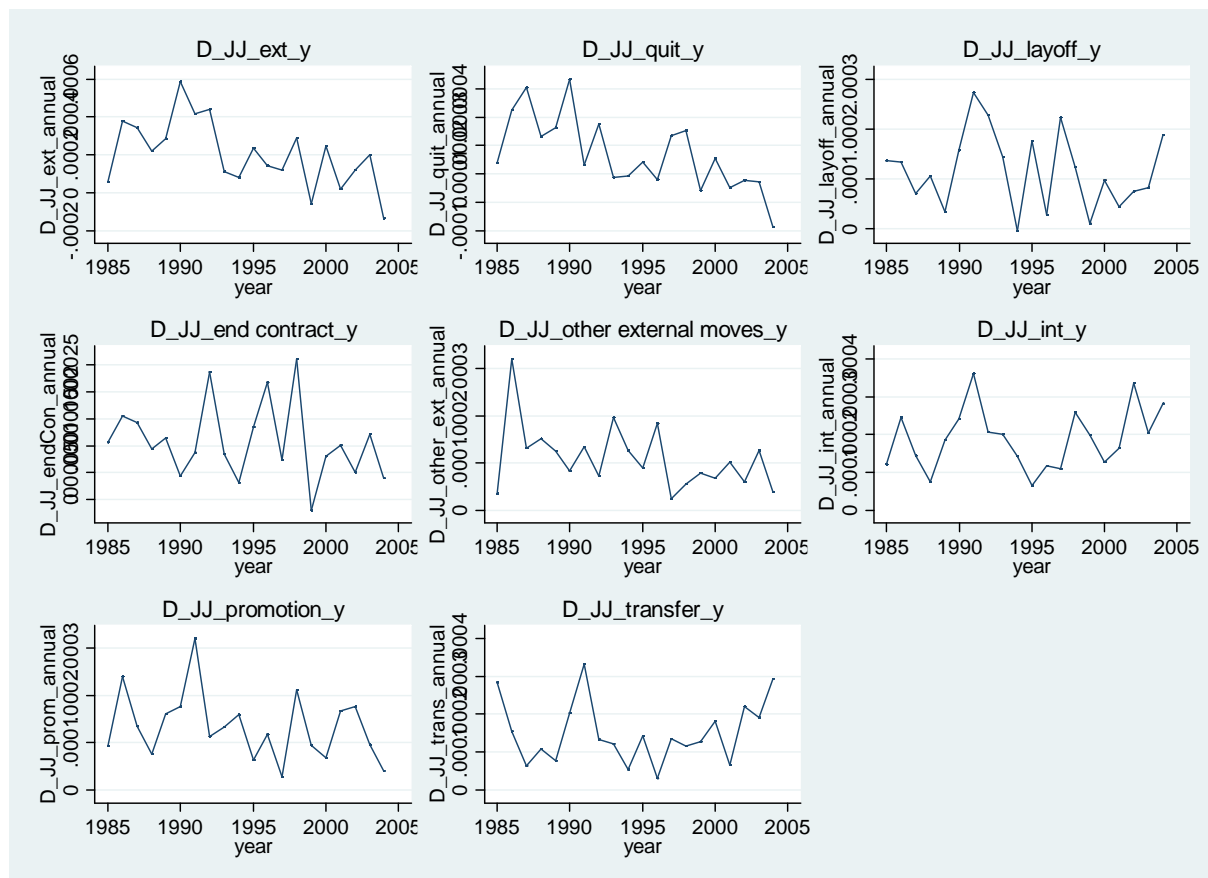
This calculation is executed for each year of the sample.

### 3.4. Descriptive statistics of job-to-job moves

Based on the information which move occurred we are able to generate the variables

$D\_JJ_{ext,y}$  as described above. Furthermore we can divide this transition rate into  $D\_JJ_{quit,y}$ ,  $D\_JJ_{layoff,y}$ ,  $D\_JJ_{end\ of\ contract,y}$  and  $D\_JJ_{other\ external\ moves,y}$  based on information about why the job has changed. For the internal transitions we are able to distinguish between  $D\_JJ_{int,y}$ ,  $D\_JJ_{promotions,y}$  and  $D\_JJ_{transfer,y}$ .

All these variables are calculated as above but information about the type of change is introduced.



Graph 4: Annual averages of the monthly 1<sup>st</sup> difference data

For reasons of averaging the time series we only use years that are available from January to December. Until 1984 this restriction is not fulfilled. The complete sample is now defined from 1985 to 2004 and the descriptive statistics can be seen in Table 7.

