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## The returns to job mobility and inter-regional migration

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Institut für Arbeitsmarkt-  
und Berufsforschung

Die Forschungseinrichtung der  
Bundesagentur für Arbeit

IAB

# IAB-Discussion Paper

6/2008

Beiträge zum wissenschaftlichen Dialog aus dem Institut für Arbeitsmarkt- und Berufsforschung

## The Returns to Job Mobility and Inter-Regional Migration

Florian Lehmer  
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# The Returns to Job Mobility and Inter-Regional Migration

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Mit der Reihe „IAB-Discussion Paper“ will das Forschungsinstitut der Bundesagentur für Arbeit den Dialog mit der externen Wissenschaft intensivieren. Durch die rasche Verbreitung von Forschungsergebnissen über das Internet soll noch vor Drucklegung Kritik angeregt und Qualität gesichert werden.

The “IAB Discussion Paper” is published by the research institute of the German Federal Employment Agency in order to intensify the dialogue with the scientific community. The prompt publication of the latest research results via the internet intends to stimulate criticism and to ensure research quality at an early stage before printing.

## Contents

Abstract.....	4
1 Data, basic definitions and some descriptive evidence .....	6
1.1 Data .....	6
1.2 Basic definitions.....	7
1.3 Some basic facts on the determinants of mobility.....	8
2 Econometric estimates .....	9
2.1 Outline of the estimation approach.....	9
2.2 Estimation results.....	10
2.3 Sensitivity check: mobility vs. migration.....	14
3 Summary of findings.....	15
References.....	16
Recently published.....	31

## Abstract

This paper analyses extensively the effects of inter-regional mobility on the earnings of skilled workers. We interact returns to inter-regional migration with employer changes to separate the two effects and find that inter-regional mobility results in positive additional returns as compared to job mobility within a region in general. Partitioning the sample by experience level and tracing the exact paths of migration, it turns out that both the contemporaneous returns and the wage-growth effects exhibit large differences: for young workers we find the highest contemporaneous returns and the largest wage growth effects. Further analyses show that these returns to migration are strongly influenced by the characteristics of both the region of origin and the region of destination. In contrast to results from economic theory, the returns to inter-regional migration are most significant for people who move to rural districts in agglomerated areas. Altogether, the results indicate that switching to a different workplace in a similar region type pays more than moving to a different type of region.

**JEL classification:** J61, R23

**Keywords:** Inter-regional migration, job mobility, contemporaneous returns, wage growth, regional characteristics

# 1 Introduction

The inter-regional mobility of labour is seen as one of the most important mechanisms for regional adjustment processes.<sup>1</sup> Besides the voluminous literature on the consequences of labour mobility for the development of regions, another strand of the literature focuses on the ramifications of internal migration at individual level.<sup>2</sup> A breakdown of individual consequences into pecuniary returns to mobility and employment prospects after migration is convenient. While the latter has been analysed especially for unemployed individuals (Pekkala, Tervo, 2002, Tervo, 2000), this paper concentrates on the impact of inter-regional mobility on the earnings of employed workers.

In recent years, a number of studies have re-investigated the effect of regional migration on earnings. For instance, Ham et al. (2004) use a distance-based measure of migration and find positive contemporaneous returns for the group of young high-skilled individuals and no effects for college dropouts. Glaeser and Maré (2001) identify gains in both contemporaneous returns and long-term wage growth for those migrating to metropolitan areas in the USA. Equivalent results are reported by Pekkala (2002) for Finland. Comparing post-move incomes across Finnish regions, the highest returns to migration can be found for people moving to urban growth centres. Hence, one can conclude that regional disparities have a strong impact on the individual earnings of movers.

Our approach is similar to that of Yankow (2003). He analyses the effects of migration on earnings "by viewing geographic mobility within a job-changing context" (Yankow, 2003, p.484)<sup>3</sup>. Thus, the group of region movers is a sub-sample of job movers. It is self-evident to compare the outcomes of both groups. The findings of Yankow (2003) suggest that regional migration entails a positive additional effect compared with local job-to-job transitions. He uses a sample of young men but allows differential effects for specific groups. While low-skilled individuals obtain the premium immediately after migration, the premium for high-skilled workers is only observed after a lag of two years. These results accentuate the need to distinguish between contemporaneous and long-term effects. The two effects might differ for several reasons. For instance, Yankow (2003) concludes that high-skilled individuals treat migration as an investment in their human capital in order to increase their future productivity. For this group, the "migration wage-level effect" immediately after migration is not significant, but the accumulation of human capital or alternatively anticipated upward mobility fostered in the new job leads to positive "migration wage-growth effects".

Altogether, the cited studies stress that the success of migration is strongly influenced by the characteristics of both the worker and the region.

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<sup>1</sup> According to the results of Blanchard and Katz (1992), this is especially true for the USA. For European countries, Decressin and Fatas (1995) assess the importance of participation behaviour instead of migration in the adjustment to an economic shock. However, the economic literature agrees that migration adjustments are much slower in Europe (see, for instance, Möller (2001)).

<sup>2</sup> A further strand of the literature deals with the determinants of migration.

<sup>3</sup> This approach goes back to Schwartz (1976).

Like Yankow (2003), we seek to identify short-term and long-term returns to migration compared to job changes within regions. Our data allow us, however, to abandon the confinement to young workers, and to investigate other age categories as well. Moreover, as an innovative contribution to the existing literature, we allow the migration premium to differ for more urban and more rural regions. A crucial advantage of this approach is the implicit consideration of differences in regional price levels. Not differentiating the type of region would yield positively biased results if regional mobility is systematically related to changes from low-price to high-price areas. Then, the wage effects of migration would simply equal the price effects.<sup>4</sup>

The remainder of the paper is organized as follows: the next section deals with a description of our data source, methodological issues and basic definitions. Section 2 also presents some empirical evidence regarding the determinants of migration. Section 3 analyses both the wage-level and wage-growth effects of local job changes and job changes involving migration. Moreover, in this section we check the robustness of our results by excluding potential commuters. Section 4 concludes.

## 2 Data, basic definitions and some descriptive evidence

### 2.1 Data

Our empirical work is based on the employment register data 1995-2000 of the German [Federal Employment Services](#). Its crucial advantage for our application is its size: it covers nearly 80 percent of the German workforce, excluding only the self-employed, civil servants, individuals in (compulsory) military service, and individuals in so-called 'marginal part-time jobs' (jobs with no more than 15 hours per week or temporary jobs that last no longer than 6 weeks).<sup>5</sup> Furthermore it contains important personal characteristics (sex, age, education, job status) as well as information on occupation, industry, establishment identifiers and wages. The regional information which refers to the location of the firm/workplace at NUTS3 (district) level is of particular interest for our analysis. Using a classification scheme of the Federal Office for Building and Regional Planning (*Bundesamt für Bauwesen und Raumordnung* - BBR) we differentiate between four types of region according to their centrality and population density. The classification "metropolitan" covers metropolitan core cities (BBR1) and highly urbanized districts in areas with large agglomerations (BBR2). The term "metropolitan surroundings" stands for urbanized (BBR3) and rural districts (BBR4) within areas comprising large agglomerations. A third category called "central city" contains core cities (BBR5) in re-

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<sup>4</sup> Unfortunately, price information is not available for most German regions. However, most studies dealing with regional issues are limited by the lack of regional price indices. A possible solution is shown in the study by Blien et al. (2007). They use a survey of regional price levels for 32 small regional units (see Ströhl, 1994) and estimate regional price differences for all areas of western Germany by Multiple Imputation.

<sup>5</sup> For a detailed description of the data set see Bender et al. (2000) or Bender et al. (1996). A more commonly used data set in Germany is the IABS, which is a 2 percent random sample of the data set we use.

gions with intermediate agglomerations and their urbanized surroundings (BBR6). All other regions are classified as "rural" (see Appendix, *Table A1*).<sup>6</sup>

However, the data suffer from some moderate limitations. First, though information on earnings is highly reliable (misreporting is subject to severe penalties), working time is only reported in three classes: full-time, part-time with at least 50 percent of full-time working hours, and part-time with less than 50 percent. To avoid bias due to imprecise working time information, we restrict our analysis to full-time prime-age (20-60 years) individuals. A further problem with the data is due to censoring at the social security threshold. Censoring is moderate (about 10-15 percent) for the entire sample. For the highly qualified males (university and other higher education graduates), however, more than 50 percent are censored. Since this would call into question all of the results obtained from the highly qualified sub-sample, we restrict the earnings analysis which we present later on to the medium qualification group. Furthermore we exclude eastern German workers from our sample to avoid bias due to the economic adjustment process after re-unification in 1990.<sup>7</sup>

The social security notification process requires employers to report any permanent or temporary changes in employment relationships. Therefore the employment register contains complete biographies in spell data form. To simplify data processing, we extract spells at cut-off dates (30.6) in every year. This shortcut makes it impossible to observe unemployment spells between 30th June of two successive years. To tackle this, we merge information on unemployment duration from the German unemployment register (LEH) with the employment register data and exclude observations with unemployment spells lasting longer than 30 days between 30th June of two consecutive years.

