

# Wage differentials between East and West Germany

## Are they related to the location or to the people?

*Werner Smolny and Matthias Kirbach*

July 23, 2010

### **Abstract**

Despite rapid economic integration and massive help from the Federal Government large wage differences between East and West Germany still persist. We ask whether those differences are related to disadvantageous locational conditions in East Germany or could be found in the characteristics of the people living there. Our paper analyses income adjustment of East-West migrants based on the German Socio-Economic Panel, 1990-2008. Since migrants earned their income in both, East and West Germany, the effect of the location can be identified. The results indicate that the wage differences cannot be attributed to the people.

Keywords: Economics of transition, human capital and income, migration

JEL No.: D31, J24, O15, P23

Address: Institute of Economic Policy

Ludwig Erhard Chair

University of Ulm

89069 Ulm, GERMANY

Tel.: (49) 731 50 24260, Fax: (49) 731 50 24262

e-mail: Werner.Smolny@uni-ulm.de

---

We like to thank Christian Peukert for research assistance and the editor of this journal and two anonymous referees for very helpful comments on an earlier version of the paper.

# 1 Introduction

In November 1989 the opening of the border between the Federal Republic of Germany and the German Democratic Republic initiated a rapid process of political and economic unification which took place in 1990. Immediately afterwards East Germany faced a breakdown of economic activity, but since 1991 a fast catching up began. Later on the convergence process faded out. Recently the overall wage differential between East and West Germany amounts to about 25 percent.<sup>1</sup>

This paper asks for the sources of the persisting wage differences. On the one hand, those differences could be related to the general economic conditions in East Germany, e.g. private and public capital accumulation, technological backwardness or inappropriate economic institutions.<sup>2</sup> On the other hand, those differences could be related to the people living and working there. One could think of differences of human capital or, more general, of the inappropriateness of the qualification of the East German employees for the labour market conditions of a competitive market system.<sup>3</sup> Basically we ask whether the income differences are related to the location or to the people.

Our analysis focusses on the importance of individual characteristics. For this purpose we ask what East German workers would have earned if their working place would have been in West Germany instead of East Germany. We differentiate between stayers and migrants. The post-unification process saw a large number of East-West migrants, and until 2008 about 15 percent of the East German population moved towards West Germany.<sup>4</sup> Our empirical analysis consists of two steps. We firstly estimate earnings functions for East and West Germany which control for observable determinants of wage income. We then place migrants into those earnings functions and compare their earnings in West Germany with those in East Germany before migration. The estimated difference is interpreted as the effect of the location.

---

<sup>1</sup>See BMVBS (2009) and Smolny (2009, 2010).

<sup>2</sup>See e.g. Burda, Hunt (2001), Sinn (2002), Burda (2006) and Snower, Merkl (2006).

<sup>3</sup>See e.g. Burda, Schmidt (1997), Hunt (2001) and Eichler and Lechner (2002).

<sup>4</sup>See Burda (1993), van Leuvenstein, Parikh (2002) and Hunt (2004, 2006).

The next section presents stylized facts on wages and observable determinants of wages for stayers and movers in East and West Germany and discusses the empirical specification. In section 3 the estimation results are presented. They show that migrants experience enormous wage gains. Thus it is the location which should be blamed, not the people. The paper concludes with a short summary and some policy implications.

## 2 Data and empirical specification

The micro data for the empirical investigation stem from the German Socio-Economic Panel (GSOEP). The GSOEP was started in 1984 as a longitudinal survey of private households and persons in the Federal Republic of Germany. In June 1990 it was extended to the territory of the German Democratic Republic. The empirical analysis distinguishes stayers and movers. Stayers are defined as those people who reported a place of residence in either East Germany (always in East) or West Germany (always in West) in 1989 before unification and during the whole sample period 1990-2008. East-West migrants have reported a place of residence in East Germany before unification and have reported a place of residence in one of the 10 West German states at least once.<sup>5</sup> For each year we distinguish East-West migrants staying in East Germany (migrant in East) and migrants staying in West Germany (migrant in West).

Table 1 gives some information on stayers and movers. In 1990 average East German income was about 1/3 of West German income, more recently (2008) the income differential is about 25 percent. The income of migrants staying in East Germany is on average (panel 1993-2008) below those of East German stayers.<sup>6</sup> Migrants in West Germany receive an income which is higher than those of East German stayers

---

<sup>5</sup>West-East migrants were excluded from the analysis, since their number in GSOEP is small. People living or working in Berlin and commuters are excluded as well.

