

Discussion Paper No. 08-133

**Employment Adjustments on the
Internal and External Labour Market –
An Empirical Study with
Personnel Records of a German Company**

Knut Gerlach and Olaf Hübler

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Das Wichtigste in Kürze

Unternehmen sind Nachfrageänderungen ausgesetzt. Daraus resultieren Beschäftigungsanpassungen. Diese können innerhalb des Unternehmens erfolgen. Zwei prominente Möglichkeiten stellen die Ausweitung oder Reduktion der Arbeitszeit, insbesondere der Überstunden und eine Modifikation im Beförderungsverhalten dar. Neben diesen Anpassungen auf dem internen Arbeitsmarkt lassen sich vor allem Veränderungen bei der Beschäftigtenzahl vornehmen. Hiervon ist der externe Arbeitsmarkt betroffen. Zwei bisher empirisch kaum untersuchte Fragen sind, ob es einerseits einen Zusammenhang zwischen den Instrumenten der internen Anpassung gibt und welche Verbindungen andererseits zu den externen Anpassungen bestehen, ob die Prozesse komplementär oder substitutiv verlaufen. Zudem ist von Bedeutung herauszufinden, ob sich im Zeitablauf eine klare Tendenz herauskristallisieren lässt und wie die Anpassungen im Zyklus verlaufen. Anliegen des Beitrages ist, diesen Fragen empirisch nachzugehen.

Für die Studie steht ein umfangreicher Datensatz eines großen deutschen Unternehmens des Verarbeitenden Gewerbes, das innovative Produkte auf dem heimischen und ausländischen Markt anbietet, für den Zeitraum 1999 bis 2005 zur Verfügung. Auch wenn wegen des Einzelfallcharakters Verallgemeinerungen der Ergebnisse nur sehr beschränkt möglich sind, weisen die verfügbaren Informationen, die direkt aus den Unternehmensunterlagen entstammen, verschiedene Vorteile gegenüber anderen Datensätzen auf. Erstens ist der Verlässlichkeitsgrad der Daten sehr hoch. Zweitens bestehen keine Probleme hinsichtlich unbeobachteter Heterogenität, soweit es Unternehmens-, Wirtschaftsbereich- und Regionalmerkmale betrifft. Drittens liegen detaillierte Angaben über die Art der Beschäftigungsanpassung sowie über monetäre Anreizinstrumente vor. Und viertens sind die Angaben monatlich.

Die empirische Analyse liefert zunächst deskriptive Ergebnisse. Daraus wird deutlich, dass der Beschäftigungszyklus des Unternehmens zwar weitgehend, aber nicht vollständig mit den volkswirtschaftlichen Bewegungen übereinstimmt, dass interne und externe Anpassungen eher komplementär als substitutiv verlaufen, dass sich kaum analoge Lohnanpassungen ausmachen lassen, dass von 2002 auf 2003 ein deutlicher Einschnitt bei der Beschäftigtenzahl eingetreten ist. Die ökonometrische Untersuchung stützt sich auf einen zweistufigen Ansatz, bei dem zunächst mit Hilfe eines bivariaten Probitmodells der Zusammenhang zwischen Überstunden und Beförderung herausgearbeitet wird. Hierbei zeigt sich – nicht unbedingt erwartet –, dass unbeobachtete Determinanten diese beiden Anpassungsinstrumente in entgegengesetzter Richtung beeinflussen, dass eine abnehmende Tendenz interner Beschäftigungsänderungen besteht und sich keine ausgeprägten zyklischen Effekte ausmachen lassen. Die anschließende Bestimmung des Einflusses von Überstunden- und Beförderungänderungen auf die Beschäftigtenzahl erfolgt einerseits unabhängig von der Art der Anpassung. Andererseits wird zwischen Kündigungen, Entlassungen, Auflösungsverträgen und Wechsel in eine Transfergesellschaft unterschieden. Im ersteren Fall zeigt sich, dass Beförderungen die Mobilitätsneigung reduzieren, während Überstunden das Gegenteil bewirken. Dieses Grundmuster bleibt im Wesentlichen bestehen, wenn nach der Art der Beschäftigungstrennung differenziert wird. Nur bei den Kündigungen ergeben sich die umgekehrten Effekte und bei den Auflösungsverträgen lassen sich keine Wirkungen von Beförderungen aufdecken.

Non-Technical Summary

Firms are affected by the product demand. This leads to employment adjustments. On the internal labour market there exist two prominent possibilities, changes of working hours, especially overtime, and modifications of promotion measures. On the external labour market the number of employees can be adjusted. In the literature we find only very few contributions investigating the issue whether internal adjustments are linked and which relationships exist with external adjustments. Are they of a complementary or substitutive nature? Furthermore it is of interest to find out, whether we can observe an obvious trend and whether the adjustments are driven by cyclical movements.

For this study we have an extensive data set of a large German manufacturing company, which supplies innovative products for the domestic and international market, provided on a monthly base from January 1999 to December 2005. Although this type of data allows only restricted generalisations of the results, the available information has several advantages compared with other data sets: (1) The data are very reliable because they are directly extracted from the human resources management of the company; (2) there do not exist problems with unobserved heterogeneity due to firms, branch or regional characteristics; (3) they allow to distinguish between several types of external employment adjustment and we can use information on monetary incentive instruments; (4) monthly, not only yearly data are provided.

The empirical analysis starts with descriptive statistics. We find that the employment adjustment cycle coincides only to a certain degree with the macroeconomic cycle. Internal and external adjustments are more characterized by complementarity than by substitution. Over the observed period we cannot detect analogous wage adjustments. It is noticeable that in 2003 compared with the years before the number of employees is substantially reduced. The econometric investigation is based on a two-stage approach. We start with a bivariate probit estimation in order to extract the relationship between the probability of overtime and of promotion. Unobserved variables have opposite effects on the former and the latter adjustment instrument. Furthermore, we detect a negative trend of internal employment adjustments. Cyclical effects are ambiguous. The next step, the determination of external adjustments with respect to overtime and promotion adjustments, is split into two estimates. On the one hand we do not distinguish between the type of external employment adjustment and on the other hand we use this information separating between quits, layoffs, workers with a cancellation agreement and with a transition into a transfer organisation. The first approach demonstrates that a promotion reduces the probability to leave the firm while overtime is positively associated with an external job change. This pattern holds generally speaking in the second, more detailed estimates. Quits are the exception. In this case we observe opposite effects. Finally, we cannot detect any influences of promotions on cancellation agreements.

