Transitional Changes in the Occupational Structure and their Impact on Individual Wages

first and very preliminary version

by

Alexandra Fedorets[†]
Humboldt Universität zu Berlin
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Abstract

This paper estimates wage losses of East Germans due to occupational changes that were necessary for the overall adjustment of the occupational structure after reunification of 1990. The occupation of the apprenticeship completed in the GDR is employed to instrument endogenous occupational changes. The IV computation reveals a negative wage effect of nearly 35% in 1991/92. This effect is persistent over time: After almost 10 years after reunification the negative wage effect associated with occupational changes due to the relocation of individual human capital across occupations is more than 20%.

JEL-Classification: J24, J62, I21, P21.

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[†]alexandra.fedorets@staff.hu-berlin.de

1 Introduction

The unification of East and West Germany in 1990 was an unprecedented phenomenon that has constituted an enormous challenge for both political and economic systems. The fall of the Berlin Wall is a symbol for the failure of the socialist society that has triggered a comprehensive process of democratization and integration of East Germany. The new economic conditions brought by "the wind of change" have started the process of multidimensional adjustments of employment, wage and occupational structure.[1] The lessons of German reunification are interesting not only as an example of a transition from planned to market economy. It can be also seen as an example to study how a fundamental shock to the occupational stucture influences individual wages and how long can a "recovery" from the shock last. Apart from its deep political, social and economic relevance, the phenomenon of reunification constitutes a challenging quasi-experimental environment which is especially attractive for empirical studies.

The research question of the current paper is the wage effects of occupational changes of East Germans after reunification. In a socialist system of the GDR, the decisions about the occupational structure were integrated into the overall state planning process. Thus, individual preferences were to some extent state-assisted, or at least not totally voluntary in the common economic sense. After 1990, the West-German institutions were transferred to the East-German labor market. Moreover, there was a wave of firm closures in East Germany due to their low or negative profitability. Generally, the integration process demanded reallocation of resources, including the overall adjustment of occupational structure accompanied by a migration wave to West Germany.[2] Under such critical economic conditions and permanent threat of unemployment, many occupational changes were superimposed by the overall changes in the occupational structure of the East-German economy. Thus, even if the data does not contain enough information to clearly define these occupational changes as voluntary or involuntary, they can be at least qualified as imposed.[3] Such an occupational change can still lead to better wage perspective or to an improvement of nonpecuniary aspects of the job – e.g. working time, overall flexibility, job stabilty, intrinsic motivation etc.

An occupational change is a usual phenomenon of a modern economy. E.g. Miller (1984) and Witte and Kalleberg (1995) claim that a successful carreer planning is unthinkable without one or several occupational changes. On the one hand, such strategic use of occupational choices to boost one's carreer can be primarily attributed to voluntary changes of the occupation. On the other hand, occupational changes that are imposed by the labor market conditions rather than by a strategic decision may result in higher wage penalties and can even be seen as a negative signal for the subsequent employment. Under stable economic conditions, most occupational changes occur in the beginning of the the professional career and cause the highest wage growth, since young workers face lower costs of unemployment or nonemployment when changing job or occupation.[4] From the standpoint of the human capital theory, occupational changes that occur later in the working life are associated with higher human capital losses.

[1] A detailed documentation of the transition process in East Germany can be found in Akerlof et al. (1991), Sinn and Sinn (1992) and Burda (2006). The evolution of wage and efficiency wages in particular was analyzed by Akerlof et al. (1991), Topel and Ward (1992), Burda and Hunt (2001), Riphahn et al. (2001).

[2] The migration studies by Akerlof et al. (1991) and, in particular, Burda and Hunt (2001) also show that the migrants to West Germany exhibit positive selectivity with respect to their labor market characteristics.

[3] More supporting evidence to this hypothesis can be found in the direct comparison between the East- and West-German subsamples in Fedorets (n.d.). Some evidence on convergense of the sectoral structures in East and West Germany after reunification can be found in Burda and Hunt (2001).

[4] See e.g. Topel and Ward (1992). Sicherman and Galor (1990) generally come to the same result for the US.

At the individual level, the decision of an occupational change would consider nonpecuniary aspects as well as future wage developments in the new occupation compared to the old one. The massive wave of the occupational changes after reunification in Germany has influenced all age groups, meaning that a high proportion of the human capital accumulated in the East-German society was not used under the new economic conditions. The question is then whether the new economic perspectives in East Germany were good enough to overweight the forced sudden career break and its negative wage impact.

