Are Individuals Optimizing Their Wage Path? An Analysis On The Performance of Employer-to-Employer Mobility*

Stefan Schneck†

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Abstract

This paper contributes to the investigation of the performance of employer-to-employer mobility across the career of wage maximizing individuals. The between-firm mobility model introduced here is establishing the benchmark for optimal transitions. Furthermore, some generalizations are appropriate to explain the coexistence of wage reductions and wage markups in the period of mobility, as reviewed in the literature. The empirical investigation of the model, based on German linked employer-employee data, checks whether the between-firm wage trajectory exceeds the within-firm wage path. The results show that most of the employer-to-employer transitions are accompanied by wage losses.

JEL-Classification: J30, J31, J62

Keywords: Employer-to-employer mobility, wage trajectories, wage loss

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†Correspondence: Stefan Schneck, Institut für Empirische Wirtschaftsforschung, Leibniz Universität Hannover, Königsworther Platz 1, D-30167 Hannover, Email: Schneck@ewifo.uni-hannover.de

1 Introduction

A variety of studies show that worker turnover is frequent in many countries (Burgess et. al. 2000, OECD 1997). Hence, labor market mobility continues to be important and recent literature is examining the extent of mobility attributable to wages. Furthermore, mobility and wage growth are assumed to be interrelated because mobility directly affects the distribution of wages and of individual human capital. This analysis is responsive to this interrelation and introduces an optimal mobility strategy for wage maximizing individuals which is dependent on the individual's labor market experience. Furthermore, the focus is on the results of Nosal and Rupert (2007) and Fitzenberger and Garloff (2007) who present evidence for the coexistence of wage markups and wage reductions in the period of mobility. Moreover, it is shown that a small fraction of workers is mobile without wage improvements[1].

This study differs from the current literature in several ways. In this paper, a model is derived where changing employer without wage improvements becomes optimal. Furthermore, generalizations of the model are appropriate to explain the coexistence of wage markups and wage reductions induced by mobility. Moreover, compared to the existing literature, counterfactual wage trajectories are estimated to describe between-firm mobility. For this reason, the application of linked employer-employee data is inevitable.

A variety of literature regarding to mobility associated with wages is existent. Borjas (1981) emphasizes that the individual earnings profile is discontinuous across jobs because job mobility results, on average, in a wage markup. This implies that the wage path of mobile individuals is, on average, characterized by a step in the period of mobility. Upward mobility is empirically conirmed by several authors (e.g., Topel and Ward 1992) and emphasized by the search theory (e.g., Burdett and Mortensen 1998). OECD (1997), Fitzenberger and Garloff (2007), and Nosal and Rupert (2007) show that upward and downward mobility coexist. Furthermore, studies mention that downward mobility has become a growing problem (e.g., Smith 1994). Hence, numerous wage reductions are

[1]Nosal and Rupert (2007) show that about 8% of all workers and approximately 5% of the voluntarily mobile workers are changing jobs without any wage improvements.

induced by mobility. An explanatory approach is derived by Connolly and Gottschalk (2008). The authors argue that wage reductions are accepted by mobile individuals because of a larger wage growth in the new job. Therefore, the downward mobility can be justified as an investment in the future wage growth. All together, the findings provide evidence for discontinuous wage profiles across a working career.

However, the mentioned authors are not explicitly investigating the wage paths at different employers simultaneously. Hence, it is impossible to conclude whether the within-firm wage path exceeds the between-firm wage path. Furthermore, the issue whether individuals are optimizing the wage path across the working career cannot be solved. Moreover, there is no explanatory approach accounting for the coexistence of upward and downward mobility. That is why the present analysis focuses on individual employer-to-employer mobility and especially addresses an investigation of wages between firms simultaneously. Hence, the performance of individual employer-to-employer mobility across the working career is analyzed.

This paper derives an optimal employer-to-employer mobility strategy which is incorporated into a generalized framework of Burdett and Mortensen (1998). Workers are searching on-the-job for higher wages permanently, whereas they benefit from free cost of search, an infinite information distribution speed, and full information. In contradiction, employers do not interact with each other and post wage offers with respect to the labor market experience of the applicant. For mobile employees, the wage paths are characterized by an intersection point. Career developments exhibiting no intersection point during the working career of an individual become non-optimal. Figure 1 illustrates the different scenarios which are analyzed in the underlying paper. Furthermore, the interrelationship of wages, mobility, and human capital are illustrated.

Insert figure 1 about here

The theoretical model predicts that mobility in the intersection point of the wage trajectories as illustrated in scenario 4 is *optimal*. Therefore, changing employer without any wage improvements becomes optimal as the wage trajectory exceeds the other one in the future periods. If the wage profile is depicted by an intersection point in combination

with a wage markup or a wage reduction in the period of mobility, the individual changes employer *suboptimally*. If the wage trajectories at different employers exhibit a steady between-firm wage differential across the career horizon, it is referred to *discontinuous* wage profiles which are split up into upward mobility and downward mobility.

As illustrated in figure 1, this analysis contributes to the literature by investigating individual wage profiles across the working career simultaneously. Furthermore, the paper picks up empirical findings about wage markups and wage reductions induced by mobility. Additionally, it will be shown that wage improvements may be accompanied by wage losses.

