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**Article**

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## DIFFERENCES IN LABOUR MARKETS ACROSS THE ATLANTIC

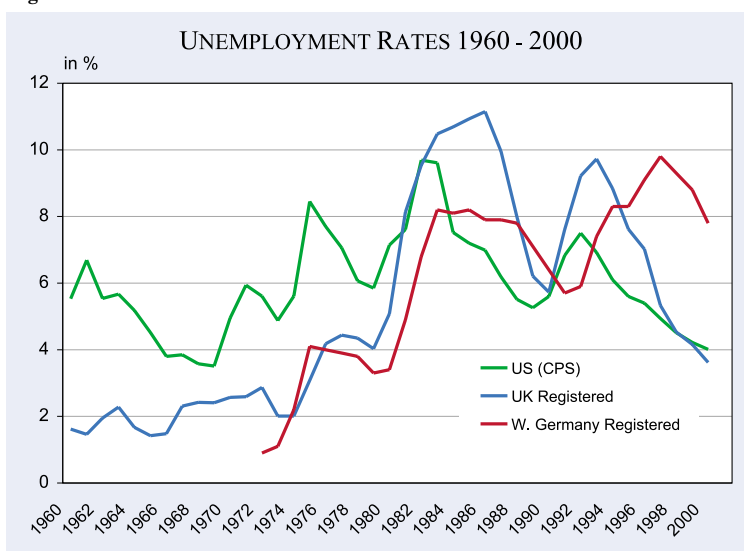
PATRICK A. PUHANI\*

During the last two to three decades, American and continental European labour markets experienced different trends in two dimensions. First, in contrast to continental Europe (in the following mainly represented by Germany), wage inequality increased substantially in the United States. In America, this increase in wage inequality did not just occur due to increases in real wages at the top, but also due to a *fall* in real wages in the middle and lower parts of the wage distributions (Acemoglu, 2002). In Germany, wage inequality hardly changed during the same period (Steiner and Wagner 1998; Fitzenberger 1999). However, wage inequality is not the only dimension in which American and German labour markets differed. Figure 1 exhibits the average unemployment rates for the United States, Germany, and Britain. Over the long-term (i.e. since 1960) no clear trend can be discerned for the American unemployment rate: It oscillated around six percent with a range between four and eight percent (with few exceptions). By contrast, German unemployment seems to have ratcheted up: Whereas it was clearly below American levels in the early

While wage inequality hardly changed, unemployment rose in Germany

post-WWII period, western Germany's unemployment rate surpassed the American rate shortly after the second oil shock and remained above it for almost every year since. The most striking divergence in American and German unemployment rates occurred in the 1990s. Interestingly, the British experience resembles the German one until about the end of the 1980s. In the 1990s, however, Britain changed from looking like a continental European labour market (the French graph would resemble the one for Germany) to follow the American pattern. Note that it was in the 1990s that German and Anglo-Saxon unemployment rates diverged, not in the 1980s (although the largest increase in Anglo-Saxon wage inequality occurred in the 1980s). One may wonder how much one can learn from such a time series exegesis: From a macro perspective, the observed divergence in unemployment across the Atlantic might just be a temporary cyclical phenomenon. However, the fact that the Anglo-Saxon economies experienced significant increases in wage

Figure 1



Note: The United States unemployment rate is based on the CPS, which uses a definition of unemployment equivalent to the ILO definition. For western Germany, OECD figures only provide the registered unemployment rate for a longer time period. Comparing the registered with the OECD standardised unemployment rate for united Germany suggests about a 1.5 percent difference between the two, so that the standardised unemployment rate for western Germany would also be lower than depicted in the graph. For the UK, however, the standardised unemployment rate is about 1 percentage point higher than the registered one shown in the graph. It is, however, not available for such a long time period.

Source: OECD.