For the analysis I employ the data from the German Qualification and Career Survey (QCS) to address the wage loss of male medium-skilled workers in East Germany due to occupational changes. In order to identify the causal effect on wages I use the occupation of the first apprenticeship completed in the GDR as an instrument for an occupational change. The analysis is conducted for the two subsequent waves of the QCS – 1991/92 and 1998/99. When running a wage regression using OLS, an occupational change is associated with a 10% lower wages in 1991, and 4% lower wages in 1998. However, the IV estimation shows that an occupational change produces a significantly more negative effect on wages – more than 35% in 1991. Surprisingly, this effect does not disappear over time due to upswing of the East-German economy. Even by 1998 the negative effect on wages constitutes 23.3%. Such negative results may be explained by high selectivity of the group of the occupational changers in East Germany, but it also shows that the shifts in the demand for some occupational groups have experienced caused fundamental reallocation of human capital that cannot be easily compensated for.

Post-unification occupational mobility in East Germany is an underexplored research field, although reunification of Germany constitutes an unprecedent quasi-experiment of transformation of the legislation and institutions. One of the rare studies on labor mobility using post-reunification changes in legislation is provided by Prantl and Spitz-Oener (2009). The authors look at the changes in entry regulations into self-employment to address the negative effect of regulations on occupational mobility. Hunt (2001) evaluates the evolution of post-unification wages in East Germany with respect to the voluntary/involuntary *job* changes as well as moves to the West. She documents an insignificant effect of an involuntary job change on the wages of East Germans, whereas both voluntary changes and moves to the West make the employees better off. However, consequences of an *occupational* change can have a more striking effect on wages than those of a job change, as the theoretical model of Neal (1999) predicts.[5]

To my knowledge there were no causal studies particularly on the change of occupation in East Germany. Moreover, the methodological novelty of the analysis presented here lies in the application of the occupation of apprenticeship obtained under the regime of planned economy as an instrument for the individual decision to change the occupation after reunification. Until now, the positive causal effect of a *voluntary* occupational change on individual wages was estimated using instruments such as military service, firm closures, newly emerged occupations, apprenticeship in industry/artisanry (see Acemoglu and Pischke (1998), Fitzenberger and Spitz (2004)). This paper contributes to the evidence on imposed occupational changes in a quasi-experimental research design of a transition economy. It highlights the negative consequences of the shock in the occupational structure and addresses the time to overcome them.

The paper begins with a brief introduction of the data set in Section 2. Section 3 contains the description of the identification strategy and the sample restrictions that contribute to the heterogeneity of the analyzed sample. Section 4 describes the main variables of the wage

[5] Kambourov and Manovskii (2007) provide empirical evidence that occupational tenure has a much higher impact on wages than industry or job tenure.

regression. Section 5 contains the results of the regression analysis. Section 6 concludes.

2 Data

The empirical analysis employs the German Qualification and Career Survey (QCS). The survey is carried out by the federal institutes for occupational training and labor market research (BiBB and IAB). The questionnaire contains a large block of questions on education with the particular focus on vocational training, which makes the survey especially suitable for studies of the middle-skilled workers. Although the QCS does not have a panel structure, information about the labor market history of the respondents can be obtained from the retrospective questions on education and employment history. For the present study it is important that the survey contains infomation on occupations of the apprenticeship and the current employment as well as the year of graduation from the apprenticeship.

In order to study the consequences of occupational changes in East Germany after reunification in 1990, the waves of 1991/92 and 1998/99 are used. The sample of male East-Germans is restricted to those who completed their first apprenticeship before reunification, and were employed in the survey year. Thus, the result of 1991/92 will reveal short-time effects of an occupational change, whereas 1998/99 is used to obtain results on long-term effects. The rough scheme of the estimation idea is sketched in Figure 1. Unfortunately, the QCS is carried out only once in 7 years, which does not allow examination of the period between the waves of 1991/92 and 1998/99 in more detail. Moreover, the next available wave after 1998/99 is the one of 2005/06 which – after necessary sample restriction – does not contain any employees with the first apprenticeship obtained in the GDR.