Variable	Mean	Std. Dev.	Min	Max
regional UR	8.395577	3.604196	3.7	21.7
east regional UR	10.99491	4.560397	5.4	21.7
regional GDP	2.481756	3.132181	-4.1	18
east regional GDP	1.225291	3.106263	-2.2	18
D_JJ_y	0.0010104	0.0006597	-0.0006961	0.0025671
D_JJ_ext_y	0.0002297	0.0001667	-0.0001347	0.000586
D_JJ_quit_y	0.0001795	0.0001199	-0.0000869	0.0004343
D_JJ_layoff_y	0.0001316	0.0000825	-4.62E-06	0.0002727
D_JJ_endCon_y	0.0001111	0.0000716	-0.0000197	0.0002612
D_JJ_other ext_y	0.000122	0.0000746	0.0000248	0.0003212
D_JJ_int_y	0.0001937	0.0000822	0.000065	0.000361
D_JJ_prom_y	0.0001467	0.0000734	0.0000274	0.00032
D_JJ_trans_y	0.0001563	0.0000846	0.0000312	0.0003329
age	35.81987	11.77269	15	79
schooling	11.57663	2.467823	7	18

**Table 7: Descriptive statistics of data used for estimation**

All transition growth rates are positive on average which can be interpreted as increasing mobility in this period. The regional UR is 8.4% on average. The maximum UR is achieved in Mecklenburg-Vorpommern. The interaction variables are calculated by multiplying a dummy variable “East” with the regional variable. The dummy variable “East” takes 0 for Western German regions while it is 1 for Eastern Germany’s regions. Respondents of the sample are on average 35.8 years old and their schooling lasts 11.6 years on average. The maximum of schooling can be achieved by attaining a high school degree in combination with a university degree.

## 4. Results

The focus of this chapter lies on the estimation results and the interpretation of the estimated coefficients.

The JJ transitions are split in external and internal transitions. Internal movements are divided into promotions and transfers. Furthermore, we will classify the external movements forced by quits, layoffs, end of contracts, and other external transitions. The exogenous variables trend, regional UR, the interaction of East and regional UR, regional growth of GDP and the corresponding interaction with East German regions, age, age<sup>2</sup>, schooling, schooling<sup>2</sup>, and tenure are divided by 1,000,000 for standardisation issues.

Moreover we will analyse two samples. The first sample is from 1985 to 2004 and presents unbalanced data. For Western regions, the whole time horizon is available while Eastern regions are only enclosed starting from 1991/1992 for regional UR/regional growth of GDP. The second sample contains the years 1992-2004 and represents Germany after its reunification. Hence this sample is a balanced panel for East and West Germany. The fragmentation into two different time horizons over different regions is necessary because of robustness checks of the estimated coefficients.

A weighted least squares estimation (WLS) is applied. The weights result from the observation per period. Moreover, we estimate heteroscedasticity robust standard errors.

The impact of the exogenous cyclical indices and personal variables schooling and age on the JJ transitions are of special interest. We expect a non-linear relation for both, age as well as schooling, as argued in chapter 2.3. Thus we include the squared terms of school and age into our specification.

Our specifications consider numerous interaction variables. The saturated model contains all interactions. All JJ transition determinants are interacted with gender (male) and region (East Germany). In general, it turned out that interactions by gender do not have significant influence on the endogenous variables. This fact sums up that males and females do not seem to differ in their behaviour and characteristics describing job-to-job transitions.

Moreover, we specified the saturated models containing all interactions without trend, with linear trend, and with quadratic trend. Most of the specifications exhibit very sensitive results to the business cycle indicators in conjunction with the squared trend. This implies that even changes in signs of the estimated coefficients occur. As we have no arguments for a quadratic trend in the variables we present only the specifications for a linear trend and without a trend. The interaction terms of Eastern Germany's regions with the regional cyclical indicators GDP and UR highlight a strong correlation which induced us to keep these variables within the model.

The estimation results are shown below. As endogenous variables  $D\_JJ_{ext,y}$ ,  $D\_JJ_{quit,y}$ ,  $D\_JJ_{layoff,y}$ ,  $D\_JJ_{end\ of\ contract,y}$  and  $D\_JJ_{other\ external\ moves,y}$  as well as  $D\_JJ_{int,y}$ ,  $D\_JJ_{promotions,y}$ ,  $D\_JJ_{transfer,y}$  are analysed.