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dispersion since the 1970s or 1980s, whereas Germany did not, *plus* the fact that the unemployment rates diverged in the 1990s, has raised considerable interest in the economics profession and in the political arena. Krugman (1994) has raised the hypothesis that the different experiences in wage dispersion and unemployment across the Atlantic are “two sides of the same coin”. The story runs like this: Relative negative demand shocks against unskilled workers lead to an increase in wage dispersion in labour markets with flexible wages, such as the United States. If relative wages (of high-skilled versus low-skilled workers) are not sufficiently flexible, though, relative unemployment of low-skilled workers will increase, thus raising the average unemployment rate. According to the “Krugman hypothesis,” this may explain the German experience.

Astonishingly, the literature testing the Krugman hypothesis is not very large, given the importance of the issue for continental European economies: We currently observe how difficult it is to reform European post-war labour market institutions. It is therefore important to gather empirical evidence on the validity of the Krugman hypothesis. Otherwise, we do not know whether the costs of changing entrenched institutions are justified.

At first sight, it might seem straightforward to test the Krugman hypothesis. Data on wages and unemployment are readily available. However, two main problems arise. First, key components of the hypothesis, *supply*, *demand* and *wage rigidities*, are not directly observable and need to be proxied or estimated. Previous studies have either explicitly or implicitly taken different approaches to this problem, which makes comparison and judgment of the results difficult. Second, the Krugman hypothesis refers to differences across countries and thus requires data that are internationally comparable. Even if data collection were harmonised across countries (which is only partly the case), education systems differ so much that harmonisation of educational degrees by the researcher effectively imposes another (possibly strong) assumption on the analysis. In the literature, degrees obtained outside the United States are often classified into American educational categories (like *college* or *high school*). Of course, it may be justified or even necessary in many situations to try to see the German school system through the American lens. However, in the context of testing the Krugman hypothesis, I argue that this is neither necessary nor justified.

Other authors have shown that the German school system produces a rather different skill structure from the American one (Nickell and Bell, 1996; Freeman and Schettkat, 2000). We will see below that this matters in the current context.

In the following, I will informally describe my empirical results concerning the Krugman hypothesis as outlined in Puhani (2003a; 2003b; 2003c). As Switzerland has a similar education system to that of Germany, but more flexible labour market institutions more similar to the ones of the United States than the rest of continental Europe, I will also report on Swiss evidence. Britain will provide another Anglo-Saxon example.

### Data

I use the Current Population Survey Merged Outgoing Rotation Group (CPS-MORG) files for the United States. The CPS is a representative and large data set, which allows to measure hourly wages as well as unemployment as defined by the ILO definition (not working, actively looking for a job and available for a job within short notice). Germany does not have a directly equivalent data set (cf. Zimmermann and Wagner 2002, 113–14). The corresponding survey would be the *Mikrozensus*, which I call the German Labour Force Survey (GLFS) here (part of this data is also the basis of the German component of the European Labour Force Survey). Although the quality of this data set is high in the sense that interviewees are obliged to respond to most questions by law, the GLFS does not contain wage information, only income in intervals and hours worked. Therefore, I use two more data sets for Germany to check the robustness of the results. One of the additional data sets is the internationally well-known German Socio-Economic Panel (GSOEP). In terms of measuring wages and unemployment, the GSOEP is conceptually well-suited for the current purpose. However, its panel nature and small sample size (compared to the other data sets used here), call into question its representativeness and its ability to measure changes in wage and unemployment structures precisely enough over time. Therefore, another large German administrative data set (IABR) is used. It precisely measures labour earnings of workers within the German social security system (which does not include civil servants and the self-employed), although there is some top-coding. A disadvantage of the IABR data set is

