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Individual Heterogeneity and Cyclical Sensitivity

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Jochen Kluve, Sandra Schaffner and Christoph M. Schmidt[1]

Labor Force Status Dynamics in the German Labor Market – Individual Heterogeneity and Cyclical Sensitivity

Abstract

The aggregate average unemployment rate in a given country is essentially the result of individual workers' transitions between the three core labor force states, employment, unemployment, and inactivity. The dynamics of these transitions depend both, on individual duration in a particular state and the transition probabilities between states. Individual transitions, in turn, depend on observable and unobserved factors. Simultaneously, person-specific dynamics may be influenced by swings of the business cycle. This paper analyzes these labor force status dynamics for the East and West German labor market, separately using comprehensive data on monthly transitions from the SOEP. The results show that the experience of high unemployment rates is more sensitive to cyclical behavior for certain demographic groups, specifically unskilled and young workers. Heterogeneity in unemployment and transition rates differ between East and West Germany, as well as between the sexes. In East Germany, all demographic cells are almost entirely detached from the cycle. Women are less influenced by the cycle in their re-employment rate from unemployment to employment.

JEL Classification: E32, J21, J64

Keywords: Labor force, unemployment dynamics, business cycle, worker heterogeneity

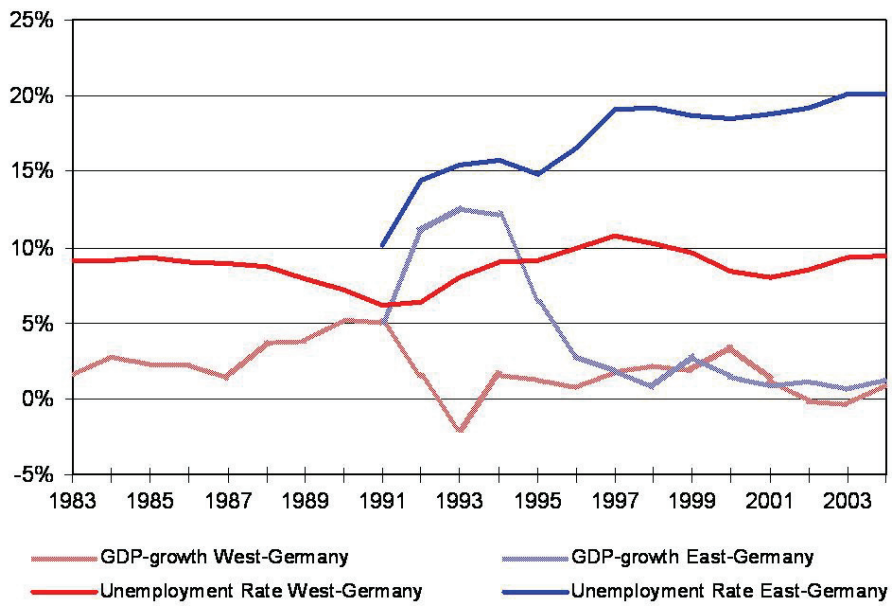
September 2009

1 Jochen Kluve, Sandra Schaffner, both RWI; Christoph M. Schmidt, RWI, University of Bochum, IZA-Bonn and CEPR London. *– We gratefully acknowledge the support of the Collaborative Research Centre SFB 475 (DFG) and of the Leibniz Association.* *– All correspondence to Sandra Schaffner, RWI, Hohenzollernstr. 1-3, 45128 Essen, Germany, e-mail: sandra.schaffner@rwi-essen.de.*

1 Introduction

The German labor market has suffered from high and persistent unemployment rates for almost two decades, and the incidence of widespread unemployment is perceived as a core problem of the German economy. The Eastern part of the country has been hit particularly hard by this issue, having had to face a steep incline in the average unemployment rate after reunification, which in 2004 still remains at about 20 percent (cf. Figure 1). In the Western part, average unemployment has been fluctuating around a rate of 10% since the early 1990s and is currently (2006) at approximately 10.2%.

Figure 1: Unemployment rate and GDP growth in West Germany and East Germany



Source: Federal Statistical Office Germany

Clearly, any particular aggregate average unemployment rate, and its fluctuation over time, is the result of individual workers' transitions between the three core labor force states, employment, unemployment, and inactivity (out-of-the-labor-force). The dynamics of these individual transitions depend

on the individual duration in a particular state and the probability of changing from each specific state to one of the other states. Both, individual durations and individual transition probabilities, however, are unlikely the same for all workers, and are also unlikely constant over time. Rather, transitions into and out of unemployment are far from being a uniform phenomenon, and depend on individual characteristics such as observable sociodemographic attributes - age, sex, educational attainment, etc. - but also unobserved attributes such as motivation and ability. Moreover, person-specific factors may be influenced by swings of the business cycle that simultaneously determine the duration and transition probability of individual labor force states. For instance, the North American evidence shows such "excess cyclical volatility" for low-educated youth, whose unemployment risk is disproportionately high during an economic downturn, relative to the average worker (Card & Lemieux, 2000).

To know more about the composition of unemployment in terms of underlying labor market flows and the role that both, individual heterogeneity and cyclical sensitivity, play in determining individual labor force status dynamics is important along several lines. First, a particular average unemployment rate can be the consequence of relatively high or low job loss rates on the one hand, along with relatively high or low probabilities of finding a job, respectively, each scenario characterizing a different type of labor market. Second, a mere description of movements between unemployment, employment, and inactivity can, if appropriately stratified, provide substantial insight into the labor market behavior of specific demographic groups over the business cycle, and how this impacts on aggregate labor market outcomes. Third, and perhaps most importantly, the analysis of individual labor force status transitions over the business cycle can help identify particular problem groups, to which specific labor market policies and reforms might be targeted.

This paper presents such an analysis for German labor market flows for the time period 1983 to 2005 using data from the German Socioeconomic Panel (SOEP). Building on the study by Schmidt (2000) we investigate unemployment rates and labor force status transitions over the business cycle for 16 demographic cells given by sex, 3 age categories, and 3 education categories[1]. In addition to adding 14 years of data, the empirical analysis extends Schmidt (2000) by including movements into and out of inactivity to both other states - employment and unemployment - as well. Moreover, in discussing and contrasting individual heterogeneity and business cycle effects we specify two variants to account for cyclical swings, one based on

[1]Because of small cell sizes young high-skilled are disregarded in our analysis

three-year regimes and the other on a simple indicator for the state of the economy, the GDP growth rate. We also consider East and West Germany separately in the analysis, and for the first time consider East German labor market flows in this context.