## 2.2 Basic definitions

To identify the returns to local job changes and job changes involving migration, we define three groups of workers. The reference group of stayers comprises all individuals who are completely immobile in the one-year period between two consecutive cut-off dates (30th June) for analyses related to wage levels and from the first year to the last year of the observation period for analyses of wage growth. Then we examine how local job changers differ in their outcomes from the reference group of stayers. A local job change is defined *as a change of establishment within the same region*. The last group covers people who move to a different type of region. We construct it as a subset of establishment movers. Stressing the importance of regional characteristics for wage determination, then, regional mobility is defined *as a move to a*

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<sup>6</sup> According to this classification scheme, "metropolitan" and "core cities" on the one hand and "metropolitan surroundings" and "rural" on the other hand show substantial similarity in their characteristics.

<sup>7</sup> See, for instance, Kemper (2006) for an exploration of migration patterns in western and eastern Germany.



*workplace in a different BBR region type*<sup>8</sup>. We use the term 'regional mobility' in this sense throughout this paper unless otherwise noted. The definition entails that we drop all job movers who move to a different region, but one which is of the same region type. Additionally, we drop all observations for individuals moving to a different region together with their firm (in the case of establishment relocations). This enables us to compare the pecuniary returns of local and migratory job changers, differentiated by the type of region.

*Table 1* gives some basic information on the number of observations for stayers, establishment movers and migratory job changers in our sample. In the years 1995/96 we observe more than 14 million individuals. The share of individuals moving to a different establishment within the same region is 5.5 percent, the share of people moving to a different region type is about 2 percent. Since this share of 2 percent comprises a figure of more than 290,000 individuals, as far as we know there is no other study on migration topics with a comparable number of observations for mobile workers.

The literature on the determinants of migration shows that gender-specific differences are remarkable. For instance, women are often tied to the migration decisions of their spouses (see, e.g. Astrom, Westerlund (2006) for Sweden or Nivalainen (2005) for Finland).<sup>9</sup> This probably influences the success of migration for female workers. Moreover, due for example to periods of parental leave, women also exhibit less stable employment histories than men. It therefore seems appropriate to concentrate on male workers. Dropping all female workers reduces the number of observations by one third since the labour force participation rate in western Germany is distinctly lower for female workers (see, for instance, Möller, Aldashev, 2007)).

### 2.3 Some basic facts on the determinants of mobility

How do the groups defined in this way differ in their characteristics from the reference group of stayers? We investigate this unconditionally (specification A) as well as conditionally on the type of the region of origin (specification B).

*Table 2* presents the marginal effects of important explanatory variables on moving propensities, calculated from multinomial logit models for the consecutive years 1995/96<sup>10</sup>. The possible exit states in the specification A models are establishment change and migration to a different region type. The explanatory variables include skill categories, (potential) work experi-

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<sup>8</sup> This definition does not differentiate between migration and commuting. In analogy to the distinction made by Eliasson et al. (2003, p.831), this definition of movers in our paper includes the following categories: (i) workers who move their place of residence and their workplace to a different region type; (ii) workers who do not change their place of residence, but start commuting to a different type of region; (iii) commuters who do not change their place of residence, but move to a workplace in a different region type. In order to ensure that our results are not driven by the group of commuters we exclude the categories (ii) and (iii) in a sensitivity analysis later on.

<sup>9</sup> Other studies which deal with family migration issues are Boyle et al. (2001), Cooke (2001), Smits (1999), van Ommeren et al. (1999) and Jacobsen, Levin (1997). For Germany, gender-specific migration wage differentials are examined in Lehmer, Möller (2006).

<sup>10</sup> The replication of multinomial logit estimations for all other pairs of years from 1996/97 to 1999/2000 showed that the described differences are fairly robust.

ence categories, log market size and log establishment size<sup>11</sup>. From the left-hand side of the table, it is obvious that being skilled or high-skilled lowers the probability of changing one's job within the region. Considering the experience categories, one can conclude that job movers are younger than stayers. This is also true of the group of individuals moving to a different region type.<sup>12</sup> While a larger establishment size reduces the probability of moving as well,<sup>13</sup> differences between the groups emerge with respect to skill category and market size. Compared with the reference group of low-skilled men, high-skilled workers are more likely to migrate but are less likely to change establishment within the region. We find quite different effects regarding market size: a larger market size increases the probability of establishment changes within a region but decreases the probability of migration to a different region type. This turns out to be quite obvious after a closer look at the issue. We compute market size by counting the individuals working in the same region x skill x industry cell. Thus the variable market size captures job opportunities as well as job competition for workers. If plenty of jobs are offered within a region, workers are more likely to change firm and there is no need to leave the region.<sup>14</sup>

In specification B, estimates are computed conditional on the type of the region. For "metropolitan surroundings", "central city" and "rural", the effects do not differ from those presented in specification A. An exception occurs only for "metropolitan". The right-hand side of *table 2* shows that the variable *log market size* turns out to be positive in the case of regional migration, indicating that the competition argument is more pronounced than the availability argument in large urban areas.

### 3 Econometric estimates

#### 3.1 Outline of the estimation approach

The empirical analysis seeks to investigate the following issues. Firstly, we analyse whether or not changing establishment within a region entails a positive wage effect in the following year. We pay special attention here to possible differences in mobility premiums with respect to experience group and region type. Secondly, we scrutinize this contemporaneous effect for the group of region-type movers in comparison to the group of stayers and also to the group of establishment movers. Thirdly, observing a cohort of workers for five years after a change took place, we are interested in the wage-growth effects of non-migratory establishment mobility. Fourthly, we assess the wage-growth effects for individuals moving to a different region

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<sup>11</sup> A description of the variables is given in table A1 in the Appendix.

<sup>12</sup> This relationship is universal in the literature. For a comprehensive survey on the determinants of migration see Greenwood (1997).

<sup>13</sup> This might stem from the fact that the average tenure increases with firm size (see, for example, Oi, Idson (1999)). The negative impact of tenure on the propensity for job mobility is well documented in the literature (see, for example, Mincer, Jovanovich (1981), Topel, Ward (1992), Farber (1999)).

<sup>14</sup> Jayet (2000) states that, due to the high concentration of adequate jobs, the group of high-skilled individuals in urban areas is relatively (regionally) immobile. In contrast, for low-skilled workers the competition argument is more pronounced, leading to a higher out-flow from big cities for this group.

type, highlighting the possibility that post-migration wage growth might be influenced by the characteristics of both the region of origin and the destination region. Fifthly, we contrast the estimated wage-level effects of the 2-year sample and the 6-year sample to capture possible selection effects that are driven by the structure of the cohort.

Generally, problems with sample selection bias arise if the groups of stayers, establishment movers and region-type movers differ in unobserved or unobservable characteristics. These differences in unobservable characteristics may result in a statistical artefact. A common way to deal with this problem is to use panel-data fixed-effect models which control (at least) for the time-invariant part of unobserved heterogeneity.

Moreover, to avoid bias due to the censoring of wages in our data set and to eliminate heterogeneity due to education, the fixed-effect estimates concentrate on the group of skilled workers. To keep the sample size tractable, we draw a 10-percent random sample of the stayers. These further restrictions reduce the number of individuals dramatically to a figure of 1 million individuals being observed in 1995 and 1996 (see *table 1*). We use this *2-year sample* to investigate issues one and two.

In order to analyse the wage-growth effects we extend the observation period to the year 2000. This *6-year sample* contains all stayers, establishment movers and region-type movers of the *2-year sample* who were employed at the cut-off dates in *all* of the years from 1995 to 2000. The selection of individuals with stable employment histories helps to reduce the selectivity problem. We reconsider the wage-level effect to assess the effect of selection on the coefficients. Moreover, we drop all observations for workers with multiple (migratory and non-migratory) job changes.<sup>15</sup> This restriction [guarantees](#) a consistent estimation of the *within-job* wage-growth effects for all groups.

### 3.2 Estimation results

*Table 3* contains the fixed-effects results of the wage-level analysis in 1995/96 where log wages<sup>16</sup> are regressed on various individual and firm variables.<sup>17</sup> The likelihood-ratio tests indicate a significant influence of the explanatory variables at very high significance level.

Comparing the groups of job movers and stayers we have two observations (one per year) for 878,699 individuals. The results indicate that job mobility within a region entails a wage increase in the year after changing establishment of about 1.3 percent on average relative to the

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<sup>15</sup> Both restrictions ensure that a renewed check of unemployment spells in the years 1996 to 2000 can be dispensed with.

<sup>16</sup> In the case of censoring, wages are imputed on the basis of Tobit estimates. The explanatory variables capture linear and quadratic terms of potential work experience, share of high-skilled workers, share of female workers, log establishment size as well as industry and regional dummies. Additionally, we add an error term drawn from a truncated normal distribution (with a standard deviation equal to the estimated residual standard deviation from the Tobit regression) to the predicted values. The results of these Tobit estimates are available from the authors on request.