For the empirical investigation of the model, the main concern is on the application of the most relevant determinant of wage growth. As several studies address the interrelation between wages and human capital as most important for wage growth, a brief review of the literature regarding experience is conducted. Some contributions advert to the returns to tenure within a certain firm (e.g., Altonji and Shakotko 1987, Topel 1991) as it can be interpreted as firm-specific human capital which is interrelated with mobility and wages. Another strand of literature argues that wage growth is essentially attributable to industry-specific experience (Parent 2000). Zangelidis (2008) shows that occupational experience is more important for the wage determination than tenure in an industry. Furthermore, Kambourov and Manovskii (2008a, 2008b) suggest that tenure with an employer has little impact on the wage determination when accounting for occupational experience. Kwon and Meyersson Milgrom (2007) reflect that worker's wages are less sensitive to changes in the occupation-specific labor market outside the firm. Moreover, firms prefer hiring employees from outside of the firm if they are comprising occupational experience. Furthermore, the authors show that these newly hired workers do not have to start the within-firm career at firm-based 'ports of entry'.

The importance of labor market experience on the wage determination is closely linked to the concept of task-specific human capital (Gibbons and Waldman 2004). Schönberg and Gathmann (2007) show that this type of human capital is portable to a large extent in Germany when individuals move to similar occupations with similar tasks. As shown

above, recent literature examines wage growth primarily determined by experience. Furthermore, general human capital seems to be the more valid determinant driving wage growth of mobile workers. Therefore, the empirical procedure applied in this paper focuses on the reward to labor market experience and adopts the concept of task-specific human capital.

In brief, the present analysis is a contribution to the existing empirical literature by describing employer-to-employer mobility using counterfactual wage trajectories as depicted in Bingley and Westergard-Nielsen (2006). The authors illustrated the worker's careers as different wage trajectories across different employment relationships. Here, the empirical work is on estimating average wage paths within firms conditional on certain individual's characteristics using German linked employer-employee data. Hence, this particular study extracts information on whether the between-firm mobility wage trajectory exceeds the within-firm wage path. Therefore, this procedure empirically investigates the optimal mobility strategy performance derived here.

The results show that the minority of wage paths is characterized by an intersection point. Hence, the analysis adverts to more complex aspects than pure wage maximization of individuals. As a consequence, when referring to the performance of employer-to-employer mobility, more complex aspects of mobility than the ones discussed here have to be accounted for.

The paper proceeds as follows: Section 2 derives the theoretical benchmark for optimal mobility and illustrates the scope of the model. The data and the empirical procedure are shown in section 3. Section 4 presents the main results while section 5 concludes.

2 The Model

2.1 The Optimal Employer-to-Employer Mobility Strategy

Based on the findings of Nosal and Rupert (2007), this paper presents a model where changing employers without any wage improvements is optimal. Anyhow, only if the wage trajectories of different employers intersect each others the employee will have an incentive

to change employer. Optimal individual mobility -in the range of a working career- will be shown to occur in the intersection point of wage trajectories. Wage profiles characterized by wage markups or wage reductions in the period of mobility become suboptimal if an intersection point is existent. Specifically, this paper shows that wage improvements are accompanied by wage losses.

The following optimal employer-to-employer mobility model is incorporated into the Burdett and Mortensen (1998) framework ('BM'). In particular, this paper focuses on the job-to-job mobility component where employed workers search for higher wages offered by other employers in order to improve the wage path across the working career. Transitions into unemployment remain unconsidered in this paper. For deriving the optimal employer-to-employer mobility strategy, BM has to be generalized.

Starting from an existing wage maximizing match, wage maximizing individuals search on-the-job for the highest wage. Therefore, individuals are searching actively in contrast to BM where workers randomly receive information on job offers[2]. Free costs of search are imposed, too. Therefore, individuals are assumed to search on-the-job most efficiently in each period of their working career.

It is imposed that employers do not interact with each other. This assumption assures, on the one hand, that employers who suffer from a shock do not affect other firms. On the other hand, it assures that poaching strategies do not have an impact on the wage setting. Moreover, employers reply to applications immediately after receiving them, and offer a wage with respect to the experience of individual i in t. This is a departure of BM and meets the wage setting of Postel-Vinay and Robin (2002) where firms can vary their wage offer according to the worker's characteristics. Therefore, given the labor market experience of the worker, wages are predictable in each period. The working contract of firm f is designed as a 'take-it-or-leave-it' offer. Moreover, the wage contracts are designed as long-term contracts which can be dissolved by the workers without penalties if they receive a higher wage offer.

[2]However, it is to expect that workers are randomly contacted with larger wage offers because of different reasons directly affecting wages (e.g., business cycle). The model framework imposed here corresponds to an equilibrium state of the labor market. Therefore, this assumption is not a critical one. Letters of refusal correspond to a wage offer of 0.

The wage contracts are following a function F subject to employer f:

$$w_{i,f,t} = F_f(exp_{i,t}) \tag{1}$$

$$\frac{\partial w_{i,f,t}}{\partial exp_{i,t}} \overset{(\leq)}{\geq} 0; \quad \frac{\partial^2 w_{i,f,t}}{\partial exp_{i,t}^2} \overset{(\geq)}{\leq} 0 \tag{2}$$

$w_{i,f,t}$ is the monotonically increasing (decreasing) wage offered by a certain employer f to individual i in period t.

$exp_{i,t}$ denotes the labor market experience of individual i in period t.

Individuals maximize the utility function by the set of firms f given their labor market experience in period t. Therefore, the worker is assumed to stay in the firm as long as the wage of the current employer exceeds the wages offered by other firms. Hence, workers should realize the upper wage path. The maximization problem is described by:

$$\max_f w_{i,f,t} = F_f(exp_{i,t}) \tag{3}$$

This is an isolated wage maximizing problem. Individual i is willing to work at firm f if $F_f(exp_{i,t}) > F_k(exp_{i,t})$ for all $f \neq k$. Hence, if any wage trajectory exceeds other wage trajectories perpetually, the worker is shown to have no incentive to change employer because it is preferable to stay at this employer all the time. This special case is not specifically excluded by Borjas (1981), Smith (1994), and among many others. In this model, this special case is referred to as discontinuous wage profile and is excluded by the isolated wage maximization of individuals.

