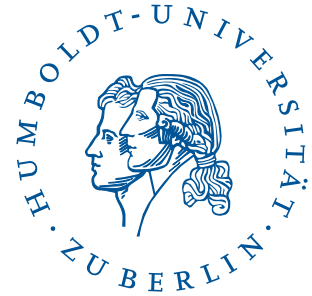
Human Capital in East and West Germany after Reunification

Christian Koopmann
Humboldt-Universität zu Berlin



Outline

The East German labour market is interesting for various reasons:

- Changes in wage structure when transitioning from planned to market economy a hot topic in economic research.
- Unique chance to check the theory on wage setting regimes.
- East German economy / labour market unique in the abruptness of regulatory changes and the existence of a reference labour market.
- With the GSOEP and other studies there are especially rich datasets for the German case.

This work tries to shine light on these research questions:

1. How do returns to education and experience differ in East and West Germany ?
2. How do these differences develop over time ?
3. How do these differences behave when differentiating between Experience and Education obtained pre- / post-unification?
4. How do results vary for different Skill Groups ? (No Degree, Vocational- , College Degree)

Current Results on West- / East German Wages

- Flatter wage profiles across age and experience in East Germany before and after reunification ([Krueger and Pischke, 1992],[Burda et al., 1997])
- Differences persist well into the twenty-first century. [Orlowski and Riphahn, 2009]
- Returns to Old Experience almost zero in East Germany. ([Gathmann, 2004])

This work extends the literature in the following ways:

- Extending the timeframe (1991-2014)
- Extending the differentiation between "New" and "Old" to years of education and applying it to both East and West German Samples (compare [Gathmann, 2004]).
- Including more detailed analysis of results across skill groups (compare [Orlowski and Riphahn, 2009])

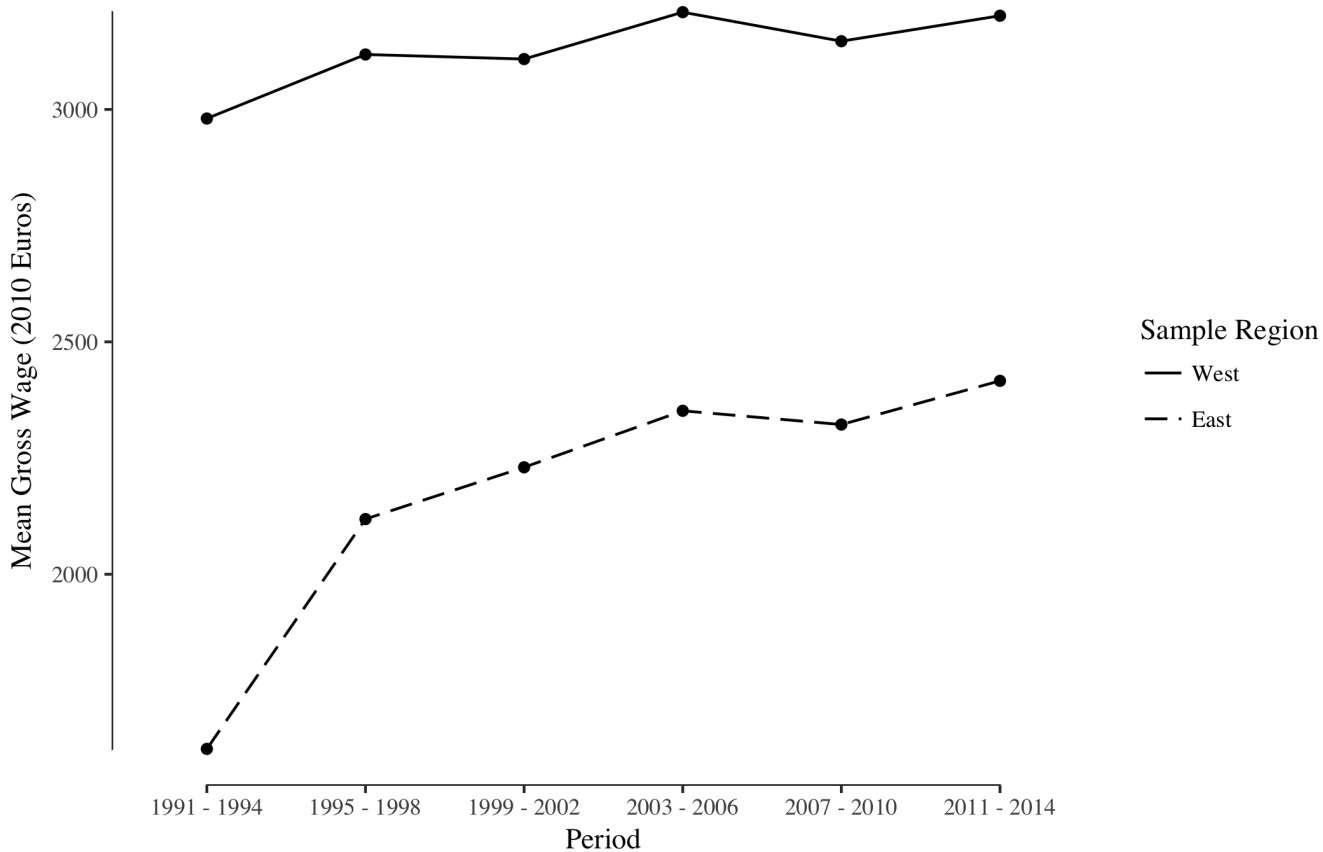
The analysis follows this basic modelling approach:

1. Separate experience into Old and New Experience where possible in the SOEP data and discard the rest of the data.
2. Divide data according to sample year and sample region into subsets.
3. Fit the two models (see below) to the data.
4. Generate and evaluate the statistics of interests from the models.

