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Returns to regional migration: Causal effect or selection on wage growth?

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Fabian Kratz and Josef Brüderl

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Returns to Regional Migration:
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Returns to Regional Migration:
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Abstract

Human capital theory predicts pecuniary returns to regional migration, but also positive self-selection of migrants. Therefore, when estimating the causal effect of migration one has to take care of potential self-selection. Several authors recommend using fixed effects models thereby controlling for time constant unobserved heterogeneity. However, if selection operates not only on wage level but also on wage growth conventional fixed effects models are also biased. In this paper we want to investigate, whether migrants are self-selected on wage growth and if this biases conventional fixed effects estimates of the returns to migration. We use data from the SOEP 1984-2010. First we analyze the time pattern of the wage differential between migrants and stayers to see whether they are on different wage trajectories. Second we introduce a fixed effects model with individual slopes to investigate whether conventional results are biased.

Key words: regional migration, causal- and selection-effects, selection on wage growth
JEL classification: C33, J61, R23

1 Introduction

This paper deals with causal effects of regional migration on wages (i.e., pecuniary returns). When estimating such migration effects empirical studies need to control for selectivity because regional migrants might be favorably self-selected compared to stayers. Due to its appeal to control for unobserved characteristics traditional fixed effects models are seen as the best method to control for self-selection of migrants (Lehmer, 2009, 25). However, conventional fixed effects models rely on the parallel trend assumption and control for time constant unobserved heterogeneity (i.e., wage level) only. If, however, migrants are also positively selected on wage growth a conventional fixed effects model will provide biased estimates.

To discuss these issues the remainder of the paper is organized as follows: First we review the human capital framework that suggests pecuniary returns to regional migration. After that we discuss arguments on the selection process of migrants. For our empirical study we draw on SOEP data (1984-2010) and employ different fixed effects (FE) modeling strategies. First we investigate the wage differential between regional migrants and stayers before regional migration, to analyze the importance of selection on wage growth. Second we estimate the pecuniary returns to regional migration via pooled ordinary least squares (POLS), a conventional FE model and an extension of the FE methodology that controls for individual specific slopes. Third we analyze the time pattern of the migration effect.

2 Theory: What explains higher wages of regionally mobile persons?

2.1 Causal effects: Immediate migration returns and wage growth effects

The human capital approach treats regional migration as “an investment increasing the productivity of human resources” (Sjastaad, 1962, 83). This strand of literature stresses the notion of regional migration as an investment in human capital with associated costs that render returns (Sjastaad, 1962; Greenwood, 1997).

Borjas et al. (1992, 170) rely on the concept of location-specific capital (see also DaVanzo / Morrison, 1981). This approach suggests that returns to regional migration become only effective after some time because regional migrants have to acquire knowledge about regional labor markets in the destination area first. This reasoning suggests a payoff of regional migration investments in the long run through steeper “post-migration earning paths” (Borjas et al. 1992, 170). This approach suggests dividing the overall pecuniary returns to the regional migration investment in wage level effects immediately after regional migrations and

long term wage growth effects that become effective via learning and acquiring location-specific capital.

2.2 Self-selection and the estimation of causal effects

Considering selection into regional migration the human capital framework postulates the importance of individual features (Mertens / Haas, 2006, Chiswick, 2000): First, work experience shall be negatively correlated with regional migration. The number of years and hence the expected returns to migration are lower for those being closer to retirement. Second, tenure shall be negatively associated with regional migration because regional migration mostly involves a change of employment and as a consequence firm-specific capital is lost. Third, we expect a positive correlation between years of schooling and regional migration because migration costs are lower for highly qualified workers. Thus, human capital theory predicts negative selection concerning work experience and tenure, and positive selection concerning education.

Chiswick (1978) further argues (for international immigrants) that after controlling for these observable characteristics the favorably self-selection hypothesis of migrants should still hold: "Economic theory suggests that migration in response to economic incentives is generally more profitable for the more able and more highly motivated. This self-selection in migration implies that for the same schooling, age, and other demographic characteristics immigrants […] have more innate ability or motivation relevant to the labor market than native-born persons" (Chiswick 1978, 901).