Furthermore, it is imposed that the market price for other individual skills is constant over the entire working career and among different employers[3]. The vector X_i describes these characteristics (e.g., schooling) whereas the vector ρ describes the constant returns to these characteristics.

To recapitulate, the maximization problem can be expressed as an isolated examination of different wage offers given the individual's labor market experience. The individual

[3]This is to impose that the individual wage trajectories are not saw blade formed across the working career and across different firms. As a consequence, this assures exactly one clearly identifiable intersection point.

utility $U_{i,t}$ of any wage maximizing individual in period t is:

$$\max_f U_{i,f,t} = F_f(exp_{i,t}) + \rho(X_i) - \underbrace{C_{i,t}^{search}}_{=0} - \underbrace{C_{i,t}^{mobility}}_{=0} \tag{4}$$

$$U_{i,t} = F_f(exp_{i,t}) + \rho(X_i) - [F_k(exp_{i,t}) + \rho(X_i)] \geq 0 \tag{5}$$

$$U_{i,t} = F_f(exp_{i,t}) - F_k(exp_{i,t}) \geq 0 \quad (\forall \text{ f} \neq \text{k}) \tag{6}$$

Hence, the model depicts that the decision of individual i to work at firm f depends solely on the reward to experience offered by firm f to the individual in period t.

In this setting, individuals are able to optimize their wage path. In particular, the upper wage path is achieved and mobility without an intersection point of the wage trajectories is excluded. That is what the modifications of the BM framework predict. Therefore, optimal mobility is not characterized by wage markups/ reductions in the period of mobility as the results of Nosal and Rupert (2007) suggest. Some of the assumptions are rather critical. However, the most crucial restriction of the model is that the reward to schooling remains constant over the whole working career. It is expected that the reward to schooling differs between different employers. Additionally, the skill biased technological process enforces individual (re)training over time. This certain model is facing a lack of considerations regarding the impact of (re)training gratifications.

To recapitulate, it is to note that only this type of mobility is not accompanied by wage losses which will be illustrated in the following section. Therefore, this model is the benchmark for optimal employer-to-employer mobility.

2.2 Illustration of the Model

This section visualizes the scope of the model. In this analysis, one employer-to-employer transition is regarded to[4]. For this reason, the analysis is reduced to a closer inspection of two wage trajectories over the working career. Moreover, different prevalent scenarios for employer-to-employer transitions are illustrated.

[4]This restriction is used for identification issues in the empirical work and is consistent with recent literature in Germany. Orlowski and Riphahn (2008) suggest that employer-to-employer changes are rather infrequent in Germany.

Insert figure 2 about here

Figure 2 presents the wage trajectories of main interest. Because of the assumptions derived above, both wage trajectories are assumed to be the wage maximizing ones for individual i. In the intersection point of the curves the worker is indifferent to staying at employer 1 or moving to employer 2. To maximize the wage path across the working career, the individual changes the employer in the intersection point to avoid hopping from one wage trajectory to the other one. Therefore, the intersection point determines the optimal period for being mobile ('OPM'). The realized period of mobility ('m') equals OPM if optimal mobility is existent.

Hence, if optimal mobility occurs, the wage trajectory offered by firm 1 is not observed after the intersection point, while that of firm 2 is counterfactual before the intersection point. This is the main problem of this analysis, and the following section shows how this analysis deals with that serious issue.

The lifetime utility of individual i, working at firm f in period t, is optimized by the choice of the utility-maximizing firm over the career horizon (t=1,..., T):

$$\max_f V_{i,f,t} = \int_{t=1}^{T} F_f(exp_{i,t}); \quad \text{f}\in(1,2) \tag{7}$$

The complete wage path of individual i is subdivided into three sections.
The individual stays in firm 1 if:

$$V_{i,f,t} = \int_{t}^{OPM} [F_1(exp_{i,t}) - F_2(exp_{i,t})]dt > 0 \quad (\text{if t} \rightarrow \text{OPM}) \tag{8}$$

In OPM, the area under both wage trajectories is 0:

$$V_{i,f,t} = \int_{OPM} [F_1(exp_{i,t}) - F_2(exp_{i,t})]dt = 0 \quad (\text{if t} = \text{OPM}) \tag{9}$$

$$\int_{OPM} F_1(exp_{i,t})dt = \int_{OPM} F_2(exp_{i,t})dt \tag{10}$$

Working in firm 2 is more valuable if:

$$V_{i,f,t} = \int_{OPM}^{T} [F_2(exp_{i,t}) - F_1(exp_{i,t})]dt > 0 \quad (\text{if OPM} \rightarrow \text{T}) \tag{11}$$

The model derived here is the benchmark for an optimal wage path for individuals changing the employer. However, suboptimal mobility is expected because of the restrictive model. A generalization of the utility function by introducing e.g. risk aversion would give further insights on individual mobility along the career horizon. Moreover, economic uncertainty which is excluded by the equilibrium model is not under consideration in this paper. Two settings for suboptimal mobility behavior are depicted in figure 3. The major criterion for suboptimal mobility is the existence of an intersection point of the individual wage trajectories.

Insert figure 3 about here

Suboptimal mobility (early) is shown in the upper part of figure 3. Here, the wage path of the individual i is characterized by a step. This is suboptimal because the mobility event does not occur in OPM. A wage loss becomes evident by closer inspection of figure 3. The area enclosed by the wage trajectories of individual i from m to OPM is to be interpreted as a wage loss during the working career.