Testing the Krugman hypothesis with differentiated data

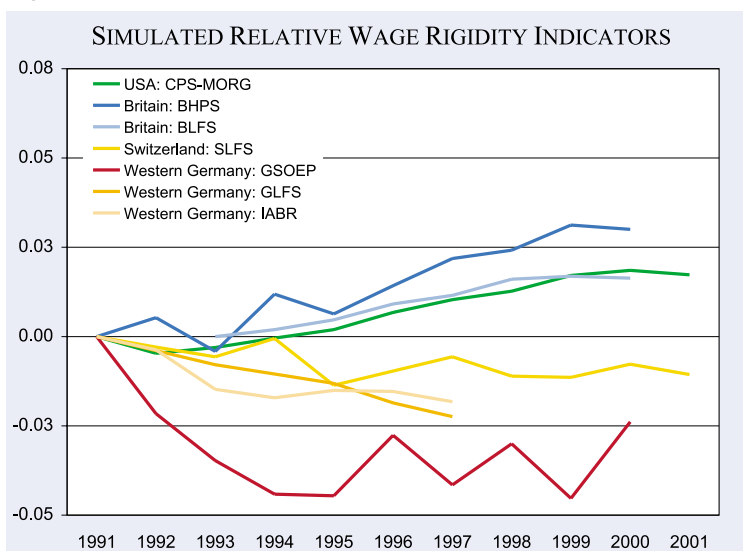
that it only allows the measurement of registered as opposed to ILO unemployment. For Switzerland, I use the Swiss Labour Force Survey (SLFS), which has information both on hourly wages and ILO unemployment. I also use the British Labour Force Survey (BLFS) and the British Household Panel Survey (BHPS) to provide another Anglo-Saxon comparison. More information on the data can be found in Puhani (2003a; 2003b; 2003c).

### A “macro” perspective

Many studies related to the question of this article are based on an analysis of relative wages and employment of two skill groups (high and low). In an American context, high-skilled workers are those with a college degree and low-skilled workers those with completed high school education. In Germany and Switzerland, workers with tertiary education (*university* or *equivalent*) are defined as high skilled and those with vocational apprenticeship training are defined as low skilled. In Britain, the high skilled are those with a degree (from a university or a former polytechnic, all polytechnics being universities now), the low skilled are those with an education equivalent to *O-levels*. The definition of the low skilled reflects the largest low-skilled groups in the respective countries (we will see below that contrary to a myth that seems to prevail among some Anglo-Saxon labour economists, those with German apprenticeship training are low skilled, at least in terms of the German wage hierarchy).

Similar to the studies by Katz and Murphy (1992), Autor, Katz and Krueger (1998), and Acemoglu (2003), I define *age-education-gender-region* cells (between 100 and 360 cells depending on the data set) and aggregate them either into the high-skilled or the low-skilled group (see Puhani 2003a; 2003b; 2003c for details). I then estimate relative supply and demand for skill changes within a constant elasticity of substitution production function framework. This allows simulation of relative wage changes since a base period (1991 in my case) warranted by changes

Figure 2



Note: The y-axis displays the simulated relative wage rigidity indicator in log points, i.e. the difference in the logarithms of the observed and the simulated market relative wage of high-skilled versus low-skilled workers. A negative number means that compared to the base year 1991, the relative wage of high-skilled versus low-skilled workers has not increased enough to balance changes in relative supply and demand for high-skilled versus low-skilled workers between 1991 and the year of observation.

Sources: Current Population Survey – Merged Outgoing Rotation Group Files (CPS); British Labour Force Survey (BLFS); British Household Panel Survey (BHPS); German Socio-Economic Panel (GSOEP); German Labour Force Survey – Mikrozensus (GLFS); German Administrative Data – Institut für Arbeitsmarkt und Berufsforschung Regionalstichprobe (IABR); Swiss Labour Force Survey (SLFS); own calculations.

in relative demand and supply (“market relative wage changes”). The differences in the observed and the simulated “market” relative wage is an indicator of relative wage rigidity between high-skilled and low-skilled workers. The results are displayed in Figure 2. A negative number indicates wage compression, i.e. that wages have become (more) rigid. In other words, a negative number means that, compared to the base year 1991, the relative wage of high-skilled versus low-skilled workers has not increased enough to balance changes in relative supply and demand for high-skilled versus low-skilled workers between 1991 and the year of observation.

