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Returns to Regional Migration: Causal Effect or Selection on Wage Growth?

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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.

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 (i.e., they are on a steeper wage trajectory) a conventional fixed effects model will provide biased estimates.

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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.

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). They argue 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 characteristics (Mertens / Haas, 2006, Chiswick, 2000): First, work experience should be negatively correlated with regional migration. The expected returns to migration are lower for those being closer to retirement. Second, tenure should 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, the *favorable*

self-selection hypothesis implies a positive correlation between years of schooling and regional migration. 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 estimate (unbiased) returns to regional migration if selection operates on wage level. 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. In this situation POLS erroneously would estimate a large migration effect, because it takes the never mobile person as counterfactual. However, a conventional FE model would show the correct result: migration does not pay off. This is, because a FE model takes the wages of the mobile person before migration as counterfactual (more on the "mechanics" of FE estimation can be found in Brüderl 2010).

However, it is most 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: "While greater ability may raise earnings throughout life, more motivation and effort increase monetary gains from investing in human capital, which in turn steepen earnings profiles" (Polachek / Kim 1994, 29). Thus, migrants may not only show higher pre-migration wage levels, they might 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, in this situation the FE model estimates erroneously a positive wage effect of migration.

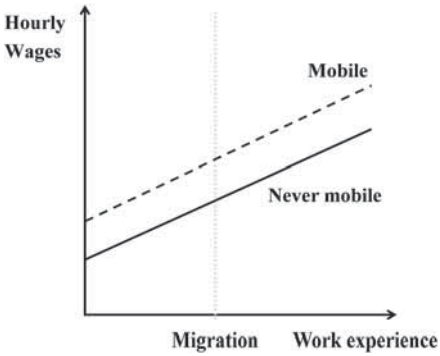

Figure 1: Selection on wage level

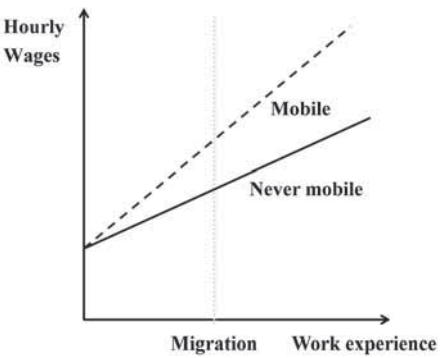

Figure 2: Selection on wage growth

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 techniques, matching approaches and Heckman procedures can be applied. However, these methods can deal with selection based on observables only. On the other hand, fixed effects, instrumental variable and difference-in-difference matching 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 approaches that provide unbiased estimates under unobservables.

Further, there are arguments against the IV approach: "The instruments used by several studies mostly disenchant their quality after deeper investigation" (Lehmer 2009, 25). Therefore, so far the literature has used mostly fixed effects models. However, as we argued above these models might provide biased estimates if self-selection operates on wage growth. The same holds true for difference-in-difference matching approaches that also rely on the parallel trend assumption (Smith / Todd 2005, 342).

In that case, however, one could apply a more general fixed effects model 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 "detrended". In the situation of Figure 2 FE-IS would provide the correct answer. 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) and estimate the following equation (Ludwig / Brüderl 2011: 9)

$$\ln w_{it} = \alpha_{1i} + \alpha_{2i} exp_{it} + \beta m_{it} + \varepsilon_{it}$$

The outcome variable w_{it} is hourly wages. As in the conventional FE model individual-specific wage levels (α_{1i}) are allowed. Here we model a linear experience $(\exp_{it})$ wage profile. m_{it} is the migration dummy that is zero before migration and one afterwards. β captures the causal effect of migration. Finally, ε_{it} is an error term. The only difference to a conventional FE model is that FE-IS allows for individual-specific wage growth α_{2i} also.

De-trending the data wipes out the α_{1i} and the α_{2i} and the parallel trend assumption must hold no longer. Ludwig / Brüderl (2011, 9) and Wooldridge (2010, 378–379) describe the estimation procedure in more detail. FE-IS requires long panels, as one needs at least $k + 1$ wage observations (where k is the number of individual-specific parameters for estimating the individual wage profiles). In our case we need at least four person years because we model not only a linear, but a quadratic wage profile.

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 Dougherty (2006; see also Yankow 2003). In this FE model one 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 Fig-

ure 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 (v27) (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 and earning more than one Euro per hour.