Employment Adjustments on the Internal and External Labour Market - an Empirical Study with Personnel Records of a German Company⁺

Knut Gerlach^{*} and Olaf Hübler^{}**

Abstract:

Firms are affected by the product demand. This leads to employment adjustments. In the literature we find only very few contributions investigating the issue whether internal adjustments are linked and which relationships exist with external adjustments. Are they of a complementary or substitutive nature? Furthermore, it is of interest to find out, whether we can observe an obvious trend and whether the adjustments are driven by cyclical movements.

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Keywords: Personnel records, overtime, promotion, job mobility, cancellation agreement, transfer organisation

JEL classification: J63, M51

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1. Introduction

This study contributes to the growing literature on internal labour markets that is based on personnel records (Baker/Holmstrom 1995, Grund 2002, Lin 2005, Pfeifer 2008). This literature, which is summarized by Lin (2005), shows that the internal and external labour markets communicate at all hierarchical levels, hence there is not much evidence of ports of exit and entry. Further it demonstrates that stable hierarchies with career ladder exist and promotions are significant for wage growth. In addition, wage variations are large within job levels and the internal labour markets are to a certain extent shielded from external market forces in the sense that market forces exert an impact on wages at the time of entry (cohort effects), but this effect is much weaker inside the company.

The relationship between internal labour market flexibility and the types as well as the degree of external adjustments, however, has received less attention in the literature. It is this imbalance that we want to redress. In a first step, we examine the individual or company induced determinants of internal flexibility such as promotions and overtime work and the extent to which they are positively or negatively interrelated. Secondly, we address the issue whether and to which extent internal flexibility exerts an impact on external adjustments. Are internal and external mobility substitutes or complements? Thirdly, we distinguish between various types of external mobility, namely quits, dismissals, cancellation agreements and transitions to a transfer organisation and examine whether differences in the relationship between internal adjustments and the types of external mobility can be detected. Finally, we investigate the impact of cyclical effects on internal and external mobility during the period covered by our data (1999 – 2005).

The paper is organised as follows. Section 2 discusses briefly the theoretical background and the related literature. In Section 3 the company and the data are described and the advantages and shortcomings of using data from personnel records are discussed. Section 4 presents descriptive statistics and Section 5 contains the methods and results of the econometric investigation. Section 6 summarizes the basic results.

2. Background and related literature

The traditional market coordination which implies that quantities adapt to price changes and vice versa is only in part applicable to basic dimensions of external labour markets such as employment and wages. Nominal wages tend to be rigid downwards which leads to real wage rigidity at low inflation rates (Franz/Pfeiffer 2003, Knoppik/Beissinger 2003, Cornelißen/Hübler 2008). Wage rigidities can increase workers' utility by insuring them against income losses and might keep companies profitable if alternative measures of adjustment such as layoffs are less costly.

Wage rigidities in conjunction with a substantial level of employment stability and opportunities for occupational careers constitute significant elements of internal labour markets which shield incumbents from negative shocks in external labour markets. For internal labour markets administrative rules and procedures as well as custom are important ingredients (Doeringer/Piore 1971, Schlicht 1998)

and these markets interact with external labour markets through specific ports of entry and exit. The observations of Doeringer and Piore (1971) inspired a broad scope of economic theories to explain the functioning of internal labour markets ranging from specific human capital, principal-agent, learning and matching theories to tournament theories (see Cahuc/Zylberberg 2001, chapter 6 for an excellent summary). All in all, until recently internal labour markets were interpreted as entities which strengthen and intensify the adjustment deficits of external labour markets. This conventional perspective, however, was challenged by Gibbs and Hendricks (2004). The authors show with the personnel records of a large U.S. corporation that a strictly administered salary system is capable to mirror the wage fluctuations emanating from the external labour market and at the same time the corporation can retain the efficiency enhancing ingredients (like reduction of transaction costs, stimulation of motivation, lowering of turnover and facilitating the accumulation of specific human capital) on its internal labour market.

Generally, there is a broad consensus that especially firms with internal labour markets prefer layoffs to wage cuts in periods of a slack demand (Bewley 2005). Layoffs are less detrimental than pay cuts to employees' morale, layoffs affect morale only temporarily, whereas the damage to morale of pay cuts endures. Layoffs tend to enhance productivity which is negatively affected by wage reductions. To some extent management can control which workers are laid off, thus avoiding that employees which the firm wants to retain leave when wages are reduced. In addition, layoffs diminish the substantial fixed costs of employment, whereas pay cuts save only the variable portion of compensation.

Firms with internal labour markets offering employment stability, however, also have to react to negative demand shocks. They can try to honour their employment commitment by internal adjustments. Variations of working times such as reduced overtime, extended part-time work and delayed promotions are measures to stabilize employment and to cut wage costs. In addition, contingent labour can be employed which is easy to dismiss in periods of slack demand. As an alternative firms can adjust to negative demand shocks by dismissing workers.