The aim of the paper is to draw robust conclusions regarding the interplay of cyclical influences and individual heterogeneity as determinants of labor force status behavior and labor market success. Rather than including cyclical swings as proportional factors that affect all individuals in equal measure, we explicitly consider idiosyncratic differences in labor force status transition for sociodemographic groups over the cycle. Clearly, such an approach faces a trade-off between modeling economic realities to the most detailed extent possible and a parsimonious parameterization to keep the interpretation for subgroups tractable.

The remainder is organized as follow. Section 2 provides a brief account of the relevant literature on labor market flows. Section 3 discusses the data. Section 4 develops the empirical model, while Section 5 presents estimation results for unemployment rates. Section 6 discusses and estimates flow intensities between labor force states. Finally, Section 7 concludes with a summary of the results and a discussion of their policy implications.

2 Background

Two strands of the literature provide the background for our analysis. First, it is frequently argued that labor market rigidities are at the heart of the European unemployment problem (see e.g. Siebert, 1997). The main piece of evidence supporting this view appears to be the divergent behavior of US and European unemployment during the 1990s: While US unemployment rates have been relatively low throughout the last decade and the US labor market is perceived as rather flexible, European countries have experienced high unemployment rates in labor markets that are relatively rigid. The basic appeal of this stylized argument notwithstanding, the European unemployment experience itself has been quite heterogeneous across countries, as has been the extent of regulatory interference with labor demand and supply. In particular, over recent years several countries (e.g. Denmark, Germany, etc.) have implemented labor market reforms aimed at making markets more flexible.

This makes it difficult to provide a reasonable characterization of the issue just using a descriptive account of the data, even on the basis of simple and logically consistent theoretical models. Similarly, given the relatively moderate within-country variation regarding institutional design and labor

market outcomes over time, time series analysis for a single country (as e.g. in Berger, 1998) appear unlikely to identify the impact of rigidities. This arises because in such a time series study it will be difficult to avoid that the variance of the measured extent of rigidities is predominantly reflecting measurement error. Moreover, the source of the variation threatens to remain unclear since changes in policy are likely to be endogenous.

Searching for a convincing alternative for addressing the issue empirically, Nickell (1997) and Blanchard and Wolfers (1999) link the differential unemployment experience observed across countries to summary statistics of labor market rigidities and of the welfare state. Specifically, their empirical estimates rely on an index of employment protection, a labor standards index, the benefit replacement rate, the duration of benefits, and expenditures on active labor market policies, and on summary statistics of the structure of the systems of wage determination such as union density and union coverage. Based on their reasoning that it might be the interaction between unfavorable shocks and inadequate institutions that is important, not either of them by itself, Blanchard and Wolfers (1999) analyze, in particular, how the presence of labor market rigidities magnifies common macroeconomic shocks across countries.

These analyses find that, as a whole, labor market rigidities indeed play an important role for a country's labor market performance, but they also yield a multifaceted picture about the magnitude and relevance of individual institutional aspects. This partially explains why the notoriously rigid West German labor market has generated comparatively low unemployment rates well into the 1990s, given the experience of other European economies. These studies also make clear that the central questions are not theoretical but empirical in nature. In the context of this paper, interest should therefore lie in the characterization of German labor market dynamics through the transition intensity of German workers between the states of employment, unemployment, and inactivity, and the extent to which these intensities vary across different individuals and over time.

In a second strand of literature, several influential studies have demonstrated that the analysis of gross worker flows and job flows provides important insights beyond analysis of the unemployment rate. Seminal studies include Clark et al. (1979), Abowd and Zellner (1985), Blanchard and Diamond (1989, 1990), and Davis and Haltiwanger (1990, 1993). These empirical analysis have been complemented by theories of job flows and workers flows (C. Pissarides, 1986; Pissarides, 1991; Mortensen & Pissarides, 1994; Hall, 2004; Shimer, 2005). The available evidence on German labor market flows is limited (early papers are Boeri & Cramer, 1992 and Burda & Wyplosz, 1994, based on aggregate data). Bachmann (2005) examines worker flows,

especially job-to-job flows over the economic cycle. The cross-country perspective of the first strand of the literature has been applied to the analysis on gross worker flows. Cohen, Lefranc, and Saint-Paul (1997) compare labor market flows between France and the US, Schmidt (1998) extends this comparison to include Germany.

3 Data on German Labor Market Flows

Our data are constructed from the German Socioeconomic Panel (SOEP). The SOEP is a panel survey of individuals that started in 1984 and that provides one annual survey wave each year, yielding 23 waves of data by 2006. In the questionnaire, among other things, respondents are asked to report their major activity for each month of the preceding year. On this account it is possible to survey individual-level monthly data for 1983 to 2005 (West Germany) and for 1992 to 2003 (East Germany). Data are drawn from all samples covering native Germans as well as immigrants.

In our analysis, the detailed information about the activities in the preceding years is condensed into three distinct labor market states, employment (E), unemployment (U), and non-participation (N). "Employed" refers to full-time work, part-time work, and vocational training, "unemployed" to registered unemployed, and "non-participation" is the residual category, comprising among others schooling, military service, community service, maternity leave, and retirement. Individuals residing in such a status are not counted as employed if they also declare to be employed in the same month. We believe that students working during vacation or retired persons performing part-time jobs are not of key interest in the analysis of labor force status transitions.

The analysis explicitly distinguishes individuals in 18 gender-age-education cells, with three age groups, 16-24, 25-49, and 50-64, and three education groups, low, medium, and high. An educational attainment of a low or medium secondary schooling degree (Hauptschule or Realschule) is considered to fall into the low category. Individuals who either hold a high secondary schooling degree (Abitur) or any form of formal post-secondary education other than university or technical college, for instance a vocational training course, are categorized as having medium education. Finally, a degree from a technical college (Fachhochschule) or a university qualifies respondents' education as being high.

The data allow us to calculate monthly employment, unemployment and non-participation rates for each month from January 1983 to December 2005 for West Germany, and from January 1992 to December 2005 for East Ger-

many. Moreover, we calculate monthly transition rates between these three states for workers in each demographic cell, for each pair of months from January-February 1983 to November-December 2005. The demographic cells of young high-skilled men or women are rather small in the sample. Therefore, we do not observe this group and restrict our analysis to the resulting 16 demographic cells.