<sup>17</sup> The explanatory variables are described in *table A1* in the appendix.

group of immobile workers. The firm-size controls capture both firm-size effects in 1995 and the effects of a change in firm size from one year to the next. For job movers, a change of establishment size is always related to a change to a different (larger or smaller) establishment, while for stayers the effects stem from the (positive or negative) growth of their employer. As can be expected from theoretical considerations, shifts in establishment size affect the earnings of workers in small establishments to the largest extent. Capturing the size of the labour market, the variables *log market size* and *log aggregated market size* both exhibit a positive influence on wages. Increasing the share of high-skilled (female) workers in a firm leads to higher (lower) wages on average. Moreover, it emerges that industry affiliation has a sizeable impact on wages.<sup>18</sup> Changing from manufacturing to services entails a wage drop of 4 percent<sup>19</sup> while job movers choosing the opposite direction gain about 3.7 percent.

Applying this analysis to the groups of region-type movers and stayers, it is evident from *table 3* that the wage-level effect (3.2 percent) is distinctly larger for region-type movers than for establishment movers. The estimated coefficients for the control variables differ from those presented above to some extent. The interaction effects of firm size with positive firm-size growth are distinctly smaller in magnitude, while the opposite is true for the interactions with decreasing firm size. A further dissimilarity occurs for *log aggregated market size*, which now contributes significantly negatively to the explanation of workers wages. Summing up the first results it is evident that contemporaneous returns to both job mobility and regional mobility are positive.

The third regression compares the outcomes of inter-regional and within-region mobility in more detail. Controlling for the documented personal and firm characteristics it is evident from *table 3* that the general extra effect of regional mobility of 1 percent is statistically significant and positive.

Before exploring potential differences by experience category and region type, we report the results of the overall wage-growth effect. They are contained in *table 4*. Note that the construction of a balanced panel for the six-year period causes a substantial reduction of the sample size.<sup>20</sup> To obtain the wage-growth effect relative to the year 1995, the dummy indicators for the specified type of mobility are interacted with time dummies. *Table 4* shows that the estimated coefficients for the dummy indicators are all highly significant.

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<sup>18</sup> Since the pioneering work of Krueger, Summers (1988), this relationship has been well documented in the literature.

<sup>19</sup> The anecdotal remark in the US literature suggests that manufacturing workers become "hamburger flippers" in the service sector (see, for example, Parrado et al. 2007). For Germany, however, there seems to be little evidence to support such a statement.

<sup>20</sup> It is obvious from *table 1* that the restriction criteria for constructing the six-year panel are most striking for mobile workers. Only about 31 percent of the region-type movers and 37 percent of establishment movers of the 2-year sample are still contained in the 6-year sample, while the share of surviving stayers is about 55 percent.

Compared to the group of immobile workers, establishment movers earn a premium of 1.17 percent in the year after mobility. The within-job wage-growth effect strictly increases from 1.30 percent in 1997 to 2.24 percent in 2000.

This is distinctly lower than the wage-growth effect for region-type movers. Their wage advantage relative to stayers rises to 4.78 percent by the end of the observation period. Comparing the groups of establishment movers and region-type movers directly, it is obvious from *table 4* that the wage-growth paths of migratory job changers are significantly steeper in general than those of non-migratory job changers.

The bulk of previous studies concentrates on pecuniary returns for *young workers*.<sup>21</sup> A major exception for Germany is the study by Schneider (2007). His results provide evidence that older workers benefit from changing establishment, but less than younger workers do.<sup>22</sup> This is confirmed by our estimates for three experience categories (see *table 5*).<sup>23</sup> While young establishment movers with a potential work experience of less than ten years earn a premium of more than two percent two years after the move, the corresponding benefit for individuals in the third category (more than 20 years of potential work experience) is less than one percent. Interestingly, after a peak three or four years after changing establishment, the returns decrease until the end of the observation period.

This pattern also emerges when comparing region-type movers and stayers. Here, differences between young and older workers are much more pronounced. The wage-growth effect increases to 7.5 percent for young workers and about 5.5 percent for workers in the second category (10-19 years of experience). In contrast, for older workers the largest return amounts to only 1.6 percent.

This is also mirrored in the comparison of region-type and establishment movers. The extra effect of regional migration is comparably high for the workers in categories 1 and 2. The contemporaneous extra return is 1.2 percent in 1996, the growth rates differ distinctly by 3 percentage points in the year 2000. The estimated coefficients for the differences between groups of older workers are mainly statistically insignificant.

Additionally, *table 5* compares the estimated wage-level effects of the 2-year and the 6-year samples. When constructing the 6-year sample, one can argue that screening in particular the job and establishment movers leads to higher wage-level effects for mobile workers in the 6-

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<sup>21</sup> See, for example: Bartel (1980), Borjas, Rosen (1980), Bartel, Borjas (1981), Mincer, Jovanovich (1981), Borjas (1984), Mincer (1986), Antel (1991), Loprest (1992), Topel, Ward (1992), Light, McGarry (1998) Yankow (1999, 2003) and more recently: Ham et al. (2004), Détang-Dessendre et al. (2004).

<sup>22</sup> According to Schneider (2007) this result can be expected from theoretical considerations since earnings increase with job tenure (indirectly with age) and workers lose the seniority-related part of their former wage after changing establishment. He works out that this argumentation is consistent with both human capital theory (see Becker (1964), Mincer (1974, 1978)) and matching theory (see Jovanovich (1979)) and the theory of deferred payment (see Lazear (1981)).

<sup>23</sup> For the sake of clarity, *table 5* contains the estimated coefficients for the dummy indicators only. The comprehensive results of the nine fixed-effects estimates for different experience categories are not documented in the paper but are available from the authors on request.

year sample. *Table 5* provides evidence that this is not the case. The wage-level effects of the 2-year sample are generally even higher. This suggests that the results are not upwardly biased by the structure of the cohort.

After having established that mobility effects differ for young and older workers, we now turn to the main question of our paper. *Table 6* sheds light on the impact of the region type on the success of establishment changes involving or not involving migration. The overall wage boost of establishment movers relative to stayers of 1.17 percent in 1996 to 2.24 percent in 2000 (see *tables 4* and *5*) exhibits some variation for the different types of region. *Table 6* shows that the contemporaneous return to establishment mobility tends to be more pronounced within "metropolitan" (1.25 percent) and "central city" (1.44 percent) districts, where employment density is higher than in "metropolitan surroundings" or "rural" districts. Hence, this is in accordance with results from matching theory according to which the likelihood of good matches between employer and employee increases with the size of the labour market. However, the steepest wage-growth profiles can be identified for establishment movers within "central city" and "rural" districts. Generally, the results indicate that there is a positive general effect of establishment mobility which is independent of the type of the region.

Turning to the success of inter-regional migration we show in *table 6* that individuals who leave the most agglomerated regions ("metropolitan") earn a 1.96 percent premium in the year after migration relative to stayers. This wage differential between region-type movers and stayers reaches about 3.5 percent by the end of the observation period. It is evident from the table that movers leaving less densely populated regions benefit more relative to the stayers in the corresponding region. More information on the outcomes of regional mobility is shown in the lower part of *table 6*, which contains separate estimates by region of origin and destination region. The gross wage-growth effect of 4.78 percent in the year 2000 (see *tables 4* and *5*) is the result of very different net effects. While movers from "rural" to "metropolitan" districts earn a premium of almost 7 percent relative to those who stay in "rural" districts, the corresponding advantage for workers choosing the opposite direction of mobility is 3.22 percent. This example demonstrates that the success and failure of regional mobility have to be considered very carefully.

This emerges clearly when comparing region-type movers and establishment movers. The general result that regional mobility has a positive extra effect over establishment mobility does not hold for "metropolitan". On the one hand, region-type movers suffer a wage loss in 1996 compared to establishment movers ranging from -0.52 percent (movers to "central city" districts) to -1.92 percent (movers to "rural" districts). Due to a somewhat higher wage growth, mobile workers were able to catch up to some extent, but the difference for movers to "rural" districts remains negative in all the consecutive years. On the other hand, the difference in wage growth between movers from "rural" to "metropolitan" districts and establishment movers within "rural" districts is positive to the magnitude of more than 5 percentage points.

The literature has documented a positive impact of employment or population density on productivity and wages.<sup>24</sup> Therefore, movers to the more densely populated types of region should benefit from high urban wage levels. Actually, this is what we observe for region-type movers leaving "metropolitan" and "central city" districts. For instance, changes from central cities and urbanized districts in regions with features of conurbation ("central city") to core cities and their highly urbanized surroundings in regions with large agglomerations ("metropolitan") result in a wage increase which is distinctly higher than for moves to regions of rural character ("rural"). However, the results in *table 6* point to the fact that regional mobility to a more densely populated region is not necessarily the best outcome. Surprisingly, for movers out of "metropolitan surroundings", the highest contemporaneous returns and growth effects relative to both reference groups can be found when migrating to rural areas. For workers leaving the most rural region type, high returns are related to moving to "metropolitan" and "metropolitan surroundings". Compared to the reference group of stayers, returns are even higher for people moving to "metropolitan surroundings". Generally, people moving to "central city" have the lowest returns to migration if they were employed in the more rural types of region ("metropolitan surroundings" and "rural") in 1995. The results indicate that moving between regions with different characteristics is more successful the more similar the regions of origin and destination are. This is corroborated by considering movers out of "metropolitan" regions. The wage disadvantage relative to establishment movers is lowest for movers to "central city" regions.