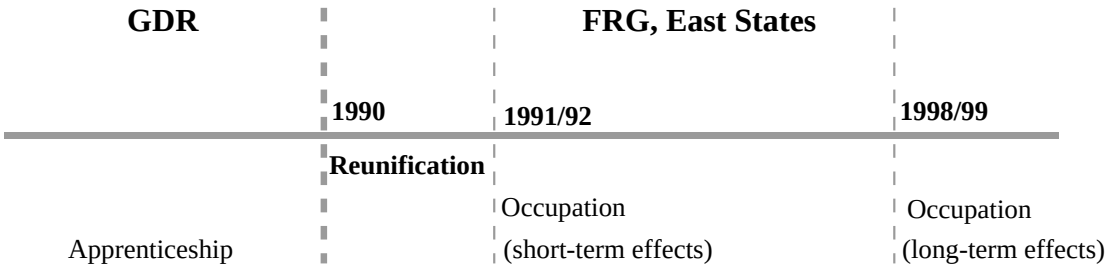


Figure 1: Schematic representation of the estimation idea.

3 Sample Restriction and Identification Strategy

As mentioned before, the current study focuses on the occupational behavior of East Germans after reunification, i.e. the analyzed sample contains only East Germans with the first apprenticeship completed in the GDR (before 1990), and who are employed in the respective survey year. I also restrict tenure of the respondent so that the occupational change can be more likely associated with the German unification. The sample was further restricted to full-time workers of prime age (20-55) employed in so-called recognized occupations with vocational training as the highest level of completed education. This ensures rather homogenous preferences and labor market behavior of the respondents across the sample.

The phenomenon of German reunification provides a unique quasi-experimental environment for the studies on occupational changes. However, it should be mentioned, that many East Germans have not only seized the occasion for occupational mobility, they also took advantage of the newly obtained geographic mobility and moved to West Germany (Burda and Hunt (2001)). Although it results in the loss of variation, I exclude all the respondents who have moved from East to West Germany after reunification since their preference structure essentially differs from those of the "stayers" which is associated with additional channels through which initial occupation of apprenticeship may affect the decision of an occupational change and, thus, individual wages. Furthermore, the decision to move to West Germany, as well as the decision to change the occupation, is endogenous. This means that keeping both "migrants" and "non-migrants" would require an estimation strategy that can clearly disentangle the decisions to migrate and to change the occupation, which would set a grand challenge to the available data. Thus, the suggested estimation strategy takes account only of occupational changes for the East-German employees with vocational training degree who stay in East Germany.

The sample restrictions described above assure that the group of the employees remaining for the analysis is homogenous in terms of possible career chances and preferences.

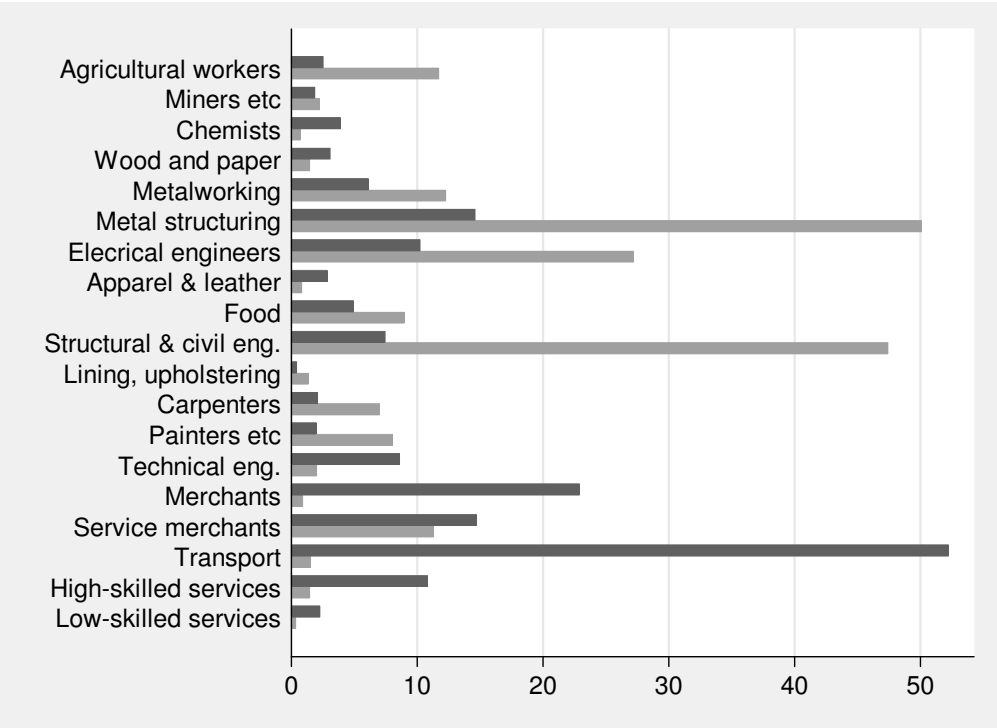
The theoretical models on the post-unification resource reallocation (e.g., Burda, 2006) as well as sociological and economics studies on transition processes (Mayer et al. (1999), Sinn and Sinn (1992)) imply that the adjustment process of the occupational structure of the GDR after reunification, the initial occupation of the employee should have played a crucial role in his decision to change the occupation.