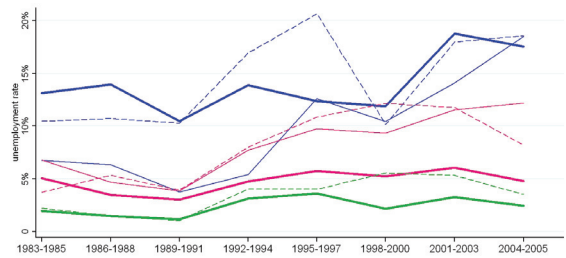
To explore the issue of cyclical sensitivity, in a first step the analysis follows the idea developed in Schmidt (1998) to distinguish three-year time-periods, so-called "regimes". These sub-periods are 1983-85, 1986-88, 1989-91 for West Germany only, and 1992-94, 1995-97, 1998-2000, 2001-2003, and 2004-2005 for both parts of the country. In a second, alternative step, the West and East German GDP growth of each year is considered to account for business cycle swings. The precise way of accounting for cyclical changes will be discussed in the next section.

Figure 2 displays the unemployment rate across the 16 gender-age-education cells and the eight (five) three-year sub-periods for West Germany (East Germany) separately. Each value is the mean of the 36 monthly unemployment rates in the particular period. The unemployment rates are somewhat higher in the East than in the West. The West-German unemployment rates vary from 0 to about 21% (Women in the period 1995-1997), whereas East German unemployment rates reach almost 24% for low-skilled and old men and women, respectively. In both parts of the country low-skilled workers face the highest risk of being unemployed. While at the beginning of our observation period the unemployment rates of low-skilled women in the West are in the same range as those of medium-skilled they sharply increase in the 1990s and in the new century. For both sexes in both parts of the country inequality in unemployment has risen.

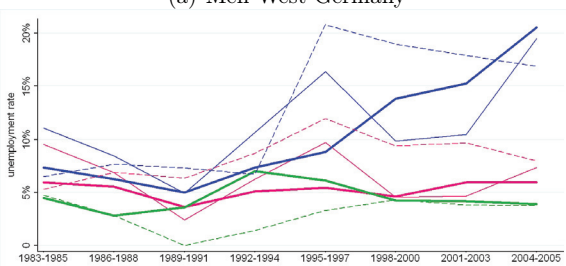
Figure displays the monthly transition rates of different groups of men in West Germany and women in East Germany. These transitions are much more volatile than the three-year averages because of seasonality. Additionally small cell sizes, especially for old unskilled workers, seem to result in outliers.

Average unemployment, however, is quite a bit smaller than these maximum values. This can be seen in Table 1, which reports the (weighted) descriptive statistics of the two samples separately for men and women. The number of observations corresponds to about 10,000 observations per month in the West German sample and 4,600 in the East German sample, i.e. the total number of observations is given by the number of individual-months. The age distribution in the sample is similar for both sexes and both samples. The distribution of skill levels is more heterogeneous, in particular regarding the top and bottom categories. Whereas for both sexes in both

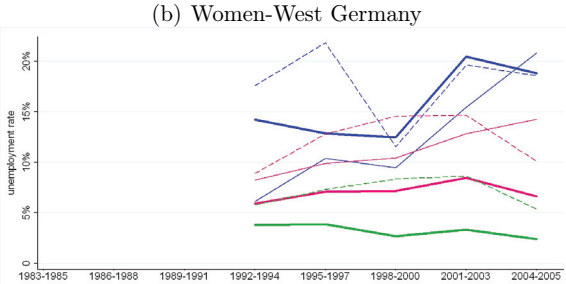
Figure 2: Unemployment rates by demographic cells



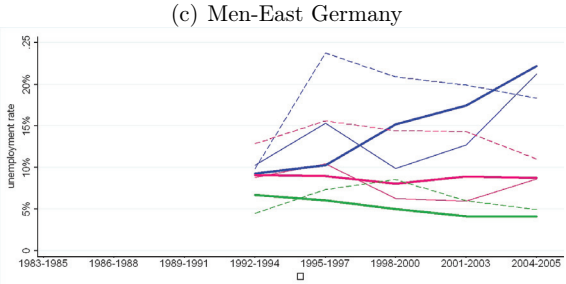
(a) Men-West Germany



(b) Women-West Germany



(c) Men-East Germany



(d) Women-East Germany

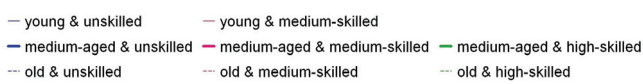
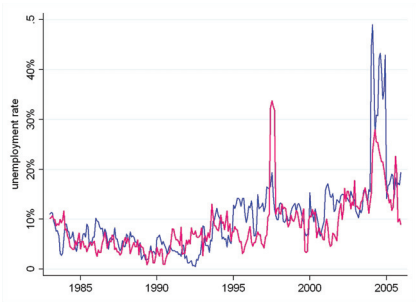
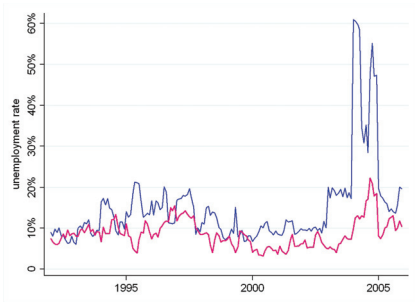


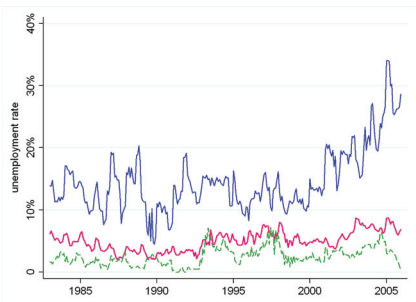
Figure 3: Monthly unemployment rates of selected groups