### 3.3 Sensitivity check: mobility vs. migration

Throughout the paper inter-regional mobility is defined as a *change to a workplace in a different BBR region type*. As mentioned above, this definition does not distinguish between migration and commuting. In order to ensure that our results are not driven by the group of commuters, we now drop all observations for region-type movers whose new workplaces are less than 1 hour's driving time away from the previous workplaces.<sup>25</sup> We then conduct the same analysis as documented above. *Tables 7* and *8* contain the results. The first lines of both tables repeat the results for the non-migratory establishment movers. It is evident that the estimated dummy indicators for the sub-sample of migrants are somewhat higher than those for the larger group of region-type movers. These results indicate that the gains from migration in-

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<sup>24</sup> The studies by Ciccone, Hall (1996) for the US or Ciccone (2002) for several European countries show the positive relationship between employment density and productivity. Moreover, there is overwhelming evidence of the existence of an urban wage premium in the literature (see, for instance, Rosenthal and Strange (2005) and Wheeler (2001) for the USA, Haas and Möller (2003) for western Germany, Combes, Duranton and Gobillon (2003) for France, Di Addario and Pattacchini (2004) for Italy and Tabuchi and Yoshida (2000) for Japan).

<sup>25</sup> More precisely, the driving time distance is measured between the central points of the districts where the old and the new workplaces are located. Unfortunately, we have no information on workers' place of residence. We therefore choose driving time as the criterion to distinguish between migration and commuting. We assume that one hour is the maximum driving time beyond which nobody is willing to commute. This criterion thins out the sample of inter-regional movers by almost 60 percent. Of course, we are aware that some of the migrants will also be dropped. Nevertheless, we refer to this sub-sample of regional movers as migrants.



crease with distance. The results documented above are qualitatively robust. Younger workers benefit most from migration and "metropolitan surroundings" is the most recommendable region of destination. For migrants leaving districts in this region type, the returns are highest when entering "rural" regions.

## 4 Summary of findings

Summing up the main results we find that both job mobility and regional mobility entail a wage increase in the year after changing the firm relative to the group of immobile workers. Here, the contemporaneous return for people moving to a different region is statistically significantly larger in the aggregate than for non-migratory job movers. Observing a cohort of workers over a six-year period, we find the steepest aggregate wage-growth paths for region-type movers. Thus, analysing contemporaneous returns and wage-growth effects, we are able to identify positive extra effects of regional mobility compared to job mobility. These results related to the aggregate sample are supplemented by investigations at the more disaggregate level.

We start by considering different age groups and find that there are marked differences. Young workers with a potential work experience of less than ten years benefit more from job mobility than older workers. This suggests that the bulk of studies focusing on young men overestimates the general return to job mobility. For region-type movers, the differences between young and older workers are even more pronounced. This indicates that the overall finding that regional mobility entails a higher wage growth, is positively biased.

The finding that the wage effect of mobility is not uniform also emerges when we analyse mobility conditional on the region type. Compared with immobile workers in the region of origin, contemporaneous returns for job movers tend to be higher in more densely populated regions. However, since wage-growth paths seem to be steeper in rural regions, the long-term success of non-migratory job mobility does not differ significantly between urban and rural areas. Significant differences can be found with regard to inter-regional mobility. Leaving more rural areas yields a gross gain (relative to the corresponding stayers in the region of origin) which is larger than the gross wage advantages related to leaving densely populated areas. The extra effect of regional mobility relative to establishment mobility without migration is even negative for movers who leave the core cities in densely populated agglomerated areas. Of course, this can be expected from theoretical considerations since movers to densely populated areas benefit from an overall higher wage level and workers who leave the densely populated areas lose at least part of the urban wage premium.<sup>26</sup> What is partly responsible for these gains and losses from inter-regional mobility are regional price differences which we are not able to observe. However, analysing symmetrically arranged streams of mobility between

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<sup>26</sup> There is empirical evidence that the urban wage premium is not entirely lost when leaving the cities. For example, Glaeser and Maré (2001) point out that the proportion of the urban wage premium which is taken away is higher the more human capital is transferable between urban and rural areas.



region types provides evidence that the wage effects of mobility are not simply equal to the price effects.

Investigating the success of inter-regional mobility in more depth, our results suggest that the positive effects of mobility out of rural areas are not tied to moving to high-wage metropolitan areas. Most interestingly, people moving to rural districts in agglomerated areas benefit more than those moving to more densely populated regions. As far as we know, these results had not yet been documented in the literature. Altogether, the results indicate that changing to a workplace in a similar type of region pays more than moving between regions which differ more.

Introducing a more restrictive definition of mobility and re-analysing the success of regional migration do not change the main findings of the paper. Furthermore, it is shown that the gains are higher for the sub-sample of long-distance movers. We conclude that the gains from mobility increase with distance and that the results documented above are not biased by the selection of the sample. Comparing the contemporaneous returns of the 2-year sample and the 6-year cohort substantiates this point of view.

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**Table 1**  
**Absolute Number and Share of Movers and Stayers in the Sample**

	Basic sample (1995/96)		2- years analysis- sample (1995/96)		6- years analysis- sample (1995/2000)	
	Total	Percent of total	Total	Percent of total	Total	Percent of total
Stayers	13,082,552	92.40	599, 230	59.96	332,588	69.79
Establishment movers	784,216	5.54	294,450	29.46	110,753	23.24
Region type movers	291,132	2.06	105,686	10.58	33,239	6.97
<b>Total</b>	<b>14,157,900</b>	<b>100.00</b>	<b>999,366</b>	<b>100.00</b>	<b>476,580</b>	<b>100.00</b>
Sample description	all skill categories and both genders included		<ul style="list-style-type: none"> <li>• Exclusion of <ul style="list-style-type: none"> <li>- female workers</li> <li>- low-skilled workers</li> <li>- high-skilled workers</li> </ul> </li> <li>• 10 percent sub sample of stayers</li> </ul>		<ul style="list-style-type: none"> <li>• Like 2 years-sample</li> <li>• Additional restrictions: <ul style="list-style-type: none"> <li>- employed at cut-off dates in all years</li> <li>- no form of mobility after 1996</li> </ul> </li> </ul>	

Source: Authors' own calculations using IAB data.

**Table 2**  
**Marginal Effects after Multinomial Logit Estimations (1995/96)**

	Approach I				Approach II	
	Establishment mobility within a region		Regional mobility		Regional mobility conditional on RT1 as region of origin	
Base outcome	Stayers		Stayers		Stayers within "metropolitan"	
Variable	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Low-skilled (ref.)						
Skilled	<b>-0.022993</b>	.00020	<b>-0.0013321</b>	0.00011	<b>-0.0007762</b>	0.00013
Highly-skilled	<b>-0.0168822</b>	.00023	<b>0.0026352</b>	0.00018	<b>0.0035292</b>	0.00022
Experience category: 0-9 years (ref.)						
Experience category: 10-19 years	<b>-0.0195311</b>	.00017	<b>-0.0065719</b>	0.00010	<b>-0.0042191</b>	0.00011
Experience category: 20-39 years	<b>-0.0314413</b>	.00018	<b>-0.0152598</b>	0.00011	<b>-0.0109172</b>	0.00013
Experience category: >=40 years	<b>-0.0386752</b>	.00017	<b>-0.0166004</b>	0.00009	<b>-0.0112935</b>	0.00010
Log market size	<b>0.0063963</b>	.00005	<b>-0.0011135</b>	0.00003	<b>0.0012549</b>	0.00004
Log establishment size	<b>-0.0065428</b>	.00003	<b>-0.0028082</b>	0.00002	<b>-0.0020936</b>	0.00002
<i>Test statistics of MNL-estimations</i>						
Number of observations	9,651,972				4,535,984	
Pseudo R <sup>2</sup>	0.0251				0.0216	
LR [ $\chi^2(14)$ ]	155,459.52				57,776.62	
Log likelihood	-3,021,337				-1,307,120	

Notes: Estimation method is multinomial logit (MNL); all coefficients significant at least at the 1 percent level are in bold. For the MNL estimation (approach I), we use the basic sample (see table 1) without female workers.

Source: Authors' own calculations using IAB data.