The point estimates of Figure 2 show a clear difference between the two Anglo-Saxon economies on the one hand, and the two continental European countries on the other. All data sets on Germany and Switzerland indicate wage compression, although wage compression in Switzerland seems to have been smaller than in Germany (note that Swiss labour market institutions allow much more flexibility in terms of employment protection and wage setting than that of Germany). By contrast, the evidence on the United States and Britain suggests wage decompression, i.e. the relative wage of high-skilled versus

low-skilled workers rose by even more than warranted by relative supply and demand changes since 1991. Most of the displayed points in the graphs are statistically significant at the 10 percent level. An exception is the result for Switzerland, where only the figure for 1995 is statistically significant.

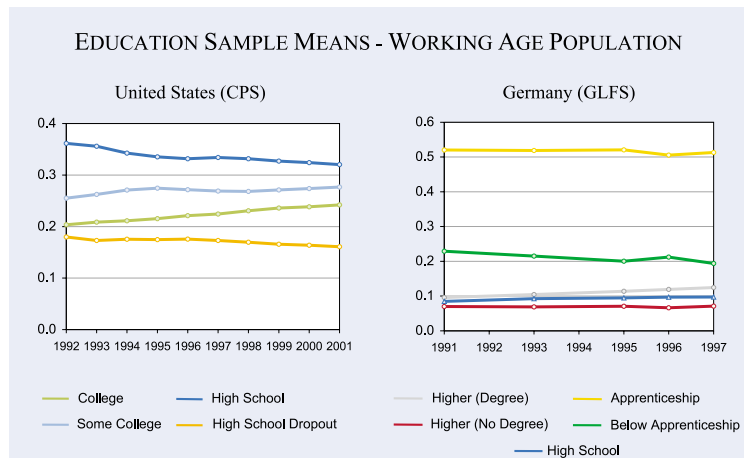
The macro evidence reproduced here from Puhani (2003a; 2003c) thus gives support to the Krugman hypothesis by demonstrating that, contrary to the Anglo-Saxon experience, relative wages in Germany moved unfavourably to the relative employment of low-skilled versus high-skilled workers. In Switzerland, this occurred to a lesser degree than in Germany, if at all.

Although this macroeconomic simulation approach has an appeal by providing a quantitative measure of wage rigidity (e.g. a figure of  $-0.02$  in the graphs of Figure 2 implies that the relative wage of high- versus low-skilled workers should have increased by about two percent in order to accommodate relative supply and demand changes), it rests on strong assumptions and simplifications. By distinguishing only between two skill groups (high and low), this approach ignores interesting information about which skills exactly are associated with relative wage rigidities.

### A “micro” perspective

Because of these deficiencies, I developed a microeconomic approach to test the Krugman hypothesis without unnecessary assumptions on the ability to proxy demand or supply shocks. The analysis is based on a neoclassical model of the labour market with heterogeneous types of labour. Here I will only outline the intuition: The approach rests on the idea that unemployment (quantity rationing) is a consequence of the failure of the market to clear (wage rigidity). Therefore, changes in relative wage rigidity can be detected by observing changes in the wage and unemployment structures. This idea was already set out in Nickell and Bell (1996) and Gottschalk and Joyce (1997). In contrast to these studies, however, I distinguish between more than just two skill

**Figure 3**



*Note:* The y-axis displays the shares of the respective education categories. Between 1991 and 1992 the coding of the education variable changed in the CPS. I therefore use 1992 as the base year in the microeconomic analysis.

Sources: Current Population Survey – Merged Outgoing Rotation Group Files (CPS); German Labour Force Survey – Mikrozensus (GLFS); own calculations.