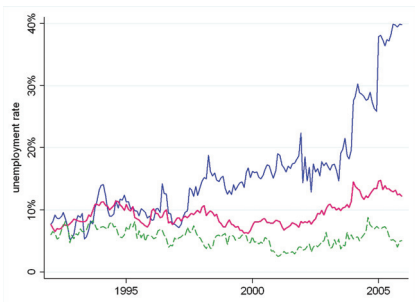
(a) West Germany, young men



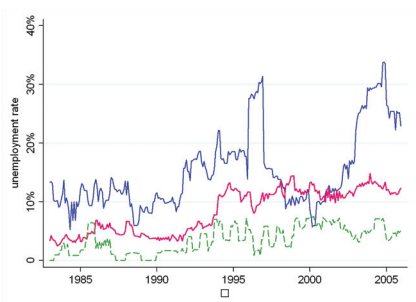
(b) East Germany, young women



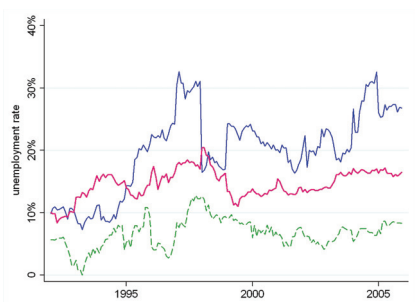
(c) West Germany, medium-aged men



(d) East Germany, medium-aged women



(e) West Germany, old men



(f) East Germany, old women

Table 1: Descriptive Statistics of the Estimation Samples - SOEP 1983-2005

	West Germany (1983-2005)		East Germany (1992-2005)	
	Men	Women	Men	Women
N	1,376,272	1,399,275	381,039	394,772
Unemployment rate	6.54	7.17	14.43	19.58
young (16-24 yrs)*	16.10	15.91	16.08	16.24
medium (25-49 yrs)*	55.86	54.91	54.40	53.25
old (50-64 yrs)*	28.04	29.17	29.52	30.51
low-skilled*	16.69	27.30	9.77	11.70
medium-skilled*	66.86	62.60	68.91	63.47
high-skilled*	16.45	10.10	21.33	24.83
employed*	74.24	53.20	59.92	49.41
unemployed*	5.12	4.11	10.11	12.03
non-participated*	20.63	42.69	29.98	38.56

*Share in percent
Weighted Summary

samples individuals with medium education constitute the core category (the share ranging from about 62-69%), in West Germany the share of low-skilled women (27.3%) is much larger than that of men (16.7%). Correspondingly, a larger share of West German men is highly educated (16.5%), compared to West German women (10.1%). In East Germany, differences by sex are much less pronounced, and the share in low education is lower for men (9.8%), and much lower for women (11.7%), than in the West. Correspondingly, male and female shares in the top education category are larger than in the West, amounting to 21% and 25%, respectively. The distribution of labor force states also shows substantial heterogeneity. Almost 43% of West German women are out of the labor force, while only 20.6% of men. In East Germany 39% and 30%, respectively do not participate.

Overall, when compared to the figures in official statistics, the unemployment rates derived from the SOEP data appear quite low, a fact which could be due to several possible reasons. First, different from calculations by the German Statistical Office self-employed individuals are included in the denominator when calculating unemployment rates. Second, there may be data problems such as recall bias or selectivity. Classification errors have played a major role in the literature on gross flow data (cf. Abowd & Zellner, 1985; Poterba & Summers, 1986, 1995). Most importantly, as a consequence of the request to list only the predominant activity of each month, respondents may omit brief spells of unemployment from their retrospective record,

leading to an underestimate of the unemployment rates and of the transition rates into and out of unemployment (for evidence on this phenomenon for East Germany see Wolff, 1998). A related problem is possible heaping, the concentration of misclassified entries in a particular month (for evidence on the SOEP see, for instance, Kraus & Steiner, 1998). Third, seasonal unemployment could be underestimated due to underreporting of small unemployment spells of only a few months. Indicators for this misspecification are the high transition rates at the turn of the year.

Finally, it might well be that the panel data used here capture a particularly "stable" part of the population, in the sense that the fact of being observed throughout most of the sample period on one hand and employment rates and re-employment success on the other are systematically positively related. While we will address this issue in future research, in this paper emphasis will instead be on the formal characterization of unemployment rates and flow rates on the basis of the available data. In particular, the next section discusses an empirical representation for monthly unemployment rates that describes the long-term demographic structure of unemployment while also addressing issues of cyclical sensitivity. This framework will then be extended to labor market flows. The corresponding estimates will allow us a formal assessment of the mechanics behind intertemporal fluctuations in unemployment rates.

4 Estimation framework

This section documents the estimation of an empirical model for unemployment rates. The model includes the assumption that the unemployment rate differs between the gender-age-education cells and over time, and also that cyclical sensitivity varies across observable demographic groups. Specifically, the analysis compares the cyclical experience of average German workers to that of women, low-skilled and high-skilled workers, respectively, and young and old workers, respectively. The estimating equation for the average unemployment rate in demographic group i ($i = 1, \ldots, 8$) for "young-low-skilled", "young-medium-skilled", "medium-aged-low-skilled", ..., "old-high-skilled", gender g (male, female), month m ($m = 1, \ldots, 12$), and period t ($t = 1, \ldots, 8$) is

$$\begin{aligned} u_{igmt} &= \alpha + \gamma \cdot 1_{fem} + \sum_{i \neq 5} (\beta_i + \delta_i 1_{fem}) 1_i + \sum_{m \neq 6} \mu_m \cdot 1_m + \\ &\quad \sum_{t \neq 5} \tau_t (1 + d_f \cdot 1_{fem} + d_u \cdot 1_{unskilled} + d_h \cdot 1_{high-skilled} + \\ &\quad d_y \cdot 1_{young} + d_o \cdot 1_{old}) \cdot 1_t + \epsilon_{igmt} \end{aligned} \tag{1}$$

where ϵ_{igmt} is the corresponding error term. In effect, the cell-specific average unemployment rates that were derived in the first pass through the individual-level data for 16 demographic cells (young, high-skilled individuals are exempted due to small cell sizes) and 276 months are decomposed into several constituent parts (for a similar approach see Blanchard & Wolfers, 1999; Hoynes, 1999).

First, coefficient α captures the average unemployment rate of males in the core demographic group of 25-49-year-old, medium-skilled workers in the baseline month June during the baseline period 1995-1997, whereas coefficient γ expresses the differential unemployment experience of women in the same demographic cell, month and period. The variable 1_{fem} is an indicator variable for the average unemployment rates of female workers. The coefficients β_i describe the demographic structure of unemployment experienced by male workers, capturing deviations from the average value characterizing the core group (with corresponding indicator variables 1_i). For instance, the average unemployment rate of young low-skilled males (in any June of period 2) is $(\alpha + \beta_1)$. Similarly, coefficients δ_i express deviations of the female structure from that for males. That is, the estimated average unemployment rate of, say, old medium-skilled women (in the baseline period and month) is $((\alpha + \beta_8) + (\gamma + \delta_8))$.