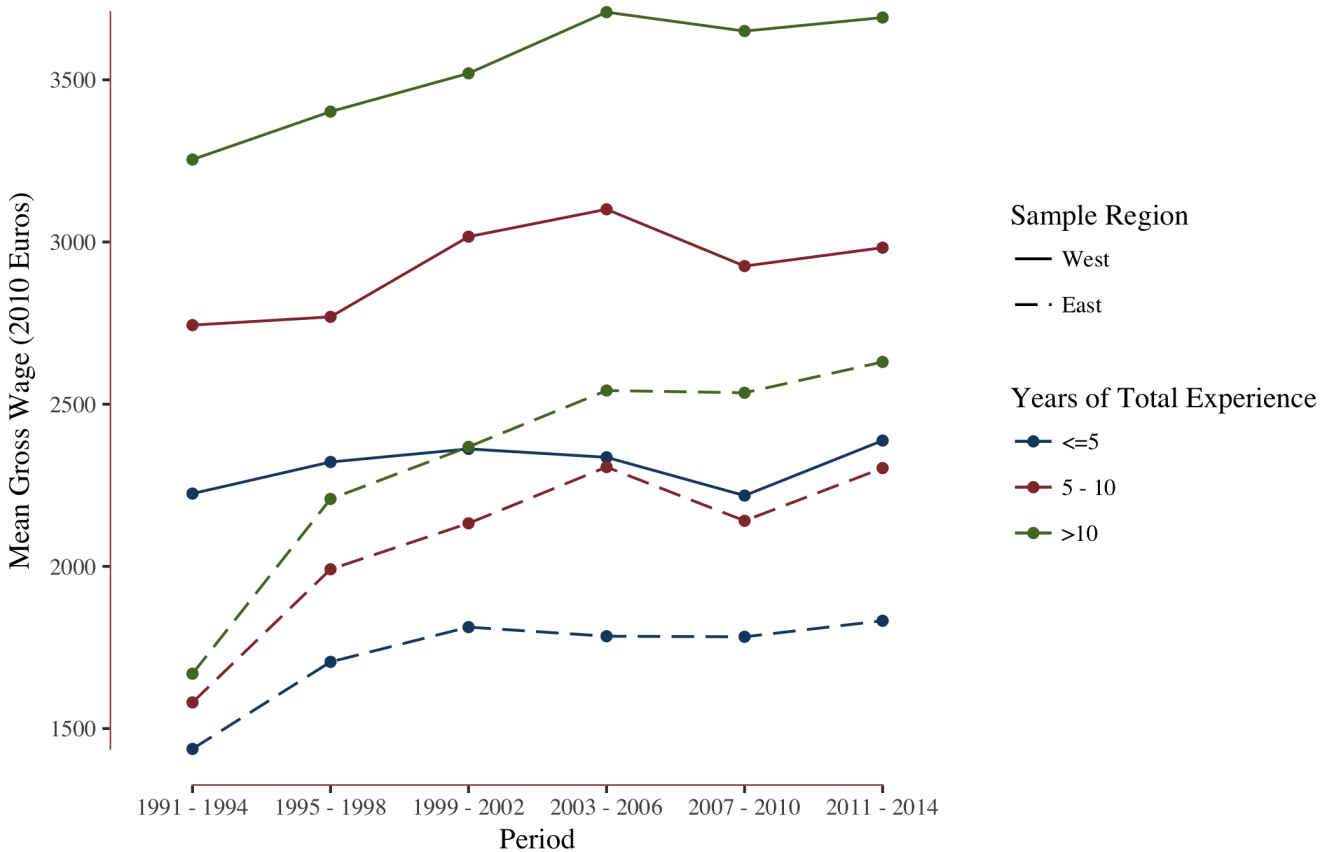
Basic Description of Data used

- The analysis is based on the *pgenl* dataset from the *SOEPLong* Data of all sample years from 1991 to 2014
- The analysed data contains all full time working individuals in the samples A and C as well as some younger individuals from later samples.
- Gross wages are deflated to 2010 levels.
- The data is then seperated by Year into 6 timeframes of length 4 and by sample region (East/West)

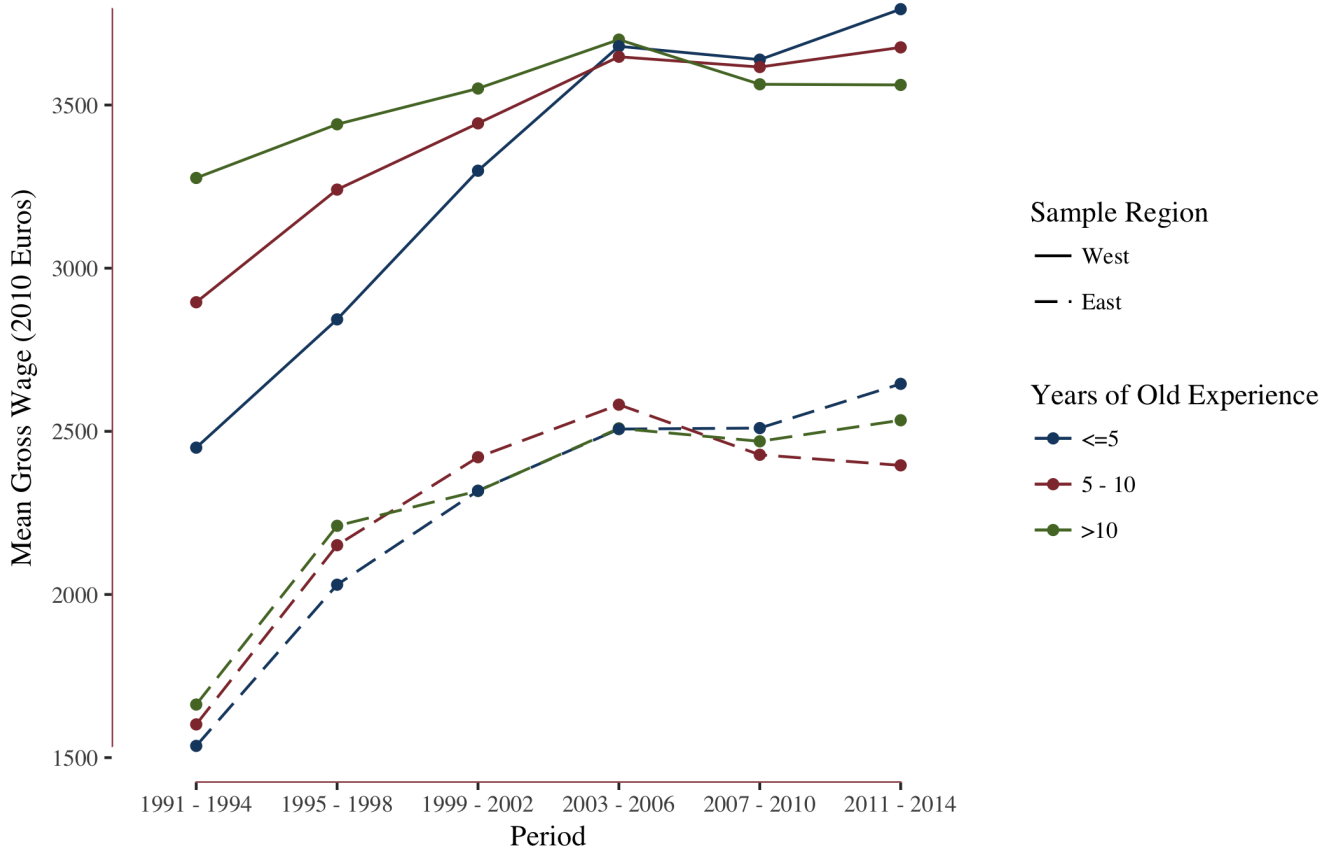
Mean Wages are significantly higher in West Germany throughout the timeframe