<sup>6</sup>The panel data analysis excludes the first years: The 1990 wave of GSOEP refers to the time before Economic, Monetary and Social Union, and the years 1991/1992 capture the period of massive downward adjustments of the labour force in East Germany and corresponding extensive active labour market programs.

Table 1: Characteristics of stayers and migrants

	income			no. of obs.			hours		
	1990	2008	panel	1990	2008	panel	1990	2008	panel
always in East	566	1878	1627	2378	889	18835	42.7	40.0	41.5
migrant in East	544	2003	1293	131	18	605	43.5	39.6	42.3
migrant in West	1329	2227	1942	1	148	1916	38.5	38.6	38.8
always in West	1644	2568	2262	3154	2048	40666	38.7	37.2	37.6
	schooling			age			women		
	1990	2008	panel	1990	2008	panel	1990	2008	panel
always in East	12.0	12.9	12.6	39.9	42.9	40.7	48.8	54.1	51.5
migrant in East	12.0	13.5	12.2	31.9	36.9	30.6	55.0	38.5	51.1
migrant in West	10.5	12.9	12.6	41.0	38.6	35.5	100	57.4	54.3
always in West	11.5	12.4	12.0	37.9	42.8	40.1	40.7	46.8	43.8

Monthly income in €, weekly hours, schooling and age in years, share of women

Panel: average 1993-2008. Source: GSOEP, Sample A and C, employees only

but below those of West German stayers.

The average working time per week in East Germany is about 3-4 hours above the corresponding figure for West Germany. The working time of migrants staying in East Germany is higher than those of migrants staying in West Germany. The table also reveals a better formal qualification level (schooling) and a higher share of women in the labour force for East German stayers.<sup>7</sup> The qualification level of migrants corresponds largely to those of East German stayers. As expected, movers are younger and, more surprisingly, the share of female migrants is above 50 percent.

The aim of the empirical analysis is estimating the effect of the location. Basically

<sup>7</sup>Schooling includes general schooling, vocational and other training and university education. Years of schooling refer to the time necessary to achieve the corresponding qualification level.

we want to know what people from East Germany would have earned if they were located in West Germany. If this hypothetical income is close to the income they earned in East Germany, the differential would be related to the employees; if this income is close to the respective income of West Germans, the differential is related to the location. The wage differential is difficult to estimate for East German employees in general, but we can estimate it for migrants. For (prospective) migrants we observe the income during their stay in East Germany as well as the income which they earned in West Germany.

Our empirical analysis consists of 2 steps. Firstly we estimate earnings functions for East and West German stayers. This should give some information on differences of wage determination in East and West Germany. We then calculate the conditional wage differential between East and West German stayers. However, movers (migrants) typically differ from stayers, and we have to take those differences into account. For this purpose we place migrants into the earnings function for East German stayers. This yields firstly an estimate of the relative conditional income of those migrants still staying in East Germany and corresponds to the estimation of the selection effect. Secondly, we estimate their place in the earnings function while they live and work in West Germany. The difference of those estimates is interpreted as the effect of the location.

### 3 Estimation results

Table 2 depicts the results of the panel data analysis. Columns (1) and (3) refer to stayers. Those results give a consistent, well determined and remarkable similar picture of income determination in West and East Germany. For West Germany, column (3), the returns to schooling are 8.6 percent per year. The corresponding estimate for East Germany, column (1), is significantly higher.<sup>8</sup> A remarkable difference is the rather small 7 percent gender wage gap in East Germany; the corresponding figure for West Germany is about 1/4.<sup>9</sup> Remarkable are also the similar

---

<sup>8</sup>Percentages refer to differences of logarithmic values.

<sup>9</sup>See Hunt (2002) for a detailed discussion.

age-income profiles in East and West Germany.<sup>10</sup> Finally, the estimates reveal a less than proportional increase of monthly income with the working time for East Germany.<sup>11</sup> The estimates for West Germany point towards a proportional relation. These estimates show that those factors which are important for income determination in West Germany are relevant in East Germany as well. The estimates do not provide evidence that the human capital of the East German employees is less valuable than those of West German employees. The age-income profiles are similar, and the returns to formal qualification are even higher in East as compared with West Germany. This result is especially noteworthy, since most East Germans have received most or all of their education and work experience in the old system.<sup>12</sup> Remarkable differences are the smaller gender wage gap and the less than proportional effect of the working time in East Germany. The smaller gender wage gap could be related to the stronger association of women to the labour force in the old system. The smaller effect of the working time on income could indicate that firms use unpaid overtime working as an additional instrument of hourly wage adjustment in a poor labour market situation.