Exogenous variables can be divided into two groups. The regressors describing the cyclical components are the regional percentage growth of GDP, the regional UR, and their corresponding interactions with East German regions. Included individual influences are schooling, schooling<sup>2</sup>, age, and age<sup>2</sup>. Moreover, for internal transitions we turn the attention to the tenure as exogenous information. The reason for including tenure only in our models for internal movements is that workers who acquired higher tenure are expected to remain in the firm. For external movements tenure is not a driving force for a change of the firm because of the relation of movements away from a firm and tenure. We only include linear tenure because of the robustness. Models including quadratic tenure are not robust.

The rows of the following Tables report the estimated coefficients and below the coefficients the corresponding P-values are reported to stress the significance of the estimated coefficients. The first column presents the coefficients for the whole group of external or internal movers and the following columns show the output of the different subgroups.



Sample 1985 - 2004					
Variables	All	Quit	Layoff	End Contract	Other external
Constant	0.000389 0.0000	0.000327 0.0000	0.000218 0.0000	0.000150 0.0160	0.000252 0.0000
regional UR	-13.655340 0.0000	-1.779603 0.029	-3.323814 0.001	0.371593 0.789	-4.215693 0.0000
east regional UR	7.976235 0.0000	1.480590 0.014	1.238944 0.059	0.324460 0.738	-0.613331 0.2680
regional GDP	36.744650 0.0000	25.814240 0.0000	6.460718 0.0000	-3.865324 0.0000	-1.869785 0.0060
east regional GDP	-30.895530 0.0000	-22.682970 0.0000	-1.378376 0.2320	6.467942 0.0000	3.153584 0.0000
schooling	-12.738720 0.0050	-15.605960 0.0030	-15.483160 0.0080	-8.846322 0.3010	-8.897050 0.0810
schooling2	0.418381 0.0150	0.516722 0.0070	0.615716 0.0070	0.336153 0.2890	0.276159 0.1420
age	-3.087128 0.0010	-3.750441 0.0010	0.215545 0.8420	0.988855 0.5880	-1.214413 0.2030
age2	0.032056 0.0120	0.032569 0.0370	-0.005032 0.7250	-0.012920 0.6180	0.009275 0.4570
R <sup>2</sup>	0.2413	0.226	0.0822	0.0315	0.0489
Root MSE	0.00014	1.00E-04	7.30E-05	7.20E-05	7.30E-05

**Table 8: WLS estimates of external JJ transitions without trend (below: P-values)**

As Table 8 (column 1) shows, all external JJ transitions ( $D_{JJ_{ext,y}}$ ) emphasise a strong correlation with the cyclical variables. Rising regional UR will reduce the external movements of workers on average. This implies that external JJ transitions suffer from increasing growth rates of unemployment in the sense that job-to-job movements are less likely in times of rising unemployment. The coefficient of the interaction term of the cyclical variables with a dummy variable for East Germany shows that the cyclicity of JJ moves is less pronounced in the Eastern part than in the Western part of Germany. Eastern mobility growth is less affected by the business cycle. This picture holds at least for the two subgroups  $D_{JJ_{quit,y}}$  (Table 8; column 2) and  $D_{JJ_{layoff,y}}$  (Table 8; column 3) which contribute 68% to all external transitions.

Theoretical considerations suggested shifts towards layoffs in recessions and towards quits in booms. This indicates that external mobility induced by quits increases in times of rising growth of GDP. According to our estimates, increasing growth of GDP affects the growth of JJ transitions more than layoffs. This supports the fact that that voluntary mobility grows cyclical upswings.

If UR -used as indicator for cyclical downturns- increases, the coefficient of job-to-job transitions induced by layoffs will exceed the absolute value of the coefficient of quits. Both coefficients are negative and significant. The above results do not support the hypothesis of a

shift towards mobility forced by layoffs in recessions. Increasing unemployment lowers the growth of JJ moves forced by layoffs to a greater extent than the mobility induced by quits.

The job-to-job mobility induced by quits increases in booms or times of increasing growth of the GDP. The shift towards quits in booms can be supported by inspecting the results. But a shift towards mobility forced by layoffs in recessions has to be rejected. In recessions people are loyal to the firm, or become unemployed because of the low number of vacancies. Mobility growth decreases when unemployment increases.