Indeed, when comparing the distribution of occupations in West Germany in 1990 and the distribution of apprenticeship qualifications obtained in the GDR before 1990 across 20 broad occupational categories (Figure 2), it becomes apparent that the occupational structures of the two economies were significatly different. However, with time the occupational structure of East Germany became more like the West-German one.[6]

Under the new economic conditions some occupations become underdemanded or even disappear, which initiates the flows from the underdemanded occupations into the nonemployment, unemployment and employment in other occupations. The underlying mechanism of how the instrument should influence individual wages through the decision to change an occupational after reunification can be described as follows. After reunification the occupational structure of East Germany has experienced dramatical changes. The demand for different occupational groups has adjusted according to the West-German occupational structure. Moreover, individuals could form new perceptions of how promising the occupation they have obtained an apprenticeship qualification in would be under new economic conditions. In the

[6]Some indication of this fact can be found in Burda and Hunt (2001). Own computations and/or references with more precise indication of the convergence of the two occupational structures are following.

Figure 2: Structure of the apprenticeships in East Germany and West-German occupational structure.



subsection presenting the descriptive statistics it will be shown that having an apprenticeship in some particular occupational groups constitutes the main difference between the subsamples of occupational "movers" and "stayers". For example, "movers" are overerpresented among agricultural workers, metalworking and metalstructuring occupations, as well as transportation. On the contrary, "stayers" are overrepresented among electrical, civil and structuring engineers, painters and food occupations. This evidence is also supported by the literature that documents the transition process and construction boom in East Germany on the whole (e.g. Sinn and Sinn (1992) and Burda and Hunt (2001)).

Thus, the initial occupation of the individuum may serve as an instrument for an occupational change, if several conditions are fulfilled. First of all, the initial assignment of occupations in the GDR should be random. Secondly, only the initial occupation may influence the decision to change the occupation after reunification.

The crucial point in the discussion of the apprenticeship occupation as a valid instrument for an occupational change depends on the economic and political system of the GDR[7]. The German Democratic Republic was a socialist state established in the Soviet occupation zone after World War II. Under the political regime of socialism, the state directs the economy by producing exact plans not only for the production and distribution of goods and services, but also for the allocation of available resources. Thus, the process of decision making is generally under control of a central planner, not single individuals. In contrast to the market economy, the social planner is responsible for forecasting future needs in particular occupations with respect to production and to guarantee that the youngsters choose the occupations that will fulfill the future plans. Although the occupational choice cannot be said to be completely involuntary, there existed various mechanisms that made the occupational choice far from voluntary in

[7]For reference see e.g. Schmitt (1975).

terms of Western economies.[8] The state started to influence the preferences of the youth for particular occupations very early. Already at school there existed occupational orientation, which was designed to direct the students' interest to particular occupations. The direct choice of the apprenticeship after school was restricted by existing quotas for the apprenticeship places in each occupation. Moreover, the chance to get a place in the occupation of particular interest was dependent on the family background and – to some extent – by the gender of the applicant. The important underlying reason for the distribution of the quotas was the policy of creating equal opportunities for men and women, as well for the working-class children.[9] Moreover, the idea of full employment and related "anti-parasite" laws made it possible to coerce those secondary school graduates who did not enter any apprenticeship after a year since graduation into any occupation chosen by the local officials.

The planned economy created in East Germany a unique quasi-experimental environment to study the resource allocation under restricted individual decision power. For research reasons it is also crucial that reunification of East and West Germany was not foreseeable; the political turn that caused the opening of the border came suddenly in 1989 and reunification of the two states was carried out within several months. Thus, the employees of the GDR did not generally sense the soon reunification, foresee the possible reallocation of the labor force, and take any action in changing the occupation to the one that could become more promising in the unified Germany.