Detailed results for all 19 years 1990-2008 are reported in tables A.1 and A.2 in the appendix.<sup>13</sup> The wave-specific estimates firstly reveal an increase of the returns to schooling in East Germany. Secondly, the East German gender wage gap was considerable larger in the early nineties. Thirdly, the age-income profiles in East Germany were more flat in the early years; for the more recent years the differences are small. Fourthly, the effect of hours on income in East Germany was quite small in the early nineties which might be related to the extended use of short-time working in those years. In general, the estimates reveal visible East-West differences of income determination in the first years after unification, but a process of convergence afterwards. A remarkable exception is the gender wage gap.

---

<sup>10</sup>Experience is derived from age and years of schooling.

<sup>11</sup>Therefore we do not work with hourly wages.

<sup>12</sup>Since the system of education in East Germany before unification was different, we do not work with education dummies.

<sup>13</sup>Since the estimation sample for each year is smaller, the year to year changes should be interpreted with care.

Table 2: Panel data estimates

dependent variable: log. nominal monthly gross income

	(1)	(2)	(3)	(4)
	always East	always East and migrants	always West	always West and migrants
schooling	.094 (64.0)	.095 (69.7)	.086 (96.9)	.087 (100.8)
women	-.072 (-10.4)	-.086 (-13.2)	-.250 (-50.5)	-.246 (-51.3)
experience	.059 (49.8)	.059 (54.2)	.065 (86.9)	.064 (89.2)
experience <sup>2</sup>	-.0010 (-40.0)	-.0010 (-43.5)	-.0011 (-71.0)	-.0011 (-72.7)
working time	.853 (80.6)	.888 (92.0)	1.044 (202.9)	1.044 (207.9)
migrant in East		-.081 (-4.2)		-.489 (-26.4)
migrant in West		.286 (25.5)		-.099 (-9.3)
observations	18835	21356	40666	43187
s.d. dep.var.	.643	.658	.795	.794
SEE	.459	.459	.449	.449
$\bar{R}^2$	.490	.513	.681	.681

*t*-statistics in parentheses, sample 1993-2008, fixed effects for the waves (not reported), schooling and experience in years, log. weekly hours, dummy variables for women and migrants, employees living in Berlin, commuters and West-East migrants excluded

Based on these wave-specific estimates we calculate what East Germans would have earned, if they were paid according to the West German earnings function and vice versa. The upper panels in figure 1 show that, if East German stayers were paid according to the West German earnings function (hypothetical West), their income would be clearly above those of West German employees (actual West). Correspondingly, if West German stayers were paid according to the East German earnings function (hypothetical East), their income would be clearly below those of East German employees (actual East). These results show that the East-West income differential is not caused by differences in observed determinants of income. The opposite is true: Without better schooling and longer working hours the income differential would be about 40 percent, i.e. much higher as compared with the observed 25 percent unconditional wage differential.

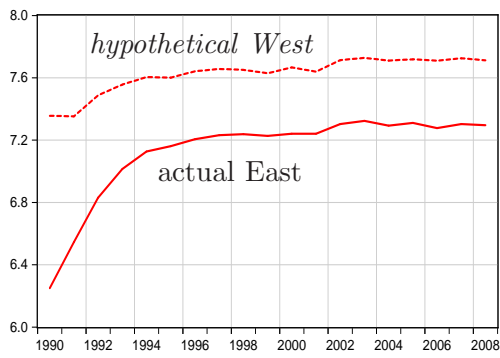
The bottom panels in figure 1 depict the corresponding income variables for migrants. The left-hand panel reveals that migrants in East Germany receive an income (actual East) which is slightly lower than the conditional income of stayers (hypothetical East). The selection effect – in terms of unobserved earnings capabilities – is negative. The right-hand panel reveals that migrants in West Germany receive an income (actual West) which is slightly lower than those of a corresponding West German stayer (hypothetical West). This might either be related to the selection effect or to a kind of discrimination effect for East Germans in West Germany. The difference between West and East income of migrants is the conditional wage differential between East and West Germany, where the conditioning relies on both observed and unobserved determinants of income. It is interpreted as the effect of the location and amounts to about 40 percent.