An exception are the job-to-job changers who are forced by the end of their contracts ( $D_{JJ_{\text{end of contract},y}}$ ). These workers are not statistically influenced by increasing unemployment rates. They are driven by the growth of the GDP and other reasons not considered in the estimates. A possible interpretation would be that the signal they are sending is negative in Western regions. Their contracts are not extended due to their low productivity. In East Germany mobility of employers is ascending when the GDP is growing. In Eastern regions workers who achieved experience are more mobile. Inspecting column 5 ( $D_{JJ_{\text{other external moves},y}}$ ) and looking at the regional growth of GDP supports the picture that East Germany workers are more mobile in times of increasing GDP in comparison to their Western counterparts. For other external JJ transitions the estimated coefficient of regional UR is significantly negative and the interaction is insignificant. This implies that both Western and Eastern Germany's workers are almost identically affected by increasing regional UR in the sense that increasing unemployment decreases the probability for a job-to-job move forced by the bankruptcy of the firm.

In times of growing regional GDP external movers seem to be more mobile assisted by the regional growth of GDP. At least the workers who are laid off or quit their jobs will profit from booming regional GDP in finding new jobs without interruption of any unemployment spell. Workers whose contracts end or who do other external moves suffer from regional growth and perform less external JJ movements. But in the East Germany regions the signal these workers send towards firms is positive which results from the adding the interaction term. This effect originates in a negative signal for Western employees because firms suspect their contracts were not extended for reasons of low productivity or other. But their Eastern counterparts seem to send a signal that workers accumulated working experience and are likely to be hired by other firms. In times of increasing GDP, Eastern workers are likely to do a JJ transition without any spell of unemployment after the end of the contract or forced by

bankruptcy while Western employees have a lower probability of finding a new job within a month. This effect may be based on the incidence that the ending of contracts frequently occurs in times of recessions and bankruptcies in the Eastern states appear more often in cyclical upturns. By taking state assistance into account, it is possible that Eastern firms are financially supported but when the cyclical turning point is reached state assistance ends and the firms are left to handle their business on their own.

East Germany workers who quit their jobs have a significantly lower probability of performing a job-to-job move even in times of increasing GDP in comparison to their Western counterparts. This is possibly due to the high Eastern regional UR which averages 11%.

As can be seen in Table 8, column 1 the minimum for all external movers is reached at about 15 years of schooling. This implies that a degree from a technical school, degrees achieved at higher technical colleges, or university will be of advance for external JJ movements. The minimum of the age is reached at 48 years. On average external transitions seem to be performed more frequently by people being 48 and older. As Clark et al. (1996) argues middle-aged workers assess their aspiration better and perform more external moves. Under the assumption that older people have acquired more working experience, working experience helps for external moves on average.

Sample 1985 - 2004					
Variables	All	Quit	Layoff	End Contract	Other external
Constant	0.000399	0.000293	0.000221	0.000202	0.000274
	0.0000	0.0000	0.0000	0.0010	0.0000
trend	-11.014480	-12.894160	-4.597774	-4.728305	-6.416799
	0.0000	0.0000	0.0000	0.0000	0.0000
regional UR	-13.620110	-0.009508	-2.766048	-0.147435	-5.361226
	0.0000	0.9900	0.0030	0.9160	0.0000
east regional UR	10.113030	2.610784	1.623147	1.360601	1.732505
	0.0000	0.0000	0.0120	0.1770	0.0010
regional GDP	25.614210	13.862700	2.965569	-10.474580	-9.649465
	0.0000	0.0000	0.0000	0.0000	0.0000
east regional GDP	-25.311820	-16.762440	-0.341619	10.158570	8.281103
	0.0000	0.0000	0.7440	0.0000	0.0000
schooling	1.286879	5.448405	-9.382040	-3.684798	-3.259760
	0.7630	0.2030	0.0980	0.6450	0.4900
schooling2	-0.051368	-0.196719	0.403705	0.159177	0.117029
	0.7490	0.2150	0.0680	0.5920	0.5000
age	-0.643736	-0.804212	1.240507	0.430863	-0.006461
	0.4680	0.4080	0.2340	0.8020	0.9940
age2	0.009563	0.011008	-0.014707	-0.004246	-0.001603
	0.4300	0.4180	0.2800	0.8610	0.8880
R <sup>2</sup>	0.3497	0.4833	0.1507	0.1291	0.2206
Root MSE	0.00013	8.40E-05	7.10E-05	6.80E-05	6.60E-05

**Table 9: WLS estimates of external JJ transitions with linear trend (below: P-values)**

If a linear trend is added –which is positive and highly significant– the results are nearly the same as calculated above (see Table 9). This is at least true for the cyclical indicators.

But looking at quits (Table 9; column 2), the regional UR statistically has no significant impact while JJ transitions induced by layoffs decrease significantly in times of recessions or times of increasing unemployment. This delivers evidence that a rise of the unemployment rate does not affect mobility induced by quits. The probability for an external transition forced by layoffs (Table 9; column 3) decreases significantly which emphasises that workers become unemployed or remain within the current firm in times of increasing UR.