The amount of research relating internal labour market mobility to external employment adjustments is very limited (Cappelli/Neumark 2004). The fundamental issue is whether the kind of flexibility such as employment stability in conjunction with promotions, overtime, further training, team work and work reorganisation that can be attained through internal labour markets is a substitute or a complement to external labour market flexibility. On the one hand, with a given level of employment stability policies and practices which strengthen the internal market, for example, by variations of overtime work and adapting promotions to cyclical conditions as well as by training employees for new tasks might covary with a smaller amount of external labour adjustments. On the other hand, companies confronted with the need of strong and frequent employment adjustments may implement policies and practices that combine internal and external flexibility. "Simple arguments about diminishing returns suggest that it may be more effective to put one's efforts into multiple mechanisms to achieve a given result than into only one" (Cappelli/Neumark 2004: 153). Interestingly, the authors find that in manufacturing substitution prevails, i.e. team-work and various measures of work restructuring are negatively correlated with involuntary

and voluntary turnover. Non-manufacturing, however, is characterised by a complementarity of internal and external flexibility. This result is basically attributed to the impediment of keeping inventories and to the stronger variations in peak demand requiring adjustments in the pace and quantity of work in the service sector.

Turning now to the institutional conditions in Germany we distinguish between two cases: Layoffs that take into account the dismissal protection law (Kündigungsschutzgesetz) and layoffs in conjunction with cost reduction that are in addition based on a consensus between the incumbents and management. In the second case either a company-level pact for employment is negotiated or a transfer organisation (Transfergesellschaft) is established. In both cases the company's works council is involved, albeit its participation is stronger in the second case as the works council acts as a partner of management in elaborating and implementing the consensus.

In the first case the firm has to adhere to the social selection criteria stipulated by the dismissal protection law. These comprise tenure, age, obligations to pay alimony and the status of severe disablement. However, incumbents whose employment is of vital importance for the firm are exempt from these criteria. Further the law requires redundancy payments, i.e. 50 percent of the monthly income for each year of tenure. Frequently, works councils negotiate more generous severance payments. In addition, workers who consider quitting because they plan to retire or to search a new job can negotiate lucrative cancellation agreements (Auflösungsverträge) of their employment contracts. This type of separation verges on normal quits which, however, are less frequent in periods of slack demand. All in all, these employment protection measures pursue the goals to preserve employment by increasing the cost of layoffs and reducing risks of employment and pay to wage-earners. The measures might attain these goals, although at the cost of a lower rate of job creation and by concentrating the burden of employment and wage risks on selected groups such as long-term unemployed as well as younger and older people (Cahuc/Zylberberg 2006).

As previously mentioned layoffs implemented with the aim of cost reduction can be based on company-level pacts for employment or transfer organisations. They usually require an agreement between management and the works council. Firms tend to use company-level pacts if the aim of cost reduction cannot be achieved by individual dismissals because they are too expensive. The pacts encompass concessions by management and the workforce and they specify deviations from the collective agreement (Tarifvertrag) (Hübler 2005, 2006). A consensus between the respective union and employers' association is normally requested.

A transfer organisation is established as an operational entity in its own right (eigenständige betriebsorganisatorische Einheit). Instead of a dismissal employees conclude a fixed-term employment contract with the transfer organisation and are thus no longer employed by the original firm. The operational entity provides counselling, supports job search activities and offers further training for new jobs and careers. In addition, the inception of unemployment is delayed while being employed by the transfer organisation and the probability of finding a job might increase. The benefits for a firm decreasing its level of employment comprise planning reliability and legal certainty as the workers switching to the transfer

organisation can no longer take legal action against a discharge (Paprotny 2008). Additionally, the firm is not restricted by statutory periods of notice and disposes of more leeway for selecting the employees it wants to discharge than in the cases of layoffs or cancellation agreements. These benefits, however, are costly. Although the Federal Labour Agency pays short-term working allowances to employees of the transfer organisation (Transferkurzarbeitergeld) the firm reducing employment usually has to supplement these payments and to incur the costs of qualification and counselling. Given the conditions of employment protection in Germany implementing layoffs by establishing transfer organisations appears to be in terms of Bewley (2005: 310) a good management practice: “to delay potential layoffs until the employer can make a large number all at once, and then to assure those who remain that there will be no more layoffs for some time”.

3. Data

The data for this analysis were provided by a large German manufacturing company, which supplies innovative products for the domestic and international market. Several interviews with high-ranking employees of the company's personnel administration were helpful for interpreting the data and clarifying institutional details. The company, which employs on average about 1500 men and women in the period investigated, has a works council and applies an industry-wide collective agreement. The data were directly extracted from the personnel records of the company's computer system and provided on a monthly basis from January 1999 to December 2005. Our empirical analysis excludes apprentices and trainees.

Using the personnel records of a company for the study of employment adjustments entails advantages and some shortcomings. First, the information is more reliable than data based on voluntary surveys and even most official statistical information as they are directly extracted from the human resources management of a company (Grund 2002). Second, it is relatively homogeneous with respect to the workforce as it covers only one company in a specific sector and region. Third, the data set at our disposal provides information on alternative measures to adjust employment such as promotions, overtime work, cancellation agreements and transitions into a transfer organisation which are usually not available in a differentiated form. Fourth, the data set allows to distinguish between various monetary measures like monthly gross wages, grants and variability of compensation which might be implemented to accompany employment adjustments. Finally and importantly, the data contain information about exits or separations on a monthly basis.

Concerning the shortcomings it is evident that an investigation with this type of data amounts to a case study with restricted opportunities to generalize. Comparisons with other companies, sectors or manufacturing industry are not feasible. Specifically, our data set is limited in the sense that information about further training, reorganisation of work and team work are not available.

4. Descriptive statistics

As previously mentioned, the personnel data of the firm are available on a monthly base. A short description of the applied variables, means, standard deviations and number of employee-months are presented in Table 1. The total number of observations (employee-months) is $N=123\ 896$. If the workforce in the firm had remained the same as in January 1999 ($n_{1/1999}=1290$) in the entire period we would have $7\ \text{years} \times 12\ \text{months} \times 1290 = 108360$ observations. This means compared with the actual number of observations or with the number of workers in December 2005 ($n_{12/2005}=1402$) that the firm expanded, but this development was not continuous. The last row of Table 2a shows the number of employees in the last month of the year. In 2002 the maximum is reached ($n_{12/2002}=1599$).