Columns (2) and (4) in table 1 depict the results of corresponding panel data regression analyses. East-West migrants were added to the estimation sample, and dummy variables estimate their place in the earnings function. Looking firstly at the results in terms of the East German earnings function, column (2), we found that migrants still staying in East Germany receive an income which is about 8 percent lower than the conditional income of East German stayers. The selection effect in terms of earnings capabilities is significantly negative. The income of migrants

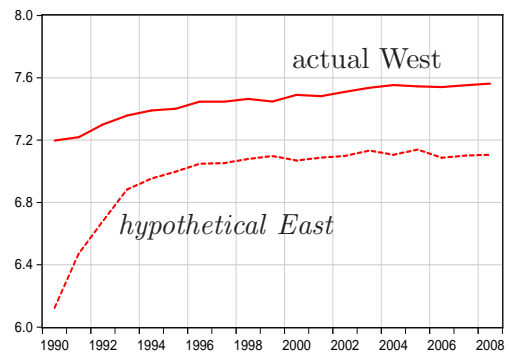


Figure 1: Actual and hypothetical income, stayers and movers

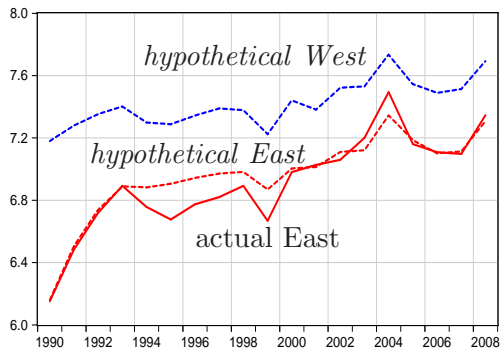
East German stayers



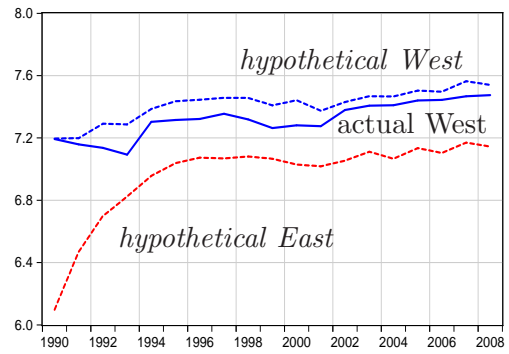
West German stayers



migrants in East Germany



migrants in West Germany



*solid lines: actual log. income, dashed lines: hypothetical log. income*

living and working in West Germany, on the other hand, is nearly 30 percent above those of a corresponding East German stayer. Repeating the exercise for the West German earnings function, column (4), yields a similar result. For both earnings functions the conditional wage differential is about 40 percent.

## 4 Conclusion

Despite rapid economic integration, massive investment and on-going help from the Federal Government large wage differences between East and West Germany persist. We asked whether those differences are related to the general locational conditions or to the characteristics of the people living there.

Our analysis is based on the income development of migrants. The estimates firstly reveal a negative selection effect of migrants. The conditional income of (prospective) migrants in East Germany is below those of corresponding East German stayers. Secondly, migrants living and working in West Germany received an income only slightly below those of corresponding West German stayers. Calculating the effect of the location as the difference of migrants' places in the earnings function during their stays in West and East Germany yields a figure close to the conditional average wage gap of stayers, i.e. about 40 percent.

As a by-product our empirical analysis yields surprisingly similar earnings functions in East and West Germany. The age-income profiles are similar, at least since the second half of the nineties, and the returns to schooling are even higher in East Germany. This result is especially noteworthy, since most East Germans have received most or all of their education and work experience in the old system. Remarkable differences are the smaller gender wage gap in the recent years and the less than proportional increase of income with the working time during the nineties.

Interpreting those results in terms of policy conclusions indicates that the human capital of East German employees is even more valuable as compared with those of West German employees. Finally, in terms of sources of East-West wage differentials, our results indicate that differences of the locational conditions in East Germany

are responsible, not differences of human capital equipment. Therefore further research and policy measures should focus on differences of public and private capital, technological backwardness and inappropriate economic institutions.