Furthermore, if the regional GDP grows, Eastern Germany's workers are not likely to do job-to-job moves after quits. This is a surprising result because in times of increasing growth of GDP we expect increasing quits because of the opportunities to find a better job due to the increasing number of vacancies. Moreover, the estimations deliver evidence that East Germany employees undertake quits in times of high unemployment. A possible reason for this could be that firms compete for high skilled workers in Eastern regions and poach workers from other firms. Another distinctive feature from the model without a linear trend is that other external moves are significantly affected by increasing regional UR.

On average schooling and age do not seem to influence the external movers when a linear trend is included. This result is not in accordance with the expectations of Clark, Oswald and

Warr (1996), who argue that on average higher educational or schooling levels will lead to more career opportunities. Thus high qualified workers change jobs more often. This effect is possibly due to the trend and the cyclical variables which overestimate individual effects by aggregating the data. But looking at layoffs, the influence of schooling is significant at least on the 10% level. The minimum is reached at about 11.5 years of schooling. Degrees from intermediary schools in combination with apprenticeships and higher school graduates will on average do external JJ transitions referring to a layoff incidence.

For the sample from 1992-2004 which includes data for the re-unionised Germany we find very similar results as for the whole sample presented above. The corresponding Tables of these estimations are shown in the Appendix (Tables 18 and 19). These Tables show almost the same results so that the cyclical influence seems to be robust. External direct job-to-job transitions are on average more probable to stem from increasing GDP and are less probable in times of increasing UR.

The results for external transitions support the hypothesis that the business cycle affects this kind of labour mobility. But is the business cycle affecting internal movements in a similar way or does it not affect internal JJ transitions, promotions, and transfers? The specifications are identical to the specifications for the external transitions.

For internal JJ transition estimations a considerably lower number of observations are available and tenure is additionally used to describe this type of transitions.

Sample 1985 - 2004			
Variables	All	Promotion	Transfer
Constant	0.0002 0.0000	0.0002 0.0000	0.0001 0.0660
regional UR	-8.0348 0.0000	-5.2296 0.0000	0.8501 0.5900
east regional UR	4.7849 0.0000	2.3048 0.0020	0.3303 0.7820
regional GDP	4.3544 0.0000	10.6633 0.0000	12.4763 0.0000
east regional GDP	-6.9637 0.0000	-11.0316 0.0000	-15.0320 0.0000
schooling	-4.8645 0.4290	-3.6408 0.5570	-8.9730 0.3840
schooling2	0.2239 0.3180	0.1400 0.5340	0.3833 0.3060
age	1.3850 0.3110	-1.0113 0.5100	1.2974 0.5960
age2	-0.0202 0.2700	0.0111 0.5990	-0.0151 0.6310
tenure	0.5192 0.0620	0.6473 0.0370	0.2147 0.6230
R <sup>2</sup>	0.0643	0.1284	0.1064
Root MSE	0.0001	0.0001	7.40E-05

**Table 10: WLS estimates of internal JJ transitions without trend (below: P-values)**

In Tables 10 and 11 we can see that schooling and age effects are insignificant for all specifications. This result can be due to the possibility that other forces determine internal mobility more adequately. The tenure shows that the latter variable has a significant influence for promotions but not for transfers. Increasing tenure rise the probability of being promoted. For promotions the minimum age is about 42.5 years which indicates that on average older workers are promoted. This result holds in the case of a linear trend, too. As the estimations suggest increasing tenure will rise the likelihood of being promoted. Furthermore the variance inflation factor (VIF) highlights strong multicollinearity for age and schooling and their corresponding squared terms but we include these variables because of the importance for describing the mobility for German workers although we know about the problems we are concerned with.

From Table 10 it can be seen that in times of increasing unemployment all types of internal mobility decreases (not significant for the growth of transfers). Growing GDP supports the internal mobility for the Western regions. The cyclical influence is less pronounced in Eastern regions in comparison to their Western counterparts.

In chapter 2.3. it was argued that a rise of transfers in cyclical downturns is expected because workers claim the additional burden of laid off workers and thus keep the output of the firm stable. This hypothesis has to be rejected because the regression for the internal transfers does not show any statistically significant effects for the regional UR.