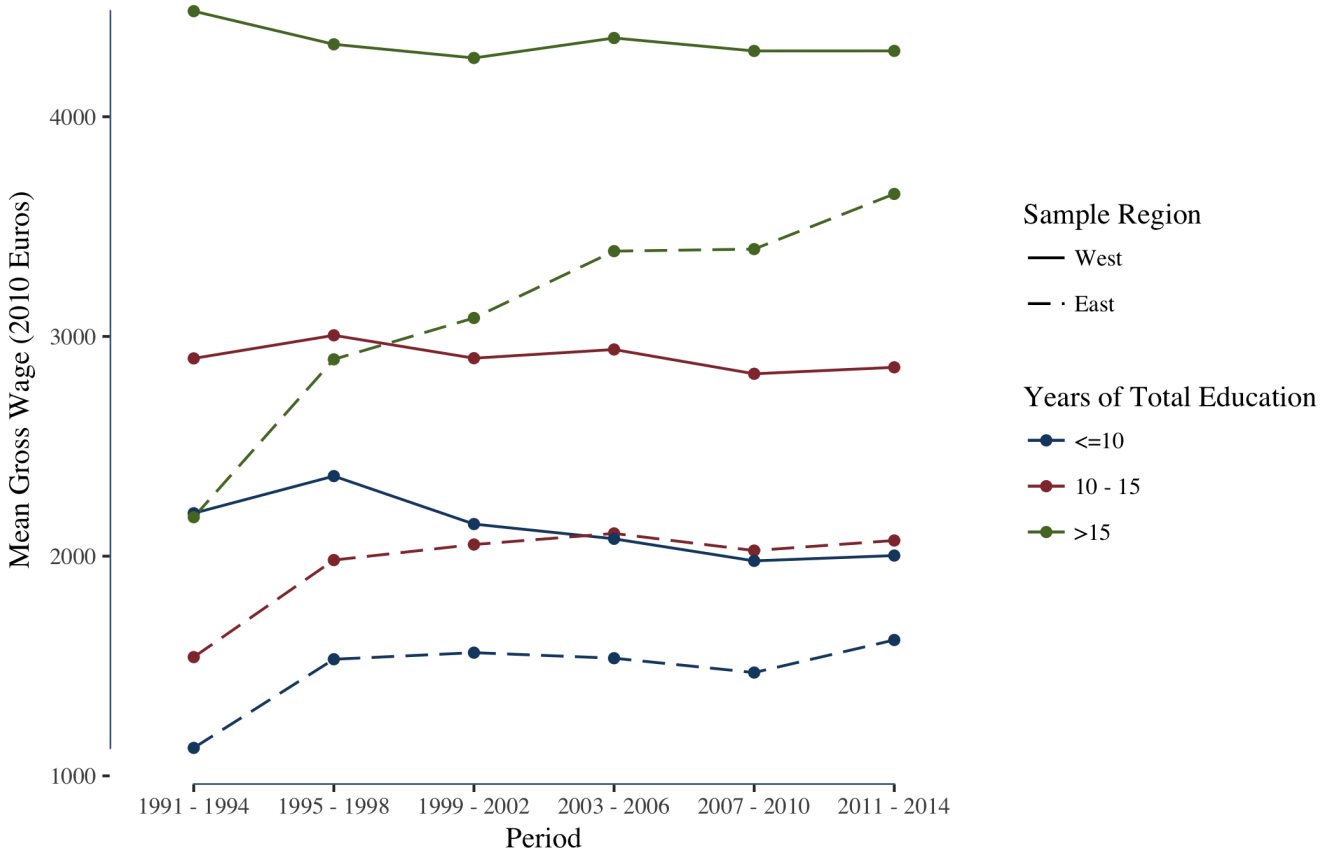
Wage distribution across Total Experience significantly flatter in East Germany:



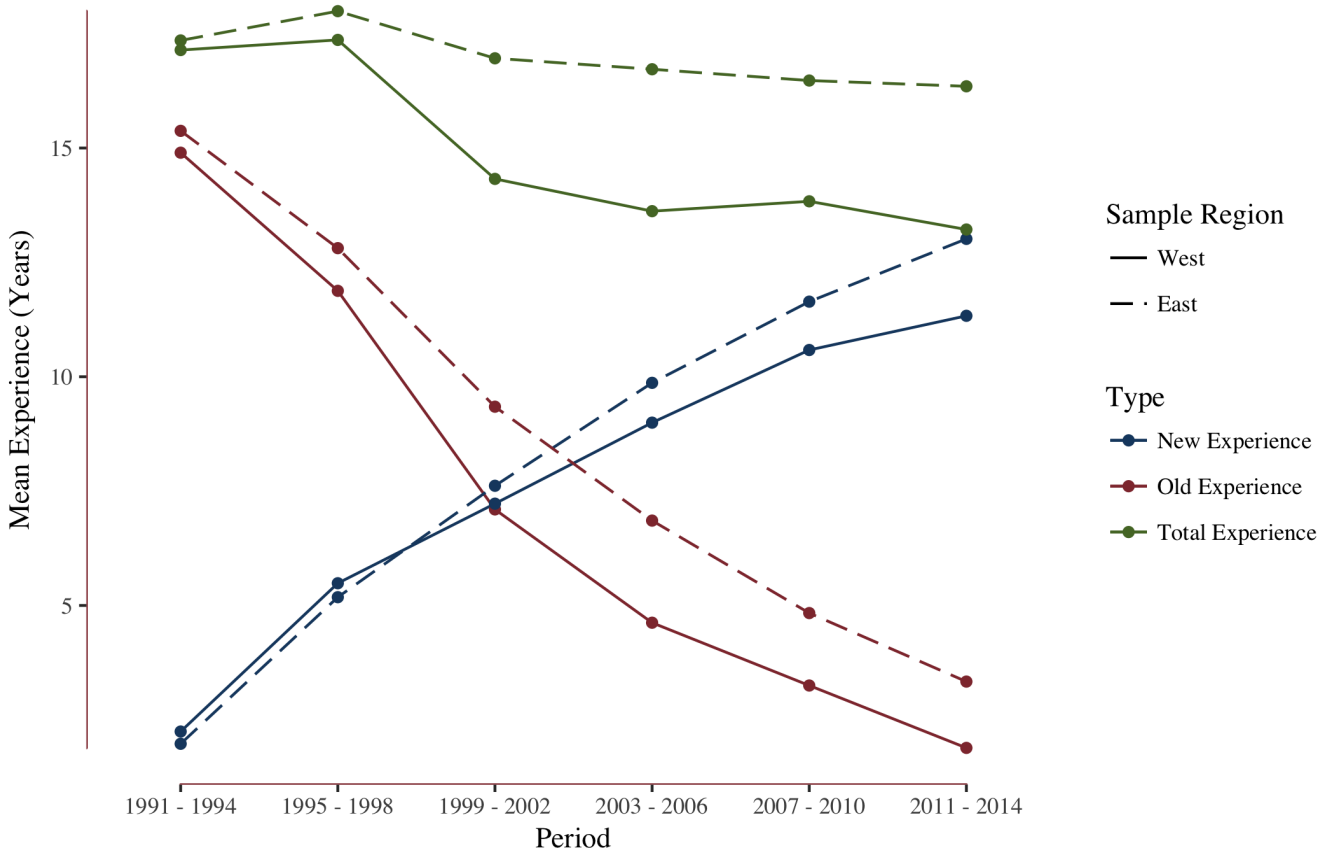
Old Experience seems to have no effect on wages in East Germany:



Differences are much smaller regarding wage distribution across education:

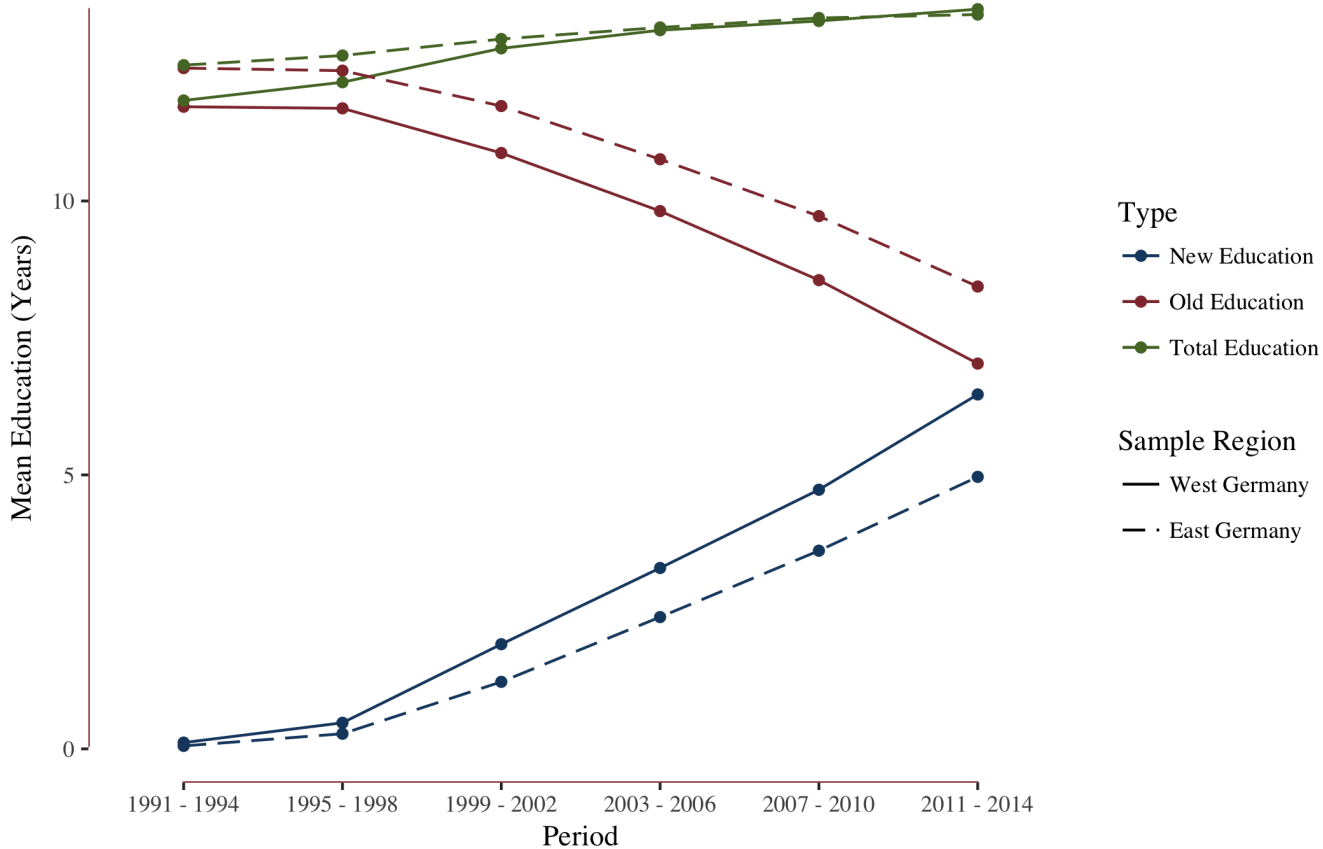


There is more Experience (especially Old one) in the East German sample:



Human Capital in East and West Germany

Total Education levels are similar, but the share of Old Education is higher in the East:



Human Capital in East and West Germany

Two models are fitted to each of the subsets:

$$\begin{aligned} log(Wage) = {} & \beta_1 TotalEdu + \beta_2 TotalExp + \beta_3 TotalExp^2 \\ & + \beta_4 Tenure + \beta_5 YearDummie + \beta_6 Sex \end{aligned} \tag{1}$$

$$\begin{aligned} log(Wage) = {} & \beta_{1a} OldEdu + \beta_{1b} NewEdu + \beta_{2a} OldExp \\ & + \beta_{2b} NewExp + \beta_{3a} OldExp^2 + \beta_{3b} NewExp^2 \\ & + \beta_4 Tenure + \beta_5 YearDummie + \beta_6 Sex \end{aligned} \tag{2}$$

These models are applied to the data in the following way:

- By fitting model 1 to the West German dataset of the years 1991 to 1994 we get coefficient: $\widehat{\beta}_2^{(9194,West)}$ for the linear part of returns to total experience.
- The log wage differential 0 - 5 years in this dataset is then calculated as:

$$Diff_{0-5,TotalExp}^{(9194,West)} = \widehat{\beta}_2^{(9194,West)} * 5 + \widehat{\beta}_3^{(9194,West)} * 5^2$$