Some additional words should be said in regard to the vocational training systems in the GDR and FRG and the recognition of the apprenticeship qualifications achieved in the GDR. The dual apprenticeship system is the dominating form of vocational training in Germany.[10] Its tradition roots in the middle ages and the formation of the system dates back to the 19th century, although the formal institutions were established in the 1960s.[11] Thus, the whole structure of the system is highly institutionalized in the economy and society, so that many researchers agree that it would be impossible to transfer the West-German dual apprenticeship system to other countries.[12] Even if the similarity of the apprenticeship system in the GDR and FRG cannot be conceded without sound scepticism, some essential facts besides the long pre-partition history speak for the general similarity of the apprenticeship systems.[13] First of all, the basic structure of the apprenticeship system in the GDR was overtaken by the FRG after reunification without deep institutional transformations.[14] The apprenticeship graduation certificates obtained in the GDR were accepted in the FRG for the majority of occupations.[15] The sample is wittingly restricted to the employees with jobs in the so-called recognized occupations, which are the most traditional and well-established occupations. Thus, it can be only the new economic and occupational structure that made East-German employees acquire new occupations after

[8] More arguments supporting the restricted voluntariness of the occupational choice in the GDR can be found in Uthmann (1991), Ulrich et al. (1991), Trappe and Rosenfeld (1998) and Solga and Konietzka (1999).

[9] For reference see, e.g. Trappe and Rosenfeld (1998) and Miethe (2007).

[10] For the detailed description of the dual apprenticeship system and its history see e.g. Timmermann (1993), Witte and Kalleberg (1995), Münch (1995) and Franz and Soskice (1995).

[11] See e.g. Mitter (1990), Bundesinstitut für Berufsbildung (2006).

[12] See e.g. Timmermann (1993), den Broeder (1995), Harhoff and Kane (1997), Korpi and Mertens (2003), Sharpe and Gibson (2005)

[13] Some information on challenges to the educational system after reunification may be found in Mitter (1992).

[14] Consult Ertl (2000) for the detailed information on the underlying legislation process, as well as the arguments for the similarity of the two systems. The transformation of qualifications after reunification is also discussed by Mayer et al. (1997).

[15] E.g. Bonin and Zimmermann (2001) mention the high level of formal qualification of East-German workers.

reunification.

On the whole, the economic guidelines of a socialist country like the GDR prove the prediction of the theoretical model regarding the validity of the occupation of the apprenticeship as the instrument for a post-reunification occupational change. Moreover, the analyzed sample is homogenous with respect to their chances to occupational and career mobility, which shuts down the secondary channels affecting the decision of an occupational change.

4 Descriptive Statistics

Under the restrictions described above, 573 observations for 1991/92 and 626 observations for 1998/99 remain in the sample. Although the sample size is quite moderate, it is still possible to identify significant tendencies concerning the average wage effect of an occupational change.

Table 1 shows the means of the variables for the subsamples of occupational movers and stayers both 1991/92 and 1998/99. Statistically, the t-tests show that the means of all variables for the two subsamples are same. However, The real log hourly wages for the occupation movers in 1991/92 is lower in comparison to the whole sample; the difference in average log wages becomes even lower by 1998/99. The average tenure with the current employers of occupational movers in 1991/92 is by 0.7 months higher those of the stayers, whereas in 1998/99 it is nearly 5 months lower. Accordingly, the overall average number of employers is somewhat higher for the occupational movers than for the stayers.

Moreover, occupational movers in 1991/92 are slightly older than the stayers. This difference becomes negligible by 1998/99. Occupational movers tend to be higher qualified than the stayers, since they more often have master certificate in their occupations.

The distribution by the firm size and the state of residence (Bundesland) of those who have changed the occupation does not significantly differ from those of the occupational stayers in the sample.

The next block of Table 1 presents the distributions of the apprenticeships obtained in the GDR over the occupational groups. Although the sample size allows us to make only rough observations on the outflows from particular occupations, it is apparent that e.g. technical engineers, agricultural and metal structuring occupations have experienced more occupational changes, whereas for electricians, nutrition occupations, construction occupations, painters and varnishers occupational changes were less common. The next block of the Table 1 shows the distribution of the current employment over the occupations.

Measured using the 2-digit occupational codes,[16] nearly 55% of the employees in the sample have changed the occupation by 1991/92. The fraction of the occupational movers has risen by 1998/99 only by additional 2 percentage points. According to own computations in Fedorets (n.d.), respective numbers for West Germany during the same period were nearly 15 percentage points lower in both 1991 and 1998. The fact that most occupational changes took place a short time after reunification is in line with the findings of Hunt (2001) on job changes associated with the German reunification.

In total, the descriptive statistics shows that the most tremendous differences between the subsamples of the occupational movers and stayers are associated with the occupational group of the apprenticeship. Overall similarity of the two groups according to other observables supports employment of the occupation of the apprenticeship as a valid instrument for an occupational change.