In times of increasing regional GDP, internal movements become more likely. This is true for all of the internal movers as well as for transfers and promotion in Western regions. The firms profit from growth of the GDP and internal employees who achieved firm-specific human capital are prominent to occupy the workplaces which are newly found or created by restructuring procedures of the firm induced by a higher GDP. The East German workers do not change internally on-the-job in times of increasing GDP. For transfers the probability of an internal transition decreases with increasing GDP. Possibly, firms in this region do not transfer their workers. Maybe newly created jobs in times of booms are not occupied by employees currently working in the firm but -as external transitions indicate- by workers whose contracts ended or were forced by other reasons to leave the former employer. These workers are probably favoured because of the skills they achieved in another firm.

Sample 1985 - 2004			
Variables	All	Promotions	Transfer
Constant	0.0002	0.0002	0.0001
	0.0000	0.0000	0.0810
trend	3.3551	-1.1294	1.5607
	0.0000	0.0030	0.0180
regional UR	-7.4578	-5.4070	1.1899
	0.0000	0.0000	0.4500
east regional UR	3.7293	2.6707	-0.1336
	0.0000	0.0010	0.9080
regional GDP	8.4111	9.3279	14.3926
	0.0000	0.0000	0.0000
east regional GDP	-9.2478	-10.2540	-16.0992
	0.0000	0.0000	0.0000
schooling	-10.2078	-1.1695	-9.8238
	0.0940	0.8510	0.3410
schooling2	0.3827	0.0589	0.3879
	0.0840	0.7940	0.2990
age	0.0209	-0.4479	0.9384
	0.9880	0.7720	0.7040
age2	-0.0045	0.0044	-0.0112
	0.8070	0.8370	0.7250
tenure	0.6087	0.6013	0.2290
	0.0240	0.0520	0.5970
R <sup>2</sup>	0.1064	0.1346	0.1151
Root MSE	7.50E-05	6.50E-05	7.40E-05

**Table 11: WLS estimates errors of internal JJ transitions with linear trend (below coefficients: P-values)**

The inclusion of a linear trend (Table 11) shows that the coefficients of the cyclical variables for all internal transitions as well as for promotions are statistically significant and the direction of the regional effects is the same as in Table 10. Increasing GDP does not increase the probability of promotions for the Eastern regions. This gives further evidence that the probability for promotions and transfers in East Germany's regions differs considerably from the probability for internal JJ transitions in Western regions. Again, increasing tenure rises the probability of a promotion significantly. The results for the sample from 1992-2004 are presented in the appendix in Tables 20 and 21. The signs of the coefficients of the cyclical indicators do not change. This indicates robustness of the regional cyclical influences.

To sum up the internal and external estimation results the effect of regional GDP is significant in each model. This shows the importance of the growth of regional GDP for the labour mobility. The second cyclical indicator regional UR is not significant in all estimations but a negative coefficient is estimated for all transition variables but for  $D\_JJ_{\text{end of contract},y}$  in Table 8, column 4. This gives evidence that increasing unemployment has a negative effect on JJ transitions. The positive coefficient for external transitions induced by the end of contracts in Table 8, column 4 is possibly due to the preparation for a new job of workers who know about the deadline and try to avoid a spell of unemployment. Schooling does not seem to affect the internal movements but is a powerful force behind external JJs. This is at least true for the specifications without a linear trend. Age does not seem to be the main force on internal as well as on external JJ movements with respect to the significance of the coefficients.



## 5. Summary

The innovation is to describe job-to-job and employment to unemployment transitions of workers on aggregated data against the background of the driving force why the move occurred. The available empirical labour market literature is in deficit with analyzing the motive why these transitions occur with respect to the business cycle.

The change of aggregated internal and external job-to-job transitions is significantly affected by the growth rate of the GDP using GSOEP. The estimations for the smaller, but balanced sample of 1992-2004 confirm these effects and highlight the robustness of the coefficients. Furthermore in most of the specifications interaction terms with East Germany are significant. This indicates that both regions differ in their mobility properties. The regional unemployment rate is insignificant in some specifications. It is possible that the aggregated unemployment rate will be outperformed by aggregated regional work force statistics which possibly describe the current labour force in a better way.

Voluntary external transitions such as quits outperform layoffs quantitatively in booms which will lead to the effect that mobility is more frequently induced by quits in cyclical upswings. In times of recessions and increasing unemployment mobility forced by layoffs decreases. As expected, job-to-job mobility induced by quits increases in booms or times of increasing growth of the GDP. The shift towards quits in booms can be supported by inspecting the results. A shift towards mobility forced by layoffs in recessions has to be rejected.