Since the estimation is based on monthly cell averages, a set of monthly effects μ_m characterizes the seasonal structure of unemployment in terms of a differential to baseline month June (with corresponding indicator variables 1_m). Estimates of the average unemployment experience of, say, young low-skilled males in any given April of the baseline period 1995-97 is $(\alpha+\beta_1+\mu_4)$. Furthermore, the analysis distinguishes the eight time periods 1983-85 to 2004-05; coefficients τ_t express the average deviation of unemployment rates for any demographic cell in period t from their corresponding value in the baseline period (with corresponding indicator variables 1_t). For instance, male workers in the core in month November of the fourth period 1992-94 are estimated to experience an average unemployment rate of $(\alpha + \mu_{11} + \tau_4)$.

Next to describing the average structure of unemployment in the four principal periods, the major emphasis in this analysis is on the differential cyclical experience of what are generally referred to as problem groups. In the regression, interaction terms capture how the evolution of their performance compares formally to the cyclical experience of the average worker. Specifically, in addition to their direct impact, the average coefficients τ_t are interacted with five loading factors, d_f for women, d_l for low-skilled workers, d_h for high-skilled workers, d_y for young and d_o for old workers, respectively. In expression (1), the indicator variables $1_{unskilled}$, 1_{young}, $1_{high-skilled}$, and 1_{old}

are defined accordingly. A positive interaction coefficient, for instance a positive d_u, would indicate that for the corresponding group, here low-skilled workers, the cyclical swings captured by τ_t are enforced, whereas a negative value would indicate that this group experiences more moderate cyclical swings than the average worker. A value of -1 would even imply complete detachment from the cycle.

Since estimation is performed on grouped data, with underlying sample sizes - and thus the precision of the individual cells' averages - varying considerably, in this second-step regression, cell averages are weighted by the sum of the individual panel of all individuals in each cell. This strategy does not only account for differences in the precision of all cell averages, it also considers the real distribution in the population. In a second step the preceding model is changed in measuring the cyclical sensitivity of unemployment. The constructed time periods are replaced by the yearly GDP growth of West Germany and East Germany respectively:

$$\begin{aligned} u_{igmt} &= \alpha + \gamma \cdot 1_{fem} + \sum_{i \neq 5} (\beta_i + \delta_i 1_{fem}) 1_i + \sum_{m \neq 6} \mu_m \cdot 1_m + \\ &\quad \tau_{gdp} \cdot GDP \cdot (1 + d_f \cdot 1_{fem} + d_u \cdot 1_{unskilled} + d_h \cdot 1_{high-skilled} + \\ &\quad d_y \cdot 1_{young} + d_o \cdot 1_{old}) \cdot 1_t + \epsilon_{igmt} \end{aligned} \tag{2}$$

The need for a nonlinear model is not given anymore because the cyclical behavior is reflected by a single variable rather than a set of dummy variables as in the first model. This suggests the possibility of measuring the direct influence of cyclical behavior on the unemployment rates. Because of the different development in East and West Germany the specific GDP growth of West and East Germany, respectively, is used as independent variable. In a third step the model is extended using a broader set of cyclical factors. These factors consider the cyclical sensitivity, but not in respect to a base cell:

$$\begin{aligned} u_{igmt} &= \alpha + \gamma \cdot 1_{fem} + \sum_{i \neq 5} (\beta_i + \delta_i 1_{fem}) 1_i + \sum_{m \neq 6} \mu_m \cdot 1_m + \\ &\quad \tau_{gdp} \cdot GDP \cdot \sum_{p \neq 5} d_p \cdot 1_p + \epsilon_{igmt} \end{aligned} \tag{3}$$

The index $p \in (1, \ldots, 16)$ reflects the 16 demographic groups (8 groups for men and women separately). Following the discussion and estimation of unemployment rates for models (1) to (3) in the following section, section 6 will analogously apply these models to labor market outcomes given by flows between employment, unemployment, and inactivity.

5 Unemployment rates

Table 2 reports the result of applying the first model to the observed unemployment rate in West Germany. The estimated constant (5.29%) reflects the mean unemployment rate of the chosen core group of medium aged, medium-skilled men. The coefficients for the demographics represent the deviation of the different cells to the male core group. It can be seen that instead of high-skilled all groups experience a higher unemployment rate than the core group does. The coefficients for the female groups represent the difference to the respective male group. The negative coefficients are smaller in their absolute value than the deviation of their respective group. A significant influence of the different regimes on unemployment can also be seen. These regimes account for cyclical behavior.

The cyclical sensitivity of different groups is captured in the five loading factors displayed at the end of Table 2. These loading factors can be interpreted in the following way: A loading factor of zero implies that there is no difference in the cyclical influence (regimes) compared to the core group, while a positive loading factor indicates a higher pronunciation and a negative loading factor less pronunciation.

In West Germany high-skilled individuals experience less pronounced swings in their unemployment rates over the cycle than the core group does. By contrast, unskilled, old or young workers experience somewhat more pronounced swings than the average worker. The absolute value of the estimated loading factor for low-skilled workers is very high. The estimates imply that low-skilled workers in West Germany are considerably more vulnerable to cyclical swings than the average West German worker.

The results for East Germany are presented in Table 3. The mean unemployment rate of the core group is 6.77% while their female counterparts experience an unemployment rate which is 1.76% higher. The differences between the different groups are similar as in West Germany. All male groups except of the high-skilled have higher unemployment rates than the core group. The findings are somewhat different for women, where medium-aged unskilled, young medium-skilled as well as old high-skilled have significantly lower unemployment rates than their male counterparts. All coefficients of the regimes are insignificant. Therefore, also the loading factors are insignificant.