**Table 3**  
**Results of the Fixed Effect Estimates: wage level- analysis (2-years: 1995/96)**

Variable	Establishment movers vs. stayers		Region type movers vs. stayers		Region type movers vs. establishment movers	
	Coef.	t-statistics	Coef.	t-statistics	Coef.	t-statistics
Dummy-indicator: wage effect of establishment movers relative to stayers	<b>0.0130</b>	37.11				
Dummy-indicator: wage effect of region type movers relative to stayers			<b>0.0322</b>	54.76		
Dummy-indicator: wage effect of region type movers relative to establishment movers					<b>0.0104</b>	17.12
Establishment size: 0-10 * pos	<b>0.0211</b>	75.67	<b>0.0139</b>	40.96	<b>0.0186</b>	60.91
Establishment size: 11-100 * pos	<b>0.0127</b>	35.63	<b>0.0054</b>	12.89	<b>0.0098</b>	25.57
Establishment size: 101-500 * pos	<b>0.0025</b>	3.89	0.0011	1.32	0.0013	1.72
Establishment size: >500 * pos	<b>0.0037</b>	2.52	-0.0003	-0.12	-0.0006	-0.32
Establishment size: 0-10 * neg	<b>0.0142</b>	13.24	<b>0.0256</b>	16.11	<b>0.0206</b>	14.84
Establishment size: 11-100 * neg	<b>0.0093</b>	22.95	<b>0.0189</b>	32.01	<b>0.0125</b>	26.14
Establishment size: 101-500 * neg	<b>0.0058</b>	17.34	<b>0.0106</b>	24.59	<b>0.0075</b>	20.05
Establishment size: >500 * neg	<b>0.0027</b>	9.45	<b>0.0106</b>	26.17	<b>0.0053</b>	16.04
ln (market size)	<b>0.0088</b>	28.88	<b>0.0072</b>	18.59	<b>0.0080</b>	23.69
ln (aggregated market size)	<b>0.0403</b>	2.92	-0.0022	-4.78	-0.0032	-6.27
Share of high-skilled	<b>0.0007</b>	24.88	<b>0.0009</b>	27.51	<b>0.0009</b>	27.86
Share of female	-0.0003	-26.61	-0.0003	-15.96	-0.0004	-24.88
Change: manufacturing to services	-0.0413	-54.86	-0.0451	-37.81	-0.0417	-46.44
Change: services to manufacturing	<b>0.0376</b>	42.93	<b>0.0579</b>	45.43	<b>0.0447</b>	43.56
Constant	<b>3.9211</b>	26.58	<b>4.3935</b>	1164.95	<b>4.3339</b>	1022.23
Time dummy			included			
	Test statistics					
Number of individuals	878,699		694,379		388,612	
F (878698, 878519)	20.65					
F (694378, 694216)			22.79			
F (388611, 388559)					10.02	

Notes: All coefficients significant at least at the 5 percent level are in bold.

Source: Authors' own calculations using IAB data.

**Table 4**  
**Results of the Fixed Effect Estimates: wage growth- analysis (6-years: 1995-2000)**

Variable	Establishment movers vs. stayers		Region type movers vs. stayers		Region type movers vs. establishment movers	
	Coef.	t-statistics	Coef.	t-statistics	Coef.	t-statistics
Dummy-indicator: wage effect of establishment movers relative to stayers	1996	<b>0.0117</b>	26.08			
	1997	<b>0.0130</b>	29.1			
	1998	<b>0.0190</b>	42.68			
	1999	<b>0.0221</b>	49.9			
	2000	<b>0.0224</b>	50.73			
Dummy-indicator: wage effect of region type movers relative to stayers	1996			<b>0.0261</b>	33.4	
	1997			<b>0.0368</b>	47.47	
	1998			<b>0.0433</b>	55.81	
	1999			<b>0.0485</b>	62.79	
	2000			<b>0.0478</b>	61.97	
Dummy-indicator: wage effect of region type movers relative to establishment movers	1996					<b>0.0070</b>
	1997					<b>0.0168</b>
	1998					<b>0.0173</b>
	1999					<b>0.0196</b>
	2000					<b>0.0186</b>
Establishment size: 0-10 * pos		<b>0.0274</b>	101.57	<b>0.0215</b>	57.46	<b>0.0268</b>
Establishment size: 11-100 * pos		<b>0.0247</b>	73.29	<b>0.0174</b>	39.49	<b>0.0221</b>
Establishment size: 101-500 * pos		<b>0.0175</b>	29.58	<b>0.0252</b>	30.86	<b>0.0154</b>
Establishment size: >500 * pos		<b>0.0136</b>	14.68	<b>0.0086</b>	8.59	<b>0.0273</b>
Establishment size: 0-10 * neg		<b>0.0203</b>	31.09	<b>0.0233</b>	31.02	<b>0.0133</b>
Establishment size: 11-100 * neg		<b>0.0124</b>	28.99	<b>0.0251</b>	42.1	<b>0.0055</b>
Establishment size: 101-500 * neg		<b>0.0040</b>	10.49	<b>0.0109</b>	21.27	<b>0.0031</b>
Establishment size: >500 * neg		<b>-0.0008</b>	-2.57	<b>0.0088</b>	18.55	0.0005
ln (market size)		<b>0.0084</b>	30.95	<b>0.0086</b>	24.94	<b>0.0062</b>
ln (aggregated market size)		<b>-0.0041</b>	-3.97	<b>-0.0007</b>	-1.49	<b>0.0027</b>
Share of high-skilled		<b>0.0010</b>	49.74	<b>0.0010</b>	42.5	<b>0.0011</b>
Share of female		<b>-0.0003</b>	-29.75	<b>-0.0002</b>	-14.54	<b>-0.0004</b>
Change: manufacturing to services		<b>-0.0171</b>	-19.23	<b>-0.0135</b>	-8.77	<b>-0.0153</b>
Change: services to manufacturing		<b>0.0516</b>	54.5	<b>0.0862</b>	56.86	<b>0.0616</b>
Constant		<b>4.3968</b>	409.11	<b>4.3487</b>	1115.58	<b>4.2985</b>
Time dummies				included		
		Test statistics				
Number of individuals		443,341		365,827		143,992
F(443340, 2216480)		59.15				
F(365826, 1828923)				62.51		
F(143991, 719915)						40.18

Notes: All coefficients significant at least at the 5 percent level are in bold.

Source: Authors' own calculations using IAB data.

Table 5

Estimated Dummy-Indicators of the Fixed Effect Estimates: wage level- and wage growth- analysis for all workers by experience category

		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
		All workers		Experience cat.: 0-9 years		Experience cat.: 10-19 years		Experience cat.: >=20 years	
Dummy-indicator: wage effect of establishment movers relative to stayers	<i>1996</i>	<b><i>1.30</i></b>	<i>37.11</i>	<b><i>1.95</i></b>	<i>21.03</i>	<b><i>1.27</i></b>	<i>20.44</i>	<b><i>0.92</i></b>	<i>18.13</i>
	1996	<b>1.17</b>	26.08	<b>1.79</b>	15.01	<b>1.16</b>	16.30	<b>1.14</b>	17.39
	1997	<b>1.30</b>	29.10	<b>2.18</b>	17.32	<b>1.39</b>	19.39	<b>0.81</b>	12.58
	1998	<b>1.90</b>	42.68	<b>2.82</b>	20.72	<b>2.00</b>	27.56	<b>1.14</b>	17.84
	1999	<b>2.21</b>	49.90	<b>2.71</b>	18.11	<b>2.23</b>	30.23	<b>1.30</b>	20.62
	2000	<b>2.24</b>	50.73	<b>2.41</b>	13.97	<b>2.19</b>	29.03	<b>1.19</b>	18.87
Dummy-indicator: wage effect of region type movers relative to stayers	<i>1996</i>	<b><i>3.22</i></b>	<i>54.76</i>	<b><i>4.28</i></b>	<i>30.42</i>	<b><i>3.70</i></b>	<i>37.24</i>	<b><i>1.55</i></b>	<i>16.61</i>
	1996	<b>2.61</b>	33.40	<b>4.68</b>	23.56	<b>2.83</b>	23.39	<b>1.20</b>	9.99
	1997	<b>3.68</b>	47.47	<b>6.16</b>	29.53	<b>4.21</b>	34.67	<b>1.40</b>	11.80
	1998	<b>4.33</b>	55.81	<b>7.35</b>	32.84	<b>5.04</b>	41.05	<b>1.34</b>	11.42
	1999	<b>4.85</b>	62.79	<b>7.47</b>	30.79	<b>5.54</b>	44.60	<b>1.61</b>	13.80
	2000	<b>4.78</b>	61.97	<b>7.29</b>	26.48	<b>5.67</b>	44.68	<b>1.05</b>	9.00
Dummy-indicator: wage effect of region type movers relative to establish- ment movers	<i>1996</i>	<b><i>1.04</i></b>	<i>17.12</i>	<b><i>1.26</i></b>	<i>8.89</i>	<b><i>1.42</i></b>	<i>13.15</i>	<b><i>0.33</i></b>	<i>3.76</i>
	1996	<b>0.70</b>	8.54	<b>1.24</b>	6.11	<b>1.23</b>	9.84	<b>-0.03</b>	-0.22
	1997	<b>1.68</b>	20.57	<b>2.36</b>	10.65	<b>2.41</b>	18.98	<b>0.51</b>	4.23
	1998	<b>1.73</b>	21.13	<b>2.91</b>	11.81	<b>2.63</b>	20.31	<b>0.12</b>	1.04
	1999	<b>1.96</b>	23.98	<b>3.17</b>	11.41	<b>2.91</b>	22.00	<b>0.23</b>	1.95
	2000	<b>1.86</b>	22.67	<b>3.30</b>	10.04	<b>3.07</b>	22.48	<b>-0.23</b>	-1.97

Notes: All coefficients are multiplied by 100.

Estimated dummy indicators of the 2-years sample in 1996 are in italic letters;

all coefficients significant at least at the 5 percent level are in bold.

Source: Authors' own calculations using IAB data.