categories and compare regression-adjusted changes in wage and unemployment structures (non-employment is also used as an alternative measure to unemployment as an indicator of quantity rationing). The dimensions of skill investigated are *age* as a proxy for experience and *education*. *Age* is discretised into five intervals (16 to 25, 26 to 25, etc.). *Education* is classified into four to five categories depending on the country. In the United States, these categories are *completed college*, *some college*, *completed high school* and *high school dropout*. In Germany, the categories are *degree*, *higher education but no degree*, *high school (Abitur)*, *apprenticeship* and *less than apprenticeship*. Thus, unlike most previous studies, I preserve national education definitions. Figure 3 exhibits sample means for the education groups in the United States and western Germany. It is shown that the educational structures in the United States and in Germany exhibit some differences, especially among the low skilled. In the United States, workers with *high school education* and *high school dropouts* constitute about one half (trend declining) of the working age population (with about 30 to 35 percent *high school graduates*). In Germany, those with *apprenticeship* education or *below* constitute about 70 percent of the working age population. However, 50 percent of the German working age population have obtained *apprenticeship* training. German apprenticeship training is quite different in content from an American high school education: Although students leave the system at roughly the same age (18 or 19 years), German apprenticeship training is

Different educational structures



Relative Wage and Unemployment/Non-Employment Behaviour and Labour Market Classification

	Contributing to a relative unemployment decrease $(\gamma_{t+\tau,k}^* - \gamma_{t,k}^*) < 0$	Contributing to a constant relative unemployment $(\gamma_{t+\tau,k}^* - \gamma_{t,k}^*) = 0$	Contributing to a relative unemployment increase $(\gamma_{t+\tau,k}^* - \gamma_{t,k}^*) > 0$
Contributing to a relative wage increase $(\beta_{t+\tau,k}^* - \beta_{t,k}^*) > 0$	(7): <i>weakly adjusting in increasing market relative to the reference market</i>	(6): <i>strongly adjusting in increasing market relative to the reference market</i>	(1): <i>strongly rigid (wage push) relative to the reference market</i>
Contributing to a constant relative wage $(\beta_{t+\tau,k}^* - \beta_{t,k}^*) = 0$	(8): <i>weakly rigid in increasing market relative to the reference market</i>	(5): <i>stable in stable market relative to the reference market</i>	(2): <i>weakly rigid in decreasing market relative to the reference market</i>
Contributing to a relative wage decrease $(\beta_{t+\tau,k}^* - \beta_{t,k}^*) < 0$	(9): <i>converging (wage pull) relative to the reference market</i>	(4): <i>strongly adjusting in decreasing market relative to the reference market</i>	(3): <i>weakly adjusting in decreasing market relative to the reference market</i>

Note:  $\beta_{t,k}^*$  and  $\gamma_{t+\tau,k}^*$  are the regression coefficients of the skill category  $k$  in the wage and unemployment regressions in the base period  $t$  and reporting period  $t + \tau$ , respectively. The coefficients of the skill dummy variables are transformed (indicated by an asterisk) to report the differential with respect to the base period sample mean as the reference category. The terminology “increasing market” refers to a positive relative net demand shock (which is the same as a negative relative net supply shock for labour market  $l$  with respect to the reference market  $r$  (the sample mean in the base period) as defined in Puhani (2003c). Increasing markets relative to the reference market are identified in cases (6), (7), and (8). Analogously, a “decreasing market” is equivalent to a negative net demand shock. Decreasing markets relative to the reference market are identified in cases (2), (3), and (4). In cases (1) and (9), the sign of the net demand shock cannot be identified. In case (5), there is no such shock. See also the theoretical discussion in Puhani (2003c).

not only classroom, but provides dual education: half classroom, half on-the-job.

The microeconomic approach estimates cross-sectional wage and unemployment regressions with *age, education, gender* and *region* as explanatory variables. Statistical tests on the *ceteris paribus* changes in the wage and unemployment structures obtained from these regressions are the basis for the classification displayed in the table. Each age and education characteristic is classified into one of nine cells depending on whether its contribution to the relative wage and unemployment position has increased, remained constant or decreased. In case the Krugman hypothesis were true, we would expect that low-skilled (young age, low education) characteristics in western Germany are classified as (1): “strongly rigid”, (2): “weakly rigid in a decreasing market”, or, if wages were somewhat but not sufficiently flexible, as (3): “weakly adjusting in a decreasing market”. In the United States, we would only expect relative wage adjustments, but no changes in relative unemployment (at least not against the low skilled). Hence, in the presence of negative relative demand shocks, low-skilled charac-

teristics in the United States should be classified as (4): “strongly adjusting in a decreasing market”.

