LoWER

European Low-Wage Employment Research Network

Labour Market Status and the Wage Position of the Low Skilled

The Role of Institutions and of Demand and Supply
- Evidence from the International Adult Literacy Survey -

Peter Mühlau
(Technical University Eindhoven, THE NETHERLANDS

Justine HORGAN
(University of Groningen, THE NETHERLANDS)

Working paper No 05

July 2001

Labour Market Status and the Wage Position of the Low-Skilled: The Role of Institutions and of Demand and Supply. Evidence from the Adult Literacy Survey

This paper is part of *The Analysis of Wages and Job Quality in the European Union* (a tender of the European Commission, DG Employment and Social Affairs).

Authors:

Peter MÜHLAU
Eindhoven University of Technology
Department of Technology Management
Postbox 513
NL 5600 MB EINDHOVEN
THE NETHERLANDS

Email: p.muehlau@tm.tue.nl

Justine HORGAN
University of Groningen
Department of Sociology
Grote Rozenstraat 31
NL 9712 TG GRONINGEN
THE NETHERLANDS

Email: j.horgan@ppsw.rug.nl

The LoWER working papers are published by LoWER and edited by Wiemer SALVERDA. The LoWER working papers are available at the editor (see address below) or visit the internetsite for the full text of the working papers in PDF-format.

LoWER working papers are the results of the LoWER-network or related projects.

The LoWER-working papers are intended to make the results of the LoWER-research available to all persons interested. They are meant to encourage discussion and suggestions for revisions.

Labour Market Status and the Wage Position of the Low Skilled: The Role of Institutions and of Demand and Supply
- Evidence from the International Adult Literacy Survey -

Peter Mühlau and Justine Horgan

Introduction

In the last two to three decades, the relative wage position of the unskilled has markedly deteriorated in several countries. This development is best documented for the United States (e.g., Juhn, Murphy, Pierce 1993, Freeman and Katz 1995), but similar evidence has also been presented for the United Kingdom (Gosling et al. 2000; Leslie and Pu 1996) and Ireland (Barett et. al 1999; 2000). As this development coincides with an increased supply of more highly educated people, it appears that the shift in the demand for skilled workers could dominate the shift in their supply raising their relative wage. The most important theory explaining this process is the theory that technical change during this period has increased the productivity of skilled workers far more than the productivity of unskilled workers ('skill-biased technical change'). In other countries however, of which Germany is most notable (Krueger and Pischke 1997), the relative wage position of less educated workers has not deteriorated as much as in the USA - rather it has even improved relative to the wages of better educated employees. Other examples appear to be the Netherlands (Salverda 1998; Ter Weel 2000), France (Card et al. 1999) and Japan (Katz and Revanga 1989). This different pattern has been explained by institutional differences between these groups of countries shaping the effects of skill-biased technical change on the labour market position of low-skilled workers (e.g., OECD 1994). Effective minimum wages and wage-floors established by collective bargaining have prevented the wages of less-skilled workers from declining in countries such as Germany or France. The other

side of this coin, however, would be that the productivity of less educated workers would be too low to allow their employment at the wage rates mandatory in these countries. High unemployment rates of low skilled workers – reinforced by favorable 'replacement rates' - are the expected consequences of the institutional fettering of the wage position of workers with poorer education (e.g., Siebert 1997). We will address this as the *trade-off hypothesis:* that the relative wages of low skilled workers are higher at the expense of their employment chances, in countries with more rigid and regulated labour markets, as against in countries with more flexible labour markets. The protection of the relative wages of low skilled workers has to be paid for by lower employment rates that may render these workers worse off. However, there is only mixed empirical support for the trade-off hypothesis. Katz (2000) for example, found that union density and union coverage is associated with higher wages and lower employment for people with low skills. Other studies in contrast found little evidence that skilled workers are more concentrated among the unemployed or inactive in countries with a compressed wage structure at the lower tail or where earnings inequality has not increased, than are workers in countries with more 'flexible' wages (Card et al. 1999; Krueger and Plischke 1997; Nickell and Bell 1995; 1996).

A different explanation for the stylised differences between the USA and Continental-European countries has been suggested by Nickell (Nickell and Bell 1995; 1996).   Unemployment is less concentrated among the less skilled in Continental-European countries than in the US or UK because European countries (Germany, the Netherlands and Switzerland being explicitly mentioned) provide their workers with excellent basic schooling. The result of these high educational standards is that productivity in these countries exceeds the relative productivity of the poorly educated workers in the US or UK. This view is supported by studies that use 'literacy' as an instrument to compare the quality of educational credentials and the dispersion of skills across countries. Indeed the dispersion of literacy is closely correlated with earnings inequality at the country-level (OECD and Statistics Canada 2000). Moreover, the wage differentials associated with different levels of education appear to correspond to the relative quality of these credentials as established by the literacy differential (Nickell and Layard 1999). Glyn and Salverda (2000) provide further support for this perspective by showing that the differences between the employment ratios of lower and higher educated workers across countries are strongly

correlated with the dispersion of quantitative literacy. Moreover, Freeman and Schettkat (2000), who focus on the comparison between Germany and USA, provide evidence that the relatively compressed wage structure and the smaller premium for higher education in Germany corresponds with the more compressed skill structure of the German working population. These findings invite two different interpretations. The first is that wage and employment differentials simply reflect the composition of the labour force in terms of cognitive skills. Skill-related employment opportunities and the returns to skills are essentially identical across countries; differences in employment and wage inequality between countries are thus driven by the country-specific distribution of skills. We will refer to this hypothesis as the *skill-distribution-hypothesis*. Studies using the few national samples of the International Adult Literacy Survey (IALS) that include detailed earnings data, however, cast some doubts on whether the hypothesis that country-differences in the dispersion of earnings can be fully explained by the distribution of skills. These studies show that the high wage inequality that characterizes the American workforce can only partially be explained by the high dispersion of literacy among American workers (Devroye and Freeman 2000, Blau and Katz 2000). Besides a higher residual variance, a much larger effect of literacy on earnings is estimated for the US than for the other countries. These higher 'returns' to cognitive skills may reflect the fact that, relative to workers with better skills, the American economy exhibits a supply of workers with poor skills which is far in excess of the demand for them. In accordance with this view, Leuven et al. (2000) found that the large wage differential between low and medium skilled workers in the US is complemented by a higher relative net-supply of low-skilled workers in the U.S. compared with the net-supply in other countries. The expectation that differences in the relative wages and employment chances of low skilled workers can be explained by their supply and the demand will be referred to as the *supply-and-demand hypothesis*

Attempts to compare the situation of the low skilled across countries are severely hindered by measurement problems. In spite of efforts to develop internationally standardised classifications of educational credentials (ISCED), there appear to be major differences regarding the 'quality' of educational credentials between countries (see below). The same holds for years of schooling. As studies on the IALS show, very different levels of literacy are reached with the same years of schooling in

different countries. In this paper, we will use standardised tests of literacy and numeracy in order to compare the economic situation of people with poor cognitive skills across countries. We aim to compare the labour market situation of the low skilled in ten countries that have been covered by the International Adult Literacy Survey, taking into account both the relative employment level and the relative wages of these groups. The first questions to be addressed in this paper are:

- Does the importance of cognitive skills for employment and wages differ across countries?

- Does the situation of people with poor cognitive skills differ between countries?

The second cluster of questions relates these differences to the flexibility of the labour markets in the countries. More flexible labour markets are assumed to exhibit more skill-related wage inequality. Consequently, we ask:

- Is the wage position of the low-skilled worse in those countries with 'flexible' labour markets when compared to countries with more 'rigid' labour markets?

The 'flip-side' of more compressed wage structures being associated with more 'rigid' countries is said to be that workers with poor skills have difficulties finding employment at all given that the 'rigid' wage for their lower skills exceeds their productivity. Thus we ask:

- Is the employment situation of the low-skilled worse in countries with 'rigid' labour markets when compared to countries with more 'flexible' labour markets?

In particular, we are interested in whether there is a shortage of jobs for low-skilled workers in countries with more rigid labour markets. Consequently, we examine whether

- there is a shortage of jobs for low-skilled workers in countries with more 'rigid' labour markets?

Finally, we examine whether there is a negative relationship between the relative wages of workers with poor cognitive skills and their probability of being employed:

- Is there a trade-off between the wage position and employment chances of the low-skilled?

In this paper, we also explore the alternative explanation of the differences regarding the economic situation of the poorly skilled, the supply-and-demand hypothesis. According to this view, the role of labour market institutions is limited and 'market forces' account for the differences between countries. The relative prices for particular skills and the opportunities of finding employment are expected to be mainly determined by the supply of the skills and the demand for them. In order to assess whether a supply/demand framework helps to explain the country differences we first examine the distribution of cognitive skills and how they differ between countries. Thus we consider:

- How does the supply of low-skilled workers compare across countries? What factors account for the relative supply of workers with poor cognitive skills?

In a second step, we describe the job structure of the different countries and estimate on this basis the relative demand for different skill groups in order to answer the question:

- How does the demand for low-skilled workers compare across countries?