Table 6

Estimated Dummy-Indicators of the Fixed Effect Estimates: wage level- and wage growth- analysis for all workers by region type

		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
		RT1		RT2		RT3		RT4	
Dummy-indicator: wage effect of establishment movers relative to stayers	1996	<i>1.35</i>	25.44	<i>1.29</i>	10.42	<i>1.29</i>	19.78	<i>1.03</i>	13.08
	1996	1.25	17.72	0.83	5.50	1.44	17.31	0.57	6.21
	1997	1.08	15.37	1.11	7.39	1.71	20.75	1.19	13.11
	1998	1.75	24.99	1.31	8.73	2.27	27.52	1.82	19.97
	1999	2.07	29.64	1.53	10.28	2.73	33.18	2.00	22.10
	2000	2.06	29.59	1.60	10.70	2.78	33.84	2.15	23.74
Dummy-indicator: wage effect of regional movers relative to stayers	1996	<i>3.17</i>	25.42	<i>2.89</i>	15.86	<i>2.91</i>	28.93	<i>3.77</i>	26.61
	1996	1.96	12.07	1.25	5.81	2.71	20.15	2.66	14.55
	1997	2.98	18.44	2.44	11.41	3.75	28.03	3.87	21.35
	1998	3.32	20.57	3.85	18.05	4.32	32.30	4.72	26.05
	1999	3.70	23.03	4.37	20.57	4.88	36.46	5.46	30.37
	2000	3.49	21.75	4.79	22.59	4.76	35.53	5.39	30.00
Dummy-indicator: wage effect of regional movers relative to establish- ment movers	1996	<i>0.37</i>	2.57	<i>0.58</i>	2.67	<i>1.64</i>	14.73	<i>2.14</i>	11.70
	1996	-0.80	-4.61	0.24	0.94	1.23	8.28	1.65	7.70
	1997	0.45	2.60	1.15	4.56	2.02	13.66	2.27	10.65
	1998	0.12	0.68	2.38	9.45	2.04	13.75	2.51	11.77
	1999	0.21	1.21	2.66	10.57	2.17	14.59	3.12	14.64
	2000	0.01	0.07	3.02	12.00	1.99	13.38	2.89	13.60
Dummy-indicator: Wage effect of region type movers relative to stayers	1996	<i>2.58</i>	12.88	<i>2.56</i>	11.68	<i>3.68</i>	24.09	<i>6.02</i>	23.22
	1996	1.52	5.88	0.93	3.51	3.39	16.39	3.00	7.78
	1997	2.57	9.97	2.02	7.71	4.62	22.56	4.56	11.93
	1998	2.83	11.00	3.79	14.48	5.42	26.51	5.58	14.61
	1999	3.47	13.55	4.40	16.84	6.05	29.59	6.53	17.21
	2000	3.06	11.95	5.02	19.24	5.96	29.14	6.85	18.03
Dummy-indicator: Wage effect of region type movers relative to establish- ment movers	1996	<i>0.29</i>	1.19	<i>0.64</i>	2.25	<i>2.76</i>	14.58	<i>4.23</i>	10.82
	1996	-1.01	-3.57	0.11	0.35	2.04	8.67	2.89	6.14
	1997	0.27	0.96	0.92	2.96	3.04	13.03	3.88	8.29
	1998	-0.13	-0.48	2.50	8.08	3.29	14.09	4.28	9.15
	1999	0.26	0.94	2.87	9.27	3.49	14.93	5.10	10.95
	2000	-0.12	-0.41	3.43	11.08	3.35	14.30	5.25	11.26

To be continued on the next page

Notes: All coefficients are multiplied by 100.

Estimated dummy indicators of the 2-years sample in 1996 are in italic;  
all coefficients significant at least at the 5 percent level are in bold.

Legend: RT1 stands for "metropolitan"

RT2 is equivalent to "metropolitan surroundings"

RT3 is "central city":

RT4 stands for "rural".

Source: Authors' own calculations using IAB data.

Table 6 continued

		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
		RT1 to RT3		RT2 to RT3		RT3 to RT2		RT4 to RT2	
Dummy-indicator:	<i>1996</i>	<i><b>3.31</b></i>	<i>20.41</i>	<i><b>2.53</b></i>	<i>8.12</i>	<i><b>3.47</b></i>	<i>14.06</i>	<i><b>3.93</b></i>	<i>14.05</i>
Wage effect of region type	1996	<b>2.35</b>	10.97	<b>1.49</b>	3.59	<b>3.91</b>	10.71	<b>4.48</b>	11.85
movers relative to stayers	1997	<b>3.41</b>	15.97	<b>2.60</b>	6.28	<b>4.91</b>	13.50	<b>5.34</b>	14.14
	1998	<b>3.58</b>	16.81	<b>2.70</b>	6.54	<b>5.52</b>	15.17	<b>6.69</b>	17.72
	1999	<b>3.82</b>	17.99	<b>2.99</b>	7.28	<b>5.45</b>	14.99	<b>7.22</b>	19.13
	2000	<b>3.73</b>	17.60	<b>2.79</b>	6.82	<b>5.65</b>	15.54	<b>7.51</b>	19.91
Dummy-indicator:	<i>1996</i>	<i><b>0.52</b></i>	<i>2.84</i>	<i><b>0.11</b></i>	<i>0.33</i>	<i><b>1.96</b></i>	<i>6.59</i>	<i><b>3.16</b></i>	<i>9.48</i>
Wage effect of region type	1996	<b>-0.52</b>	-2.31	<b>-0.08</b>	-0.17	<b>2.21</b>	5.41	<b>2.01</b>	4.71
movers relative to establish-	1997	<b>0.78</b>	3.46	<b>0.81</b>	1.83	<b>3.08</b>	7.54	<b>2.27</b>	5.32
ment movers	1998	<b>0.28</b>	1.26	<b>0.72</b>	1.62	<b>3.11</b>	7.61	<b>3.01</b>	7.05
	1999	<b>0.22</b>	0.96	<b>0.75</b>	1.69	<b>2.60</b>	6.37	<b>3.41</b>	7.97
	2000	<b>0.13</b>	0.59	<b>0.46</b>	1.05	<b>2.74</b>	6.73	<b>3.56</b>	8.33
		RT1 to RT4		RT2 to RT4		RT3 to RT4		RT4 to RT3	
Dummy-indicator:	<i>1996</i>	<i><b>2.42</b></i>	<i>8.76</i>	<i><b>3.58</b></i>	<i>10.67</i>	<i><b>1.85</b></i>	<i>10.86</i>	<i><b>3.11</b></i>	<i>16.72</i>
Wage effect of region type	1996	<b>1.55</b>	4.70	<b>3.19</b>	6.95	<b>2.44</b>	11.70	<b>2.36</b>	10.32
movers relative to stayers	1997	<b>2.36</b>	7.22	<b>4.84</b>	10.61	<b>3.24</b>	15.59	<b>3.47</b>	15.26
	1998	<b>3.13</b>	9.57	<b>5.96</b>	13.07	<b>3.51</b>	16.91	<b>4.11</b>	18.12
	1999	<b>3.37</b>	10.34	<b>6.46</b>	14.17	<b>4.13</b>	20.00	<b>4.76</b>	21.19
	2000	<b>3.22</b>	9.86	<b>6.67</b>	14.62	<b>3.91</b>	18.88	<b>4.42</b>	19.69
Dummy-indicator:	<i>1996</i>	<i><b>-0.51</b></i>	<i><b>-1.42</b></i>	<i><b>0.19</b></i>	<i><b>0.52</b></i>	<i><b>0.67</b></i>	<i>2.96</i>	<i><b>1.40</b></i>	<i>5.51</i>
Wage effect of region type	1996	<b>-1.92</b>	-5.11	<b>1.44</b>	2.98	<b>0.93</b>	3.79	<b>1.26</b>	4.67
movers relative to establish-	1997	<b>-0.81</b>	-2.17	<b>2.91</b>	6.04	<b>1.43</b>	5.90	<b>1.77</b>	6.60
ment movers	1998	<b>-0.72</b>	-1.93	<b>3.89</b>	8.05	<b>1.16</b>	4.76	<b>1.81</b>	6.75
	1999	<b>-0.74</b>	-1.99	<b>4.14</b>	8.58	<b>1.32</b>	5.50	<b>2.33</b>	8.75
	2000	<b>-0.90</b>	-2.43	<b>4.29</b>	8.89	<b>1.03</b>	4.27	<b>1.84</b>	6.92

Notes: All coefficients are multiplied by 100.

Estimated dummy indicators of the 2-years sample in 1996 are in italic;  
all coefficients significant at least at the 5 percent level are in bold.

Legend: RT1 stands for "metropolitan"

RT2 is equivalent to "metropolitan surroundings"

RT3 is "central city":

RT4 stands for "rural".

Source: Authors' own calculations using IAB data.