Innate ability or motivation is usually not observed and therefore cross-sectional regression estimates of the returns to migration are biased upwards. Given that panel data are available conventional fixed effects models are the appropriate models to measure (unbiased) returns to regional migration. Figure 1 shows this situation (see Ludwig / Brüderl 2011). In this thought experiment we have a mobile person who has a higher wage level than the never mobile person. Further, there is no causal effect of migration. POLS however would estimate a large migration effect. A conventional FE model would show the correct result: migration does not pay off.

Figure 1: Selection on wage level

However, it is highly likely that higher ability and motivation not only increase wage levels, but that more able and more motivated persons end up on a steeper wage trajectory. Thus, migrants do not only show higher pre-migration wage levels, they also have higher wage growth. In this case the parallel trend assumption of conventional fixed effects models is violated and the estimate of the returns to regional migration is biased. In the thought experiment depicted in Figure 2 (see Ludwig / Brüderl 2011), the within comparison of the mobile person yields a higher after-before wage difference than the same comparison of the never mobile person. Therefore, the FE model estimates erroneously a positive wage effect of migration.

Figure 2: Selection on wage growth

3 Methodological approaches for estimating the returns to regional migration

Lehmer (2009) gives an excellent review of the state of research on selection into regional migration and monetary returns to regional migration. He concludes that the literature clearly shows that there is both a causal effect and self-selection. Thus, when trying to estimate the returns to regional migration one obviously has to deal with the problem of self-selection.

There are basically two approaches for tackling the problem of self-selection: On the one hand, conventional regression, matching approaches and Heckman procedures can be applied. These methods can deal with selection based on observables only. On the other hand, fixed effects and IV-approaches are used to tackle the issue of selection on unobservables. Because it is unlikely that all relevant variables are observed the literature meanwhile clearly prefers the second approach. Further, there are arguments to prefer the FE approach: "Though the results are not uniform they tend to indicate a positive effect of regional migration […] the self-selection hypothesis holds (at least to a small extent), but can be tackled rather by fixed effects- than by IV-approaches. The instruments used by several studies mostly disenchant their quality after deeper investigation" (Lehmer 2009, 25).

However, so far the literature has used only conventional fixed effects models. As we argued above these models might provide biased estimates if self-selection operates on wage growth also. In that case, however, one could apply a fixed effects model variant that allows not only for person-specific constants, but for person-specific wage growth (fixed effects individual slopes, FE-IS). The basic idea of FE-IS is very simple: individual wage panels are not only "de-meaned", but they are "de-trended". In the situation of Figure 2 FE-IS would provide the correct answer: there is no causal migration effect. FE-IS was invented by Polacheck / Kim (1994) and is discussed in Wooldridge (2010) as well as in Ludwig / Brüderl (2011). We use the Stata implementation of the FE-IS model developed by Volker Ludwig (2010).

Before estimating the FE-IS model we provide descriptive information on wage profiles of migrants and stayers by using the distributed FE model introduced by Dogherty (2006; see also Yankow 2003). In this FE model one estimates not only the effect of a single migration dummy (0 before migration, 1 afterwards), but estimates "distributed effects", i.e., migration effects for each year separately (on a process time axis defined by the migration event). By this procedure one gets an impression on whether the wage differential between migrants and stayers remains constant (as in Figure 1) or widens over time (as in Figure 2). A more extensive description of this model can be found in Ludwig / Brüderl (2011).

4 Data, definitions and variables

We use SOEP data from 1984 to 2010 (SOEP 2011). The SOEP is described in detail in Wagner / Frick / Schupp (2007). Due to very special issues associated with female (see for example Nisic (2009)) and East-German regional migration we restrict the sample to men living in West Germany when first observed. Further, we restrict the sample to part- or full-time workers working more than 19 hours per week.

To compute the dependent variable we deflated monthly earnings and divided them by the hours worked per month. Finally, we took the natural logarithm of the hourly wages. As observable human capital measures we control for years of education, a dummy for being currently enrolled in education, tenure with the current employer, work experience, work experience squared and dummies for survey year.

We define regional migration as a move due to job related reasons.[1] We dropped person years with missings on one or more of the model variables. Finally, we excluded persons with less than four observations because for estimating a FE-IS model with a quadratic trend we need at least four person years.