Finally, we put both supply and demand together aiming to estimate the relative impact of the net supply for skill groups on the labour market situation of the less skilled:

- Can the differences of the labour market situation of workers with poor cognitive skills between countries be explained by the relative supply of and demand for low skilled workers?

'Rigid' and 'flexible' labour markets

In this study, we will use micro-data for 10 countries which have participated in the International Adult Literacy Survey. Six of these countries, Belgium, Germany, Ireland, the Netherlands, Sweden and the United Kingdom, belong to the European Union. A seventh, Switzerland, is geographically and culturally, embedded in the Union. The remaining countries are the North-American states Canada and the United States and New Zealand. This set of 10 countries can be divided into a subset of 'Anglo-Saxon' countries with more 'flexible' labour markets and a subset of 'Continental European' countries which exhibit more regulated, i.e. 'rigid' labour markets. Table 1 reports selected labour market policies, characteristics of collective bargaining and wage dispersion for these countries, which support the suggested

grouping of countries. The replacement rates of Continental countries are generally higher than in the Anglo-Saxon countries. The Continental European countries have on average more elaborate rules governing the hiring and firing of employees ('employment protection') although Ireland and Switzerland do not fully fit this pattern. The same holds for labour standards, a composite measure of the strictness of legislation covering various aspects from working time to employee representation. Further, collective bargaining is more centralised in the Continental countries and collective agreements tend to cover a higher percentage of the workforce (although Ireland and New Zealand exhibit coverage rates that are more in line with Continental figures). A cluster analysis of these variables corroborates the view that the countries form two distinctive groups, the Anglo-Saxon countries (which score on average low on the indicators of labour market rigidity) and Continental-European countries (which score on average high on these variables).

The picture is complemented by the fact that earnings inequality is higher in each of the 'Anglo-Saxon' countries than in any of the Continental countries. This appears to be consistent with the hypothesis that strong unions and protective labour market policies compress the wage distribution. Moreover, the differences between the Anglo-Saxon and the Continental-European countries are more pronounced for the D5/D1 ratios (.47) than for the D9/D5 ratios (.27) which fits with the idea that wage compression should occur primarily at the left tail of the wage distribution (cp. Blau and Katz 1996). It is also the case that the inequality at the lower end of the wage distribution is more closely asscociated with the different measures of labour market rigidity than inequality at the right tail. On average, non-parametric and parametric correlations between these measures and the D5/D1 ratios are rather than non-parametric correlations between these measures and the D9/D5 ratios (see Table A1 Appendix, A2 Appendix).

The fact that the countries with 'rigid' labour markets are not only more compressed at the bottom of the wage distribution but also at least as compressed at the top may indicate that differences between the countries are not fully captured by their labour market institutions (which should primarily affect the left tail of the wage distribution). The obvious differences regarding labour market policies may be part of a more encompassing institutional, social structural and socio-cultural complex that

10

distinguishes between more 'collectivist-egalitarian' and 'individualistic-unequal' societies. The Continental-European countries may differ from the Anglo-Saxon ones by exhibiting more equal initial distribution of resources including human capital and access to quality schooling. This is reinforced by stronger government and by complementary ideologies and both together result in more pronounced compensatory welfare measures. As a consequence, the Continental-European countries may exhibit a more compressed skill structure which fits with the skill-distribution hypothesis and the supply-and-demand hypothesis. In the next section, having introduced the measure of cognitive skills used in this paper, we examine whether the skill distribution discriminates between these country groups.

Table 1: Labour Market Policies, Collective Bargaining, and Earnings Dispersion

	Labour Market Policies			Collective Bargaining			Earnings Dispersion		
	Employment Protection[1] (Ranking)	Labour Standards[2] [Rank]	Replacement Rate (%)[3] [Rank]	Union Density (%)[4] [Rank]	Union Coverage (%) [Rank][5]	Coordination (Union/Employer) [Rank][6]	D9/D1[7] [Rank]	D9/D5[7] [Rank]	D5/D1[7] [Rank]
Ango-Saxon Countries									
Canada	3	2 [3]	59 [5]	35.8 [5]	38.0 [2]	2 (1 / 1) [1]	4.20 [3]	1.84 [4]	2.28 [2]
Ireland	7	4 [6]	37 [2]	49.7 [9]	85.0 [7]	2 (1 / 1) [1]	4.54 [1]	1.96 [2]	2.32 [1]
New Zealand	2	3 [4]	30 [1]	44.8 [8]	67.0 [5]	2 (1 / 1) [1]	3.05 [5]	1.76 [5]	1.73 [5]
UK	5	0 [1]	38 [3]	39.1 [6]	47.0 [3]	2 (1 / 1) [1]	3.31 [4]	1.86 [3]	1.78 [4]
USA	1	0 [1]	50 [4]	15.6 [1]	18.0 [1]	2 (1 / 1) [1]	4.35 [2]	2.07 [1]	2.10 [3]
Continental Europe									
Belgium	10	4 [6]	60 [6]	41.2 [7]	90.0 [9]	4 (2 / 2) [6]	2.24 [9]	1.57 [10]	1.43 [9]
Germany	9	6 [9]	63 [7]	32.9 [4]	90.0 [9]	5 (2 / 3) [9]	2.32 [8]	1.61 [8]	1.44 [8]
Netherlands	6	5 [8]	70 [8]	25.5 [2]	71.0 [6]	4 (2 / 2) [6]	2.59 [7]	1.66 [7]	1.56 [7]
Sweden	8	7 [10]	80 [10]	82.5 [10]	86.0 [8]	6 (3 / 3) [10]	2.13 [10]	1.59 [9]	1.34 [10]
Switzerland	4	3 [4]	70 [8]	26.6 [3]	53.0 [4]	4 (1 / 3) [6]	2.65 [6]	1.68 [6]	1.58 [6]

1 OECD Jobs Study (!994), Part II, Table 6.7, Column 5. Country ranking increaing with strictness. Ranking adapted to the sample. (1990)
2 OECD Employment Outlook (1994), Table 4.8, Column 6; Nickell and Nunziata (1999). This is an index (maximum value 10) which refers to labour market standards enforced by legislation on working time, fixed term contracts, employment protection, minimum wages and employee representation rights. (0=no legislation, 2=strict legislation).
3 OECD Job Study (1994)
4 OECD Employment Outlook (1994), Chapter 5, Table 5.7. Trade union members as percentage of all wage/salary earners (1990).
5 OECD Employment Outlook (1994), Chapter 5, Chart 5.1. Number of workers covered by collective agreements as a percentage of wage/salary earners (1990)
6 Layard et al. (1991), Annex 1.4. Union and employer coordination in wage bargaining (3=high, 2=middle, 1=low).
7 OECD Earnings Database; Barrett, A., Callan, T., Nolan, B. (1999); [1993]

Measurement of Cognitive Skills: Literacy

While much of the theoretical literature analysing the impact of technical change on the relative productivity of and demand for different workers focuses implicitly on cognitive skills, most of the evidence pertains to the demand for and remuneration of workers with different educational credentials. In comparative studies it appears to be problematic whether levels of educational attainment (as proxies for skills) are taken as equivalents. International comparable tests show that the knowledge and skills of pupils of the same grade differ widely between countries. In particular at the lower end of the educational hierarchy, the quality of educational credentials appears to vary substantially between countries (OECD and Statistics Canada 2000; see also below).

The IALS permits a much closer examination of the quality of cognitive skills and their distribution across countries. In this paper, we use 'literacy' as a measure of cognitive skills. Based on intensive paper-and-pencil tests, 'literacy' is a composite measure of three aspects of literacy: the comprehension of information derived from prosaic text; documents; and quantitative representations (see OECD and Statistics Canada 1995; 1997; 2000; Statistics Canada and OECD 1998a). Unlike the publication of OECD/Statistics Canada, we do not distinguish between different aspects of literacy (prose literacy proficiency, document literacy proficiency, quantitative literacy proficiency). The reason is that all three components are highly correlated and tend to show the same relationship with outcome variables. We interpret this as an indicator that all three aspects of literacy measure an underlying dimension, i.e. cognitive skills. The measure of literacy proficiency used in this paper is simply the average score on the three components of literacy.

In order to develop a measure of *low cognitive skills,* we assign each person to a literacy decile (quintile). The decile membership has been determined on the basis of the pooled data of the 10 countries. For this procedure, the sum of weights per country has been standardised to the ratio of the total population to the number of countries so that each country contributes equally to this ranking. The literacy scores that represent the cut-off points of the deciles are reported in Table A3 (Appendix). In this study, we identify *low cognitive skills* with belonging to the first literacy quintile. This group is large enough to yield meaningful estimates even in countries with a small share of people with low literacy. It contains people that have been characterised as 'low

literates' (which indicates serious deficits in literacy skills) and the lower stratum of moderate literates (which still experience strong cognitive limitations).