In the following tables we forbear from presenting all the estimated coefficients and restrict the tables to the loading factors. The detailed results are available upon request. In each table we subsume the loading factors of each of the three described specifications named models 1-3. Tables 4 and 5 report the results of applying these models to the observed unemployment

Table 2: Unemployment Rates in West Germany - the Cyclical Sensitivity of Problem Groups

Core Values			
Constant	0.0529	Female	0.0042
	(13.26)	Deviation	(1.01)

Demographics: Deviation from the Core			
	Unskilled	Medium-skilled	High-skilled
Young	0.0829	0.0445	
(16-24)	(16.12)	(10.13)	
Medium	0.1156		-0.0291
(25-49)	(25.59)		(-6.68)
Old	0.1302	0.0421	-0.0092
(50-64)	(25.77)	(9.83)	(-1.98)

Female Deviation			
	Unskilled	Medium-skilled	High-skilled
Young	0.0119	-0.0230	
(16-24)	(2.14)	(-4.16)	
Medium	-0.0394		0.0164
(25-49)	(-7.10)		(2.97)
Old	-0.0211	-0.0021	-0.0087
(50-64)	(-3.80)	(-0.38)	(-1.57)

Regimes						
Regime 1	Regime 2	Regime 3	Regime 4	Regime 6	Regime 7	Regime 8
(1983-1985)	(1986-1988)	(1989-1991)	(1992-1994)	(1998-2000)	(2001-2003)	(2004-2005)
-0.0135	-0.0146	-0.0192	-0.0112	-0.0062	-0.0005	0.0039
(-4.52)	(-4.54)	(-4.61)	(-4.44)	(-3.97)	(-0.57)	(3.31)

Seasonal Factors					
January	February	March	April	May	June
0.0044	0.0054	0.0037	0.0025	-0.0012	
(1.29)	(1.60)	(1.09)	(0.74)	(-0.34)	
July	August	September	October	November	December
0.0027	0.0026	0.0008	0.0014	0.0024	0.0053
(0.78)	(0.78)	(0.24)	(0.41)	(0.71)	(1.56)

Cyclical Sensitivity				
Women	Unskilled	High-skilled	Young	Old
-0.0867	3.0562	-0.7043	1.2998	1.2944
(-0.50)	(3.93)	(-3.35)	(2.86)	(3.09)

Diagnostics			
Number of Obs.	4608	Adj. R-squared	0.4835

The model was estimated via Nonlinear Least Squares. Asymptotic t-values in parentheses.

Table 3: Unemployment Rates in East Germany - the Cyclical Sensitivity of Problem Groups

Core Values			
Constant	0.0677	Female	0.0176
	(12.10)	Deviation	(2.89)

Demographics: Deviation from the Core			
	Unskilled	Medium-skilled	High-skilled
Young	0.0497	0.0394	
(16-24)	(6.69)	(6.34)	
Medium	0.0842		-0.0381
(25-49)	(12.46)		(-6.27)
Old	0.1055	0.0521	0.0013
(50-64)	(16.27)	(8.52)	(0.21)

Female Deviation			
	Unskilled	Medium-skilled	High-skilled
Young	-0.0027	-0.0483	
(16-24)	(-0.32)	(-5.62)	
Medium	-0.0262		0.0026
(25-49)	(-3.05)		(0.31)
Old	-0.0101	-0.0027	-0.0254
(50-64)	(-1.17)	(-0.32)	(-2.96)

Regimes			
Regime 1	Regime 3	Regime 4	Regime 5
(1992-1994)	(1998-2000)	(2001-2003)	(2004-2005)
-0.003	-0.002	0.0018	0.0047
(-1.07)	(-1.05)	(1.04)	(1.08)

Seasonal Factors					
January	February	March	April	May	June
0.0042	0.0056	0.0033	0.0027	-0.0011	
(0.80)	(1.07)	(0.62)	(0.51)	(-0.21)	
July	August	September	October	November	December
0.0037	0.0040	0.0012	0.0010	0.0020	0.0049
(0.70)	(0.77)	(0.23)	(0.19)	(0.38)	(0.93)

Cyclical Sensitivity				
Women	Unskilled	High-skilled	Young	Old
-1.4469	10.0975	-0.7176	4.4598	-2.4358
(-1.18)	(1.03)	(-0.79)	(0.94)	(-1.23)

Diagnostics			
Number of Obs.	2880	Adj. R-squared	0.4181

The model was estimated via Nonlinear Least Squares. Asymptotic t-values in parentheses.

Table 4: Unemployment Rates in West Germany - the Cyclical Sensitivity of Problem Groups

Model 1				
Women	Unskilled	High-Skilled	Young	Old
-0.0867	3.0562	-0.7043	1.2998	1.2944
(-0.50)	(3.93)	(-3.35)	(2.86)	(3.09)
Model 2				
Women	Unskilled	High-Skilled	Young	Old
-0.2589	1.1092	-0.4024	0.4151	0.3867
(-2.49)	(4.58)	(-3.00)	(2.20)	(2.37)
Model 3				
Men	Unskilled	Medium-skilled	High-skilled	
Young	2.0396	1.4381		
(16-24)	(2.10)	(1.80)		
Medium	1.3581		-0.0799	
(25-49)	(1.75)		(-0.19)	
Old	3.0929	0.9192	-0.0218	
(50-64)	(2.42)	(1.40)	(-0.05)	
Women	Unskilled	Medium-skilled	High-skilled	
Young	-0.0961	-1.0084		
(16-24)	(-0.22)	(-1.91)		
Medium	0.5444	-0.2211	0.0025	
(25-49)	(1.18)	(-0.57)	(0.01)	
Old	-1.3867	-0.3487	-0.2576	
(50-64)	(-2.31)	(-0.79)	(-0.59)	

The models were estimated via Nonlinear Least Squares. Asymptotic t-values in parentheses.

rates in West Germany and East Germany, respectively. The structure of all subsequent pairs of tables follows the one given in Tables 4 and 5: The first in the pair gives results for West Germany, the second for East Germany. Model 1 in each table contains the estimation results from applying equation 2.1 to examine the respective outcome variable (in Tables 4 and 5: unemployment rate, subsequently: labor market flows). Model 2 and 3 display the cyclical sensitivity resulting from applying equations 2 and 3, respectively.

While Table 4 displays estimation results for the outcome "unemployment rate", comparable results for the East German sample are displayed in Table 5. Adopting the second specification, using the GDP-growth instead of the regimes, leads to almost the same loading factors in West Germany. Only women in West Germany have a negative loading factor instead of an insignificant one. In East Germany the loading factor of high-skilled becomes significantly negative applying the second model. In the third specification loading factors for all cells are estimated. In the first and the second specifications women are less sensitive or even detached - which implies a loading factor of -1 - to the cycle. Estimating fifteen loading factors shows that all women except of young medium-skilled and old unskilled women are comparable to the core group. Though, these two groups are detached by the cycle. In East Germany medium-skilled young women and medium-aged high-skilled men or women are detached from the economic cycle or benefit from a cyclical downturn relative to the other groups. Summed up low-skilled male workers in the West are the most strongly affected groups over the economic cycle.