Table 7

Estimated Dummy-Indicators of the Fixed Effect Estimates: wage level- and wage growth- analysis by experience category after excluding commuters

		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
		All workers		Experience cat.: 0-9 years		Experience cat.: 10-19 years		Experience cat.: ≥20 years	
Dummy-indicator:	1996	<i>1.30</i>	37.11	<i>1.95</i>	21.03	<i>1.27</i>	20.44	<i>0.92</i>	18.13
wage effect of establishment	1996	<b>1.17</b>	26.08	<b>1.79</b>	15.01	<b>1.16</b>	16.30	<b>1.14</b>	17.39
movers relative to stayers	1997	<b>1.30</b>	29.10	<b>2.18</b>	17.32	<b>1.39</b>	19.39	<b>0.81</b>	12.58
	1998	<b>1.90</b>	42.68	<b>2.82</b>	20.72	<b>2.00</b>	27.56	<b>1.14</b>	17.84
	1999	<b>2.21</b>	49.90	<b>2.71</b>	18.11	<b>2.23</b>	30.23	<b>1.30</b>	20.62
	2000	<b>2.24</b>	50.73	<b>2.41</b>	13.97	<b>2.19</b>	29.03	<b>1.19</b>	18.87
Dummy-indicator:	1996	<i>3.99</i>	51.58	<i>5.30</i>	28.67	<i>4.77</i>	37.35	<i>2.04</i>	16.49
wage effect of region type	1996	<b>3.34</b>	30.05	<b>6.23</b>	21.09	<b>3.51</b>	20.44	<b>1.68</b>	9.96
movers relative to stayers	1997	<b>4.56</b>	41.20	<b>7.98</b>	25.56	<b>5.18</b>	30.06	<b>2.04</b>	12.25
	1998	<b>5.12</b>	46.27	<b>9.45</b>	27.88	<b>5.90</b>	33.89	<b>2.01</b>	12.19
	1999	<b>5.44</b>	49.32	<b>9.61</b>	25.76	<b>6.46</b>	36.56	<b>1.98</b>	12.10
	2000	<b>5.28</b>	47.83	<b>9.88</b>	22.75	<b>6.72</b>	37.17	<b>1.25</b>	7.67
Dummy-indicator:	1996	<i>1.52</i>	19.12	<i>2.10</i>	10.76	<i>2.25</i>	16.00	<i>0.78</i>	6.76
wage effect of region type	1996	<b>1.32</b>	11.40	<b>2.56</b>	8.42	<b>2.27</b>	12.91	<b>0.52</b>	3.09
movers relative to establishment	1997	<b>2.47</b>	21.32	<b>3.97</b>	11.84	<b>3.76</b>	21.10	<b>1.22</b>	7.34
movers	1998	<b>2.42</b>	20.96	<b>4.81</b>	12.66	<b>3.86</b>	21.30	<b>0.87</b>	5.28
	1999	<b>2.46</b>	21.29	<b>5.09</b>	11.69	<b>4.20</b>	22.60	<b>0.68</b>	4.16
	2000	<b>2.25</b>	19.45	<b>5.64</b>	10.68	<b>4.49</b>	23.37	<b>0.05</b>	0.30

Notes: All coefficients are multiplied by 100.

Estimated dummy indicators of the 2-years sample in 1996 are in italic letters;

all coefficients significant at least at the 5 percent level are in bold.

Legend: RT1 stands for "metropolitan"

RT2 is equivalent to "metropolitan surroundings"

RT3 is "central city":

RT4 stands for "rural".

Source: Authors' own calculations using IAB data.

Table 8

Estimated Dummy-Indicators of the Fixed Effect Estimates: wage level- and wage growth- analysis by region type after excluding commuters

		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
		RT1		RT2		RT3		RT4	
Dummy-indicator: wage effect of establishment movers relative to stayers	1996	<i>1.35</i>	<i>25.44</i>	<i>1.29</i>	<i>10.42</i>	<i>1.29</i>	<i>19.78</i>	<i>1.03</i>	<i>13.08</i>
	1996	<b>1.25</b>	<b>17.72</b>	<b>0.83</b>	<b>5.50</b>	<b>1.44</b>	<b>17.31</b>	<b>0.57</b>	<b>6.21</b>
	1997	<b>1.08</b>	<b>15.37</b>	<b>1.11</b>	<b>7.39</b>	<b>1.71</b>	<b>20.75</b>	<b>1.19</b>	<b>13.11</b>
	1998	<b>1.75</b>	<b>24.99</b>	<b>1.31</b>	<b>8.73</b>	<b>2.27</b>	<b>27.52</b>	<b>1.82</b>	<b>19.97</b>
	1999	<b>2.07</b>	<b>29.64</b>	<b>1.53</b>	<b>10.28</b>	<b>2.73</b>	<b>33.18</b>	<b>2.00</b>	<b>22.10</b>
	2000	<b>2.06</b>	<b>29.59</b>	<b>1.60</b>	<b>10.70</b>	<b>2.78</b>	<b>33.84</b>	<b>2.15</b>	<b>23.74</b>
Dummy-indicator: wage effect of region type movers relative to stayers	1996	<i>3.59</i>	<i>21.74</i>	<i>3.76</i>	<i>13.20</i>	<i>4.02</i>	<i>31.28</i>	<i>4.74</i>	<i>26.85</i>
	1996	<b>1.78</b>	<b>8.13</b>	<b>2.22</b>	<b>5.54</b>	<b>3.56</b>	<b>19.22</b>	<b>3.86</b>	<b>15.22</b>
	1997	<b>2.93</b>	<b>13.44</b>	<b>4.01</b>	<b>10.07</b>	<b>4.67</b>	<b>25.35</b>	<b>5.23</b>	<b>20.82</b>
	1998	<b>3.28</b>	<b>15.10</b>	<b>4.98</b>	<b>12.54</b>	<b>5.32</b>	<b>28.86</b>	<b>5.92</b>	<b>23.57</b>
	1999	<b>3.39</b>	<b>15.63</b>	<b>5.54</b>	<b>14.01</b>	<b>5.62</b>	<b>30.46</b>	<b>6.64</b>	<b>26.64</b>
	2000	<b>3.25</b>	<b>15.02</b>	<b>5.68</b>	<b>14.36</b>	<b>5.48</b>	<b>29.65</b>	<b>6.25</b>	<b>25.11</b>
Dummy-indicator: wage effect of region type movers relative to establishment movers	1996	<i>0.65</i>	<i>3.35</i>	<i>1.21</i>	<i>3.68</i>	<i>2.50</i>	<i>17.26</i>	<i>3.11</i>	<i>13.03</i>
	1996	<b>-1.19</b>	<b>-5.07</b>	<b>0.88</b>	<b>2.07</b>	<b>2.15</b>	<b>10.46</b>	<b>2.89</b>	<b>9.74</b>
	1997	<b>0.21</b>	<b>0.90</b>	<b>2.44</b>	<b>5.75</b>	<b>3.03</b>	<b>14.76</b>	<b>3.69</b>	<b>12.52</b>
	1998	<b>-0.11</b>	<b>-0.48</b>	<b>3.22</b>	<b>7.60</b>	<b>3.12</b>	<b>15.21</b>	<b>3.77</b>	<b>12.79</b>
	1999	<b>-0.29</b>	<b>-1.26</b>	<b>3.55</b>	<b>8.42</b>	<b>3.00</b>	<b>14.58</b>	<b>4.35</b>	<b>14.82</b>
	2000	<b>-0.43</b>	<b>-1.82</b>	<b>3.63</b>	<b>8.60</b>	<b>2.79</b>	<b>13.58</b>	<b>3.81</b>	<b>13.00</b>
Dummy-indicator: Wage effect of region type mov- ers relative to stayers	1996	<i>3.27</i>	<i>7.70</i>	<i>3.39</i>	<i>7.28</i>	<i>5.15</i>	<i>26.38</i>	<i>6.22</i>	<i>22.43</i>
	1996	<b>1.84</b>	<b>3.55</b>	<b>2.19</b>	<b>3.29</b>	<b>4.50</b>	<b>16.23</b>	<b>3.22</b>	<b>7.47</b>
	1997	<b>3.84</b>	<b>7.43</b>	<b>3.90</b>	<b>5.88</b>	<b>5.59</b>	<b>20.40</b>	<b>4.93</b>	<b>11.54</b>
	1998	<b>3.87</b>	<b>7.51</b>	<b>5.43</b>	<b>8.18</b>	<b>6.46</b>	<b>23.57</b>	<b>5.71</b>	<b>13.35</b>
	1999	<b>4.04</b>	<b>7.84</b>	<b>5.93</b>	<b>9.01</b>	<b>6.74</b>	<b>24.61</b>	<b>6.41</b>	<b>15.12</b>
	2000	<b>4.35</b>	<b>8.46</b>	<b>6.38</b>	<b>9.70</b>	<b>6.95</b>	<b>25.38</b>	<b>6.85</b>	<b>16.16</b>
Dummy-indicator: Wage effect of region type mov- ers relative to establishment movers	1996	<i>0.90</i>	<i>1.68</i>	<i>1.50</i>	<i>2.46</i>	<i>3.64</i>	<i>14.85</i>	<i>4.55</i>	<i>10.78</i>
	1996	<b>-0.98</b>	<b>-1.67</b>	<b>1.14</b>	<b>1.57</b>	<b>3.12</b>	<b>9.84</b>	<b>2.97</b>	<b>5.66</b>
	1997	<b>1.28</b>	<b>2.20</b>	<b>2.62</b>	<b>3.61</b>	<b>4.02</b>	<b>12.79</b>	<b>4.12</b>	<b>7.90</b>
	1998	<b>0.64</b>	<b>1.10</b>	<b>3.95</b>	<b>5.45</b>	<b>4.33</b>	<b>13.79</b>	<b>4.28</b>	<b>8.21</b>
	1999	<b>0.60</b>	<b>1.04</b>	<b>4.23</b>	<b>5.91</b>	<b>4.20</b>	<b>13.34</b>	<b>4.86</b>	<b>9.37</b>
	2000	<b>0.98</b>	<b>1.69</b>	<b>4.63</b>	<b>6.46</b>	<b>4.36</b>	<b>13.85</b>	<b>5.14</b>	<b>9.91</b>

To be continued on the next page

Notes: All coefficients are multiplied by 100.