Immigrants pose a particular problem for using literacy as a proxy for cognitive skills. Literacy tests in a foreign language that is imperfectly mastered definitely underestimate cognitive skills as language problems may prevent immigrants from conveying the full extent of their cognitive endowment. However, a substantial share of immigrants– due to their poorer education – are indeed more likely to belong to the lower strata of the hierarchy of cognitive skills, more likely occupy low-wage jobs and to have more problems in finding employment. Given that the inclusion of immigrants may bias the results by confounding cognitive skills with language capability, while the exclusion of immigrants may give an inaccurate impression of the share of low skilled and their labour market position, we present results for both, i.e. the samples including immigrants and the samples excluding immigrants.

Distribution of Literacy

Table 2 describes characteristics of the distribution of literacy among the inhabitants aged between 16-65 yrs in the different countries. Columns 2 and 3 report the means and the standard deviation of the literacy scores. Column 4 reports the share of people who belong to the first quintile of literacy in the pooled sample (*low skilled*). Column 5 reports the share of people for whom the language of the literacy tests was not their first language (*immigrants*). Columns 6 (means) and 7 (standard deviation) describe the distribution of literacy for people for whom the language of the literacy tests was their mother tongue. Column 8, finally, reports the share of low skilled (first literacy quintile) among the native speakers. Figure 1 gives a more detailed view of the distribution of literacy within the 10 countries. The stacked bars in this figure indicate how many percent of the population (16-65 years) in the countries belong to the literacy deciles of the pooled sample. Dark bars refer to the native population, light bars to immigrants (compare Tables A4-A6 Appendix).

If we first consider the whole populations, the average mean literacy of the Anglo-Saxon countries is substantially lower than the mean literacy of the Continental-European countries (t=2.62; d.f.=8; p=.030). The differences between countries are even larger as far as the standard deviation of literacy is concerned (t=4.48; d.f. 8,

p.=.002). Moreover the share of people with poor literacy tends to be higher in the Anglo-Saxon countries (t=3.71; d.f. 8; p.=.006). All Continental European countries have a smaller dispersion of literacy than the Anglo-Saxon ones, and with the exception of Belgium (which has a slightly higher share of people with poor literacy than Canada). Continental-European countries also have a smaller share of persons with poor cognitive skills. Although Anglo-Saxon countries have on average only slightly more immigrants than Continental-European countries, the 'quality' of these immigrants is on average poorer than the 'quality' of the immigrants of Continental-European countries (see Figure 1; Table A6 Appendix). Consequently, the exclusion of immigrants raises mean literacy and reduces both the dispersion of literacy and the share of people with poor literacy more strongly for the Anglo-Saxon than for the Continental-European countries. Nevertheless, although the pattern is weakened by excluding immigrants it remains the case that average literacy is higher in Continental-European countries (t=1.87; d.f. 8, p=.099) and that both the dispersion of literacy (t=4.03; d.f. 8; p=.004) as well as the share of people with poor literacy (t=2.64; d.f. 8, p=.030) are lower in these countries. The 'odd' country is Belgium (Flanders) which has by far the lowest average literacy, the widest dispersion of literacy and the highest share of poorly skilled people among the Continental-European countries and is in this aspect closer to the average Anglo-Saxon country.

A closer look at the differences between the two country groups reveals that there are two main reasons that account for the more compressed skill structure and the relative lack of people with poor cognitive skills in the Continental-European countries. First, as a decomposition of the literacy differences between the countries shows (see Appendix B) it is mainly the quality of educational credentials and not the level of educational credentials that distinguishes the two groups of countries. While there are no differences regarding the effect of educational composition between the two country groups, all Continental European countries exhibit a larger effect of educational quality (measured across four education groups) than the Anglo-Saxon countries. As Table B1 shows, these differences in educational quality pertain to a higher quality of lower educational credentials in Continental-European countries while there are no systematic differences in the quality of upper secondary and tertiary education between the country groups. People with less than secondary education (ISCED 0-1) have higher average literacy scores in each of the Continental-European

countries. The average literacy score across the Anglo-Saxon countries is 208 which compares to 248, the average literacy scores for the Continental-European countries. Similarly, the literacy of people with lower secondary education (ISCED 2) is much better in Continental-European countries. The average literacy score across the five Anglo-Saxon countries is 255 while the average literacy score of the Continental-European countries amounts to 278. With the exception of Switzerland, where the literacy of ISCED 2 people is poorer than in Canada, all Continental-European countries have higher average literacy scores for people with lower secondary education than Anglo-Saxon countries.

The second reason pertains to the literacy of immigrants. Again, 'quality' differences between the immigrants differentiates more strongly between the country groups than their sheer number. If we ignore Ireland (which does not have a substantial number of immigrants and where most of the non-native speakers are people from the Irish-speaking pockets), between 33 percent (Canada) and 49 percent (USA) of the immigrants of Anglo-Saxon countries belong to the lowest literacy decile (pooled sample; see Table A6, Appendix). In Continental Europe, the share of immigrants belonging to the lowest decile varies from 16 percent (Sweden) to 32 percent (Switzerland). Although these differences may in part reflect the origin of the immigrants, it is likely that integrative measures and compensatory policies account for them as well.

We may conclude that the two country groups differ not only with respect to their labour market institutions but also with respect to the distribution of literacy. The inhabitants of Continental-European countries are on average more literate than the inhabitants of Anglo-Saxon countries. Even stronger differences pertain to the dispersion of literacy and to the share of people with poor literacy. Both, the quality of people with low educational credentials and the literacy deficit of immigrants contribute to this pattern.

16

Table 2: Literacy: Distributional Characteristics

Country	Population, 16-65				Native Speakers		
	Mean	Std dev	Share Low-Skilled	Non-native Speakers (%)	Mean	Std dev	Share Low-Skilled
Canada	**278.9**	**63.7 (2)**	**20.2 (6)**	**17.2**	**288.7**	**54.3 (3)**	**15.4 (6)**
Ireland	**262.3**	**57.0 (4)**	**28.8 (2)**	**1.7***	**262.2**	**57.0 (2)**	**29.6 (1)**
New Zealand	**272.2**	**56.4 (5)**	**23.8 (3)**	**10.5**	**277.5**	**52.4 (6)**	**20.4 (3)**
UK	**265.0**	**61.9 (3)**	**29.0 (1)**	**6.2**	**267.5**	**59.5 (1)**	**27.0 (2)**
USA	**275.0**	**64.2 (1)**	**23.0 (4)**	**14.0**	**286.0**	**53.6 (4)**	**17.4 (5)**
Anglo-Saxon	270.7	60.7	25.0	9.9	276.4	55.4	22.0
Belgium (Fl.)	**277.1**	**55.0 (6)**	**21.0 (5)**	**6.3**	**278.7**	**53.4 (5)**	**20.4 (3)**
Germany	**286.0**	**42.2 (10)**	**14.7 (8)**	**6.1**	**287.6**	**41.0 (9)**	**12.7 (7)**
Netherlands	**286.0**	**43.9 (9)**	**13.0 (9)**	**7.5**	**288.3**	**41.8 (8)**	**12.4 (8)**
Sweden	**304.5**	**48.5 (8)**	**8.0 (10)**	**10.1**	**308.4**	**44.6 (7)**	**6.5 (10)**
Switzerland	**277.1**	**50.3 (7)**	**17.0 (7)**	**17.8**	**285.6**	**39.0 (10)**	**11.1 (9)**
Continental Europe	286.1	48.0	14.7	9.6	289.7	44.0	12.6

* including people with Irish as first language

Figure 1 Distribution of literacy, native and non-native speakers of the literacy test