In this survey, I only display the graphical results for the United States and western Germany with respect to educational groups. The classification results for both *age* and *education* categories for these countries as well as for Britain and Switzerland are reported in Puhani (2003a; 2003b; 2003c). The graphs in Figure 4 show that both the German and the American wage structures have become more unequal between educational groups. It is also shown that German workers with apprenticeship training are low-skilled if skills are defined in terms of the relative wage position that they hold in Germany (astonishingly, some Anglo-Saxon labour economists call German workers with apprenticeship “high skilled”). A striking contrast between western Germany and the United States emerges when comparing the changes in the unemployment structures between these two countries. Whereas the American *ceteris paribus* unemployment structure has become more *equal*, the German unemployment structure has become more *unequal*. This finding is consistent with the Krugman hypothesis, although one has to add that the German

Both, the German and US wage structures have become more unequal between educational groups

wage structure was rigid not in the sense of having been constant, but in the sense of not having been flexible *enough*.

Formal statistical tests (reported in my cited papers) substantiate this view: For both *high school dropouts* and those with *completed high school*, the flexible classification (4) (cf. Table) dominates the test results for the United States. For western Germany, a distinction emerges between the two low-skilled groups, i.e. workers *with* and those *without apprenticeship training*. Whereas a relative wage rigidity is robust in the two large German data sets for those without apprenticeship training classification (1) dominating in the GLFS and classification (3) dominating in the IABR data), the finding of a wage rigidity for workers with apprenticeship training is not robust (classification (2) dominates in the GLFS, but classifications (6) and (7) dominate in the IABR data). The results for Switzerland similarly

point to relative wage rigidity only for workers who do not even have *apprenticeship* training (as discussed in Puhani 2003a; 2003b; union demands for minimum wages might have shown their bite for this least qualified group). Those with *apprenticeship* training do not seem to have been affected by a relative demand shock. This finding reveals the importance of distinguishing between more than just two education categories and considering each major education group as it is defined in the respective country! Indeed, it seems that the largest parts of the low skilled in Germany and Switzerland – that is those with *apprenticeship* training, who constitute about half of the working age population in both countries – were not affected by the same negative relative demand shocks as were workers with a *high school degree* and *high school dropouts* in the United States. The German-style vocational education system (apprenticeships) may thus shield the largest part of low-skilled workers in Germany and

Switzerland from the negative relative demand shocks experienced by the largest part of low-skilled American workers. This result is consistent with the arguments made in Nickell and Bell (1996) and Freeman and Schettkat (2000) that the German-style apprenticeship system may provide the low skilled in Germany with more valuable human capital than does the Anglo-Saxon school system to their peers in the United States and in Britain. Hence, although I find evidence for the Krugman hypothesis, it only seems to be valid for the very lowest skill groups in Germany and Switzerland. Another qualification of the Krugman hypothesis arises from the British case. For Britain, the bottom line of my results is that large-scale skill upgrading due to educational reform helped to keep the British wage structure fairly constant in the 1990s (cf. Puhani 2003c).

As to the *age* structure (not displayed here, see my cited papers), there is robust evidence that the German wage structure behaved rigidly with respect to