Estimated dummy indicators of the 2-years sample in 1996 are in italic letters;  
all coefficients significant at least at the 5 percent level are in bold.

Legend: RT1 stands for "metropolitan"

RT2 is equivalent to "metropolitan surroundings"

RT3 is "central city":

RT4 stands for "rural".

Table 8 continued

		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
		RT1 to RT3		RT2 to RT3		RT3 to RT2		RT4 to RT2	
Dummy-indicator:	<i>1996</i>	<i><b>3.41</b></i>	<i>16.97</i>	<i><b>2.92</b></i>	<i>6.72</i>	<i><b>4.78</b></i>	<i>12.88</i>	<i><b>4.91</b></i>	<i>13.16</i>
Wage effect of region type	1996	<b>1.73</b>	6.45	<b>1.68</b>	2.76	<b>7.27</b>	12.08	<b>6.95</b>	12.91
movers relative to stayers	1997	<b>2.86</b>	10.74	<b>3.07</b>	5.03	<b>9.12</b>	15.17	<b>7.73</b>	14.38
	1998	<b>2.97</b>	11.17	<b>2.89</b>	4.74	<b>10.50</b>	17.46	<b>9.37</b>	17.42
	1999	<b>3.06</b>	11.53	<b>3.96</b>	6.53	<b>10.19</b>	16.95	<b>9.69</b>	18.04
	2000	<b>2.76</b>	10.40	<b>3.55</b>	5.86	<b>10.41</b>	17.32	<b>10.36</b>	19.27
Dummy-indicator:	1996	<i><b>0.77</b></i>	<i>3.32</i>	<i>0.49</i>	<i>0.97</i>	<i><b>2.86</b></i>	<i>5.96</i>	<i><b>3.85</b></i>	<i>8.35</i>
Wage effect of region type	1996	<b>-1.16</b>	-4.08	0.56	0.84	<b>4.86</b>	6.98	<b>4.36</b>	6.96
movers relative to establishment	1997	0.23	0.80	<b>1.73</b>	2.59	<b>6.64</b>	9.54	<b>4.56</b>	7.31
movers	1998	-0.34	-1.20	<b>1.32</b>	1.98	<b>7.46</b>	10.72	<b>5.58</b>	8.94
	1999	-0.56	-1.98	<b>2.11</b>	3.18	<b>6.74</b>	9.70	<b>5.75</b>	9.20
	2000	<b>-0.86</b>	-3.04	<b>1.59</b>	2.41	<b>6.90</b>	9.93	<b>6.27</b>	10.03
		RT1 to RT4		RT2 to RT4		RT3 to RT4		RT4 to RT3	
Dummy-indicator:	<i>1996</i>	<i><b>2.76</b></i>	<i>9.04</i>	<i><b>4.30</b></i>	<i>9.69</i>	<i><b>1.94</b></i>	<i>9.05</i>	<i><b>3.80</b></i>	<i>14.94</i>
Wage effect of region type	1996	<b>1.58</b>	4.36	<b>2.85</b>	4.07	<b>2.48</b>	8.93	<b>3.06</b>	9.10
movers relative to stayers	1997	<b>2.42</b>	6.71	<b>5.22</b>	7.48	<b>3.49</b>	12.57	<b>4.25</b>	12.73
	1998	<b>3.25</b>	9.02	<b>6.69</b>	9.59	<b>3.69</b>	13.27	<b>4.57</b>	13.71
	1999	<b>3.34</b>	9.28	<b>6.81</b>	9.75	<b>4.14</b>	14.95	<b>5.40</b>	16.32
	2000	<b>3.30</b>	9.17	<b>7.14</b>	10.22	<b>3.46</b>	12.46	<b>3.89</b>	11.77
Dummy-indicator:	<i>1996</i>	<i>-0.27</i>	<i>-0.68</i>	<i>0.92</i>	<i>1.80</i>	<i><b>0.93</b></i>	<i>3.18</i>	<i><b>2.11</b></i>	<i>6.01</i>
Wage effect of region type	1996	<b>-1.89</b>	-4.58	1.35	1.82	<b>1.15</b>	3.46	<b>1.95</b>	4.90
movers relative to establishment	1997	-0.75	-1.82	<b>3.57</b>	4.84	<b>1.81</b>	5.48	<b>2.57</b>	6.50
movers	1998	-0.60	-1.47	<b>4.89</b>	6.62	<b>1.46</b>	4.41	<b>2.29</b>	5.78
	1999	-0.78	-1.90	<b>4.72</b>	6.40	<b>1.45</b>	4.40	<b>2.99</b>	7.58
	2000	<b>-0.83</b>	-2.04	<b>5.00</b>	6.78	<b>0.66</b>	2.01	<b>1.32</b>	3.34

Notes: All coefficients are multiplied by 100.

Estimated dummy indicators of the 2-years sample in 1996 are in italic letters;  
all coefficients significant at least at the 5 percent level are in bold.

Legend: RT1 stands for "metropolitan"

RT2 is equivalent to "metropolitan surroundings"

RT3 is "central city":

RT4 stands for "rural".

## Appendix

**Table A1**  
**Regional Classification Scheme based on BBR Classification**

Structural region type	District type (BBR Classification)	Term used in the paper	Description of region type (BBR)
Regions with large agglomerations	BBR1	metropolitan	Core cities
	BBR2		Highly urbanized districts in regions with large agglomerations
	BBR3	metropolitan surroundings	Urbanized districts in regions with large agglomerations
	BBR4		Rural districts in regions with large agglomerations
Regions with features of conurbation	BBR5	central city	Central cities in regions with intermediate agglomerations
	BBR6		Urbanized districts in regions with intermediate agglomerations
	BBR7	rural	Rural districts in regions with intermediate agglomerations
Regions of rural character	BBR8		Urbanized districts in rural regions
	BBR9	Rural districts in rural regions	

**Table A2**  
**A Description of the Variables**

Name of Variable	Description
	<b>MNL Estimates</b>
Low-skilled (ref.)	Individuals with no occupational qualification regardless of which schooling level.
Skilled	Individuals with an occupational qualification regardless of which schooling level.
Highly-skilled	Individuals with upper secondary education holding a degree from university or university of applied sciences.
Experience category: 0-9 years (ref.)	Categories of potential work experience in years, measured as age minus average duration of education minus 6.
Experience category: 10-19 years	For low-skilled workers without an upper secondary education we assume 10 years as the average educational period,
Experience category: 20-39 years	for low-skilled workers with an upper secondary education 13 years, for skilled workers 12.5 and 15 years respectively,
Experience category: >=40 years	for highly-skilled workers holding a polytechnic type of degree 16 years and for highly-skilled alumni of a university 18 years.
Log market size	Logarithm of the number of individuals with the same skill category working in the same region and industry in a given year.
Log establishment size	Logarithm of the number of individuals working in the same establishment (plant size information).
	<b>Fixed Effects Estimates</b>
log wage	Logarithm of gross daily earnings, calculated as average over the observed employment period for each person.
Dummy-indicator: wage effect of establishment movers relative to stayers	Effect of establishment mobility, base outcome: stayers.
Dummy-indicator: wage effect of region type movers relative to stayers	Effect of regional mobility, base outcome: stayers.
Dummy-indicator: wage effect of region type movers relative to establishment movers	Effect of regional mobility, base outcome: establishment movers.
Establishment size: 0-10 * pos	Interaction effects of establishment size in the years before mobility might take place with
Establishment size: 11-100 * pos	a change to a larger establishment (for movers)
Establishment size: 101-500 * pos	an increase of firm size (for stayers).
Establishment size: >500 * pos	
Establishment size: 0-10 * neg	Interaction effects of establishment size in the years before mobility might take place with
Establishment size: 11-100 * neg	a change to a smaller establishment (for movers)
Establishment size: 101-500 * neg	a decrease of firm size (for stayers).
Establishment size: >500 * neg	
ln (market size)	Logarithm of the number of individuals with the same skill category working in the same region and industry in a given year.
ln (aggregated market size)	Logarithm of the number of individuals with the same skill category working in the same region in a given year.
Share of high-skilled	Share of high-skilled workers in the same establishment.
Share of female	Share of female workers in the same establishment.
Change: manufacturing to services	Job mobility is related with a change from manufacturing sector to services sector.
Change: services to manufacturing	Job mobility is related with a change from services sector to manufacturing sector.

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