Using schooling and age as regressors does not affect the estimations significantly. Tenure is a driving force for promotions but not for transfers. This indicates that a premium can be achieved by exhibiting a long tenure on average. Furthermore, the employer gets to know more details about the worker and thus avoids shirking effects.

The hypothesis of shifts in the composition of the internal JJ transitions induced by cyclical movements cannot be supported. Transfers as well as promotions exhibit almost the same development among the business cycle.

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# Appendix

Panel unit root tests Lag selection based on SIC Balanced data				
cross-sections	Variable	Test	level	1st difference
5	GDP east	Levin, Lin, Chu t*	stationary	stationary
		Breitung t - stat	unit root	stationary
		Im, Peseran, Shin W - stat	stationary	stationary
		Fisher - ADF	stationary	stationary
		Fisher - PP	stationary	stationary

**Table 12: Panel unit root tests for annual percentage change GDP for the eastern federal states**

Panel unit root tests Lag selection based on SIC Balanced data				
cross-sections	Variable	Test	level	1st difference
11	GDP west	Levin, Lin, Chu t*	stationary	stationary
		Breitung t - stat	stationary	stationary
		Im, Peseran, Shin W - stat	stationary	stationary
		Fisher - ADF	stationary	stationary
		Fisher - PP	stationary	stationary

**Tabelle 13: Panel unit root tests for annual percentage change GDP for the western federal states**

Panel unit root tests Lag selection based on SIC Balanced data				
cross-sections	Variable	Test	level	1st difference
16	GDP 1992 - 2004	Levin, Lin, Chu t*	stationary	stationary
		Breitung t - stat	unit root	stationary
		Im, Peseran, Shin W - stat	stationary	stationary
		Fisher - ADF	stationary	stationary
		Fisher - PP	stationary	stationary

**Tabelle 14: Panel unit root tests for annual percentage change GDP for all states from 1992-2004**

Panel unit root tests Lag selection based on SIC Balanced data				
cross-sections	Variable	Test	level	1st difference
5	UR east	Levin, Lin, Chu t*	stationary	stationary
		Breitung t - stat	stationary	stationary
		Im, Peseran, Shin W - stat	stationary	stationary
		Fisher - ADF	stationary	stationary
		Fisher - PP	stationary	stationary

**Tabelle 15: Panel unit root tests for UR for the eastern federal states**

Panel unit root tests Lag selection based on SIC Balanced data				
cross-sections	Variable	Test	level	1st difference
10	UR west	Levin, Lin, Chu t*	stationary	stationary
		Breitung t - stat	stationary	stationary
		Im, Peseran, Shin W - stat	stationary	stationary
		Fisher - ADF	stationary	stationary
		Fisher - PP	stationary	stationary

**Tabelle 16: Panel unit root tests for UR for the western federal states**

Panel unit root tests				
Lag selection based on SIC				
Balanced data				
cross-sections	Variable	Test	level	1st difference
15	UR 1991 - 2004	Levin, Lin, Chu t*	stationary	stationary
		Breitung t - stat	stationary	stationary
		Im, Peseran, Shin W - stat	stationary	stationary
		Fisher - ADF	stationary	stationary
		Fisher - PP	stationary	stationary

**Tabelle 17: Panel unit root tests for UR for all states from 1991-2004**

Sample 1992 - 2004					
Variables	All	Quit	Layoff	End of contract	Other reasons
Constant	0.0003	0.0001	0.0002	0.0001	0.0002
	0.0000	0.0000	0.0000	0.0000	0.0000
regional UR	-8.8695	0.6071	0.9231	-0.4575	2.1261
	0.0000	0.0000	0.1640	0.6220	0.0000
east regional UR	5.2031	0.7306	-1.3406	1.2613	-3.3926
	0.0000	0.0000	0.0000	0.1240	0.0000
regional GDP	13.4427	14.2859	-1.1261	-0.9476	-15.1368
	0.1100	0.7030	0.0090	0.3540	0.0340
east regional GDP	-7.0771	-10.2414	6.6330	3.5437	18.7562
	0.1420	0.8750	0.0100	0.3320	0.0660
schooling	-8.6495	-1.8587	-17.6198	-10.6939	-9.0578
	0.1650	0.9750	0.1840	0.3200	0.9090
schooling2	0.2947	0.0284	0.6720	0.4109	0.2865
	0.2420	0.6960	0.2010	0.3610	0.9190
age	-1.4423	-0.0332	1.5970	2.2425	-0.0838
	0.0000	0.0000	0.0000	0.1020	0.0000
age2	0.0162	-0.0057	-0.0200	-0.0285	-0.0010
	0.0000	0.0000	0.0000	0.0000	0.0000
R <sup>2</sup>	0.0638	0.0912	0.0666	0.0289	0.2249
Root MSE	0.0001	0.0001	0.0001	0.0001	0.0000