We investigate employment adjustments by three indicators, namely by two dummy variables which describe the employment changes on the internal labour market (promotion - PROM, overtime work - OT) and one dummy variable (external job mobility - EJM) which demonstrates separations from the firm to the external labour market. Roughly 0.4% of the workforce left the firm per month within the period 1999-2005, while 0.5% was promoted and 8.5% worked overtime – see Table 1. Hence we observe internal as well as external mobility. However, at this stage we are not able to say anything about the relationship between these movements and about the determinants of job mobility. Furthermore, the dynamics of the variables are of interest.

In Table 2a-2b the development of the relevant mobility variables is exhibited for the period 1999 to 2005. (For a detailed descriptive investigation of entries and exits by hierarchical levels see Gerlach/Pfeifer 2006.) All in all, the numbers show that the firm is characterized by two phases. First, from 1999 to 2002 employment expands as indicated by the December figures. Subsequently, the number of employees decreases again, but the final level is higher than the starting value. Less workers leave the firm and more enter from 1999 to 2002 than in the subsequent years. Nevertheless tenure does not change systematically. In 2003 and 2005 we observe a difficult economic situation in the firm. This contrasts partially with the business cycle in Germany with the highest unemployment rate in 1999 and 2005, but not in 2003. Overtime working and promotions are less frequent in 2003 to 2005 than in the previous years. Apparently, internal and external labour mobility move in parallel. However, the standard working hours per month tend to decline from 1999 to 2003 and subsequently a minor rise can be observed (not in the Tables). This development is not accompanied by reduced wages (WAGE) and falling supplementary grants (GRANTS) on average. Only in 2002 the average wage declines. The ratio of workers exposed to a negative wage growth (0.9-6.9%) or negative supplementary grant growth (1.4-4.6%) remains very low and does not follow a positive trend (not in the Tables). Hence there is evidence of wage rigidity.

The figures in Table 2a and 2b are not completely comparable. In Table 2a the number of workers is based on the last month of the year. In Table 2b the total number of mobility cases per year is displayed but the reason for separation is not available for all workers who leave the firm. The strongest restructuring of the firm is observed in 2003 and 2005. Insofar our firm follows the general

phenomenon that enterprises concentrate their adjustments on few and limited periods. The difference between 2003 and 2005 is that in the former year the transfer organisation is intensively used for reducing employment, whereas the latter year is characterised by internal job changes. A first step in downsizing is followed by the reorganisation of the firm. Noteworthy is the low number of dismissals during the entire period (see Table 2b).

Table 2c presents some detailed information for the critical year 2003. It is evident that external job mobility (EJM) and overtime working (OT) are not very different comparing younger and older employees, whereas the probability of promotion is higher for younger workers and, of course, older employees have a longer tenure. If we compare men and women the most striking result is the male dominance in overtime working. It is noteworthy that workers with a longer education have a higher probability to quit and as a consequence a shorter tenure than employees with less education. The latter are more involved in overtime work.

5. Econometric investigations

5.1. Methods

In the following our econometric results are presented. On the one hand the effects of individual characteristics and macroeconomic variables (x_1) on the internal mobility are determined. On the other hand external mobility, expressed by a dummy whether an individual has left the firm (EJM – y_3), is estimated. We expect that promotion (PROM – y_1) and overtime working (OT – y_2) are related to jointly unobserved influences. As these variables are measured by dummies we assume a bivariate probit model

$$(1) \quad \begin{aligned} y_1^* &= x_1' \beta_1 + u_1 \\ y_2^* &= x_1' \beta_2 + u_2 \\ E(u_1) &= E(u_2) = 0 \\ V(u_1) &= V(u_2) = 1 \\ \text{Cov}(u_1, u_2) &= \rho, \end{aligned}$$

where y_1^* and y_2^* are latent variables. We observe only $y_k = 1$ if $y_k^* > 0$ and $y_k = 0$ if $y_k^* \leq 0$ for $k=1;2$. The coefficients are estimated by the ML method where the covariance matrix is determined with a cluster robust procedure as employee-months are considered which are correlated within the group of an individual. The likelihood function is specified by

$$(2) \quad \begin{aligned} \ln L &= \sum_{i=1}^n \ln \Phi(q_{1i} x_{1i}' \beta_1, q_{2i} x_{1i}' \beta_2, \rho_i^*) \\ q_{ki} &= +1 \text{ if } y_{ki} \neq 0; q_{ki} = -1 \text{ otherwise where } k=1;2. \\ \rho_i^* &= q_{1i} q_{2i} \rho. \end{aligned}$$

In vector x_1 the following variables are incorporated: GRANTS, VCOMP, TARGET, WAGE, WAGE², AGE, AGE², SCHOOL, WC, TRAIN, WHOURS, UR, YEAR (see Table 1).

The next step is to estimate external job mobility (EJM – y_3). Again a probit model is used and the covariance matrix is determined with a cluster robust procedure. As robustness check the random effects panel estimator is added. As we want to analyse whether internal mobility has an impact on EJM we incorporate the internal mobility variables and control for macroeconomic variables and individual characteristics (x_3). Interdependencies are likely. Therefore, PROM and OT are substituted by the estimates of y_1^* and y_2^* ($\hat{y}_1 = ePROM, \hat{y}_2 = eOT$) following Olsen (1980) and Newey (1999) extended to the bivariate probit case

$$(3) \quad y_3^* = \hat{y}_1 \alpha_1 + \hat{y}_2 \alpha_2 + x_3' \beta_3 + u_3.$$