As shown in figure 3, the employee hops from one wage trajectory to another one in the period of mobility. Hence, the individual changes employers suboptimally and is suffering a loss of wages over his/ her working career.

$$V_{i,f,t} = \int_{t=1}^{OPM} F_1(exp_{i,t})dt + \int_{OPM}^{T} F_2(exp_{i,t})dt + \\ + \underbrace{\int_{m}^{OPM} [F_2(exp_{i,t}) - F_1(exp_{i,t})]dt}_{< 0;\ \text{wage loss: } \textit{suboptimal mobility (early)}} \tag{12}$$

Moreover, a wage reduction as mentioned by Smith (1994) becomes evident. Therefore, the wage path is characterized by a step induced by mobility. Hence, the interpretation of wage cuts as investments in future wage growth (Connolly and Gottschalk 2008) becomes to be of special interest. In the current framework, wage reductions are never due to investment in future wage growth, but they are due to suboptimal behavior of individuals.

Suboptimal employer-to-employer transitions can also be executed after OPM. Possibly, job satisfaction causes this certain type of suboptimal mobility. In this case, again, the wage path is characterized by a step in m. Hence, the individual changes employers suboptimally in the context of this model, as illustrated at the bottom of figure 3.

$$V_{i,f,t} = \int_{t=1}^{OPM} F_1(exp_{i,t})dt + \int_{OPM}^{T} F_2(exp_{i,t})dt + \\ + \underbrace{\int_{OPM}^{m} [F_1(exp_{i,t}) - F_2(exp_{i,t})]dt}_{< 0;\ \text{wage loss: } \textit{suboptimal mobility (late)}} \tag{13}$$

A wage loss, defined as the area from the intersection point of the curves to the mobility event is also evident. Furthermore, wage markups induced by mobility as mentioned by Borjas (1981) and Topel and Ward (1992) become evident. None of the above authors consider upward mobility in combination with wage losses explicitly. A further interpretation for this type of wage loss is costly on-the-job search which is excluded by assumption. Furthermore, analogously to Bingley and Westergard-Nielsen (2006), the separation probability synchronously increases with the wage loss.

If the benchmark for optimal mobility derived above is correct, wage reductions and wage markups result simply from a suboptimal mobility choice of individual i. Here, it is shown that wage markups are possibly not compensating for the wage loss attained by the suboptimal mobility period. Hence, a waste of wage potentials of individuals is evident. If between-firm mobility is not executed in the optimal way, the discontinuities are shown to cause wage losses in the individual's wage profile across the career.

It is necessary to mention that downward and upward mobility in the context of this paper are characterized by a steady wage differential in two firms across the working career of individual i. Hence, these wage paths become discontinuous by mobility and are not characterized by an intersection point. Hence, OPM is non-existent. The concepts of Borjas (1981) and Smith (1994) are not specifically excluding such mobility patterns.

Although, these profiles cannot be displayed by the model, they describe further wage paths of interest. Several possibilities are expected to cause such profiles across the working career horizon. First, discontinuous profiles can be due to the individual's lack of

full information about wage profiles and match quality in all firms. Second, this path may be due to individual utility functions of other forms than the one described above. Third, uncertainty with respect to the economic environment or individual career developments is not accounted for. Moreover, the literature refers to upward and downward mobility as the prevalent types of mobility.

Equation 14 illustrates the wage loss introduced by downward mobility:

$$V_{i,f,t} = \int_{t=1}^{m} F_1(exp_{i,t})dt + \int_{t=m}^{T} F_2(exp_{i,t})dt + \\ + \underbrace{\int_{m}^{T} [F_2(exp_{i,t}) - F_1(exp_{i,t})]dt}_{< 0;\ \text{wage loss: } \textit{downward mobility}} \tag{14}$$

A loss of utility is evident from m until the end of the career by moving to firm 2. The corresponding wage loss accompanied by upward mobility is described by:

$$V_{i,f,t} = \int_{t=1}^{m} F_1(exp_{i,t})dt + \int_{t=m}^{T} F_2(exp_{i,t})dt + \\ + \underbrace{\int_{t=1}^{m} [F_1(exp_{i,t}) - F_2(exp_{i,t})]dt}_{< 0;\ \text{wage loss: } \textit{upward mobility}} \tag{15}$$

From the beginning of the working career until m a loss becomes evident. Working in firm 2 all the time is of higher value across the working career.

The upper wage path, as referred to in this setting, is not explicitly accounted for in the literature. Moreover, the study extracts information on whether the between-firm wage path exceeds the within-firm trajectory. Therefore, the literature is enhanced by a simultaneous observation of individual wage trajectories across the working career.

3 Data and Procedure

3.1 Data

Holzer et al. (2004) stress the importance of both, firm as well as individual characteristics for between-firm mobility. Therefore, the analysis uses linked employer-employee data to investigate the explanatory power of the model empirically. More specifically, the

cross-sectional model of the linked employer-employee dataset of the Institut für Arbeitsmarkt und Berufsforschung ('LIAB') is applied (Alda et al. 2005). The data consist of observations on workers from a representative sample of firms in Germany. Furthermore, the dataset is a panel of cross-sections from 1993 to 2006 at the corresponding record date of June 30th. Hence, 14 periods are available for investigating working careers. A further benefit of this dataset is that the construction of wage trajectories is possible by controlling for a variety of firm characteristics and by the observation of comparable workers in the same firm.