To compute hourly wages we deflated monthly earnings and divided it by the hours worked per month. 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 and work experience squared. Macro-economic conditions like the role of business cycle effects are also supposed to affect wage growth. To make sure that our results are not biased by such period effects we include the yearly percentage growth of the GDP from 1984 – 2010 in the models.[1]

We define regional migration as a move due to job related reasons.[2] All together there are 2110 moves in our sample consisting of 1711 first moves and 399 second or higher order moves. One has to decide how to deal with higher order moves. One way is to keep them in the sample and interpret them as long term returns to initial migrations (see Lehmer / Ludsteck 2011). We decided to employ a strategy that leads to more conservative estimates of the returns to regional migration and dropped second or higher order moves by censoring panels in case a second move occurs.[3]

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1 We thank the editors for pointing that out. We used data from the national accounts of the Federal Statistical Office of Germany (downloadable under the following link: https://www.destatis.de/DE/Publikationen/Thematisch/VolkswirtschaftlicheGesamtrechnungen/Zusammenhaenge.pdf?__blob=publicationFile). A different estimation strategy where we control period effects via seven dummy variables that capture the broad economic conditions in the respective years leaves the results unaffected. The results are available from the authors upon request.

2 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").

3 Working careers of most of our men are left censored, because they were already several years in the labor market, when they entered the SOEP. Thus some of the first moves that we observe in the SOEP might actually be higher order moves. Therefore, as robustness check we restricted the sample to only those men, whose work careers are not left censored. Then all moves used for estimation are really "first" moves. The drawback of this strategy is, however, that the sample is drastically reduced to roughly ¼. Never-

Further, we drop observations with missing values on one of the model variables. This results in 1151 moves. Then we drop persons migrating in the first year they are observed, because they do not contribute to the within estimation. Finally, we drop persons with less than four person years, because we need at least four person years for the FE-IS model. In the end, we have 523 moves in our sample.

Table 1 gives the descriptive statistics for the estimation sample. 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 similar hourly wages of stayers and migrants.

Table 1

Descriptive statistics of the sample

	Stayer		Regional Migrant	
	mean	std. dev.	mean	std. dev.
hourly wages	16.12	9.30	15.45	8.89
work experience (years)	19.27	11.48	12.58	9.71
tenure (years)	12.78	10.38	6.26	6.46
education (years)	11.76	2.70	12.63	3.08
Currently enrolled in education	0.01	0.11	0.01	0.11
Persons	7603		523	
Person years	76608		5599	

Source: SOEP v27 (1984 – 2010), own calculations.

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. The years 6 to 25 (resp. –26 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 (–26 to –6) of future migrants. The distributed effects show

theless, the pattern of the results is qualitatively similar to those reported in the text with the full sample. Results with the restricted sample are available from the authors upon request.

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 6% more than stayers. The wage differential increases only slightly in the years before migration. In the year after migration the wage differential reaches 10%. The wage differential peaks 3 years after regional migration with almost 14%. This pattern gives only weak indication that migrants are on a steeper wage profile.

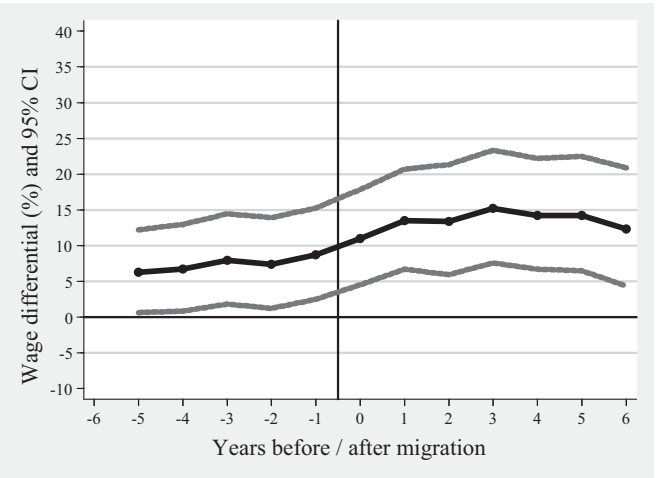
Table 2

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	0.0609*	(0.0278)
4 years before migration	0.0651*	(0.0290)
3 years before migration	0.0766*	(0.0298)
2 years before migration	0.0713*	(0.0301)
1 year before migration	0.0834**	(0.0299)
Year of migration	0.1042***	(0.0306)
1 year after migration	0.1265***	(0.0314)
2 years after migration	0.1256***	(0.0346)
3 years after migration	0.1414***	(0.0348)
4 years after migration	0.1327***	(0.0346)
5 years after migration	0.1329***	(0.0357)
6–15 years after migration	0.1163**	(0.0375)
R^2 within	0.2385	
Number of persons	8126	
Number of person years	82207	
Number of regional moves	523	

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 the yearly percentage growth of the GDP. All regression tables were produced using esttab (Jann 2007).