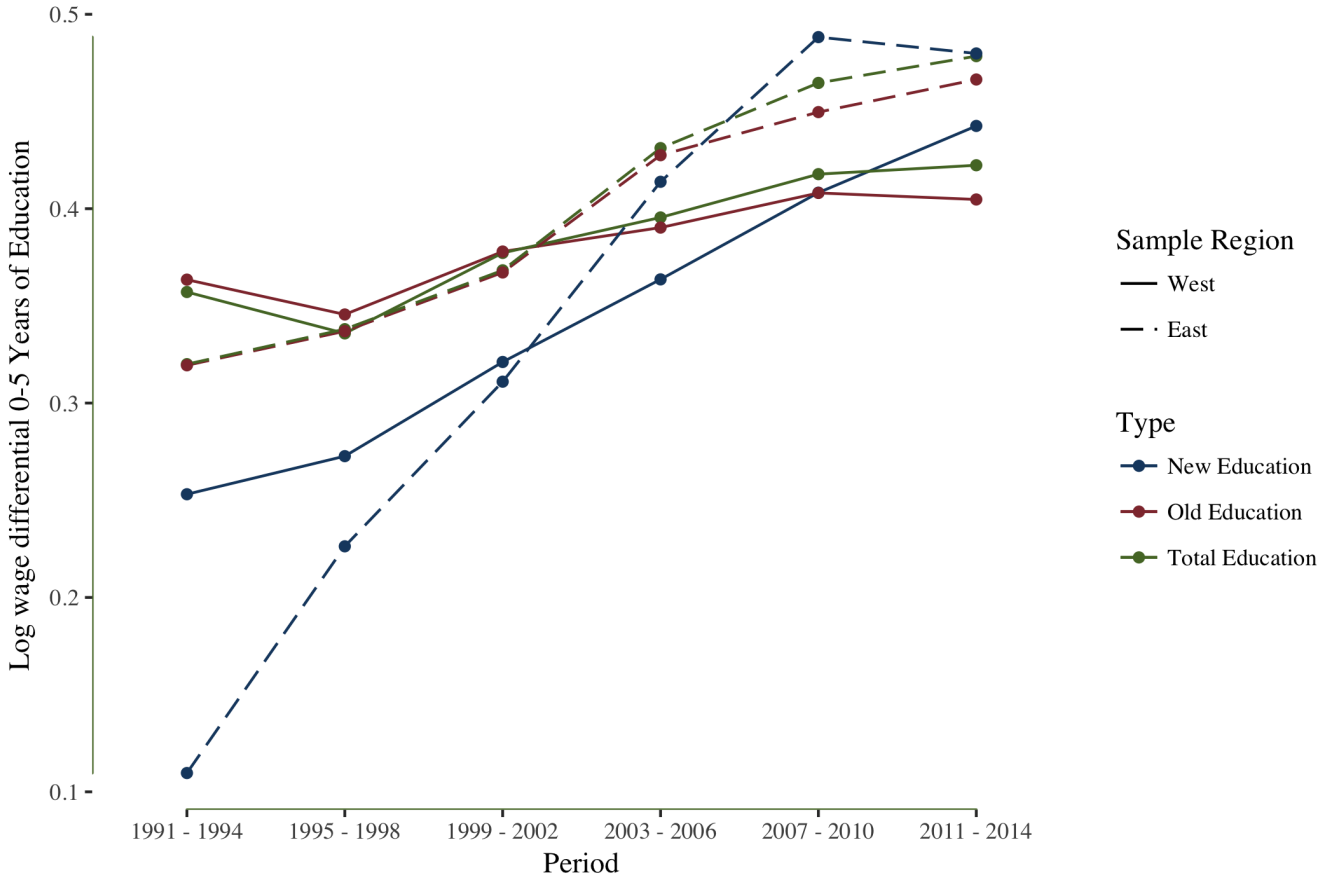
These models are applied to the data in the following way:

- The mean log wage differential for total experience equals:

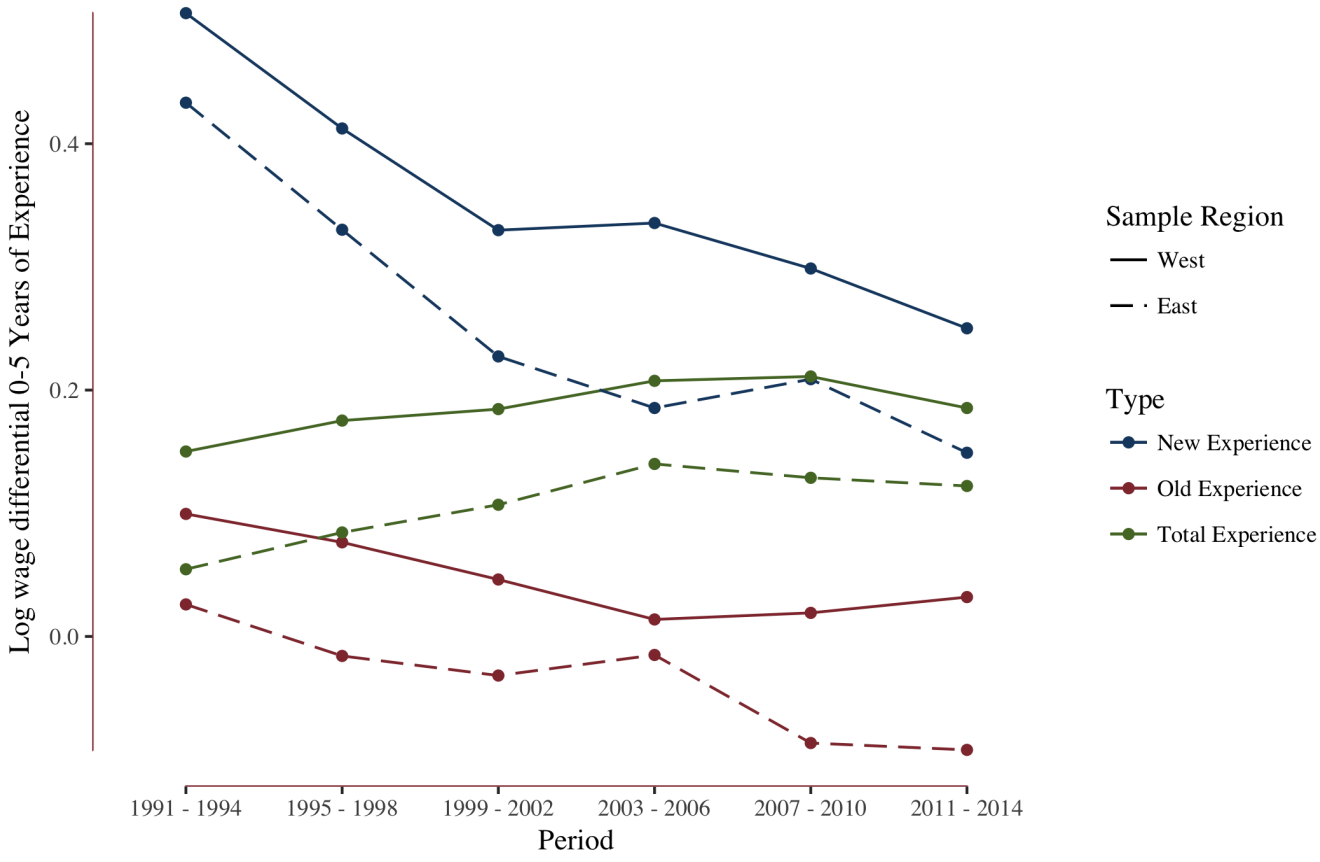
$$Diff_{TotalExp}^{(9194,west)} = \frac{1}{|I_{9194}^{west}|} \sum_{i \in I_{91-94}^{west}} \widehat{\beta}_2^{(9194,west)} * TotalExp_i + \widehat{\beta}_3^{(9194,west)} * TotalExp_i^2 \quad (3)$$

- Where I_{9194}^{West} is the set of all observations in the respective subset.