**Table 18: WLS estimates of external JJ transitions without trend (below: P-values)**

Sample 1992 - 2004					
Variables	All	Quit	Layoff	End of contract	Other reasons
Constant	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000
trend	-10.0389	0.6793	0.2762	-0.2095	1.0005
	0.0000	0.3650	0.7800	0.9010	0.1840
regional UR	7.9656	2.3950	0.0238	2.1017	-2.1711
	0.0000	0.0000	0.9720	0.0760	0.0000
east regional UR	16.0324	16.4226	0.9937	-1.8795	-14.6130
	0.0000	0.0000	0.1450	0.3990	0.0000
regional GDP	-18.7095	-19.2058	-0.3519	-2.3181	15.8104
	0.0000	0.0000	0.7680	0.3590	0.0000
east regional GDP	5.7631	11.4786	-6.3798	4.2303	-8.7426
	0.2320	0.0040	0.3000	0.6700	0.0330
schooling	-0.1708	-0.4053	0.2628	-0.0872	0.2938
	0.3410	0.0070	0.2700	0.8110	0.0500
schooling2	-0.9566	0.2178	2.2711	-0.9936	0.9600
	0.3210	0.8100	0.0380	0.6170	0.1750
age	0.0180	0.0009	-0.0260	0.0154	-0.0112
	0.1650	0.9420	0.0640	0.5670	0.2100
age2	0.0004	0.0002	0.0002	0.0003	0.0002
	0.0000	0.0000	0.0000	0.0000	0.0000
R <sup>2</sup>	0.2182	0.3665	0.1898	0.2047	0.2983
Root MSE	0.0001	0.0001	0.0001	0.0001	0.0000

**Table 19: WLS estimates of external JJ transitions with linear trend (below: P-values)**

Sample 1992 - 2004			
Variables	All	Promotions	Transfer
Constant	0.0004	0.0003	0.0002
	0.0000	0.0000	0.0170
regional UR	-10.2567	-7.1648	-6.8969
	0.0000	0.0000	0.0000
east regional UR	5.8500	3.9444	4.6032
	0.0000	0.0000	0.0000
regional GDP	11.2461	17.5909	18.2632
	0.0000	0.0000	0.0000
east regional GDP	-14.4325	-18.2910	-21.9965
	0.0000	0.0000	0.0000
schooling	-15.8815	-16.9932	-8.2987
	0.0560	0.0490	0.4570
schooling2	0.5933	0.5885	0.3689
	0.0480	0.0570	0.3600
age	-0.7414	-3.6438	0.8139
	0.6860	0.0760	0.7580
age2	0.0056	0.0428	-0.0099
	0.8180	0.1210	0.7680
tenure	0.6846	0.9058	-0.0640
	0.0360	0.0140	0.8880
R <sup>2</sup>	0.1244	0.2412	0.2147
Root MSE	0.0001	0.0001	0.0001

**Table 20: WLS estimates of internal JJ transitions without trend (below: P-values)**

Sample 1992 - 2004			
Variables	All	Promotions	Transfer
Constant	0.0002	0.0001	0.0001
	0.0010	0.0490	0.1560
trend	7.5753	0.9088	9.5294
	0.0000	0.0300	0.0000
regional UR	-4.7356	-1.2203	-2.5013
	0.0000	0.3100	0.0960
east regional UR	0.8777	-0.4703	0.2875
	0.2830	0.5860	0.7860
regional GDP	-12.2274	-5.8516	-2.5985
	0.0000	0.0000	0.1640
east regional GDP	13.9916	6.6431	4.9101
	0.0000	0.0000	0.0180
schooling	-10.4196	-2.3569	-12.1091
	0.1130	0.7130	0.1270
schooling2	0.4104	0.1206	0.4844
	0.0860	0.6030	0.0960
age	0.4062	2.0654	-0.9547
	0.7940	0.1610	0.6160
age2	-0.0068	-0.0287	0.0149
	0.7400	0.1480	0.5450
tenure	0.3499	0.2823	-0.2460
	0.2040	0.3270	0.5060
R <sup>2</sup>	0.2274	0.044	0.3152
Root MSE	6.20E-05	4.90E-05	5.20E-05

**Tabelle 21: WLS estimates of internal JJ transitions with linear trend (below: P-values)**