Source: SOEP v27 (1984–2010), own calculations.



Source: SOEP v27 (1984 – 2010), own calculations.

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

5.2 Controlling for Self-Selection

The distributed FE model provides only weak evidence for selection on wage growth. Nevertheless, we want to make a more formal test, 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.

The POLS model shows a very small and statistically not significant positive migration effect. However, the conventional fixed effects approach estimates pecuniary returns to regional migration of 6.6%. Thus, comparing the POLS and the FE estimates it seems that migrants are overall negatively selected with respect to unobservable characteristics. However, given the descriptive evidence in Table 1 this seems surprising. More likely the FE results are biased upwards, because there is some selection on wage growth. In fact, the estimate of the FE-IS model that controls for person-specific wage growth is again lower: The estimate is 2.9% and is still significant on the 5%-level. Thus, we can conclude from this exercise that even after controlling for selection on wage growth we estimate a significant migration effect of about 3%.

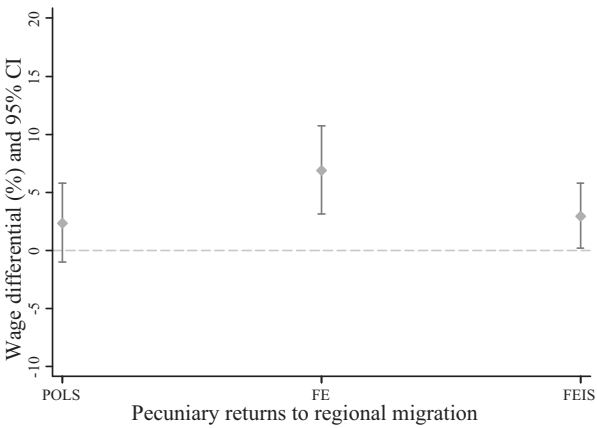
Table 3

Estimates of the pecuniary returns to regional migration

	(1) POLS		(2) FE		(2) FE-IS	
Migrated	0.023	(0.0169)	0.0664***	(0.0181)	0.02916*	(0.0139)
Experience	0.0436***	(0.0010)	0.0469***	(0.0012)		
Experience squared / 100	–0.0841***	(0.0024)	–0.0789***	(0.0025)		
Tenure	0.0070***	(0.0005)	0.0055***	(0.0006)	0.0050***	(0.0005)
Years of education	0.0759***	(0.0013)	0.0896***	(0.0048)	0.0940***	(0.0028)
Currently in education	–0.7587***	(0.0190)	–0.6332***	(0.0248)	–0.4434***	(0.0158)
Economic growth	–0.0083***	(0.0008)	0.0009	(0.0005)	0.0015***	(0.0005)
Number of persons	8126		8126		8126	
Number of person-years	82207		82207		82207	
Number of moves	523		523		523	

Notes: Panel robust standard errors in parentheses $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

Source: SOEP v27 (1984–2010), own calculations.



Source: SOEP v27 (1984–2010), own calculations.

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

6. Conclusion

Based on our empirical results we conclude that regional migration pays off. Our best estimate from the FE-IS model indicates that the return to regional migration is 3%. The rate of return seems to be overestimated by a conven-

tional FE model (7%). Thus, it might be that the migration effects reported in the literature so far are overestimated. Migrants are to some degree on a steeper wage trajectory and this biases estimates from a conventional FE model upwards.

These results suggest that the returns to different migration types should be reconsidered by explicitly taking regard of the issue of selection on wage growth. It would enhance our understanding of the selection process and ensure that the estimated returns to different types of migration are unbiased. 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 that future work estimates the returns to different types of regional migrations for diverse groups of workers by the methods we introduced in this paper. By employing this procedure we get a more complete understanding of the selection process. Further, the procedure ensures that the results of the returns of different migration types are not biased by a violation of the parallel trend assumption.

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