This analysis focuses on mobile full-time working employees changing from one LIAB-firm[5] to another LIAB-firm in two consecutive periods. Moreover, vocational trainees are included in the analysis because they compose the most flexible group of workers. Moreover, Topel and Ward (1992) show that young workers are upward mobile. By consideration of the model, vocational trainees are expected to invest in the future wage growth as Connolly and Gottschalk (2008) suggest. This directly contradicts Topel and Ward (1992) because early suboptimal mobility is accompanied with downward mobility. The main interest is in the individual wages achieved in the primary occupation at firm f. The data report individual daily wages. By looking only at full-time employed workers and vocational training participants, one can assume that any bias caused by the non-consideration of working hours will be diminished. When referring to schooling, the school leaving degree surveyed by the individual is accounted for. This assures that the reward to schooling remains constant during the entire working career among the different employers, as postulated by the model. Different rewards to schooling is accounted for by performing estimates for each firm. Hence, the procedure described in the following section will absorb the bias introduced by different rewards for education in different firms. Potential experience ('$\exp_{pot}$') is calculated with respect to the individuals' stated labor market entry. Hence, possible unemployment spells or internships following education are considered by construction of $\exp_{pot}$.

An advantage of this dataset is that a worker is to be observed in different firms.

[5]In the data, establishments are observed. Here, firm and establishment are used interchangeably.

Therefore, it is assured that employer and employee committed an employment relationship. Hence, the matching procedure is not explicitly to test because the worker's skills do meet the requirements of the employers. Moreover, problems regarding sorting or individual selection into LIAB-firms are nonexistent because workers are not expected to systematically change from one LIAB-firm to another LIAB-firm. It is to mention that the researcher is not able to identify certain moves: Transitions into the sample from a non-LIAB-firm or transitions out of the sample into a non-LIAB-firm are not identified. Therefore, the number of individual moves is unknown if the individual was not observed in the sample for the whole career horizon because the individual employment history is not completely surveyed in the data. Furthermore, this analysis refers to a LIAB-firm-to-LIAB-firm transition when the individual changes establishments within the same employer.

3.2 Procedure

The main goal of the procedure applied here is to extract information about whether the between-firm mobility wage trajectory exceeds the within-firm wage path. It is possible to construct the information on whether an individual changed employer by moving from one LIAB-firm to another LIAB-firm. Based on this information, the wage trajectories of these individuals are estimated. Hence, for each mobile individual, wages are estimated in both firms at which the individual was employed at period t (f $\in (1, 2)$). Separate estimates for each firm are necessary as it is assumed that different employers reward labor market experience in different ways and individual i's wages are not observable in two firms simultaneously. Hence, estimation of wage-experience contracts in the sense of the model above is expected to be most precise by this procedure. For reasons of efficiency in estimating the wages, the analysis only includes firms for which at least 100 observations are available . Moreover, this analysis focuses on the reward to $\exp_{pot}$. The inclusion of the squared $\exp_{pot}$ is to impose decreasing returns to experience over time.

Wage trajectories are estimated by OLS, distinguishing between the firms at which the employee was employed.

$$\widehat{log(w)}_{i,f,t}^{OLS} = \hat{\beta}_{0,f} + \hat{\beta}_{1,f}(exp_{pot})_{i,t} + \hat{\beta}_{2,f}(exp_{pot})_{i,t}^2 + \hat{\gamma}' X_{i,t} \tag{16}$$

where the log wage of individual i at period t in firm f is to be estimated (f $\in (1, 2)$). $X_{i,t}$ contains information on the classifications of occupation (vocational trainee, unskilled worker, skilled worker, technician, clerk), schooling (maximum degree achieved by individual i), gender, a dummy variable describing the first 100 days in a firm[6], and a dummy variable for Germans. All the information included in $X_{i,t}$ describes main determinants of an individual's wage path. The dummy variable describing the first 100 days in a certain firm is included in order to account for monitoring and seniority. During the monitoring period, the wages are lower than after the monitoring. This dummy is to account for this. The inclusion of dummies for schooling becomes necessary as schooling strongly configures an individual's working career because certain education levels provide access to certain jobs. The gender wage gap is controlled for by a dummy variable for males. A further determinant affecting wages is the occupational status of blue-collar and white-collar workers.

Adjacent, the estimation results are used to predict the wage trajectories in each firm. For each mobile individual, changing from one LIAB-firm (firm 1) to another LIAB-firm (firm 2), the wage differential between the predicted wages is used to determine optimal mobility.

$$\widehat{log(w)}_{i,1,t}^{OLS} - \widehat{log(w)}_{i,2,t}^{OLS} \tag{17}$$

where $\widehat{log(w)}_{i,f,t}^{OLS}$ describes the OLS prediction of the log wage of individual i, working in firm f at period t.

Table 1 shows the calculation of the different mobility patterns which are illustrated in figure 1. Scenarios 1 and 2 verify steady between-firm wage differentials, and therefore, are discontinuous[7]. Discontinuous mobility results in a wage markup as described in

[6]For vocational trainees, the probation period equals 3 months in Germany.

[7]Scenarios 1 and 2 have to be examined more differentiated. If the wage trajectories do not run exactly parallel, they have to intersect at any point in time. Here, it is imposed that the wage trajectories do not intersect during the observed working career horizon of individual i.

scenario 1. Evidence for this type of mobility is presented in Borjas (1981) and Topel and Ward (1992). Smith's (1994) contribution becomes evident in scenario 2 because the predicted wage differential indicates a wage cut during the individual's career horizon.

Insert table 1 about here

Scenarios 3 and 4 depict intersecting wage profiles. Scenario 3 depicts individual mobility that is problematic for the model to deal with. While the individual is employed in firm 1, he/ she would be better off in firm 2, whereas, while he/ she is employed in firm 2, the estimated wage is larger in firm 1. This case is referred to as 'unanticipated mobility'. Scenario 4 describes the optimal and suboptimal mobility pattern as described above. Hence, only this scenario is in line with the model derived above.