## References

- BMVBS, (2009). Jahresbericht der Bundesregierung zum Stand der Deutschen Einheit 2009. Bundesministerium für Verkehr, Bau und Stadtentwicklung.
- Burda, M.C., (1993). The determinants of East-West German migration. Some first results. *European Economic Review* 37, p. 452-461.
- Burda, M.C., (2006). Factor Reallocation in Eastern Germany after Reunification. *American Economic Review* 96/2, p. 368-374.
- Burda, M.C., and J. Hunt, (2001). From reunification to economic integration: Productivity and the labour market in Eastern Germany. *Brookings Papers on Economic Activity* 2, p. 1-71.
- Burda, M.C., and C.M. Schmidt, (1997). Getting behind the East-West wage differential: Theory and evidence. In R. Pohl (ed.), *Wandeln oder Weichen – Herausforderungen der wirtschaftlichen Integration für Deutschland*. *Wirtschaft im Wandel* 3, p. 170-201.
- Eichler, M. and M. Lechner, (2002). An evaluation of public employment programmes in the East German State of Sachsen-Anhalt. *Labour Economics* 9, p. 143-186.
- Hunt, J., (2001). Post-Unification wage growth in East Germany. *Review of Economics and Statistics* 83/1, p. 190-195.
- Hunt, J., (2002). The transition in East Germany: When is a ten-point fall in the gender wage gap bad news? *Journal of Labor Economics* 20/1, p. 148-169.
- Hunt, J., (2004). Are migrants more skilled than Non-Migrants? Repeat, return and same-employer migrants. *Canadian Journal of Economics* 37/4, p. 830-849.

- Hunt, J., (2006). Staunching Emigration from East Germany: Age and the Determinants of Migration. *Journal of the European Economic Association* 4/5, p. 1014-1037.
- Sinn, H.W., (2002). Germany's economic unification: An assessment after ten years. *Review of International Economics* 10/1, p. 113-128.
- Smolny, W., (2009). Wage adjustment, competitiveness and unemployment – East Germany after unification. *Journal of Economics and Statistics* 229/2+3, p. 130-145.
- Smolny, W. (2010). Dynamic adjustment and long-run equilibria: Panel data estimates for the East German states, *Economic Modelling* 27, p. 1223-1229.
- Snower, D.J. and C. Merkl, (2006). The caring hand that cripples: The East German labor market after reunification. *American Economic Review* 96/2, p. 375-382.
- Van Leuvenstein, M., and A. Parikh, (2002). How different are the determinants of population versus labour migration in Germany? *Applied Economic Letters* 9, p. 699-703.

Table A.1: Wave-specific estimates: East German stayers

dependent variable: log. nominal monthly gross income								
year	school.	women	exp.	exp. <sup>2</sup>	hours	obs.	SEE	$\overline{R}^2$
1990	.081 (24.4)	-.187 (-12.6)	.038 (16.5)	-.0007 (-13.5)	.624 (20.7)	2378	.341	.446
1991	.072 (18.9)	-.216 (-12.9)	.039 (13.6)	-.0007 (-11.2)	.393 (15.7)	1836	.352	.390
1992	.085 (20.9)	-.133 (-7.2)	.048 (14.3)	-.0009 (-11.7)	.624 (15.9)	1664	.364	.422
1993	.092 (19.9)	-.122 (-5.9)	.044 (11.1)	-.0008 (-8.2)	.477 (13.3)	1506	.390	.399
1994	.082 (17.7)	-.094 (-4.5)	.054 (13.7)	-.0010 (-10.9)	.714 (17.2)	1435	.387	.442
1995	.077 (15.2)	-.113 (-4.9)	.053 (12.6)	-.0010 (-10.2)	.668 (17.1)	1480	.422	.412
1996	.094 (19.2)	-.112 (-4.9)	.053 (13.4)	-.0009 (-10.6)	.672 (16.3)	1395	.410	.450
1997	.088 (16.9)	-.074 (-3.0)	.063 (14.4)	-.0011 (-11.6)	.753 (16.9)	1329	.427	.450
1998	.091 (17.0)	-.066 (-2.7)	.066 (15.0)	-.0012 (-12.4)	.711 (17.3)	1251	.427	.466
1999	.092 (16.7)	-.097 (-3.7)	.071 (15.6)	-.0013 (-13.1)	.561 (16.0)	1279	.456	.445
2000	.103 (18.2)	-.073 (-2.7)	.065 (14.8)	-.0011 (-11.5)	.859 (21.6)	1224	.448	.538
2001	.097 (16.6)	-.061 (-2.2)	.061 (13.2)	-.0010 (-10.6)	.870 (23.4)	1165	.458	.535
2002	.101 (16.5)	-.031 (-1.0)	.060 (11.9)	-.0010 (-9.2)	.958 (21.1)	1071	.460	.525
2003	.097 (15.9)	-.026 (-0.9)	.065 (13.4)	-.0011 (-10.7)	.960 (23.8)	1043	.453	.564
2004	.095 (15.0)	-.006 (-0.2)	.062 (12.7)	-.0010 (-10.1)	1.119 (28.7)	1030	.468	.603
2005	.096 (12.9)	-.036 (-1.0)	.061 (10.0)	-.0010 (-8.1)	0.929 (19.1)	949	.539	.463
2006	.104 (13.4)	-.083 (-2.2)	.053 (8.3)	-.0009 (-6.8)	1.097 (20.4)	910	.546	.478
2007	.106 (14.0)	-.064 (-1.7)	.057 (9.0)	-.0010 (-7.5)	1.160 (21.0)	889	.527	.502
2008	.111 (15.2)	-.071 (-1.9)	.053 (8.7)	-.0009 (-7.3)	1.226 (24.4)	879	.522	.559