Canada

Ireland

New Zealand

United Kingdom

United States

Immigrant
Native
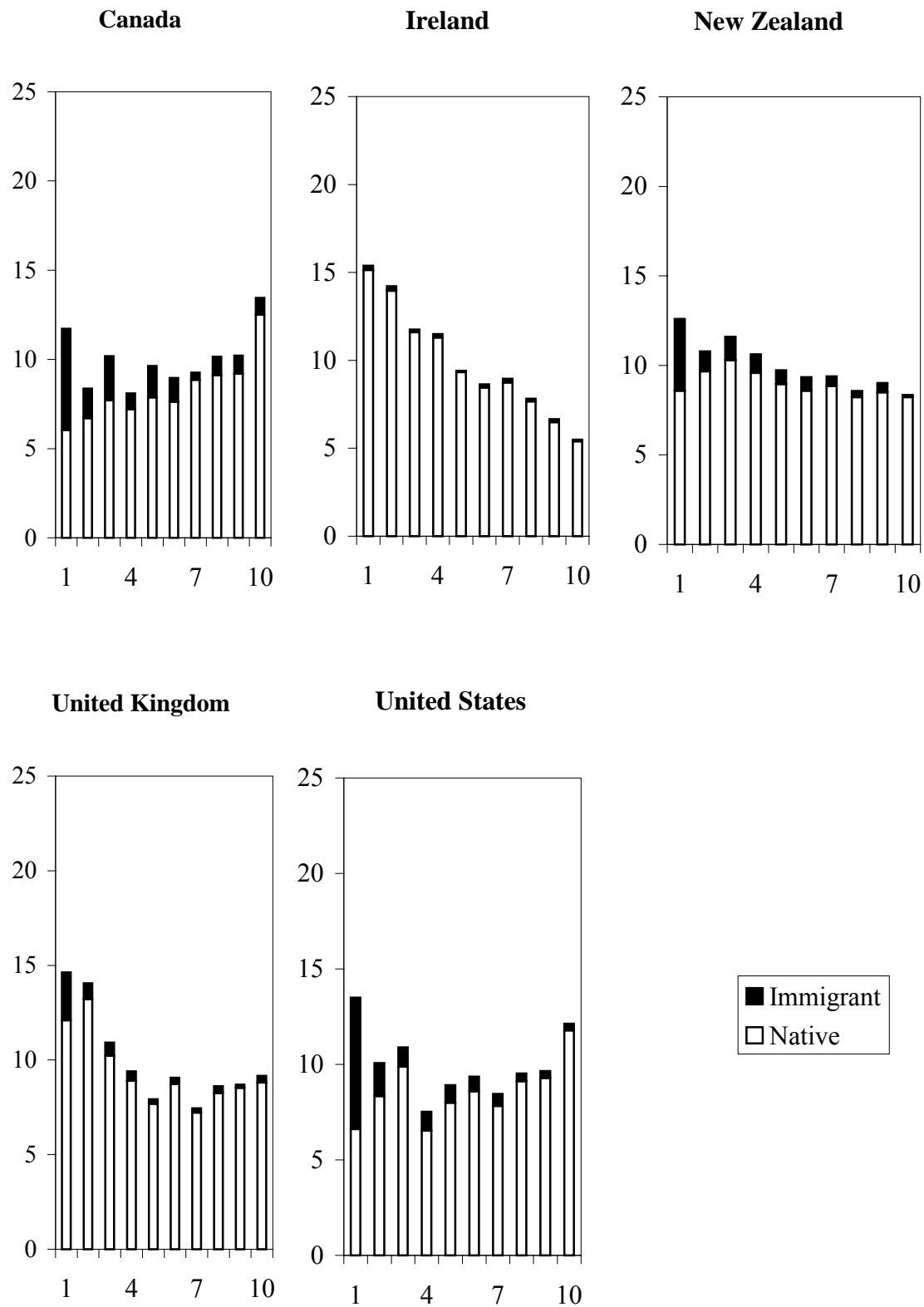
Belgium (Fla.)

Germany

Netherlands

Sweden

Switzerland

■ Immigrant
□ Native
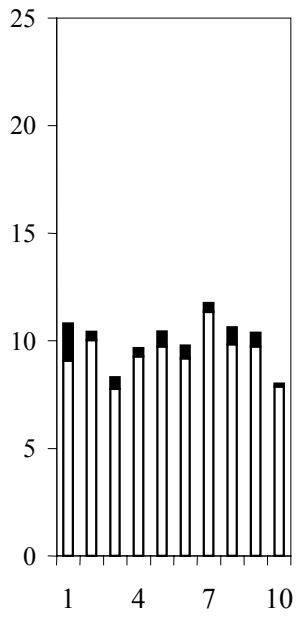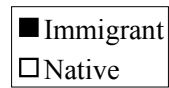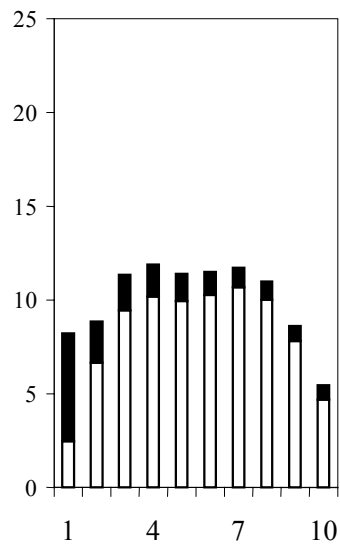
Cognitive Skills and Wages

In order to compare the effect of cognitive skills and the relative wage position of workers with poor skills, we estimated the following wage regressions separately for the ten countries:

(1) $\ln Earnings_{ij} = b_1 LitScore_{ij} + BX_{ij} + u_{ij}$

where ln Earnings is the logged dispersion-weighted annual earning quintile of worker i in country j, and LitScore is his or her score value on the literacy test. X refers to a vectors of control variables which include the gender of the respondent, his or her age (and its square), whether the first language of the respondent was the language of the literacy test and the annual hours worked (weeks worked last 12 month X hours usually worked per week). Further, the age variables as well as the annual hours are interacted with the gender dummy.
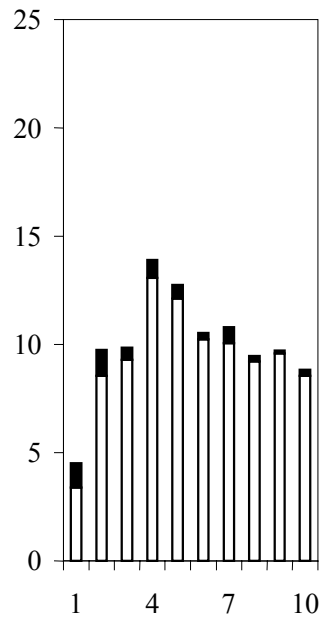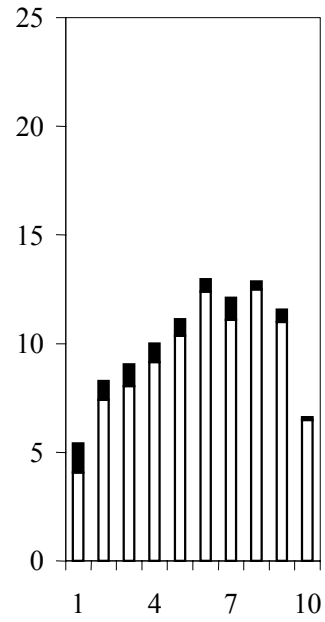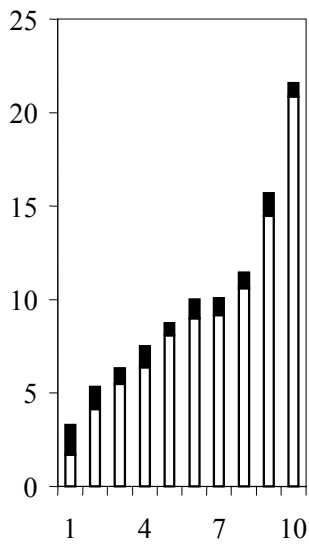
(2) $\ln Earnings_{ij} = b_1 LitQuin1_{ij} + b_2 LitQuin2_{ij} + b_3 LitQuin4,5_{ij} + BX_{ij} + u_{ij}$

where LitScore of (1) has been substituted by dummies indicating whether the respondent belongs to the first literacy quintile (LitQuin1), the second literacy quintile (LitQuin2) or the fourth and fifth literacy quintile (LitQuin4,5) of the population so that the regression coefficients estimate the earning differences between workers relative to workers belonging to the third literacy quintile of the population. These regressions have been estimated both for the samples including immigrants and the samples excluding immigrants.

A disadvantage of the IALS dataset is the quality of the earnings data. The IALS data indicate only the quintile of the distribution of annual incomes from work. We transformed the earnings data into log earnings in order to take the country-specific spread of earnings into account. We transformed the D9/D5 and D5/D1 ratio (see Table 1) into log ratios, projected these differences on a normal distribution (separately for the left and the right tail), took the densities at the quintile centers (i.e., the 10th, 30th, 50th, 70th and 90th percentile) and substituted the earnings quintiles by these approximations. Comparison of the regression results with the results of analyses which used more detailed earnings data (which are available for a few of the national data sets; Devroye and Freeman 2000, Blau and Katz 2000) shows that the use of weighted quintiles instead of more finely graded earning bands does not result

in a loss of information and does not affect the ranking of the estimates across countries, or their relative size.

The estimates for the literacy scores show that the 'relative price' of cognitive skills varies considerably between the countries (Table 2, Column 2). The highest coefficient for the literacy score is estimated for Ireland, followed by the US and Canada. The smallest effect of Literacy is estimated for Sweden, followed by Germany and Belgium (Flanders). It is striking that for the Continental countries an effect of literacy has not been estimated that exceeds the smallest effect among the Anglo-Saxon countries. This pattern is robust when the effect of literacy scores is estimated on the samples of native speakers (Column 5). The difference between the two groups of countries are so strong that they are significant (t-value: 3.58; d.f. 5.8; unequal variance assumed).

If the effect of literacy is not strictly linear, a strong effect of literacy does not necessarily imply that the relative wages of workers with poor literacy are particularly low. The second specification (Eq. 2) estimates the earnings differences between workers with poor literacy skills (Literacy Quintile 1) and average workers (Literacy Quintile 3). These estimates are reported in Columns 3 and 6. Three groups of countries can be distinguished: (1) Ireland (all workers: -.313; native speakers: -.306) and the USA (-.291; -.282) exhibit earnings differences between the first and third literacy quintile that are clearly above the average. (2) Belgium (-.076; -.053), Germany (-.079; -.082) and Sweden (-.092; -.089) exhibit earnings differences between poor and average literacy workers that are below the average. (3) Canada (-.181; -.125), New Zealand (-.131; -.133), United Kingdom (-.141; -.141), the Netherlands (-.139; -.155) and Switzerland (-.144; -.166) exhibit earnings differences that are around the country average. Given that the two countries with large earnings differences belong to the group of countries with 'flexible' labour markets, that the three countries with small earnings differences belong to the group of countries with 'rigid' labour markets and that the average difference is clearly larger for the 'Anglo-Saxon' (-.211; -.197) than for the Continental countries (-.106; -.109;[t-value all workers: 2.58; d.f. 5.2; p=.048; native speakers: 1.95; d.f. 6.2; p=.097) it may be concluded that the relative wages of poorly skilled employees are indeed lower in Continental European countries than Anglo-Saxon countries. This finding is

consistent with both the hypothesis that the relative wages are lower for low-skill workers in countries with 'flexible' than in countries with 'rigid' labour markets and the hypothesis that wages of low skilled workers are relatively higher in countries where the educational policy and flanking measures restricts the number of low skilled workers who face less competition for a scarce number of jobs.