The US unemployment structure has become more equal, the German one more unequal

Figure 4a

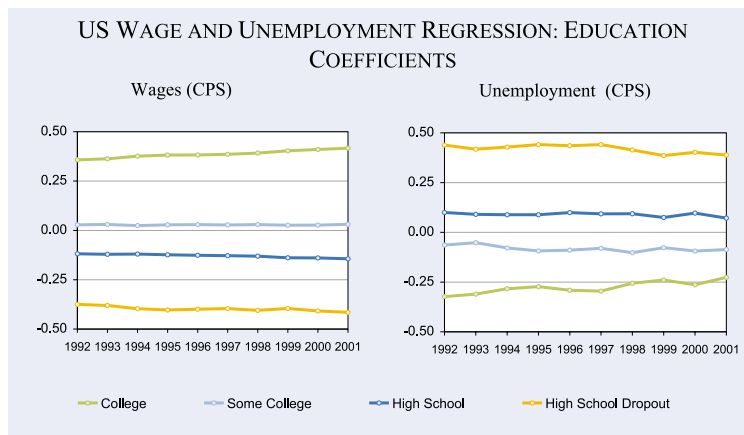
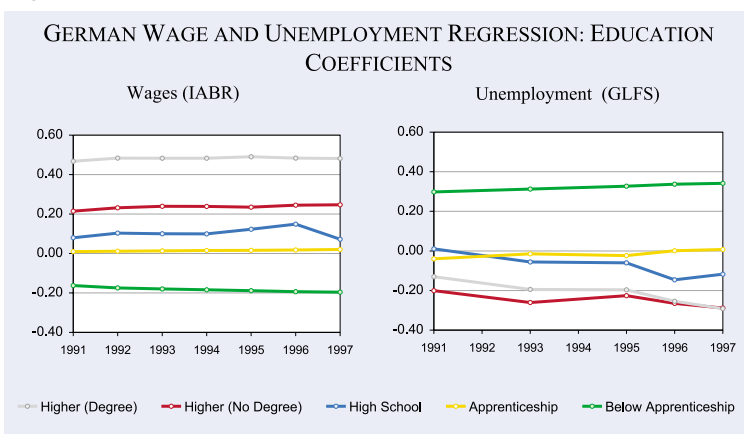


Figure 4b



Note: The left and right panels exhibit the transformed wage and unemployment regression coefficients  $\beta_x$  and  $\gamma_x$  respectively.

Sources: Current Population Survey – Merged Outgoing Rotation Group Files (CPS); British Labour Force Survey (BLFS); German Labour Force Survey – Mikrozensus (GLFS); own calculations.

the youngest age group (16 to 25 years of age). There is similar evidence for the United States, but it is not robust.

The robustness checks I carry out do not only use alternative data sets, but also choose different base periods for the tests of changes in wage and unemployment structures and the subsequent classification of the table above. In addition, I use *non-employment* instead of *unemployment* as an alternative measure of quantity rationing. In sum, the results are robust in the sense that a negative relative demand shock and relative wage rigidity is found for workers without apprenticeship in western Germany and Switzerland. In western Germany, there is an additional robust relative wage rigidity concerning young workers. (Results based on the GSOEP are often not statistically significant due to the smaller sample size). For the United States and Britain, no robust results of relative wage rigidities against the unskilled groups can be found. But consistent with the Krugman hypothesis, all investigated countries exhibit negative relative demand shocks against low-skilled workers.

Evidence for the Krugman hypothesis applies only to the very lowest skill groups in Germany

### Alternative explanations?

Although the empirical evidence discussed here is – with some qualifications – consistent with the Krugman hypothesis, one may think of alternative interpretations of the data. In Puhani (2003c), I discuss several other potential explanations. These are (i) business cycle effects, (ii) efficiency wage effects, (iii) welfare and unemployment benefit reform effects, and (iv) sample selection effects. I argue that these alternative explanations are not convincing, because – to sum up the arguments – (i) the changes in the unemployment structures look rather smooth and trendlike over a period longer than a representative business cycle, (ii) efficiency wages cannot explain differences across countries and furthermore should have less effect on the least skilled, (iii) the timing of welfare and unemployment benefit reforms is not consistent with this alternative explanation, and (iv) sample selection effects cannot be the main explanation as the evidence for the United States is inconsistent with that.

### Conclusions

Empirical evidence broadly supports Krugman's hypothesis that negative relative demand shocks

against low-skilled workers led to increased wage dispersion in the United States, but increased unemployment in continental Europe. However, the German-style apprenticeship system might have shielded large parts of the low skilled in Germany and Switzerland from the negative relative demand shocks affecting high school graduates and high school dropouts in the United States. In addition, supply effects dominate the British experience of a fairly constant wage structure with respect to educational groups in the 1990s.

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