[16] Based on the German KldB occupational classification in the version of 1988.

Table 1: Descriptive statistic for the samples of 1991/92 and 1998/99)

	1991		1998	
	Stayers	Movers	Stayers	Movers
	(1)	(2)	(3)	(4)
N	257	316	267	359
Proportion of stayers and movers	44.85%	55.15%	42.65%	57.35%
Individual characteristics				
Log wages	1.700	1.603	1.929	1.891
	(0.372)	(0.354)	(0.298)	(0.358)
Age	32.61	35.67	38.94	38.92
	(8.528)	(9.160)	(7.455)	(7.764)
Tenure, curr. employer	2.132	2.193	6.468	6.042
	(1.148)	(1.151)	(3.067)	(2.975)
Number of employers	2.630	2.801	2.839	3.153
	(0.952)	(0.957)	(0.962)	(0.847)
Master certificate	0.097	0.139	0.116	0.142
	(0.297)	(0.347)	(0.321)	(0.350)
Distribution of workers across firms (column total=1)				
Less than 5 employees	0.074	0.089	0.056	0.078
5 to 9 employees	0.195	0.139	0.206	0.139
10 to 49 employees	0.339	0.329	0.502	0.421
50 to 99 employees	0.148	0.149	0.105	0.139
100 to 499 employees	0.167	0.165	0.105	0.159
500 to 1000 employees	0.035	0.041	0.015	0.017
More then 1000	0.043	0.089	0.011	0.047
Distribution of workers across federal states (Bundesland, colum total=1)				
East Berlin	0.109	0.079	0.097	0.081
Brandenburg	0.070	0.108	0.154	0.178
Mecklenburg-Vorpommern	0.187	0.155	0.112	0.109
Saxony	0.222	0.171	0.356	0.281
Saxony-Anhalt	0.163	0.199	0.176	0.192
Thuringia	0.249	0.288	0.105	0.159
Distribution across the occupational groups of the apprenticeship (column total =1)				
Agricultural occupations	0.031	0.082	0.011	0.095
Mining, mineral winning, stonery, material production	0.012	0.016	0.004	0.014
Chemical industry	0	0.013	0.004	0
Wood and paper manufacturing, converting, printing	0.004	0.016	0.004	0.008
Metalworking occupations	0.012	0.114	0.030	0.075
Metal-structuring, engineering	0.156	0.323	0.187	0.306
Electrical engineering	0.195	0.082	0.221	0.084
Apparel industry, leather production and processing	0.004	0.006	0	0.008
Food industry	0.082	0.0190	0.038	0.050
Structural and civil engineering	0.323	0.161	0.326	0.181
Lining, upholstering	0.020	0	0.015	0

Carpenters	0.031	0.032	0.041	0.039
Painters, varnishers	0.066	0.025	0.071	0.017
Technical engineers	0.008	0.010	0.004	0.020
Merchants	0.008	0.003	0	0.008
Service merchants	0	0	0	0
Transport occupations	0.035	0.073	0.034	0.072
Organization, administration, high-skilled professionals	0.008	0.013	0	0.011
Cleaning, low-skilled healthcare sevices	0.004	0.013	0.008	0.008
Occupations of order and security	0.004	0	0.004	0.003
Distribution across the occupational groups of the current occupation (column total=1)				
Agricultural occupations	0.031	0.035	0.011	0.059
Mining, mineral winning, stonery, material production	0.012	0.003	0.004	0.003
Chemical industry	0	0.016	0.004	0.006
Wood and paper manufacturing, converting, printing	0.004	0.010	0.004	0.011
Metalworking occupations	0.012	0.020	0.030	0
Metal-structuring, engineering	0.156	0.130	0.187	0.109
Electrical engineering	0.195	0.016	0.221	0.011
Apparel industry, leather production and processing	0.004	0	0	0
Food industry	0.082	0.010	0.038	0.009
Structural and civil engineering	0.323	0.120	0.326	0.187
Lining, upholstering	0.020	0.006	0.015	0.008
Carpenters	0.031	0.010	0.041	0.033
Painters, varnishers	0.066	0.022	0.071	0.031
Technical engineers	0.008	0.013	0.004	0.008
Merchants	0.008	0.104	0	0.117
Service merchants	0	0.019	0	0.022
Transport occupations	0.035	0.339	0.034	0.281
Organization, administration, high-skilled professionals	0.008	0.079	0	0.070
Cleaning, low-skilled healthcare sevices	0.004	0.044	0.007	0.033
Occupations of order and security	0.004	0.006	0.004	0.003