4 Results

The empirical investigation of the model derived above shows that upward mobility is most common among mobile workers. According to the data, 73854 wage paths are predicted via OLS. As the counterfactual wage differentials in table 2 show, almost half of the workers (46%) were found to realize a wage markup when changing employers while facing a discontinuous wage profile using the OLS predictions. Downward mobility is also very common. About one third (37%) of the employees experience wage reductions as a result of mobility. Hence, steady between-firm wage differentials are common in reality. Moreover, this results shows that individual mobility is more complex than the model above predicts.

Insert Table 2 about here

The remaining 17% of the workers changing employer once are featuring an intersection point of the wage trajectories across their career. Unanticipated mobility explains about 8% of the employer-to-employer mobile workers, while the model derived above describes about 9% of the mobility events. Therefore, the results, show that the suboptimal mobility pattern is describing labor market mobility inadequately. The frequency

of unanticipated mobility shows that individual and economic uncertainty is a further source affecting the extent of mobility attributable to wages.

To evaluate whether mobility is executed optimally (given that OPM is existent), it is necessary to investigate the observed period of mobility. In the benchmark scenario, OPM equals m. Table 3 presents descriptive statistics for the realized period of mobility of workers changing employer in line with the model. The results show that optimal mobility is not evident because the wage differential in m does not equal 0 for any worker[8]. On average, a wage markup becomes evident. This result suggests that individuals are changing employers suboptimally late.

Insert Table 3 about here

Table 3 also displays statistics on suboptimal mobility. One-third of the mobile workers are changing employers suboptimally (early). On average, they experience wage reductions of 0.066 log points. According to the approach of Connolly and Gottschalk (2008), this is the average investment in future wage growth. Two-thirds of the workers are changing employer in line with the model execute the transition after OPM. The corresponding wage markup equals, on average, 0.0735 log points.

About 20% of the individuals are changing employer optimally if a threshold of $|\widehat{log(w)}^{OLS}_{i,1,t} - \widehat{log(w)}^{OLS}_{i,2,t}| \leq 0.01$ is chosen at haphazard. Moreover, about 60% of the individuals are changing employer optimally if a threshold of 0.05 is chosen. This result suggests that workers changing employer in line with the optimal employer-to-employer mobility strategy only cope with low wage losses and are optimally mobile to a large extent.

In summary, the literature regarding employer-to-employer mobility is enhanced by introducing the investigation of wage trajectories at different firms simultaneously. Furthermore, optimal mobility is rather uncommon among workers changing employer once during the career. The results suggest that very few wage cuts (7.5%)[9] are described by the model. Hence, a very low fraction of workers is accepting wage reductions in order

[8] It is to note that the predictions in m are equal to 0 only by accident.

[9] Calculated as: $\frac{\text{suboptimal (early)}}{\text{downward mobility + suboptimal (early)}} = \frac{2203}{27284+2203}$

to improve the career. 11.6%[10] of the wage markups are due to late suboptimal mobility. This result is interpreted in the way that uncertainty affects mobility. However, it is to notice that a relationship between wages and employer-to-employer mobility is existent. Therefore, this analysis contributes to the literature by examining the costs and benefits of employer-to-employer mobility across the working career.

5 Conclusion

Why is the optimal strategy rather uncommon among workers changing employer once? The predictions show that just 9% of the mobile workers changing employer are mobile in accordance to the model. Moreover, discontinouos mobility becomes evident to a large degree. Possible reasons are, on the one hand, the restrictive assumptions of the model, and, on the other hand, insufficient estimation of counterfactual wage trajectories.

It is of use to discuss the most disputable assumptions of the model. In reality, the individual's utility is not limited to a wage maximizing problem. Introducing an enhanced utility function that accounts, e.g., for the aversion to unemployment spells the model would become more realistic. The evident problem of enlarging the utility function is that the upper wage path is not exactly to identify. The empirical application of the fixed-effects estimation possibly diminishes the problems regarding to a time-invariant risk aversion. But it is expected that a downswing enforces the desire for secure employment (albeit lower wages). Hence, even the fixed-effects estimation is to be reviewed critically in this context because economic uncertainty cannot be covered by this procedure. Moreover, as discussed above, schooling remains constant over the working career and among different employers. This is assumed to be the most critical assumption of the model.

A further source causing problems is the estimation of the counterfactual wage trajectories. The dataset contains 14 periods and possibly is too short to reproduce working careers. It is to notice that the availability of data for a longer time horizon would be of

[10] Calculated as: $\frac{\text{suboptimal (late)}}{\text{upward mobility + suboptimal (late)}} = \frac{4450}{34056+4450}$

advance, although 14 years are expected to be large enough to illustrate one employer-to-employer transition. Beyond, the most advance would arise from a survey which incorporates the whole working biographies of individuals. Then, the optimal mobility strategy is used to be completely illustrated by the individual's counterfactual wage path. Furthermore, the estimates are facing a lack of information on promotions or transfers within the firm. The dataset lacks this information on the individual level and therefore, the estimates designed here are expected to be as precise as possible.