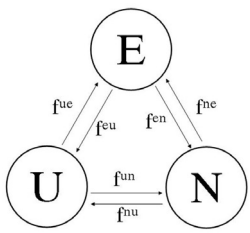
6 Labor Market Flows

In this section the models delineated in section 4 are extended to consider as outcome variables the transitions between the three different labor force states: Employment (E), Unemployment (U) and Non-Participation (N).

Clearly, six different flows f^{eu}, f^{un}, f^{ne}, f^{ue}, f^{en}, and f^{nu} can be distinguished (Figure 3). As in the preceding section, the analysis is based on cell averages, while we consider the same 16 demographic cells as in the first analysis. The transition rate, for example, from employment to unemployment, f^{eu}, is the weighted number of individuals in a specific cell changing between month t to $t+1$ from employment to unemployment, divided by the weighted number of persons in employment in month t.

Tables 6 and 7 display the results for the loading factors of applying models 1-3 to the employment-to-unemployment flow f^{eu} (i.e. the job loss

Figure 4: Labor force status transitions



rate) for West and East Germany. Except of the loading factor for old workers by applying model 2 all loading factors for the West-German data are insignificant. While the coefficient for the GDP growth is negative in the second model it is also insignificant in the third model. These findings suggest that there is no difference in the cyclical dependence of the job loss rates between the different groups. However, there are differences in the level of flow rates (these coefficients are not shown in the table). In contrast to the unemployment rates some seasonality is found for job loss rates.

Applying the first model to the East-German data, we find a higher sensitivity to cyclical behavior for the elderly while high-skilled experience less pronounced swings. Similar interpretations are suggested in the third model where high-skilled as well as medium-skilled women experience less pronounced swings in their job loss rates. The estimated coefficient for the GDP growth is insignificant by applying model 2.

Besides the job loss rates also the job finding rates (f^{UE}) are decisive for differences in rates. Tables 8 and 9 report the results of applying the models to the re-employment rate, i.e. the transition from unemployment to employment, for West and East Germany, respectively. We find a positive influence of the GDP growth on the re-employment rate in the second model in West Germany. Also a significant influence of the different regimes can be found for both parts of Germany. Women and the elderly in West Germany are almost detached from the cycle in West Germany and experience less pronounced swings in East Germany, respectively. These findings could be a result of the relatively low participation rate and the high share of part-time work of women especially in the West. Finding a job with the adequate number of working hours could be more important than having any job at all. Therefore, their job search is almost independent of the cyclical situation. In contrast, young workers in the West and high-skilled in the East are more

sensitive to the cycle. However, especially old men have the lowest level of re-employment rates in both parts of the country.

Additionally to the transition rates between unemployment and employment, we estimated the same models for the remaining four transition rates out of and into non-participation. These findings are not reported, but are available upon request. Summed up it can be seen that women have lower transition rates out of non-participation while young men have higher transition rates into non-participation which can also be some kind of schooling or university after some working experience. There is no cyclical dependence of these transition rates, while there is a significant influence of GDP growth on the transition rates out of non-participation in the West. There can also be seen that elderly women and women of the core group are less influenced by the cycle in their transition rate from non-participation back to employment.

7 Concluding remarks

Using a formal empirical model, this paper parsimoniously characterizes the long-term structure of unemployment rates and flow intensities, as well as their cyclical behavior across 16 demographic cells for the West-German and the East-German labor markets separately. In particular, the model captures cyclical behavior by a set of loading factors translating unobserved shocks to the labor market into observed fluctuations in cell-specific unemployment rates and transition intensities. The estimates use monthly data on worker flows between three principal labor market states, employment, unemployment and non-participation, and on detailed information regarding major demographic characteristics, gender, age, and education from the German Socio-Economic Panel (SOEP) for the period 1983 to 2005 for West Germany and 1992 to 2005 for East Germany.

Unemployment is heterogeneous over the different demographic cells in both parts of Germany. In West Germany low-skilled workers and medium-skilled young or old workers experience higher unemployment rates than the core group of medium-aged medium-skilled workers. These differences between the groups are somewhat smaller for women as for men. The differences in unemployment rates are quite similar in East Germany. Hence, in the East mean unemployment rates of women are higher than those of men. It is remarkable that within the unskilled, the young have the lowest unemployment rates.

In West Germany it appears that those groups with a higher unemployment rate are more sensitive to cyclical changes than the core groups, and those cells that experience a lower unemployment rate than the core are less

sensitive to or completely detached from cyclical behavior. In principle it can be asserted that the demographic structure is similar in both parts of Germany, but West-German women are more homogeneous than men and East-German women. The cyclical influence on unemployment is much smaller (in some settings insignificant) and more homogeneous in East Germany than in the Western part. Only in the first years after re-unification East Germany faced a relatively high growth rate, while unemployment rose rapidly because of the economic transition and adaptation processes. In the following years up to the present a high unemployment rate has been accompanied by low GDP growth. Therefore, our results mainly cover East Germany in a low-growth state, and labor force dynamics for a high-growth East German economy cannot really be assessed.

It is evident that the transition rate from unemployment to employment, i.e. the re-employment rate, is a decisive component of the overall unemployment rate. The differences in unemployment rates can therefore be explained by the heterogeneity in the transition rates between unemployment and employment. There is a higher cyclical sensitivity of the job loss rate and the re-employment rate in East Germany than of the unemployment rate. The findings for the loading factors are miscellaneous. It can be stated that old people are less or not dependent on cyclical influences in their flows between employment and unemployment and the other way round. Women in West and East Germany are less sensitive or even detached from the cycle in their re-employment rate. This finding raises the question, why women do not gain from from expansions in their probability to find a new job while unemployed. A possible explanation can be due to the fact that most women are the secondary wage earner and therefore can search until finding an adequate job, especially in respect to working hours, to reconcile work and family life.