5 Econometric Model and Estimation Results

The estimation of the correlation between an occupational change and individual wages was performed separately for the two subsequent survey waves of 1991/92 and 1998/99:

$$\ln w_{1991} = \alpha_{1991} + \beta_{1991} \cdot \text{Occ. change} + \gamma_{1991} \cdot X_{1991} + \epsilon_{1991}, \quad (1)$$

$$\ln w_{1998} = \alpha_{1998} + \beta_{1998} \cdot \text{Occ. change} + \gamma_{1998} \cdot X_{1998} + \epsilon_{1998}. \quad (2)$$

The main variable of interest is occupational change. The vector X contains such variables as tenure with the current employer, dummy for having a master certificate, age and age squared. Moreover, it includes the sets of dummies for the firm size and state of residence (Bundesland).

Table 2 presents both OLS and IV estimation results for 1991/92 in three specifications. The first one (see columns (1) and (4)) contains only exogenous variables, whereas the specification in columns (2) and (5) is extended by the common covariates listed above. The specification in colums (3) and (6) also contains very broad 1-digit occupational groups of the current employment and is included in the table for illustration purposes. The following Table 3 displays the coefficients of the first stage IV regression estimation. Similarly, Tables 4 and 5 contains the respective results for 1998/99.

The first part of the estimation was performed using OLS. This revealed negative correlation between occupational change and wages. The estimates in Table 2 indicate about 10% lower wages for those who have change the occupational up to 1991/92. This number falls to insignificant 4% to 1998/99, see Table 4. In order to take account of the endogeneity of the occupational change in this setup, the estimation was complemented by an IV estimation with the occupation of the apprenticeship as instrument for the occupational change. Technically, the 3-digit occupational group of the apprenticeship of the East Germans instuments the decision to change the occupation on the 2-digit level. The groups of the apprenticeship are descendingly ordered according to the size of the respective occupational group in West Germany in 1990.[17] The ordering mirrors the chances of the East Germans to stay in their occupations under the new economics conditions.

The first stage estimations confirms that the occupation of the apprenticeship plays a significant role in the post-reunification individual decisions to change the occupations. The employees with an apprenticeship in occupational groups that are small in West Germany, are more likely to change their occupations. This general results of the first stage holds both for 1991/92 and 1998/99.

The IV estimation generally confirms the negative impact of an occupational change on wages both in 1991 and 1998. The F-statistics for the formal Angrist-Pischke test proves the validity of the occupation of the apprenticeship as suitable instrument. Similar coefficients for other controls in the OLS and IV regressions also confirm that the instrument affects through the channel associated with the occupational change imposed by the changes in the occupational structure.

Generally, the estimated IV coefficients for occupational change are much lower than their OLS counterparts. This supports the initial conjecture that imposed occupational changes in East Germany have lead to severe interruptions in the individual wage profiles and have on average caused tremendous losses. Moreover, the coefficients imply positive selectivity of the group of occupational movers, which is in line with the theoretical and empirical findings on the selectivity of job and occupational changers (see e.g. Hunt (2001)).

[17] The ordering is conducted using the respective official population statistics.

Table 2: Comparison of the coefficients for OLS and IV estimations in East Germany for 1991

Dependent variable:		OLS			IV	
ln wages	(1)	(2)	(3)	(4)	(5)	(6)
Occ. change 2-dig	-0.108***	-0.100***	-0.071**	-0.459***	-0.359**	-0.488
	(0.000)	(0.001)	(0.041)	(0.006)	(0.017)	(0.167)
Age	0.044***	0.040***	0.040***	0.050***	0.046***	0.044***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)
Age squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
Tenure, curr. employer		0.003	0.004		0.008	0.008
		(0.832)	(0.738)		(0.571)	(0.568)
Master certificate		0.060	0.051		0.069	0.058
		(0.184)	(0.255)		(0.145)	(0.243)
Firm size		Yes	Yes		Yes	Yes
Bundesland		Yes	Yes		Yes	Yes
Occ. groups			Yes			Yes
Constant	0.897***	0.879***	0.621***	0.926***	0.860***	0.709***
	(0.000)	(0.000)	(0.008)	(0.000)	(0.000)	(0.007)
Adjusted R^2	0.036	0.173	0.190			
Angrist-Pischke (F-stat)				23.60	23.10	6.49
Observations	576	576	576	576	576	576

Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: First stage of the IV estimations for 1991