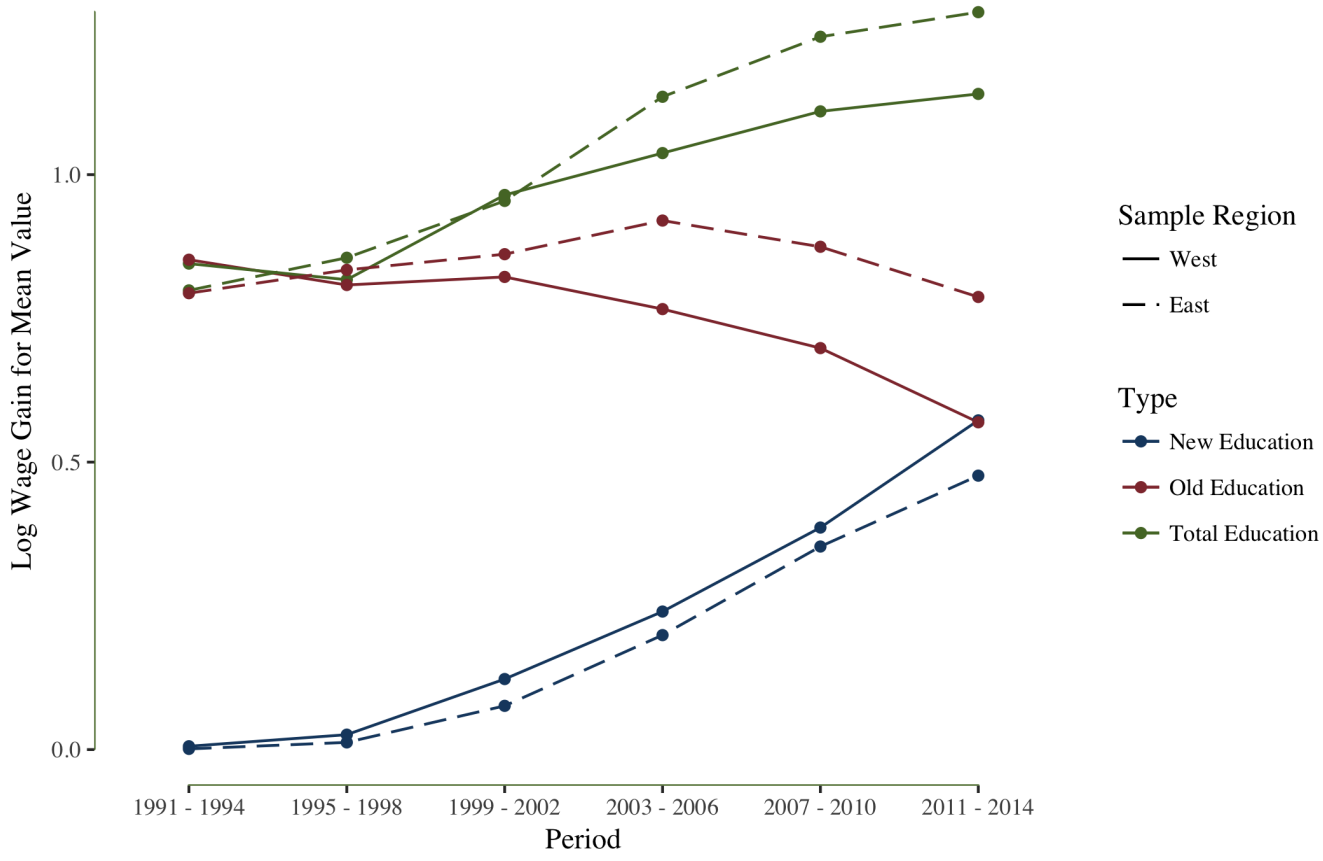
Returns to Education:



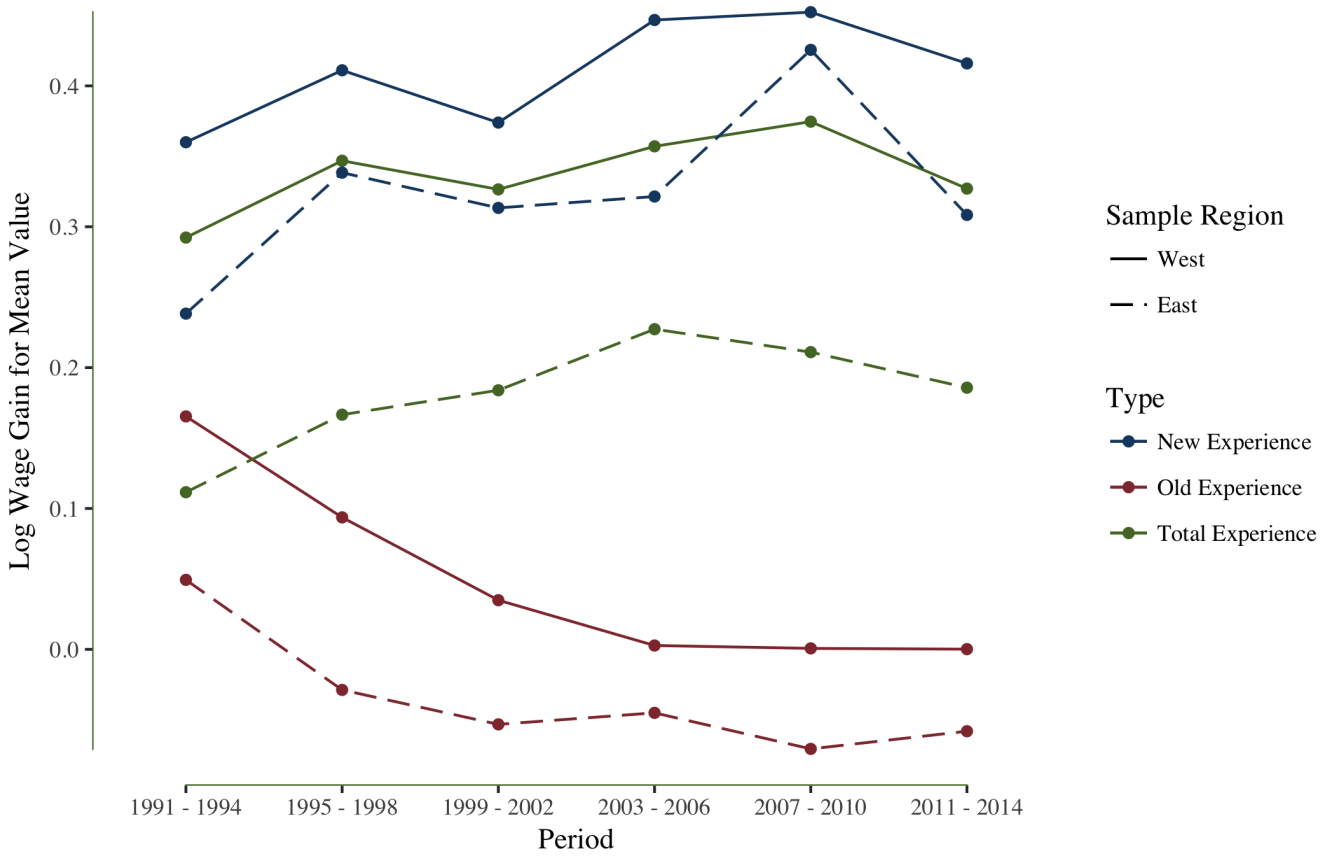
Returns to Experience:



Human Capital in Education:



Human Capital in Experience:



Coefficients

	1991 - 1994	1999 - 2002	2011 - 2014
(Intercept)	6.8089^{***}	6.6882^{***}	6.4816^{***}
	(0.0199)	(0.0239)	(0.0249)
TotalEdu	0.0714^{***}	0.0754^{***}	0.0845^{***}
	(0.0014)	(0.0015)	(0.0016)
TotalExp	0.0332^{***}	0.0408^{***}	0.0409^{***}
	(0.0011)	(0.0013)	(0.0014)
TotalExpSquared	-0.0006^{***}	-0.0008^{***}	-0.0008^{***}
	(0.0000)	(0.0000)	(0.0000)
R^2	0.3823	0.3821	0.3898
Adj. R^2	0.3818	0.3815	0.3892
Num. obs.	10383	8769	8488
RMSE	0.3463	0.3848	0.4096

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Table 1: Model Coefficients for West German Data using Model 1

Coefficients

	1991 - 1994	1999 - 2002	2011 - 2014
(Intercept)	6.2025^{***}	6.4577^{***}	6.1040^{***}
	(0.0255)	(0.0312)	(0.0404)
TotalEdu	0.0640^{***}	0.0737^{***}	0.0957^{***}
	(0.0017)	(0.0022)	(0.0027)
TotalExp	0.0121^{***}	0.0242^{***}	0.0278^{***}
	(0.0014)	(0.0016)	(0.0022)
TotalExpSquared	-0.0002^{***}	-0.0006^{***}	-0.0007^{***}
	(0.0000)	(0.0000)	(0.0001)
R^2	0.3517	0.2762	0.3474
Adj. R^2	0.3510	0.2750	0.3460
Num. obs.	7242	5155	3659
RMSE	0.3430	0.3688	0.4110

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Table 2: Model Coefficients for East German Data using Model 1

Coefficients

	1991 - 1994	1999 - 2002	2011 - 2014
(Intercept)	6.7103***	6.6270***	6.3922***
	(0.0241)	(0.0282)	(0.0295)
OldEdu	0.0727***	0.0756***	0.0809***
	(0.0014)	(0.0015)	(0.0017)
NewEdu	0.0506***	0.0642***	0.0885***
	(0.0067)	(0.0026)	(0.0019)
OldExp	0.0222***	0.0109***	0.0105**
	(0.0011)	(0.0017)	(0.0034)
OldExpSquared	−0.0005***	−0.0003***	−0.0008***
	(0.0000)	(0.0001)	(0.0002)
NewExp	0.2374***	0.0839***	0.0561***
	(0.0207)	(0.0056)	(0.0029)
NewExpSquared	−0.0272***	−0.0036***	−0.0012***
	(0.0044)	(0.0004)	(0.0001)
R^2	0.4005	0.4000	0.3980
Adj. R^2	0.3999	0.3993	0.3973
Num. obs.	10383	8769	8488
RMSE	0.3413	0.3793	0.4069

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Table 3: Model Coefficients for West German Data using Model 2