Table 2: Cognitive Skills and Wages

	All Workers			Native Speakers		
	Literacy Scores	Q1-Q3	Q2-Q3	Literacy Scores	Q1-Q3	Q2-Q3
Canada	**.230 [3]**	**-.181 [3]**	**+.021[10]**	**.260 [3]**	**-.125 [7]**	**+.044[10]**
Ireland	**.352 [1]**	**-.313 [1]**	**-.153 [1]**	**.343 [1]**	**-.306 [1]**	**-.153 [1]**
New Zealand	**.166 [5]**	**-.131 [7]**	**-.022 [9]**	**.171 [5]**	**-.133 [6]**	**-.030 [7]**
United Kingdom	**.195 [4]**	**-.141 [5]**	**-.056 [5]**	**.192 [4]**	**-.141 [5]**	**-.055 [4]**
USA	**.313 [2]**	**-.291 [2]**	**-.087 [3]**	**.312 [2]**	**-.282 [2]**	**-.024 [8]**
Anglo-Saxon	.251	-.211	-.059	.256	-.197	-.037
Belgium (Fl.)	**.110 [8]**	**-.076 [10]**	**-.073 [4]**	**.092 [9]**	**-.053 [10]**	**-.070 [3]**
Germany	**.105 [9]**	**-.079 [9]**	**-.023 [8]**	**.108 [8]**	**-.082 [9]**	**-.018 [9]**
Netherlands	**.154 [6]**	**-.139 [6]**	**-.049 [6]**	**.153 [7]**	**-.155 [4]**	**-.049 [5]**
Sweden	**.053 [10]**	**-.092 [8]**	**-.042 [7]**	**.051 [10]**	**-.089 [8]**	**-.044 [6]**
Switzerland	**.134 [7]**	**-.144 [4]**	**-.096 [2]**	**.169 [6]**	**-.166 [3]**	**-.100 [2]**
Continental	.111	-.106	-.057	.115	-.109	-.056
All countries	.181	-.158	-.058	.185	-.153	-.046

Cognitive Skills and Employment

Does the opposite apply to the employment chances of the low skilled as the trade-off hypothesis would lead us to expect, or is the pattern repeated for employment chances as the supply-demand-hypothesis suggests? In order to compare the effect of cognitive skills and the relative employment chances of workers with poor skills, we estimated the following logistic regressions on employment chances separately for the ten countries:

(3) $L_{ij} = b_1 LitScore_{ij} + BX_{ij} + u_{ij}$

(4) $L_{ij} = b_1 LitQuin1_{ij} + b_2 LitQuin2_{ij} + b_3 LitQuin4,5_{ij} + BX_{ij} + u_{ij}$

where L_{ij} are the logged odds of being employed. The control variables are the gender of the respondent, his mother tongue (same or different than language of literacy test), and four age dummies (16-25; 26-35; 46-55; 56-65) interacted with gender. People, who report their principal economic activity as being students have been excluded from the analysis.

The estimates for the literacy scores show that the effects of cognitive skills on the logits of being employed also vary considerably between countries (Table 3, Column 2). The highest coefficient is estimated for the Netherlands with New Zealand being a close second. The smallest effect of literacy is estimated for Switzerland, followed by Sweden and Germany. Contrary to the trade-off hypothesis, the estimates for the Continental-European countries appear not to be larger than the estimates for the Anglo-Saxon countries. The average effect is 1.167 for the Anglo-Saxon countries and .928 for the Continental-European countries (t=1.21, df=8, p=.26). The ranking of the country-specific effects and the between-country differences change only marginally when the immigrants are excluded (Column 5). If one takes into account that the highest three ranks (the lowest effects) are occupied by Continental-European countries and that Continental-European countries have on average a smaller estimate, one is inclined to expect that cognitive skills matter less rather than more in Continental-European countries in determining the chance of being employed (if there are at all any differences between these groups of countries).

This pattern is more pronounced if we focus on the situation of the low skilled as measured by the difference between people belonging to the first and the third literacy quintile (Columns 3 and 6). New Zealand (all: -1.279; natives: -1.171) and Canada (-1.123; -1.209) exhibit the strongest differences in the logged odds of being employed between first and third quintile workers, followed by the USA (-1.208;-1.123), the United Kingdom (-1.135; -1.146), and Ireland (-.980; -1.018). All Anglo-Saxon countries have higher estimates than Belgium (-.926; -.873) and Sweden (-.934; -.724), the Continental-European countries with the highest estimates. Germany (-.794; -.664), the Netherlands (-.711; -.632) and Switzerland (-.399; -.316) have the lowest estimates. The high estimates for the literacy scores achieved for the Netherlands and (to a lesser degree) for Belgium reflect mainly strong differences regarding employment between the median worker and workers with better cognitive skills. As

far as the differences between median workers (third quintile) and workers with poorer cognitive skills are concerned (first quintile), these countries appear to fit perfectly into the pattern of small estimates for Continental-European countries and large estimates for Anglo-Saxon countries. Unsurprisingly, the differences between the country-groups are statistically significant for both samples (all: t=-3.57; d.f.8, p=.007; natives: t=5.08; d.f. 8, p=.001).

Table3: Cognitive Skills and Employment

	Literacy Scores	Q1-Q3	Q2-Q3	Literacy Scores	Q1-Q3	Q2-Q3
Canada	**1.047 [7]**	**-1.123 [4]**	**-0.579 [2]**	**1.273 [3]**	**-1.209 [1]**	**-0.456 [5]**
Ireland	**1.128 [4]**	**-0.980 [5]**	**-0.539 [3]**	**1.128 [5]**	**-1.018 [5]**	**-0.586 [2]**
New Zealand	**1.431 [2]**	**-1.279 [1]**	**-0.437 [5]**	**1.433 [2]**	**-1.171 [2]**	**-0.351 [8]**
United Kingdom	**1.150 [3]**	**-1.135 [3]**	**-0.511 [4]**	**1.112 [7]**	**-1.146 [3]**	**-0.539 [3]**
USA	**1.078 [6]**	**-1.208 [2]**	**-0.379 [7]**	**1.050 [6]**	**-1.123 [4]**	**-0.464 [4]**
Anglo-Saxon	1.167	-1.145	-0.489	1.199	-1.113	-0.505
Belgium (Fl.)	**1.115 [5]**	**-0.926 [7]**	**-0.399 [6]**	**1.191 [4]**	**-0.873 [6]**	**-0.402 [6]**
Germany	**0.906 [8]**	**-0.794 [9]**	**-0.183 [9]**	**0.862 [8]**	**-0.664 [8]**	**-0.174 [9]**
Netherlands	**1.473 [1]**	**-0.711 [8]**	**-0.278 [8]**	**1.497 [1]**	**-0.632 [9]**	**-0.371 [7]**
Sweden	**0.793 [9]**	**-0.934 [6]**	**-0.732 [1]**	**0.812 [9]**	**-0.724 [7]**	**-0.608 [1]**
Switzerland	**0.353 [10]**	**-0.399 [10]**	**0.084 [10]**	**0.467 [10]**	**-0.316 [10]**	**0.035 [10]**
Continental	0.928	-0.753	-0.346	0.966	-0.642	-0.357
all countries	1.047	-0.949	-0.418	1.083	-0.888	-0.431

The (delogged) regression coefficients of the dummy variable 'LitQuin1' in a logistic regression on employment can be interpreted as the odds ratios between the groups. Employment odds ratios are not widely accepted measures of group differences regarding employment. Moreover, as Glyn and Salverda (2000) show in the example of employment rate differences and employment rate ratios, country rankings of group differences regarding employment are very sensitive to variations of the employment rates of the reference groups. The same holds for the odds ratios. Since Belgium, Germany and the Netherlands have particularly low overall employment rates, it appears useful to examine whether these findings are robust if other measures of employment differences between the groups are used.

Columns 2 and 5 of Table 4 report the estimated differences between the employment rates of Quintile 1 and Quintile 3 workers. These differences have been calculated as marginal effects using the employment rate of Quintile 3 workers as a reference:

$$me(q1)_j = b_j^{empl} p(q3)_j (1 - p(q3)_j)$$

where $me(q1)_j$ is the marginal effect of dummy variable LitQuin1 for country j, b^{Empl} is the regression estimate for this dummy variable of the logistic regression of employment chances and $p(q3)_j$ is the observed employment rate of Quintile 3 workers.