The vector x_3 contains the variables: GRANTS, VCOMP, WAGE, TEN9905, WHOOURS, SCHOOL, SEX, KIDS, UR and YEAR (see Table 1). Finally, the EJM variable is split in accordance with the reason to leave the firm (REASON). Four reasons are distinguished, namely quits (y_{31}), layoffs (y_{32}), cancellation agreements (y_{33}) and entry into a transfer organisation (y_{34}). Subsequently, a multinomial probit model is estimated by the Gaussian quadrature procedure. The multidimensional integral is reduced to one dimension. Workers with other reasons of job changes (end of fixed-term contract, dismissal without notice, internal job change, retirement, death) are not considered in the multinomial probit estimation. The probability that individual i choose alternative k is

$$(4) \quad P(v_{i1j} \leq 0, \dots, v_{i,J-1,j} \leq 0),$$

where the alternatives (reasons to leave the firm) are $1, 2, \dots, j, \dots, J$ and

$$v_{ijj'} = \eta_{ij} - \eta_{ij'} = x_{3i}'(\gamma_j - \gamma_{j'}) + (\varepsilon_{ij} - \varepsilon_{ij'}) =: x_{3i}'\gamma_{jj'} + \varepsilon_{ijj'},$$

where the alternatives j and j' are compared. The multinomial logit approach is not used because it is difficult to explain that the internal job mobility is determined by a probit model while the external model is based on a logit model. Furthermore, the Hausman tests reject the necessary IIA condition of the logit model. The χ^2 - test statistics of the same specification as in Table 5 demonstrate this for the logit model

$$\begin{aligned} \chi^2 &= 64.26 \text{ (} p\text{-value} = 0.0005 \text{) if reason 1 is eliminated ;} \\ \chi^2 &= 52.26 \text{ (} p\text{-value} = 0.0005 \text{) if reason 2 is eliminated ;} \\ \chi^2 &= 36.69 \text{ (} p\text{-value} = 0.0470 \text{) if reason 3 is eliminated ;} \\ \chi^2 &= 214.47 \text{ (} p\text{-value} = 0.0000 \text{) if reason 4 is eliminated .} \end{aligned}$$

An open question is whether individuals react instantaneously or lagged on internal labour market changes with external adjustments. From our view both possibilities should be considered and therefore we extend the static model by lagged influences.

An alternative to our two-stage approach might be a trivariate probit model where promotion, overtime and separation are jointly related to unobserved individual influences. Though we have checked this idea our investigation concentrates on

the stepwise procedure. We argue that employees do not decide jointly on internal and external adjustments. The determinants are not identical. Internal adjustments have priority for the workers whereas external mobility is a second order problem. One of our main objectives in this paper is to analyse explicitly the influence of internal on external adjustments. We want to ascertain whether these two types of adjustment are complements or substitutes. A trivariate probit model seems to us less adequate for this issue. Furthermore, it is difficult to incorporate dynamic processes and the various types of external mobility in this model. The application of the trivariate approach has shown that the incorporation of lagged overtime working and promotion effects does not perform well. The estimates which use the GHK simulator cannot evaluate the likelihood function.

5.2. Results

The bivariate probit estimates in Table 3 show the relationship between promotion and overtime work, our two indicators of internal mobility. A priori it is ambiguous whether the link is positive or negative. The firm might promote the most productive workers and the employees who are strongly involved in overtime work. However, for our firm we observe the opposite with a negative and significant correlation ($\rho = -0.09$). The reason might be that the requested abilities for promotion and overtime work differ. The former should encompass characteristics such as decisiveness and tenacity in negotiations, willingness to accept responsibility as well as less risk-aversion. Overtime work, however, is more important for less educated workers.¹ Due to employment protection firms are reluctant to hire employees if product demand increases temporarily. The alternative is overtime work. The estimates confirm this hypothesis. In the OT function the coefficient of the regressor SCHOOL is negatively significant. The opposite is expected in the PROM equation. However, we find an insignificant influence. Altogether the PROM equation is suboptimal compared with the OT equation. Only few effects are significant. A nonlinear wage influence is detected. Initially, the probability rises with wage and roughly at a monthly wage of €4000 the probability decreases again. Furthermore, a white collar worker has better chances to be promoted. A striking result is the negative trend in the promotion and in the overtime function. Both indicators of internal mobility are less important in the end than in the beginning of the considered period. Evidently, the relevance of the internal labour market has declined. Cyclical effects expressed by the unemployment rate (UR) cannot be detected. It should be stressed that wage has also a nonlinear influence of second order on OT. This could contradict the hypothesis of especially less educated employees performing

¹ We have tested whether the negative correlation between overtime and promotion vanishes when lagged overtime is incorporated. The hypothesis is that a prior commitment to work overtime increases the probability to be promoted. However, the estimates of this approach do not confirm this conjecture, promotion and lagged overtime are negatively correlated in our data set, too – not in the Tables. A further reason of the negative correlation might be a data problem, namely that overtime is not always correctly recorded. With a higher position of an individual within the firm's hierarchy the probability that overtime is unpaid and that these hours are not documented might increase. One can also suppose that overtime for white collar workers who receive a fixed monthly salary is not correctly recorded. And finally, incomplete recording is likely if the firm has introduced a working hours account (Arbeitszeitkonto). We cannot test these suppositions, however, the management of our firm has declared that they have recorded all hours of overtime working because the works council requires this information.

overtime work. However, the coefficients of SCHOOL and TRAIN support our interpretation.

The next step is the analysis of external mobility. We investigate the determinants that an individual separates from the firm (EJM). For this purpose a probit model is estimated. The results are presented in Table 4. We are especially interested in detecting whether internal mobility has an impact on external mobility when interdependencies are taken into account (ePROM, eOT). The result in column (1) and also in column (3) where a random effects panel estimator is applied is obvious: Promoted employees (ePROM) are less likely to leave the firm. A priori we could expect a similar effect for overtime workers because the performance of overtime work indicates that the enterprise has a strong demand for these employees. The coefficient of eOT shows the opposite, the relation is positive. In this context we should take into account that the workforce can be substituted partially by overtime work. The incorporation of a one-year lagged variable demonstrates that internal adjustment prior to the separation decision has reverse effects. If no further promotions follow we observe a tendency to quit the job, whereas working overtime in the past does not favour external mobility. These results also hold under neglecting instantaneous effects – not in the Tables. Finally, we should stress that lagged influences cannot be detected in panel estimates. They are completely insignificant.