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Figures and Tables

Figures

Figure 1
Different mobility scenarios

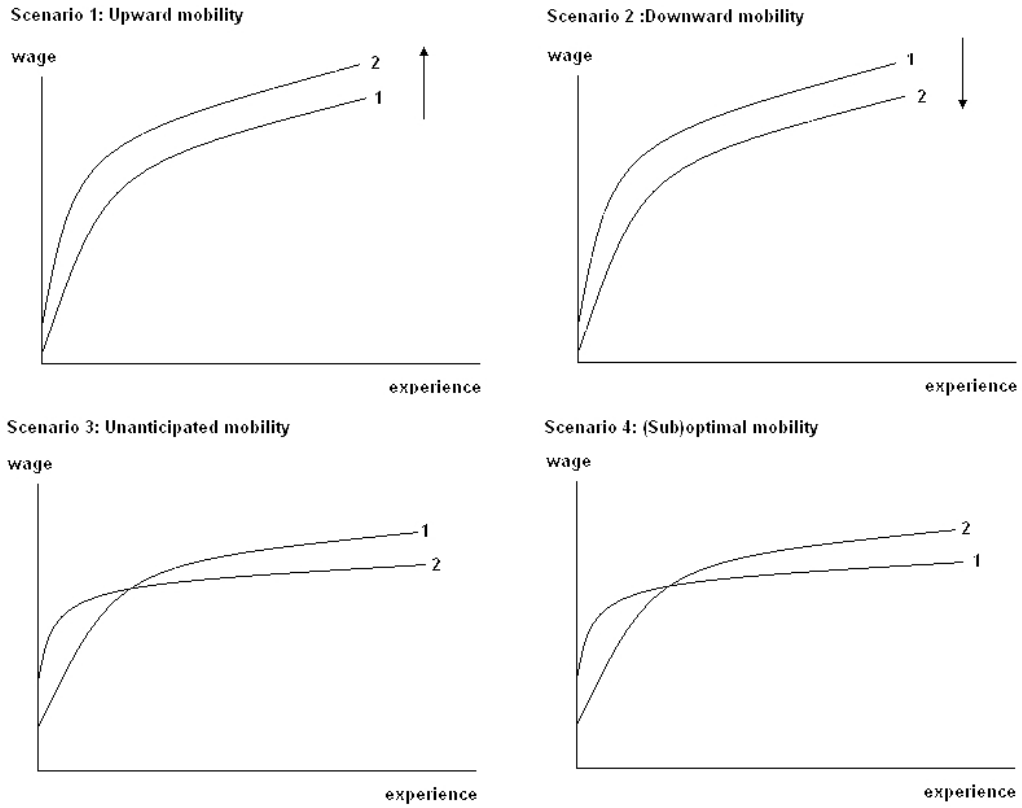


Figure 2
Optimal mobility

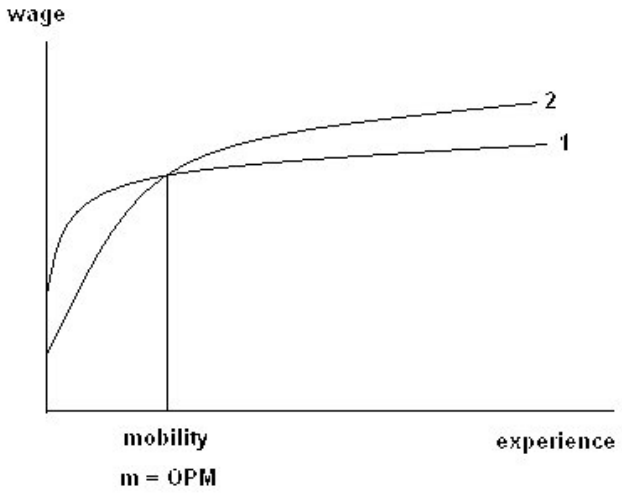
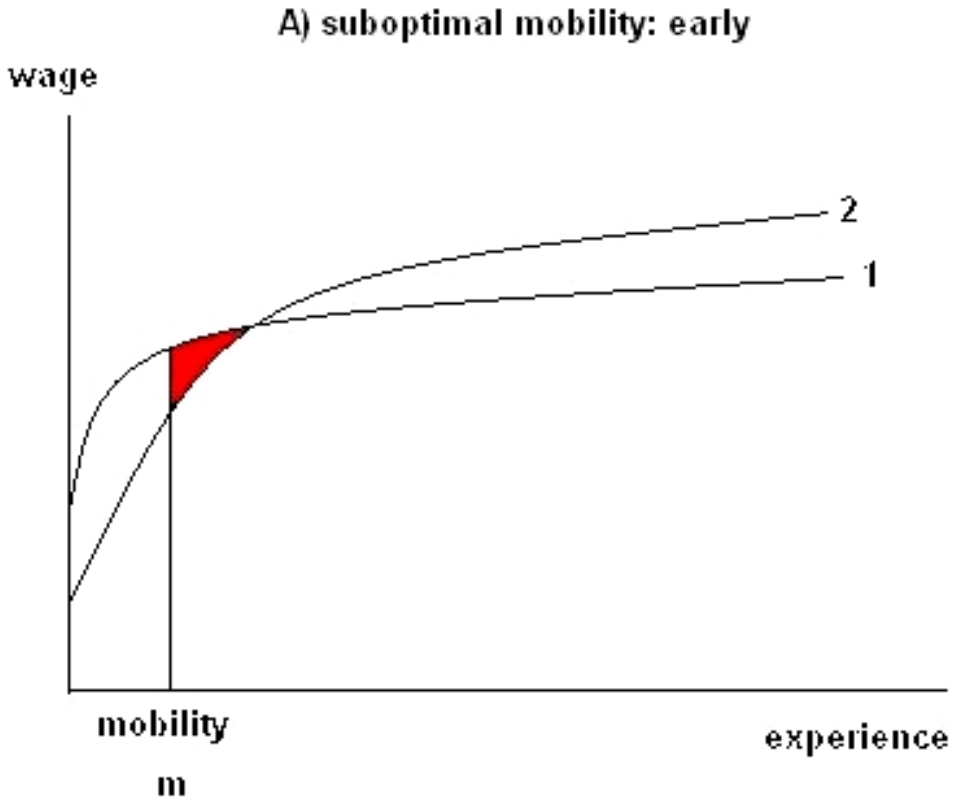
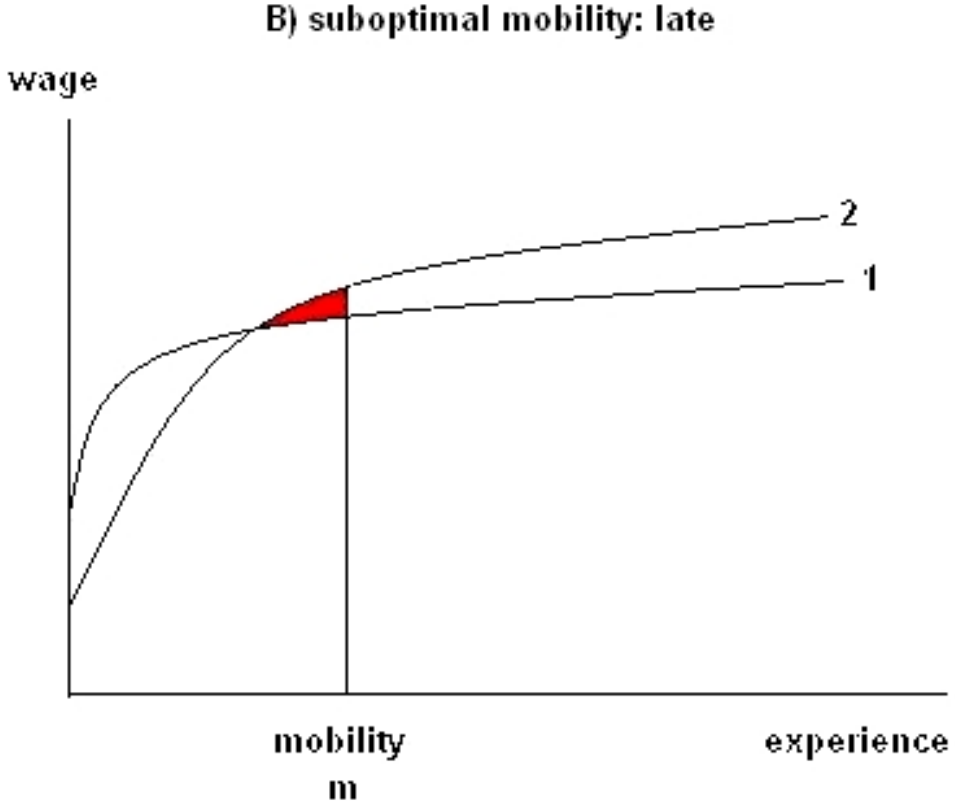