The estimated differences in percentage points between the employment rates range from 22 (Ireland, Canada) to 6 (Switzerland) for the sample including immigrants and from 24 (Canada) to 5 (Switzerland) for the sample excluding immigrants. For both samples, the percentage differences are higher for each of the Anglo-Saxon countries. The average of the Continental-European countries (15 percent [all]; 13 percent [natives]) is significantly lower (all: t=2.57, d.f. 8, p=.033; natives: t=3.37, d.f. 8, p=.010) than the average of the Anglo-Saxon countries (21 percent [all]; 21 percent [natives]).

Columns 3 and 6 report the ratio of the estimated employment rates [{p(q3)+me(q1)}/p(q3)] between the two groups. The estimated employment rate ratios range from 66 percent (all; natives 65 percent) [Ireland] to 92 and 94 percent respectively for Switzerland. This measure has major consequences for the ranking of the US which has the third (all) and fourth (natives) highest employment rate ratio between quintile 1 and quintile 3 workers. For the sample of all workers, Germany shifts to the second lowest rate ratio. Nevertheless, the average employment rate ratio of the Anglo-Saxon countries (72 percent for both samples) remains smaller than the employment rate ratio of Continental-European countries (all: 79 percent; natives: 82 percent). The difference between the country group is however only significant for the sample excluding the immigrants [t=2.25; d.f. 8; p=.047) while is below all conventional standards of significance 9t=1.62, d.f. 8; p=.143) in the case of the total samples.

Taken together, there is no evidence indicating that low-skilled workers in the countries with more rigid labour markets pay for their relatively better wages with reduced employment possibilities. The data are however supportive of the hypothesis that the employment chances of the low skilled are better in countries that pursue a policy of providing good basic education for all citizens and of integrating immigrants, thereby limiting the supply of workers with low skills.

Table 4: Employment/ Expected Wage: Q1/Q3

	all			native speakers		
	marginal effect	employ-ment rate ratios	ratio of expected wage	marginal effect	employ-ment rate ratios	ratio of expected wage
Canada	-.219 (2)	.701 (3)	.585 (3)	-.239 (1)	.671 (2)	.592 (3)
Ireland	-.223 (1)	.657 (1)	.480 (1)	-.229 (2)	.651 (1)	.479 (1)
New Zealand	-.214 (3)	.728 (4)	.638 (5)	-.200 (4)	.745 (4)	.652 (5)
United Kingdom	-.204 (4)	.733 (5)	.637 (4)	-.205 (3)	.732 (3)	.636 (4)
USA	-.190 (5)	.763 (8)	.571 (2)	-.179 (5)	.777 (7)	.586 (2)
Anglo-Saxon	-.210	.716	.582	-.210	.715	.589
Belgium (Fl.)	-.187 (6)	.741 (6)	.687 (8)	-.176 (6)	.756 (6)	.717 (8)
Germany	-.187 (6)	.699 (2)	.646 (6)	-.156 (7)	.747 (5)	.689 (7)
Netherlands	-.162 (8)	.749 (7)	.652 (7)	-.143 (8)	.782 (8)	.670 (6)
Sweden	-.144 (9)	.821 (9)	.729 (9)	-.119 (9)	.862 (9)	.788 (9)
Switzerland	-.061 (10)	.924 (10)	.800 (10)	-.050 (10)	.938 (10)	.792 (10)
Continental	-.148	.787	.703	-.129	.817	.731
all countries	-.179	.752	.643	-.170	.766	.660

In Figure 2, we plott the delogged regression coefficients of the wage regression against the employment rate ratios for the samples excluding immigrants. It is obvious that the relationship between the relative wages and the relative employment chances of low skilled workers is not negative (as expected by the trade-off hypothesis). Across all countries, the relationship is slightly positive (which is consistent with the supply-and-demand hypothesis). Within the country groups, the relationship is however slightly negative. This may indicate that there is a trade-off between wage position and employment chances but that this trade-off is dominated by other factors that underlie the differences between the country groups; the supply of low skilled workers would be the first of these to come to mind.

Figure 2 Relative wages and Employment Rates Literacy Quintile 1
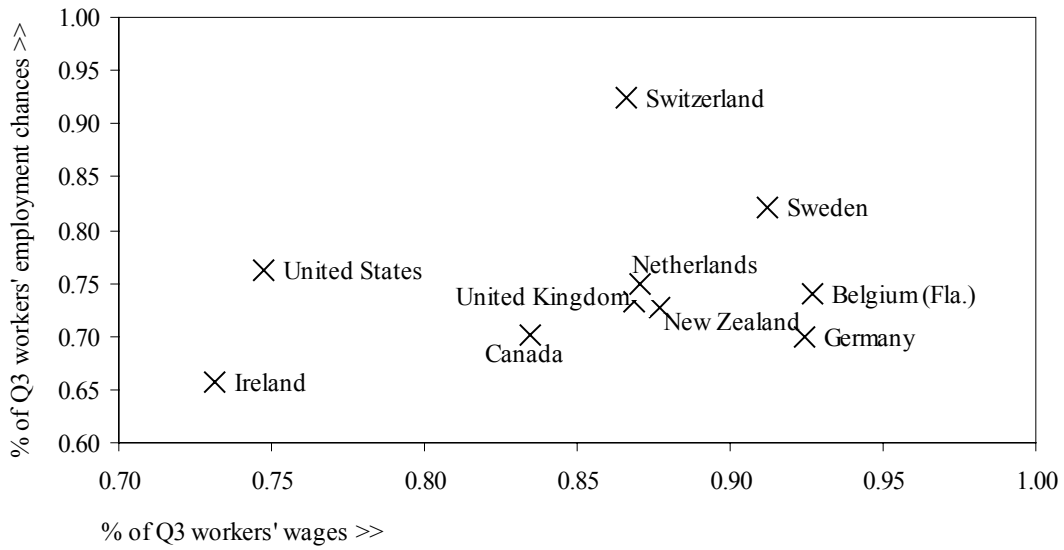
Finally, we computed an overall index of the relative disadvantage of low skilled workers, the ratio of the 'expected wage' of quintile 1 workers and quintile 3 workers:

$$EW(q1)_j / EW(q3)_j = e^{b_j^{Wage}} * p(q1)_j / p(q3)_j$$

where the b^{Wage} is the regression coefficient for the quintile 1 dummy of the wage equation (2) and p(q1)/p(q3) is the employment rate ratio. The expected wage is not the wage a workers expects to receive once he or she is employed but the average wage weighted by the chance of finding employment. Columns 4 and 7 of Table 4 report the expected wage ratios for the 10 countries. Figure 3 presents them graphically where dark bars refer to the samples including immigrants and light bars to the samples excluding immigrants.

Low skilled people fare best in Switzerland where quintile 1 workers expect 80 (all) and 79 (natives) percent of the expected wages of quintile 3 workers. Sweden follows with 73 and 79 percent. Belgium ranks third with 69 and 72 percent followed by Germany [65 and 69] and the Netherlands [65 and 67]. New Zealand [64 and 65] and United Kingdom [64 and 64] are the Anglo-Saxon countries where low skilled workers did relatively well. In Canada [59 and 59], the USA [57 and 59] and Ireland [48 and 48] the situation of the low skilled is poorest.

In general, the overall pattern is that in the five Continental-European countries people with poor cognitive skills do relatively well while they do relatively poor in Anglo-Saxon countries. The average of the expected wage ratios is significantly higher for both samples (all: t=2.97, df8, p=.018; natives=3.62, df8, p=.007). We may hence conclude that the overall relative position of workers with low skills is better in Continental European countries than in the Anglo-Saxon countries, a finding that supports the supply-and-demand hypothesis.