All together there are 2195 moves in our sample consisting of 1794 first moves and 401 second or higher order moves. Second moves (often return migration) have to be addressed separately, because of different underlying mechanisms (DaVanzo / Morrison, 1981). Therefore, we discarded second moves by censoring panels in case a second move occurs.

From the 1794 first moves there are 834 in the first person year observed and 960 in later person years. One has to decide how to deal with persons moving in their first person year. These contribute nothing to a within analysis. Therefore, we deleted them when estimating the (FE) regression models (sample 2). However, those migrating in the first person year contribute to the distributed FE model. Therefore, they are included when estimating the distributed FE model (sample 1).

Table 1 gives the descriptive statistics for sample 1 (sample 2 differs mainly in that there are 2505 person years less). Human capital arguments on the kind of selection that should go on are clearly supported: Regional migrants exhibit less work experience, less tenure and more years of education. These opposing forces with respect to pecuniary returns result in nearly the same hourly wages of stayers and migrants.

[1] In some waves of the SOEP it is a dichotomous variable (move due to job related reasons “yes/no”) and in some a categorical variable (asking the reason for a move; category four is “due to job related reasons”).

Table 1: Descriptive statistics of sample 1 (for estimating the distributed FE model)

	Stayer		Regional Migrant	
	mean	std. dev.	mean	std. dev.
hourly wages	16.10	9.73	15.97	9.23
work experience (years)	19.36	11.72	13.69	10.38
tenure (years)	12.89	10.54	7.37	7.65
education (years)	11.73	2.70	12.87	3.10
Currently enrolled in education	.012	.11	.012	.11
Person years	79290		9975	

5 Results

5.1 Is there self-selection on wage growth?

Descriptive evidence on whether migrants are on steeper wage trajectories is provided by a distributed FE model. Results are given in Table 2 and Figure 3. As mentioned above, this model estimates a “wage differential” between migrants and stayers for each year before and after migration. We restrict the observation window to 15 years before and after migration. The years 6 to 15 (resp. -15 to -6) are grouped together (due to low numbers of cases). The baseline (reference category) of the distributed effects are regional stayers and the earliest observation (-15 to -6) of future migrants. The distributed effects show how the hourly wages of regional migrants develop before and after regional migration with respect to the wages of never mobile men.

5 years before regional migration future migrants earn about 3 % more than stayers. The wage differential is more or less stable in the years before migration. In the year after migration the wage differential reaches 6.5 % and is significant for the first time. The wage differential peaks at 4 years after regional migration with almost 8 %. This pattern does not give any indication that migrants are on a steeper wage profile. Instead it is completely compatible with an immediate migration effect.

Table 2: The distributed FE Model: the time-path of the wage differential migrant/stayer

	Coeff.	s.e.
Ref.: never mobile, 15 to 6 years before migration		
5 years before migration	0.0300	(0.0267)
4 years before migration	0.0373	(0.0282)
3 years before migration	0.0283	(0.0283)
2 years before migration	0.0139	(0.0291)
1 year before migration	0.0309	(0.0288)
Year of migration	0.0651*	(0.0299)
1 year after migration	0.0592	(0.0307)
2 years after migration	0.0624	(0.0328)
3 years after migration	0.0723*	(0.0324)
4 years after migration	0.0804*	(0.0324)
5 years after migration	0.0663*	(0.0336)
6-15 years after migration	0.0626	(0.0343)
R^2 within	0.2643	
Number of persons	8691	
Number of person years	89265	
Number of regional migrations	889	

Notes: Panel robust standard errors in parentheses* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Models also include experience (years), experience squared, tenure (years), education (years), a dummy for being currently enrolled in higher education and dummies for survey year
Source: SOEP 1984-2010, own calculations

Figure 3: The time-path of the wage differential migrant/stayer

5.2 Controlling for self-selection

Even though the distributed FE model did not provide much evidence for selection on wage growth, we nevertheless want to make the more formal check, by estimating the FE-IS model. We compare POLS, FE and FE-IS in Table 3. In the FE-IS model we allow for person-specific quadratic experience-wage profiles. Therefore, the experience effects cannot be estimated. Figure 4 plots the migration effects estimated by these models.