Figure 3
Suboptimal mobility





Tables

Table 1

Description of the different mobility scenarios

Predicted wage path differential in t, f∈(1,2)	$t_{1,i}, ..., t_{OPM,i}$	$t_{OPM+1,i}, ..., t_{T,i}$	Scenario (see figure 1)
$\widehat{log(w)}^{OLS}_{i,1,t} - \widehat{log(w)}^{OLS}_{i,2,t}$	< 0	< 0	[1] upward mobility *
$\widehat{log(w)}^{OLS}_{i,1,t} - \widehat{log(w)}^{OLS}_{i,2,t}$	> 0	> 0	[2] downward mobility *
$\widehat{log(w)}^{OLS}_{i,1,t} - \widehat{log(w)}^{OLS}_{i,2,t}$	< 0	> 0	[3] unanticipated mobility **
$\widehat{log(w)}^{OLS}_{i,1,t} - \widehat{log(w)}^{OLS}_{i,2,t}$	> 0	< 0	[4] (sub)optimal mobility **

* persistent wage differential from t=1, ..., T → no intersection point (OPM) existent

** subdivided sections from t=1, ..., OPM; t=OPM+1, ..., T → intersection point (OPM) is existent

Table 2

Scenarios; one employer-to-employer change is accounted for

	OLS predictions		
	Frequency	Percent	Cumulative
[1] upward mobility	34056	46.11	
[2] downward mobility	27284	36.94	83.05
[3] unanticipated mobility	5861	7.94	90.99
[4] (sub)optimal mobility	6653	9.01	100
Total	73854	100	

Table 3

Descriptive statistics on the realized period of mobility; Scenario: (Sub)optimal mobility

				Quantiles				
	Observations	Mean	Std.Dev	0.10	0.25	Median	0.75	0.90
$\widehat{log(w)}^{OLS}_{i,1,t} - \widehat{log(w)}^{OLS}_{i,2,t}$	6653	-0.0273	0.1366	-0.1375	-0.0588	-0.0130	0.0087	0.0588
$\widehat{log(w)}^{OLS}_{i,1,t} - \widehat{log(w)}^{OLS}_{i,2,t} > 0$; suboptimal (early)	2203	0.0660	0.1244	0.0029	0.0088	0.0272	0.0731	0.1600
$\widehat{log(w)}^{OLS}_{i,1,t} - \widehat{log(w)}^{OLS}_{i,2,t} = 0$; optimal	0	0	0	0	0	0	0	0
$\widehat{log(w)}^{OLS}_{i,1,t} - \widehat{log(w)}^{OLS}_{i,2,t} < 0$; suboptimal (late)	4450	-0.0735	0.1175	-0.1760	-0.0902	-0.0353	-0.0128	-0.0042