Figure 3   Expected wage LitQuintile1 as percentage of LitQuintile3, total population and native speakers only
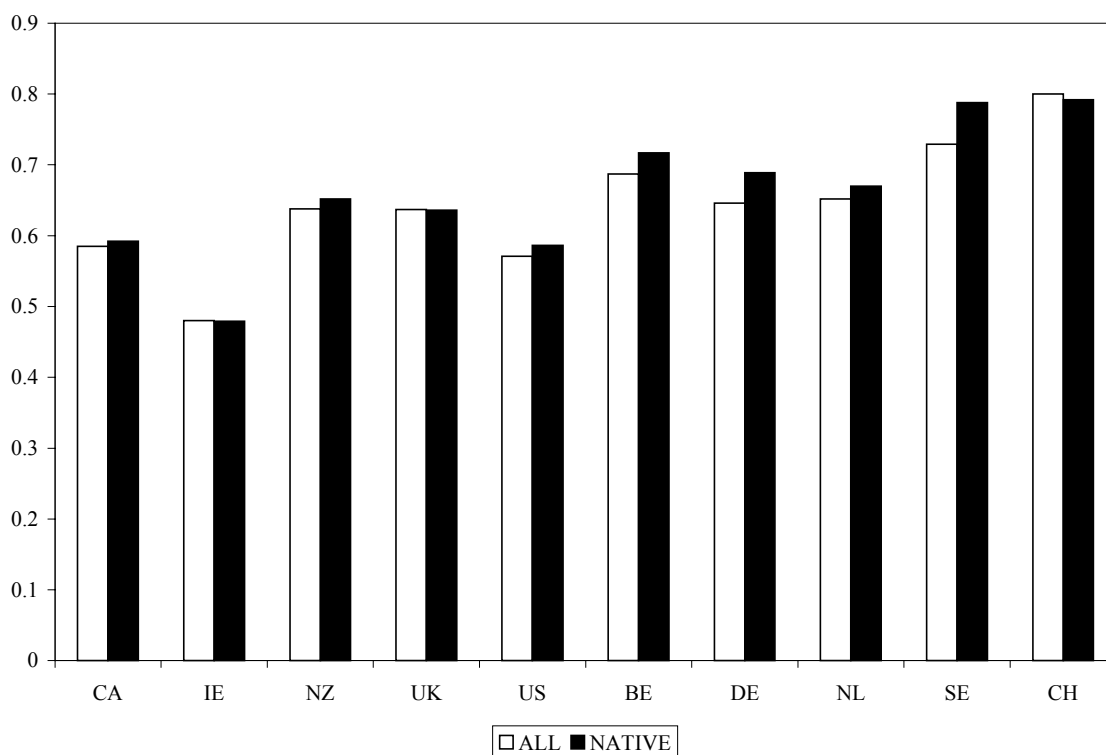
How is the position of workers with poor cognitive skills related to the more direct measures of labour market rigidity and supply of workers with poor skills? All measures of labour market rigidity are positively related (rank-order correlations) to the regression coefficients of the wage regression, to the coefficients of the logistic regression on employment chances and to the ratio of expected wages (see Table A7, Appendix). 'Union density' is the exception, which shows a small positive correlation with the wage coefficient and a small negative correlation with the employment coefficient. This variable is unrelated with the expected wage ratio. These bivariate

correlations confirm the finding that the country-differences regarding the relative position of low skilled workers are difficult to reconcile with the trade-off hypothesis.

The average literacy level, the standard deviation of literacy within a country and the share of people with low literacy in a country can all be seen as proxies for the supply of low skilled workers (the latter two being inverse), of which the share of people with low literacy appears to be the most direct. In terms of the supply-and-demand hypothesis, all of these variables exhibit the expected relationship with the regression coefficients of the wage regression and of the logistic regression on employment chances and with the ratio of expected wages (see Table A8, Appendix, for the samples of all workers and Table A9, Appendix, for the sample where the immigrants are excluded). It is however the standard deviation of literacy and not the share of low skilled workers which is most closely related to these variables. Moreover, none of the measures of 'supply' is closer related to these variables than the country-grouping variable.

A reason for this finding that the measures of supply are not more closely related to proxies for the labour market and wage position of the low skilled may that countries differ strongly with regard to the demand for low skilled workers. In the following sections, we examine whether this situation can be improved if we consider also the demand for low skilled workers and relate this demand to the supply of this type of workers. For this purpose, we examine first the job structure of the countries.

Distribution of Job Requirements

If employers choose technologies, organisational forms and a division of labour with a keen eye on the quality of labour that is actually available to them, then the pattern of a more compressed distribution of cognitive skills and the relatively low share of workers with poor literacy which are characteristic of Continental-European countries such as Germany, the Netherlands, Switzerland and Sweden should be reflected in there being quite a different structure and design of jobs in these latter countries when compared to the jobs of Anglo-Saxon countries such as the USA, Ireland or the United Kingdom. Faced with an abundance of well-trained manual workers, employers in the former countries are more likely to integrate problem-solving and routine tasks in lower-level jobs, arrange information technologies on a horizontal

rather than hierarchical way (cp. Aoki 1988) and implement production and organisation technologies that require the 'intellectual skills' (Koike 1996) of operators to ensure their efficient use. Manufacturing organisations in Germany for example appear to be less taylorised and more dependant on the flexible use of skilled production work than are American or British organisations (e.g., Piore and Sabel 1984; Sorge and Streeck 1988). Such differences in the job structure may be important for the economic situation of the low skilled since the job structure (in conjunction with the relative prices) determines the demand for workers with different levels of cognitive skills.

In what follows we ask whether there are differences in the skill requirements of jobs between countries and derive an approximation of the demand for workers with different levels of cognitive skills.

On the basis of self-reported reading and writing requirements we constructed a scale General Reading and Writing Job Requirements (GRWJR, range: 0-24)) in order to assess the amount of reading and writing demanded by the jobs (see Appendix). On the basis of this scale, we defined four different job levels (1= no reading and writing requirements [GRWJR=0], 2= low reading and writing requirements [GRWJR = 1 – 4]; 3= medium reading and writing requirements [GRWJR = 5 –14]; 4= high reading and writing requirements [GRWJR = 15-24]). Columns 2 to 7 of Table 5 reports means and standard deviations of GRWJR as well as the share of jobs at each level for the different countries/regions based on a person-count. The description of job structure on the basis of the number of persons holding a particular job tends to give a biased picture because it ignores the possibility that workers may share jobs. This is particularly relevant for cross-country comparisons since countries differ in the amount of part-time work and the degree to which part-time workers are concentrated on low complexity job. Columns 8 to 15 of Table 5 report therefore figures based on time-equivalents (i.e. jobs weighted by hours per week). Across countries, the adjustment for working hours increases the average job requirement score from 12.1 to 12.6 and the share of jobs with little or no job requirement decreases from 20.8 percent to 18.6 percent at the expense of jobs with high requirements. The share of these jobs increases from 42.7 percent to 45.8 percent.

Table 5: Reading and Writing Job Requirements

Country/Region	Persons						Time-Equivalents					
	GWRJR		JL 1	JL 2	JL 3	JL 4	GWRJR		JL 1	JL 2	JL 3	JL 4
	m.	s.d.	%	%	%	%	m.	s.d.	%	%	%	%
Canada	11.9	7.48	9.1	13.2	38.2	39.4	12.4	7.59	8.7	12.3	36.7	42.3
Ireland	10.0	7.68	17.6	15.2	33.4	33.7	10.1	7.65	15.9	16.4	33.7	34.0
New Zealand	12.7	7.46	8.5	12.0	33.5	46.1	13.5	7.23	6.0	10.5	32.5	51.0
UK	11.6	7.19	8.6	13.1	38.2	40.1	12.6	6.89	6.1	10.9	38.4	44.6
USA	12.3	7.66	12.3	10.6	30.7	46.4	13.0	7.52	10.1	9.7	30.0	50.2
AS countries	11.7	7.49	11.2	12.8	34.8	41.1	12.3	7.38	9.4	12.0	34.3	44.4
Belgium (Flan)	10.5	7.26	14.5	12.1	40.4	33.1	10.9	7.35	13.9	11.7	39.4	35.0
Germany	13.6	6.46	5.2	7.0	36.3	51.5	13.9	6.36	4.5	6.6	34.9	54.0
Netherlands	11.6	7.19	9.3	12.5	39.3	38.9	12.5	7.04	6.2	11.3	38.4	44.0
Sweden	13.3	6.65	5.4	8.3	37.5	48.8	13.5	6.61	4.8	8.1	36.9	50.2
Switzerland	13.1	6.47	5.4	8.4	37.0	49.1	13.7	6.33	4.4	7.8	35.3	52.5
CE countries	12.4	6.81	8.0	9.7	38.1	44.3	12.9	6.74	6.8	9.1	35.3	47.1
Across Countries	12,1	7,15	9,6	11,2	36,5	42,7	12,6	7,06	8,1	10,5	35,6	45,8

Although the Continental-European countries have on average slightly higher job requirements (persons: 12.4; time-equivalents: 12.9) than Anglo-Saxon countries (persons: 11.7; time-equivalents: 12.3), these differences are far from being significant. This arises because two of the Continental-European countries, Belgium and the Netherlands, have surprisingly low average job requirements. After Ireland, Belgium (Flanders) is the country with the lowest job requirements and the Netherlands do not have higher job requirements than the United Kingdom. The dispersion of job requirements as measured by their within-country standard deviation is however larger within the Anglo-Saxon countries (persons: 7.49, time equivalents: 7.38) than in the Continental-European countries (persons: 6.81, time equivalents: 6.74). For both, persons and time equivalents, the differences between the groups of countries are significant (persons: $t=3.51$, d.f. 5.9. $p=.013$; time-equivalents: $t=2.62$, d.f. 8, $p=.031$).

On the basis of the distribution of job requirements we can distinguish between the following groups of countries. This grouping differs however from the classification of the countries into Anglo-Saxon and Continental-European ones:

- A group of countries with high average job requirements, with a low dispersion of these job requirements and with a small share of jobs with low or no reading and writing requirements (Germany, Switzerland and Sweden) [Group A]. All of these countries belong to Continental-Europe.

- A group of countries that exhibit a polarised job structure with a large share of jobs with high requirements as well as a large share of jobs with low requirements. The United States and to a lesser degree New Zealand and Canada show this pattern [Group B]. These three countries are the non-European members of the Anglo-Saxon group.