It is noticeable that individual characteristics such as SEX, KIDS and SCHOOL have no clear effects on external mobility. Nevertheless the signs of the coefficients of KIDS and SCHOOL are in accordance with our expectations. Educated workers and workers without children are more mobile. TENURE has the expected sign if this variable measures the specific human capital (SHC), the influence is insignificant, however. An interpretation is that SHC does not increase continuously with tenure. Capital will become obsolete. Thus, medium-term tenure is probably a better indicator of SHC than entire tenure. Therefore, we use the total employee-months in the firm within the period 1999-2005 (TEN9905) as an alternative measure of SHC. If we substitute TENURE in Table 4 by TEN9905, we find a negative and highly significant influence (not in the Tables).

As internal mobility exhibits a falling trend, an increase of external mobility could compensate this development. However, this trend is also negative. This means all in all that the firm is characterised by a decreasing labour mobility. In contrast to internal mobility the estimates demonstrate a cyclical course of external job changes. Higher unemployment rates (UR) reduce the probability to separate from the firm. A problem with the results of Table 4 is that it does not distinguish between reasons for external job changes. Other investigations have impressively demonstrated that the factors influencing quits and layoffs are very different (Campbell 1997, Giuliano/Levine/Leonard 2006).

In Table 5 multinomial probit estimates for four reasons of separating from the firm are presented in two versions, with and without lagged variables. The conventional distinction is between quits and layoffs. Additionally, we distinguish between cancellation agreements and entries into a transfer organisation. The results display fundamental differences and also some similarities. We find a negative trend (YEAR), a cyclical behaviour (UR) and a positive correlation

between wages and separation for all four reasons. The internal mobility (ePROM, eOT) has significant instantaneous impacts on the layoff risk and the risk to pass into the transfer organisation while lagged influences are effective in all four cases. The former two causes of separation are comparable as in both cases the decision is more strongly determined by the employer, whereas employees will finally make the decision to quit or to accept a cancellation agreement. As our empirical analysis focuses on individual level, we can only implicitly argue that our firm pursue a different adjustment strategy for different groups of workers.

An increasing probability of overtime work leads instantaneously to a higher risk of a layoff or a switch into the transfer organisation. Although this result is mitigated by positive lagged effects we have to ask what's the logic behind this result? Excess work is an indicator that the firm has a strong demand for these employees. However, in a crisis with a falling product demand the firm has to save costs. Dismissals are one way to reduce costs. The required cost reduction is more easily attained if workers with overtime are laid-off than employees with standard working hours. In other words, fewer workers have to be dismissed in the former than in the latter case to achieve a constant level of cost reductions. This is beneficial for the firm as less negative reactions of the remaining work force are expected, and it is cheaper to expand the working hours than to hire new employees if product demand is rising again.

Furthermore, firms want to keep their promoted employees. They have invested in them and they have tested that their abilities are valuable for the enterprise. The quit decision depending on promotion is ambiguous. On the one hand an individual might expect a further rise within the hierarchy. On the other hand another promotion could be impossible because the hierarchy is too flat and therefore the individual quits. Empirics support the latter hypothesis though the relation is only significant for delayed effects.

All in all, the multinomial approach is more successful in explaining the separations that are primarily determined by the firm than the separations initiated by decisions of individual workers. Individual characteristics such as SCHOOL, SEX and KIDS are not very important, although we should emphasize that females are more willing to accept a cancellation agreement than males. The effect of TEN9905 is negative and highly significant for all four separation reasons. If the entire tenure variable (TENURE) is used only a vague impact is detected (the results are not presented in the Tables). Long tenure reduces only the quit decision significantly.

6. Summary

This paper investigates internal and external labour mobility of employees. Personnel records from one company are used for the period 1999 to 2005. This has the advantage that it is not necessary to control for firm specific characteristics. The most notable results are:

- (i) Promotion and overtime work are negatively correlated via jointly unobserved variables.

(ii) Internal labour mobility has an impact on external mobility. Promoted employees and employees without overtime work are less likely to separate from the firm.

(iii) Our approach is more successful in explaining separations that are primarily determined by the firm than separations based on decisions by individual employees.

(iv) There is a tendency of reduced internal as well as external mobility, whereas pro-cyclical effects can only be observed for external employment adjustments. Apparently, management concentrates on dismissals in a specific period.

(v) Due to the last result, given the conditions of employment protection in Germany, transfer organisations providing counselling, supporting job search and offering further training are a policy instrument that helps companies to implement and concentrate layoffs. Apart from enhancing labour market flexibility transfer organisations play an important role in the process of clustering downsizing.

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Table 1: Variable definitions, number of observations, mean and standard deviation measured in employee-months of 1999-2005

Variable - Definition	N	Mean	Std.dev.
AGE - age in years	123896	42.2023	9.1217
EJM - dummy=1, if external job mobility	123896	0.0041	0.0615
eOT - estimated overtime (see eq. (1))	105589	-1.6662	1.2646
ePROM - estimated PROM (see eq. (1))	105589	-2.6875	0.4253
GRANTS - supplementary grants per year	121425	4866.4020	4223.6010
KIDS - number of children	123896	0.7055	0.9133
OT - dummy=1, if overtime working	123896	0.0849	0.2787
PROM - dummy=1, if promotion last period	123896	0.0051	0.0711
REASON to leave the firm - catecorial variable (0-stayer, 1-quit, 2-layoff, 3-cancellation agreement, 4-transfer organisation)	8567	5.4429	3.0274
SEX - dummy=1, if female	123896	0.2402	0.4272
SCHOOL - dummy =1, if high school (Abitur) or university degree	123896	0.3101	0.4626
TARGET - dummy=1, if target agreement	107928	0.0847	0.2784
TENURE - number of years within the firm	123896	14.3271	9.4439
TEN9905 - tenure in months in 1999-2005	123896	74.3377	16.6804
TRAIN - dummy=1, if occupational training	123896	0.6513	0.4766
VCOMP - dummy=1, if variable compensation	123896	84.9430	163.7649
UR - unemployment rate in the region (Bundesland) of the firm (in %)	123896	10.9770	0.9806
WAGE - monthly gross wage	123896	3052.1800	1249.6880
WC - dummy =1, if white collar worker In a high position	123896	0.0871	0.2821
WHOURS - standard working hours per month	123896	151.2733	15.5982