Comparing the estimates of POLS, FE and FE-IS shows that in the POLS model the opposing selection forces result in a zero effect. The conventional fixed effects approach estimates pecuniary returns to regional migration of 6.8 %. The FE-IS model that controls for person-specific wage growth shows an effect of 2.8 % that is significant on the 5%-level.

Table 3: Estimates of the pecuniary returns to regional migration

	(1) POLS		(2) FE		(2) FE-IS	
Migrated	-0.0031	(0.0178)	0.0684***	(0.0186)	0.0283*	(0.0141)
Experience (years)	0.0454***	(0.0012)	0.0452***	(0.0012)		
Experience squared / 100	-0.0876***	(0.0029)	-0.0825***	(0.0026)		
Tenure (years)	0.0068***	(0.0005)	0.0062***	(0.0006)	0.0061***	(0.0005)
Education (years)	0.0740***	(0.0014)	0.0957***	(0.0049)	0.0878***	(0.0028)
Currently in education	-0.8075***	(0.0214)	-0.6794***	(0.0268)	-0.5221***	(0.0160)
Number of persons	8346		8346		8346	
Number of person-years	86760		86760		86760	

Notes: Panel robust standard errors in parentheses* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Models also include dummies for survey year
Source: SOEP 1984-2010, own calculations

Figure 4: Comparing estimates of the pecuniary returns to regional migration

5.3 The time pattern of the migration effect

Finally, to get more information on the time pattern of the migration effect we not only enter a migration dummy into the model, but in addition "time clock variables" (years since migration linear and squared). This modeling allows for different time patterns of the migration effect (see Brüderl 2010). Here we use a conventional FE model because the evidence for selection on wage growth as given above is weak. Table 4 gives the estimation results. Figure 5 plots the resulting migration effect. As can be seen there is an immediate and significant migration effect of 3.7 %. This effect increases over the first six years after migration to about 5 %, as predicted by the theory of location-specific capital. However, this increase is slight and not significant.

Table 4: FE estimates of the migration effect on wage

	(1) Coeff.	se
Migrated	0.0366*	(0.0177)
years since migration	0.0020	(0.0044)
years since migration sq. / 1000	0.0059	(0.2664)
R^2 within	0.2692	
Number of persons	8346	
Number of person years	86760	
Number of regional migrations	544	

Notes: Panel robust standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Model also includes experience (years), experience squared, tenure (years), education (years), a dummy for being currently enrolled in higher education and dummies for survey year
Source: SOEP 1984-2010, own calculations

Figure 5: The estimated migration effect over time

6 Conclusion

Based upon the empirical results we conclude that regional migration pays. The return estimated by a conventional FE model is about 7 %. The bulk of this return (4 %) arrives immediately after regional migration. There is only a slight increase of the migration effect afterwards. Thus, the hypothesis that pecuniary returns to regional migration are a result of acquiring location-specific capital in the region of destination is not approved. Further, there is weak evidence that selection on wage growth biases this estimate upwards. Though the distributed FE model shows no indication that migrants have steeper wage profiles, the FE-IS model decreases the migration effect to 3 %. In our opinion, this is not enough evidence for selection on wage growth. Therefore, we would recommend sticking with the results of the conventional FE model.

An implicit assumption of the analyses presented is that regional costs of living and the regional amenities (attractiveness of a regional area) are in equilibrium and that wages are unaffected by both. To tackle this issue Lehmer / Ludsteck (2011) introduce regional fixed effects and conclude that the regional migration wage differential is only to a small extent affected by such differences in regional price levels.

Furthermore the analyses presented here could be done for several migration types. DaVanzo / Morrison (1981) distinguish between first, repeat and return migrants. Hunt (2004) differentiates between regional migration with and without changing the employer. Glaeser /Maré (2001) differentiate regional migrants according to the region type of the origin and destination area. We expect that selection on wage growth is differently important for these diverse migration types. Furthermore we expect that selection on wage growth is more important amongst highly qualified persons. Therefore, we suggest for future work estimating the returns to different types of regional migration for diverse groups of workers by FE-IS to see whether migration effects are affected by selection on wage growth with specific types of migration.

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