Dependent var: Occ. change	(4-fs)	(5-fs)	(6-fs)
Age	0.0127	0.019	0.011
	(0.017)	(0.017)	(0.014)
Age squared	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Tenure with the current employer		0.015	0.008
		(0.018)	(0.015)
Master certificate		0.023	0.012
		(0.066)	(0.055)
Occ. of apprenticeship	-0.002***	-0.002***	-0.001***
	(0.000)	(0.000)	(0.010)
Firm size		Yes	Yes
Bundesland		Yes	Yes
Occ.groups			Yes
Constant	0.593	0.424	0.389
	(0.314)	(0.333)	(0.291)
Observations	576	576	576
Adj. R^2	0.06	0.07	0.35

Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Comparison of the coefficients for OLS and IV estimations in East Germany for 1998

Dependent variable:		OLS			IV	
ln wages	(1')	(2')	(3')	(4')	(5')	(6')
Occ. change 2-dig	-0.038	-0.041	-0.011	-0.257***	-0.233**	-0.339*
	(0.158)	(0.114)	(0.729)	(0.009)	(0.016)	(0.064)
Age	-0.001	-0.005	-0.009	-0.007	-0.011	-0.012
	(0.974)	(0.765)	(0.615)	(0.731)	(0.559)	(0.502)
Age squared	0.000	0.000	0.000	0.000	0.000	0.000
	(0.987)	(0.818)	(0.633)	(0.743)	(0.604)	(0.509)
Tenure, curr. employer		0.023***	0.025***		0.020***	0.018***
		(0.000)	(0.000)		(0.000)	(0.002)
Master certificate		0.077**	0.073*		0.083**	0.047
		(0.039)	(0.054)		(0.031)	(0.265)
Firm size		Yes	Yes		Yes	Yes
Bundesland		Yes	Yes		Yes	Yes
Occ. groups			Yes			Yes
Constant	1.947***	1.742***	1.597***	2.191***	1.977***	1.944***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Adjusted R^2	-0.002	0.138	0.169			
Angrist-Pischke (F-stat)				55.93	49.40	20.38
Observations	626	626	626	626	626	626

Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: First stage of the IV estimations for 1998

Dependent var: Occ. change	(4'-fs)	(5'-fs)	(6'-fs)
Age	-0.029	-0.031	-0.015
	(0.026)	(0.026)	(0.022)
Age squared	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Tenure with the current employer		-0.012*	-0.018***
		(0.006)	(0.001)
Master certificate		0.023	-0.075
		(0.056)	(0.048)
Occ. of apprenticeship	-0.002***	-0.002***	-0.001***
	(0.000)	(0.000)	(0.000)
Firm size		Yes	Yes
Bundesland		Yes	Yes
Occ.groups			Yes
Constant	1.653***	1.757***	1.356***
	(0.552)	(0.536)	(0.000)
Observations	626	626	626
Adj. R^2	0.08	0.10	0.372

Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Two years after reunification, in 1991/92, the negative effect of an occupational change amounts to more than 35% in all specifications. Although the OLS estimates indicate no significant wage losses in 1998/99, the IV estimates still point at significant negative effect of nearly 20%. These numbers show that the post-reunification fundamental changes of the occupational structure in East Germany can be evaluated as both tremendous and persistent.

6 Conclusion

The aim of this analysis is to estimate the individual wage effect of the overall adjustment of the occupational structure after reunification of 1990 in East Germany. Generally, ”the wind of change” that has brought the political and economic freedom to East Germany is normally associated with the new chances that have opened for East Germans. However, the overall economic evolution of the region in terms of wages and productivity is rather moderate, which is empirically well documented. Apart from the option of migration to West Germany, the question is what chances had middle-skilled employees under these new conditions? Reunification has caused broad reallocation of resources, including the adjustment of the occupational structure.

The wave of occupational changes from the occupations that were no longer demanded, has destroyed plenty of employee-occupation matches which has caused massive reallocation of human capital. Apart from the problematic of massive unemployment, application of early retirement schemes, emigration etc., the analysis presented in the current paper shows a significantly negative effect of an occupational change on wages. The IV estimation reports that an occupational change for middle-skilled employees has caused a wage loss of more than 35% in the short and one of more than 20% in the long run.

It can be hypothesized that an imposed occupational change in a transition process can still open new wage perspectives in the new market economy. In practice, the calculations show that after a decade of transition process one can observe a persistent negative wage effect for the employees who had to change their occupations due to fundamental changes in the occupational structure of East Germany.

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