Table 2a: Mobility and earnings indicators measured in December 1999-2005

Mean and standard deviation in parentheses							
	1999	2000	2001	2002	2003	2004	2005
EJM	0.0051 (0.0715)	0.0035 (0.0588)	0.0077 (0.0873)	0.0050 (0.0706)	0.0053 (0.0727)	0.0027 (0.0517)	0.0036 (0.0596)
PROM	0.0198 (0.1393)	0.0194 (0.1380)	0.0205 (0.1417)	0.0231 (0.1504)	0.0106 (0.1025)	0.0040 (0.0633)	0.0000 (0.0000)
OT	0.0777 (0.2677)	0.1353 (0.3422)	0.1108 (0.3139)	0.1463 (0.3536)	0.0571 (0.2320)	0.0563 (0.2306)	0.0571 (0.2320)
TENURE	14.2088 (8.7151)	14.1587 (9.1227)	13.7306 (9.5858)	14.0244 (9.7373)	14.6371 (9.7066)	14.7738 (9.8522)	15.4967 (9.8191)
WAGE	2840.65 (1120.87)	2925.58 (1194.02)	3007.14 (1266.29)	2999.19 (1140.06)	3095.71 (1249.20)	3220.13 (1289.50)	3305.55 (1370.47)
GRANTS	4426.73 (3516.22)	4333.36 (3493.97)	4483.07 (4296.93)	4618.61 (3186.75)	4773.73 (3937.18)	5201.97 (4461.75)	5714.36 (5983.36)
n	1365	1441	1562	1599	1507	1492	1402

Note: Variable definitions see Table 1; n - number of employees.

Table 2b: Reasons of separation (1999-2005)

Reason of separation	1999	2000	2001	2002	2003	2004	2005
QUIT	8		5	7	16	7	10
LAYOFF		1		2	2	5	2
CANCELLATION AGREEMENT	2	1		3	8	5	9
TRANSFER ORGANISATION					66	3	
END of FIXED-TERM CONTRACT		1	2	3	11	10	17
INTERNAL JOB CHANGE						2	77
DISMISSAL without NOTICE					1		1
RETIREMENT				2	9	4	10
DEATH		1		2	1	2	1
Total	10	4	7	19	114	38	127

Table 2c: Descriptive statistics 2003

Variable	AGE<=30			AGE>=50		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.
EJM	2380	0.0088	0.0935	4843	0.0112	0.1050
PROM	2380	0.0055	0.0737	4843	0.0012	0.0352
OT	2380	0.0408	0.1978	4843	0.0493	0.2166
TENURE	2380	4.0285	2.4830	4843	22.753	9.2276

Variable	SEX=1			SEX=0		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.
EJM	4547	0.0090	0.0945	14269	0.0056	0.0747
PROM	4547	0.0035	0.0592	14269	0.0032	0.0567
OT	4547	0.0172	0.1299	14269	0.0644	0.2455
TENURE	4547	13.021	9.1501	14269	14.740	9.8863

Variable	SCHOOL=1			SCHOOL=0		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.
EJM	5867	0.0085	0.0919	12949	0.0055	0.0738
PROM	5867	0.0041	0.0638	12949	0.0029	0.0541
OT	5867	0.0249	0.1558	12949	0.0657	0.2478
TENURE	5867	10.461	8.3898	12949	16.075	9.8065

Note: Variable definitions see Table 1.

Table 3: Bivariate ML probit estimates of promotion and overtime

	Coef.	Robust Std. Err.	z	P> z
PROM				
GRANTS/10 ³	-0.0079	0.0074	-1.07	0.285
VCOMP/10 ³	0.0293	0.1107	-0.26	0.792
TARGET	0.3097	0.2163	-1.43	0.152
WAGE	0.0008	0.0001	7.07	0.000
WAGE ² /10 ⁴	-0.0945	0.0156	-6.07	0.000
AGE	0.0103	0.0135	0.77	0.444
AGE ²	-0.0004	0.0002	-2.29	0.022
SCHOOL	-0.0061	0.0434	-0.14	0.888
WC	0.5284	0.2159	2.45	0.014
TRAIN	-0.0262	0.0379	-0.69	0.490
WHOURS	-0.0003	0.0017	-0.16	0.873
UR	-0.0333	0.0234	-1.42	0.155
YEAR	-0.0978	0.0110	-8.89	0.000
Constant	192.6902	21.9709	8.77	0.000
OT				
GRANTS/10 ³	-0.0516	0.0109	-4.73	0.000
VCOMP/10 ³	1.0838	0.1183	9.16	0.000
TARGET	0.5572	0.3029	1.84	0.066
WAGE	0.0018	0.0002	8.39	0.000
WAGE ² /10 ⁴	-0.0024	0.0003	-7.30	0.000
AGE	0.0103	0.0193	0.54	0.592
AGE ²	-0.0001	0.0002	-0.58	0.559
SCHOOL	-0.4372	0.0834	-5.24	0.000
WC	-1.5066	0.3280	-4.59	0.000
TRAIN	-0.1718	0.0639	-2.69	0.007
WHOURS	0.0127	0.0031	4.16	0.000
UR	0.0145	0.0134	1.08	0.280
YEAR	-0.1016	0.0094	-10.80	0.000
Constant	197.1183	18.8229	10.47	0.000
N		105 589		
Wald test	CHI ² (26)	694.21	Prob value	0.0000
rho		-0.0862		
Test of rho=0	CHI ² (1)	8.465	Prob value	0.0036

Note: Variable definitions see Table 1.