*t*-statistics in parentheses. Berlin, commuters and migrants excluded.

Schooling and experience in years, log. weekly hours, dummy variable for women.

Table A.2: Wave-specific estimates: West German stayers

dependent variable: log. nominal monthly gross income								
year	school.	women	exp.	exp. <sup>2</sup>	hours	obs.	SEE	$\overline{R}^2$
1990	.094 (27.0)	-.315 (-17.3)	.067 (24.8)	-.0012 (-19.9)	.778 (37.7)	3154	.466	.584
1991	.088 (26.6)	-.268 (-15.4)	.065 (25.1)	-.0011 (-19.9)	.954 (48.9)	3140	.442	.643
1992	.083 (25.5)	-.292 (-17.1)	.063 (23.3)	-.0011 (-18.4)	.924 (48.1)	3035	.428	.644
1993	.084 (26.2)	-.284 (-16.5)	.062 (23.4)	-.0011 (-19.3)	.987 (50.1)	2990	.424	.657
1994	.079 (25.9)	-.251 (-15.1)	.066 (26.3)	-.0012 (-22.4)	1.031 (55.4)	2951	.402	.688
1995	.084 (25.3)	-.286 (-15.8)	.067 (24.6)	-.0012 (-20.8)	0.910 (48.6)	2974	.450	.640
1996	.080 (24.8)	-.244 (-13.7)	.069 (25.5)	-.0012 (-21.0)	1.014 (50.6)	2933	.434	.654
1997	.078 (24.5)	-.232 (-13.1)	.068 (25.1)	-.0012 (-20.6)	1.057 (54.1)	2878	.426	.675
1998	.088 (25.9)	-.232 (-12.5)	.064 (22.7)	-.0011 (-18.2)	1.001 (51.2)	2728	.438	.663
1999	.083 (25.4)	-.222 (-12.0)	.066 (24.2)	-.0011 (-19.9)	1.075 (55.8)	2789	.437	.689
2000	.091 (27.2)	-.246 (-13.1)	.062 (22.0)	-.0010 (-17.8)	1.027 (51.6)	2697	.435	.680
2001	.093 (24.8)	-.270 (-13.1)	.065 (20.8)	-.0011 (-16.6)	1.049 (50.8)	2574	.473	.675
2002	.095 (25.1)	-.249 (-11.9)	.067 (20.9)	-.0011 (-17.1)	1.057 (50.3)	2417	.460	.692
2003	.088 (22.8)	-.231 (-10.5)	.070 (21.3)	-.0011 (-17.5)	1.112 (49.3)	2335	.472	.685
2004	.089 (23.3)	-.275 (-12.8)	.065 (20.4)	-.0010 (-16.2)	1.049 (49.1)	2258	.459	.699
2005	.093 (23.6)	-.236 (-10.5)	.063 (18.7)	-.0010 (-14.6)	1.067 (50.4)	2148	.466	.709
2006	.090 (21.0)	-.259 (-10.6)	.062 (16.6)	-.0010 (-13.6)	1.103 (46.4)	2018	.486	.688
2007	.089 (22.0)	-.228 (-10.0)	.058 (17.0)	-.0009 (-13.5)	1.111 (49.1)	2048	.459	.708
2008	.085 (19.7)	-.240 (-9.9)	.063 (17.6)	-.0010 (-14.4)	1.109 (46.7)	1928	.475	.691

*t*-statistics in parentheses. Berlin, commuters and migrants excluded.

Schooling and experience in years, log. weekly hours, dummy variable for women.