Table 5: Unemployment Rates in East Germany - the Cyclical Sensitivity of Problem Groups

Model 1				
Women	Unskilled	High-skilled	Young	Old
-1.4469	10.0975	-0.7176	4.4598	-2.4358
(-1.18)	(1.03)	(-0.79)	(0.94)	(-1.23)
Model 2				
Women	Unskilled	High-skilled	Young	Old
-0.0891	3.4655	-1.2317	0.7613	1.0961
(-0.23)	(1.76)	(-2.16)	(0.94)	(1.26)
Model 3				
Men	Unskilled	Medium-skilled	High-skilled	
Young	3.6589	1.7012	-	
(16-24)	(1.41)	(1.09)		
Medium	1.2177	-	-1.3785	
(25-49)	(0.92)		(-2.37)	
Old	-0.6314	1.3842	0.0213	
(50-64)	(-1.09)	(0.98)	(0.03)	
Women	Unskilled	Medium-skilled	High-skilled	
Young	1.4383	-1.5041	-	
(16-24)	(1.00)	(-2.47)		
Medium	4.0348	-0.9552	-2.0477	
(25-49)	(1.45)	(-1.75)	(-2.60)	
Old	4.6518	-0.2622	0.1375	
(50-64)	(1.49)	(-0.39)	(0.17)	

The models were estimated via Nonlinear Least Squares. Asymptotic t-values in parentheses.

Table 6: Transition Rates from Employment to Unemployment, West Germany - the Cyclical Sensitivity of Problem Groups

Model 1				
Women	Unskilled	High-skilled	Young	Old
0.0538	-0.2823	0.1260	0.5988	0.0853
(0.27)	(-1.06)	(0.45)	(1.67)	(0.37)
Model 2				
Women	Unskilled	High-skilled	Young	Old
0.3587	-0.0026	0.1435	0.7066	-0.6948
(0.87)	(-0.01)	(0.30)	(1.10)	(-2.00)
Model 3				
Men	Unskilled	Medium-skilled	High-skilled	
Young	1.6185	0.9452	-	
(16-24)	(0.83)	(0.62)		
Medium	-1.5213		0.2605	
(25-49)	(-1.94)		(0.23)	
Old	-0.9913	-0.2181	-0.1029	
(50-64)	(-1.42)	(-0.25)	(-0.11)	
Women	Unskilled	Medium-skilled	High-skilled	
Young	0.0947	1.2590	-	
(16-24)	(0.09)	(0.73)		
Medium	2.4270	-0.3798	0.9415	
(25-49)	(0.98)	(-0.46)	(0.62)	
Old	-0.1874	-0.1496	-1.0009	
(50-64)	(-0.21)	(-0.16)	(-1.44)	

The models were estimated via Nonlinear Least Squares. Asymptotic t-values in parentheses.

Table 7: Transition Rates from Employment to Unemployment, East Germany - the Cyclical Sensitivity of Problem Groups

Model 1				
Women	Unskilled	High-skilled	Young	Old
1.2266	1.5010	-1.1267	-2.1853	-0.7219
(1.66)	(1.67)	(-2.38)	(-2.78)	(-1.91)
Model 2				
Women	Unskilled	High-skilled	Young	Old
0.8308	0.8688	-0.6567	-1.0219	-1.6199
(0.66)	(0.61)	(-0.74)	(-1.06)	(-1.26)
Model 3				
Men	Unskilled	Medium-skilled	High-skilled	
Young	-2.0614	0.3117	-	
(16-24)	(-1.69)	(0.33)		
Medium	-13.1048		-2.2437	
(25-49)	(-2.10)		(-3.94)	
Old	-37.8490	0.3040	-1.1395	
(50-64)	(-3.13)	(0.51)	(-1.50)	
Women	Unskilled	Medium-skilled	High-skilled	
Young	-1.0434	-0.7368	-	
(16-24)	(-0.50)	(-0.88)		
Medium	-4.8569	-2.3071	-1.9008	
(25-49)	(-1.20)	(-4.91)	(-4.15)	
Old	-5.2237	0.5298	-4.2352	
(50-64)	(-1.80)	(0.78)	(-3.25)	

The models were estimated via Nonlinear Least Squares. Asymptotic t-values in parentheses.

Table 8: Transition Rates from Unemployment to Employment, West Germany - the Cyclical Sensitivity of Problem Groups

Model 1				
Women	Unskilled	High-skilled	Young	Old
-0.8721	0.0165	0.3436	1.1387	-0.6170
(-3.58)	(0.06)	(0.89)	(2.13)	(-2.67)
Model 2				
Women	Unskilled	High-skilled	Young	Old
-1.0682	-0.0568	0.5767	1.5134	-0.3026
(-2.75)	(-0.16)	(0.94)	(1.71)	(-0.91)
Model 3				
Men	Unskilled	Medium-skilled	High-skilled	
Young	4.6414	9.2502	-	
(16-24)	(0.37)	(0.41)		
Medium	3.2126		15.6865	
(25-49)	(0.34)		(0.43)	
Old	1.2875	0.6756	-3.4064	
(50-64)	(0.24)	(0.16)	(-0.59)	
Women	Unskilled	Medium-skilled	High-skilled	
Young	6.4859	3.1406	-	
(16-24)	(0.39)	(0.34)		
Medium	-5.0365	-0.4801	-5.1205	
(25-49)	(-0.55)	(-0.20)	(-0.55)	
Old	0.6040	-0.1892	9.0184	
(50-64)	(0.15)	(-0.07)	(0.40)	

The models were estimated via Nonlinear Least Squares. Asymptotic t-values in parentheses.

Table 9: Transition Rates from Unemployment to Employment, East Germany - the Cyclical Sensitivity of Problem Groups

Model 1				
Women	Unskilled	High-skilled	Young	Old
-0.5280	0.2911	0.9347	-0.3181	-0.5919
(-3.13)	(1.18)	(2.42)	(-1.47)	(-3.16)
Model 2				
Women	Unskilled	High-skilled	Young	Old
-3.7619	1.2219	6.2007	4.3504	2.2342
(-0.52)	(0.31)	(0.44)	(0.42)	(0.38)
Model 3				
Men	Unskilled	Medium-skilled	High-skilled	
Young	3.9872	-0.3264	-	
(16-24)	(1.02)	(-0.34)		
Medium	-0.9315		-0.7940	
(25-49)	(-1.15)		(-0.97)	
Old	0.1599	-0.0247	-0.7258	
(50-64)	(0.13)	(-0.02)	(-0.87)	
Women	Unskilled	Medium-skilled	High-skilled	
Young	-3.1248	-0.7310	-	
(16-24)	(-1.72)	(-0.88)		
Medium	-1.3167	-1.9539	1.1398	
(25-49)	(-1.57)	(-1.79)	(0.62)	
Old	-1.2232	-1.2083	2.4028	
(50-64)	(-1.49)	(-1.47)	(0.88)	

The models were estimated via Nonlinear Least Squares. Asymptotic t-values in parentheses.

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