Table 4: ML probit estimates of external job mobility

	Probit ML		Probit ML		RE Probit ML		RE Probit ML	
	Coef.	Robust Std.Err.	Coef.	Robust Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
ePROM	-0.6043	0.2634	-1.3114	0.2645	-0.8828	0.4534	-0.9932	0.5503
eOT	0.2226	0.1028	0.3918	0.1016	0.3484	0.1902	0.3342	0.2198
ePROM(L12)			1.0443	0.0790			0.4636	0.3382
eOT(L12)			-0.2487	0.0305			-0.0866	0.1110
GRANTS/10 ³	-0.0019	0.0141	0.0009	0.0145	0.0356	0.0167	0.0342	0.0174
VCOMP	0.1683	0.2379	0.1750	0.2365	0.1883	0.4693	0.2381	0.6151
WAGE/10 ³	0.1963	0.0749	0.1740	0.0767	0.1165	0.1414	0.0340	0.1480
TENURE	-0.0088	0.0059	-0.0085	0.0060	-0.0110	0.0116	-0.0056	0.0121
WHOURS	-0.0076	0.0039	-0.0071	0.0039	-0.0118	0.0070	-0.0070	0.0071
SCHOOL	0.1822	0.1415	0.1216	0.1430	0.5106	0.2381	0.4713	0.2521
SEX	0.2119	0.1133	0.1647	0.1121	0.2409	0.2160	0.3124	0.2178
KIDS	-0.0986	0.0565	-0.0946	0.0567	-0.0872	0.1040	-0.0850	0.1076
UR	-0.5688	0.0508	-0.5691	0.0524	0.0378	0.0966	0.0310	0.0997
YEAR	-0.3632	0.0313	-0.4007	0.0328	-0.1921	0.0602	-0.2016	0.0632
Constant	730.58	62.757	806.38	65.664	373.52	120.02	392.63	126.10

Note: L12 - Lag of 12 months; other variable definitions see Table 1.

Table 5: Multinomial ML probit estimates of external job mobility with respect to reason of separation

		Robust	Robust
	Coef.	Std.Err.	Coef. Std.Err.
QUIT			
ePROM	0.7571	0.4909	-0.1342 0.5028
eOT	-0.0879	0.1813	0.1848 0.1779
ePROM(L12)			1.4841 0.2152
eOT(L12)			-0.4117 0.0593
GRANTS/10 ³	0.0367	0.0215	0.0491 0.0214
VCOMP	-0.1270	0.5534	-0.1569 0.5735
WAGE	0.0002	0.0002	0.1338 0.2118
TEN9905	-0.0548	0.0046	-0.0583 0.0049
WHOURS	-0.0034	0.0121	-0.0021 0.0123
SCHOOL	0.0092	0.3167	-0.1343 0.3381
SEX	0.4698	0.2810	0.4089 0.2798
KIDS	-0.0204	0.1906	-0.0127 0.1971
UR	-0.7691	0.1280	-0.7772 0.1237
YEAR	-0.4029	0.0734	-0.4673 0.0783
Constant	816.38	147.15	946.76 156.85
LAYOFF			
ePROM	-1.6488	0.7719	-2.4384 0.7594
eOT	0.7780	0.3535	0.9988 0.3525
ePROM(L12)			0.9498 0.2336
eOT(L12)			-0.2116 0.0709
GRANTS/10 ³	0.0560	0.0233	0.0624 0.0265
VCOMP	-0.9654	0.9692	-1.3611 1.1535
WAGE	0.0006	0.0003	0.6358 0.2696
TEN9905	-0.0479	0.0050	-0.0487 0.0052
WHOURS	-0.0396	0.0139	-0.0412 0.0146
SCHOOL	0.4745	0.4783	0.4706 0.4845
SEX	0.3457	0.5577	0.3269 0.5762
KIDS	0.2790	0.1440	0.2606 0.1418
UR	-0.7028	0.1008	-0.6456 0.0972
YEAR	-0.4804	0.0658	-0.5238 0.0631
Constant	968.77	131.89	1055.71 126.45

Continuation Table 5

CANCELLATION

ePROM	-0.2501	0.7105	0.9029	0.7029
eOT	0.4139	0.2285	0.5236	0.2214
ePROM(L12)			1.0809	0.2088
eOT(L12)			-0.0358	0.0933
GRANTS/10 ³	-0.0327	0.0365	-0.0259	0.0395
VARCOMP	0.4649	0.6048	0.4194	0.5778
WAGE	0.0004	0.0002	0.0047	0.0216
TEN9905	-0.0579	0.0056	-0.0607	0.0061
WHOURS	-0.0008	0.0099	-0.0031	0.0101
SCHOOL	-0.7649	0.4280	-0.8884	0.4419
SEX	0.8752	0.3111	0.7889	0.3141
KIDS	0.2461	0.1705	0.2299	0.1755
UR	-0.8491	0.1557	-0.6942	0.1519
YEAR	-0.4371	0.1012	-0.4948	0.1012
Constant	882.86	202.28	998.25	202.17

TRANSFER

ePROM	-1.8824	0.3911	-2.6987	0.3875
eOT	0.8907	0.1461	1.0995	0.1485
ePROM(L12)			1.1689	0.1609
eOT(L12)			-0.2771	0.0571
GRANTS/10 ³	0.0293	0.0219	0.0327	0.0211
VCOMP	1.0014	0.4209	1.1413	0.4145
WAGE	0.0004	0.0001	0.3940	0.1327
TEN9905	-0.0683	0.0039	-0.0709	0.0042
WHOURS	-0.0320	0.0062	-0.0329	0.0063
SCHOOL	-0.0857	0.2754	-0.1729	0.2757
SEX	0.2923	0.2153	0.2464	0.2134
KIDS	0.0473	0.1010	0.0665	0.1033
UR	-1.5415	0.1404	-1.4376	0.1544
YEAR	-0.8397	0.0748	-0.9053	0.0822
Constant	1698.25	150.83	1829.63	165.42

N	104	150	88	233
CHI ² (48)	612.29	CHI ² (56)	676.87	
Prob value	0.000		0.000	

Note: L12 - Lag of 12 months; other variable definitions see Table 1.