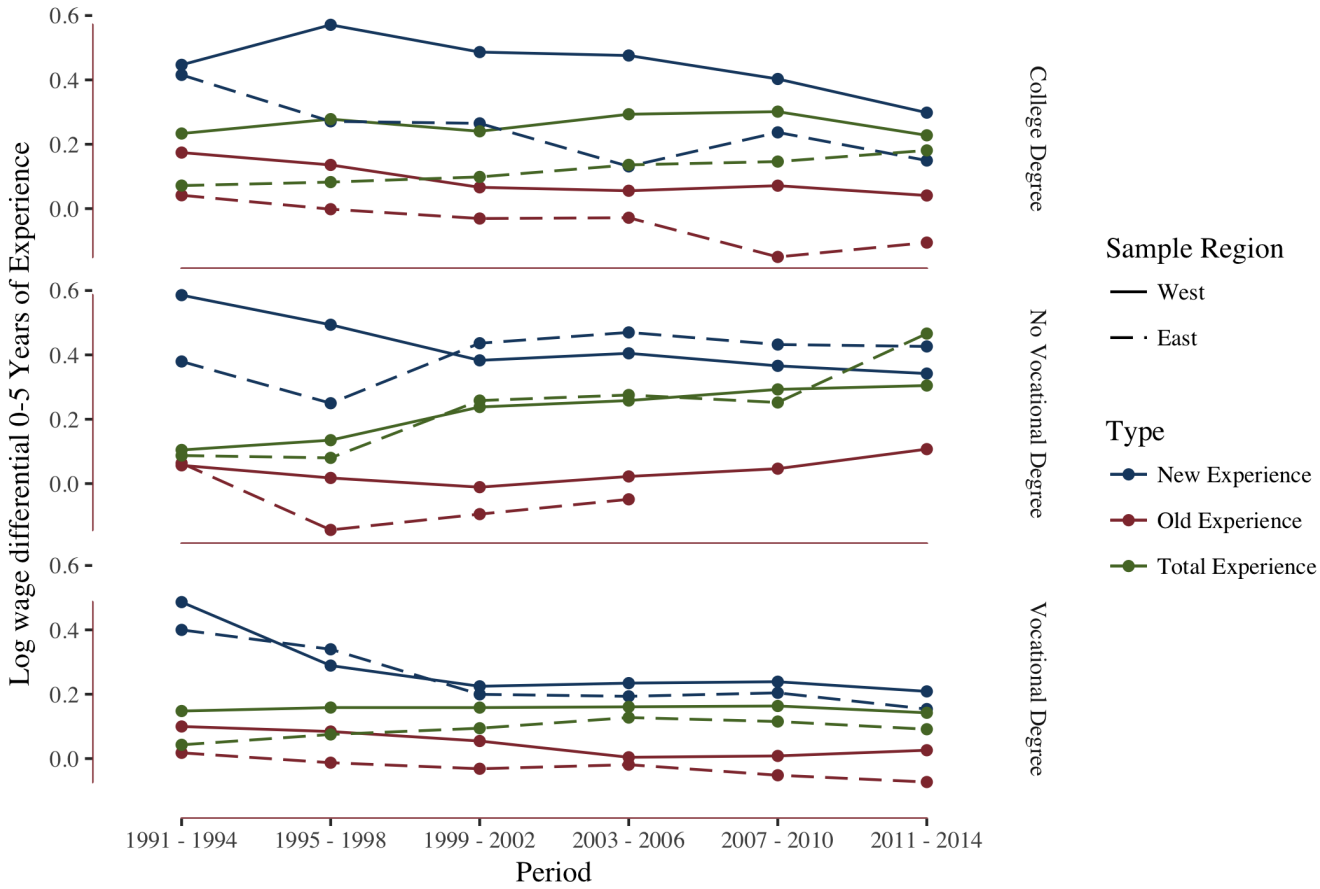
Coefficients

	1991 - 1994	1999 - 2002	2011 - 2014
(Intercept)	6.1512^{***}	6.4373^{***}	6.0872^{***}
	(0.0304)	(0.0391)	(0.0492)
OldEdu	0.0639^{***}	0.0734^{***}	0.0933^{***}
	(0.0017)	(0.0022)	(0.0028)
NewEdu	0.0219	0.0622^{***}	0.0960^{***}
	(0.0121)	(0.0041)	(0.0032)
OldExp	0.0058^{***}	-0.0066^{**}	-0.0191^{***}
	(0.0014)	(0.0022)	(0.0049)
OldExpSquared	-0.0001^{**}	0.0000	0.0001
	(0.0000)	(0.0001)	(0.0003)
NewExp	0.1555^{***}	0.0510^{***}	0.0324^{***}
	(0.0284)	(0.0082)	(0.0049)
NewExpSquared	-0.0138^{*}	-0.0011	-0.0005^{**}
	(0.0063)	(0.0006)	(0.0002)
R^2	0.3637	0.3054	0.3630
Adj. R^2	0.3628	0.3039	0.3611
Num. obs.	7242	5155	3659
RMSE	0.3399	0.3614	0.4062

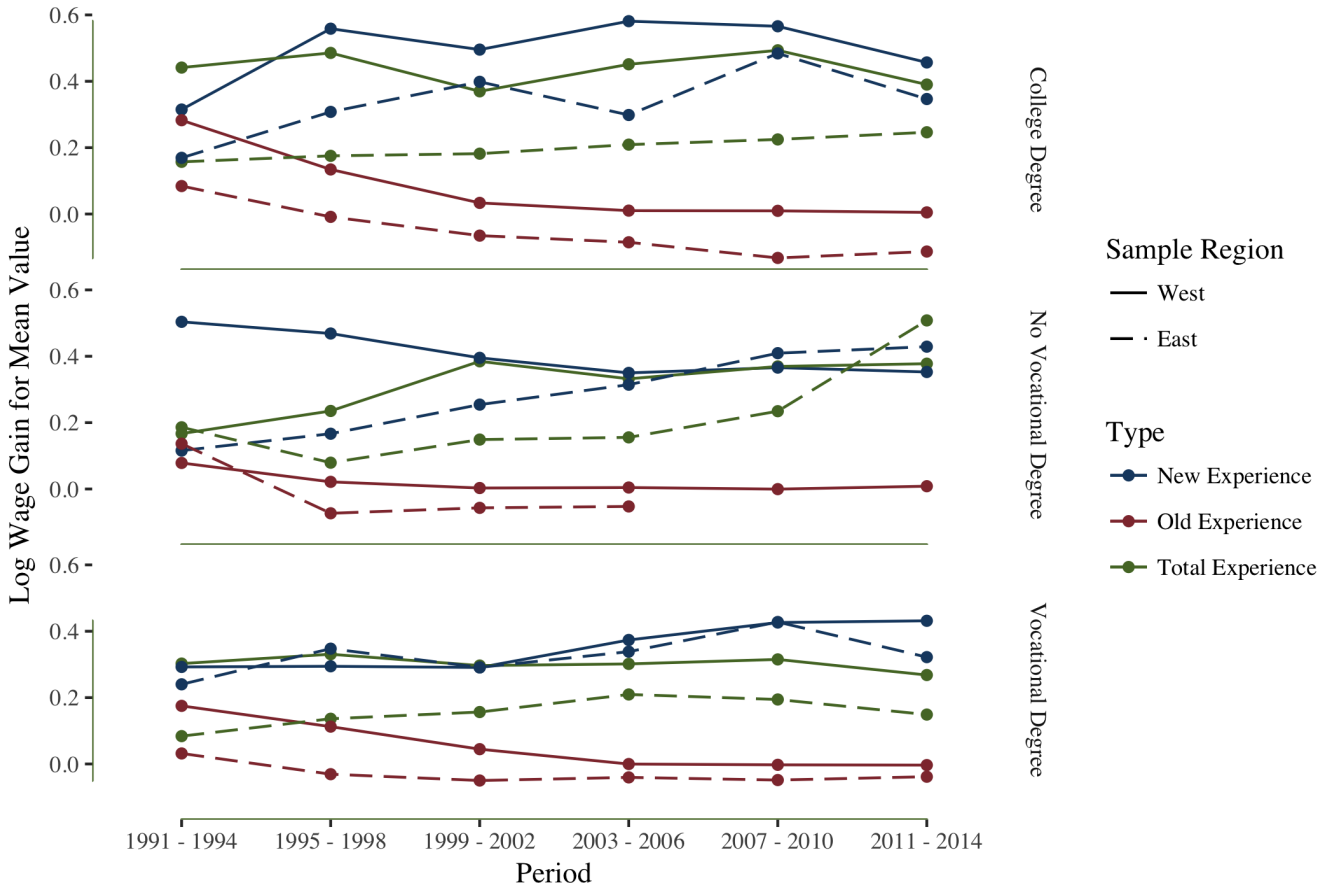
$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Table 4: Model Coefficients for East German Data using Model 2

Returns to Experience By Skill Group:



Human Capital in Experience By Skill Group:



From the above evidence one might draw the following conclusions regarding the research questions: I

1. How do returns to education and experience differ in East and West Germany ?
   - ▷ Returns to education (Old and New) show now significant differences
   - ▷ Old Experience in East Germany loses its value immediately after reunification, whereas the devaluation in the West happens more gradually.
   - ▷ The relative returns to New Experience are significantly higher in the West.

From the above evidence one might draw the following conclusions regarding the research questions: II

2. How do these differences develop over time ?
   - ▷ Differences in Evaluation of Old Experience disappear over time, whereas differences regarding New Experience persist
   - ▷ The remaining difference in valuation of Total Experience seem to be caused in the difference of evaluation of new experience.
3. How do these differences behave when differentiating between Experience and Education obtained pre- / post-unification?
   - ▷ See above.

From the above evidence one might draw the following conclusions regarding the research questions: III

4. How do results vary for different Skill Groups ? (No Degree, Vocational- , College Degree)
   - ▷ Initially large differences in returns to experience decreased much faster for individuals without degree than for those with college degree.
   - ▷ Differences in the returns to experience for individuals with vocational degree are relatively small throughout the time frame.
   - ▷ The difference in human capital from New Experience seems to be concentrated in the group of people with College Degree.

References I

Burda, M. C., Schmidt, C. M., and others (1997).
Getting behind the East-West wage differential: Theory and evidence.
Citeseer.

Gathmann, C. (2004).
Understanding Changes in Relative Wages during East Germanys Transition.
Stanford University.

References II

Krueger, A. B. and Pischke, J.-S. (1992).
A comparative analysis of East and West German labor markets: before and after unification.
Technical report, National Bureau of Economic Research.

Orlowski, R. and Riphahn, R. T. (2009).
The East German wage structure after transition1.
Economics of Transition, 17(4):629–659.

Github Link

- https://github.com/ckoopmann/EconProject