- Two countries, Ireland and Belgium (Flanders), which have a particularly high share of low requirement jobs, on average low reading and writing requirements and only a few high requirement jobs. [Group C].

- Two countries, the United Kingdom and the Netherlands, which exhibit a lower share of jobs with few or no demands regarding the reading and writing capabilities of the job holders [Group D]. In both of the last clusters, a Continental-European country is matched with a country from the British Isles.

In order to visualise these different job structures, we grouped the GRWJR scores of the total sample into deciles. These deciles are based on time-equivalents, and equal weight is attached to all countries. The bars of Figure 1 represent whether a country has more jobs (> 10 percent) or less jobs (< 10 percent) than the average country in each decile of job requirements. This representation of the distribution of job requirements makes clear that Group A countries differ primarily from the other countries by a strong under-representation of low requirement job (deciles 1 to 3) and an over-representation of higher medium jobs (deciles 6-8). Further, Group D is marked by an over-proportional share of lower medium job (decile 2-4).

Figure 4: Distribution of Job Requirements

Countries Type A

Germany   Switzerland   Sweden

Countries Type B

Canada   New Zealand   United States

Countries Type C

Ireland   Belgium (Fla.)

Countries Type D

Netherlands   United Kingdom
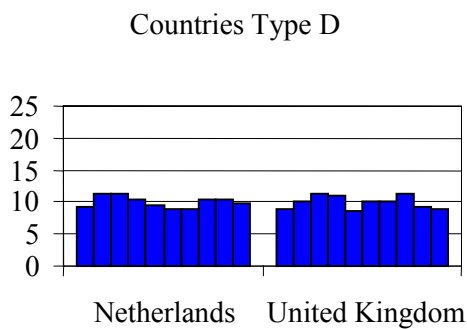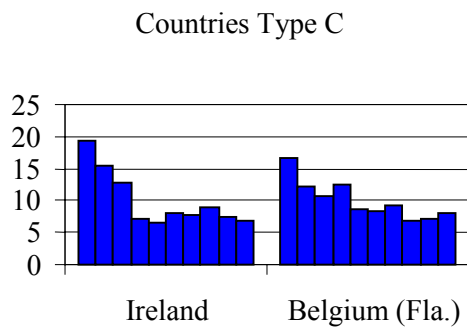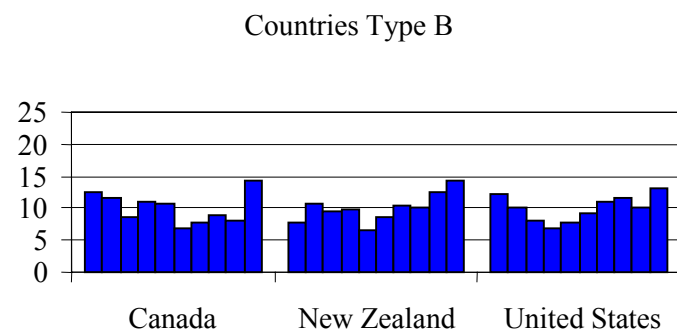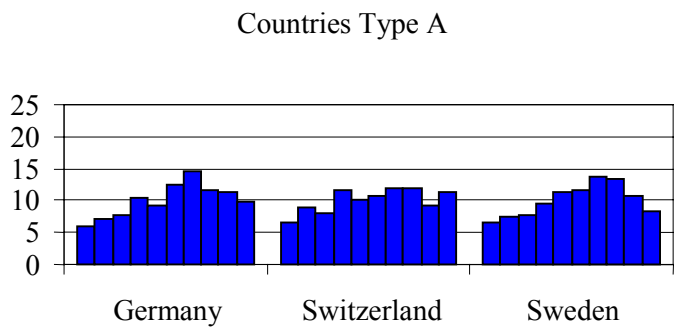
Demand for the low skilled

The share of jobs that impose little or no job requirement and the share of jobs which belong to the lowest job requirement quintile of the pooled data (which cover a slightly higher percentage of jobs, see Table 6; Table A10 Appendix) can be seen as first approximations for the demand of the low-skilled. Evidently, the two group C countries have the highest share of jobs that appear to be suited for people with poor cognitive skills. In Ireland, jobs with little or no requirement comprise 32.3 percent of the jobs (time-equivalents) [lowest quintile: 34.9 percent]. Belgium (Flanders) is the other country which has a far higher share of jobs with little or no requirements than the average country, 25.6 percent [28.7 percent]. The country groups D and B follow: Canada: 21.0 [24.0] percent; USA: 19.8 [22.3] percent; the Netherlands: 17.5 [20.4] percent; United Kingdom 17.0 [19.0] percent; New Zealand 18.5 [16.5] percent. The countries grouped as A have relatively few jobs that require little or no reading and writing proficiency from the job holder: Sweden 12.9 [15.4] percent; Switzerland12.2 [13.9] percent and Germany 11.1 [12.9] percent.

Employees with low cognitive skills are strongly concentrated in jobs with little of few requirements. For example. 41.3 percent of the jobs which belong to the lowest GRWJR decile are occupied by workers who belong to the lowest literacy quintile (see Table A11 Appendix). However, workers with low literacy also find employment in jobs that demand more reading and writing proficiency from their holders. In order to get a more balanced picture of the demand for low skilled workers, we constructed the following demand index for workers belonging to literacy decile d in country j (cp. Katz and Murphy 1992):

$$D_{dj} = \sum_{i}^{10} S_{ij} E_{id,pooled}$$

where i refers to the job requirement decile (pooled data), *Sij* is the share of i-decile jobs in the total employment in country j (in time equivalents), and $E_{idpooled}$ is the share of decile d workers in the employment of job requirement decile i in the pooled data. The main differences between this demand index and that suggested by Katz and Murphy (1992) is, first, we calculate the index for ten decile groups rather than three skill group (high, medium, low). Second, we calculate the demand on the basis of the skill composition of the job requirement deciles for the pooled sample instead of the skill composition of occupation-industry cells for a reference category to determine

the demand for the skill groups (see Table A11 Appendix for $E_{idpooled}$ and Table A12 Appendix for D_{ij}).

According to this calculation of a demand index for low skilled workers, we estimate that Ireland with 18.1 percent has the highest share of jobs suited for low skilled workers (LitQuint1 workers), followed by Belgium (Flanders) [16.5 percent], Canada [14.6 percent], the USA and the Netherlands [both 14.0 percent] and the United Kingdom [13.8 percent]. Relatively low shares of this kind of jobs are found in New Zealand [12.9 percent], Sweden [12.1 percent], Switzerland [11.9 percent] and Germany [11.6 percent]. The average share of jobs for the low skilled is 14.7 percent in the Anglo-Saxon countries and 13.2 percent in the Continental-European countries (see Table 6).

Table 6: Demand for the Low Skilled

Country	Low Requirement Jobs (Quintile 1)	Jobs for Low Skilled Workers $(D_{1+2, j})$	Ratio (workers/ jobs; $S_{1+2,j}/D_{1+2; j}$)
Canada	24.0 [3]	14.6 [3]	2.24 [6]
Ireland	34.9 [1]	18.1 [1]	3.25 [1]
New Zealand	18.5 [7]	12.9 [7]	2.59 [3]
UK	19.0 [6]	13.8 [6]	3.18 [2]
USA	22.3 [4]	14.0 [4]	2.57 [4]
AS countries	23.7	14.7	2.77
Belgium (Flan)	28.7 [2]	16.5 [2]	2.21 [7]
Germany	12.9 [10]	11.6 [10]	2.01 [8]
Netherlands	20.4 [5]	14.0 [4]	1.54 [9]
Sweden	15.4 [8]	12.1 [8]	1.01 [10]
Switzerland	13.9 [9]	11.9 [9]	2.40 [5]
CE countries	18.3	13.2	1.83
Across Countries	21.0	14.0	2.30

From a demand-and-supply perspective, the ratio of people with a given level of skill to the number of jobs which require this level of skill is more important as

determinant of the relative labour position of a skill group than the number or share of jobs that are suited for these workers. Consequently, we constructed a net-supply index for the skill groups by dividing the number of people belonging to a litercay decile by the number of jobs available for them (S_{dj}/D_{dj}):

$$S_{dj} / D_{dj} = F_{dj} P_{dj} / D_{dj}$$

where F_{dj} is the share of people of country j who belong to literacy decile d and P_{dj} is the employment ratio of decile d workers in country j. We calculated this index for following part of the populations: all inhabitants of a country between 16-65 who are not primarily studying.

Table 6, Column 4, reports these ratios for the lowest literacy quintile. Although Ireland has by far the largest number of jobs for people with low cognitive skills, it has also the highest ratio of low skilled workers and jobs (3.25). The United Kingdom follows closely (3.18). On rank 3 and 4 are New Zealand (2.59) and the United States (2.57). Switzerland is the Continental-European country with the highest ratio of low –skilled people and jobs (2.40; rank 5) . Canada (rank 6) in turn is the Anglo-saxon country with the lowest ratio (2.24). On rank 7 to 10, the Continental-European countries Belgium (2.21), Germany (2.01), Netherlands (1.54) and Sweden (1.01) follow. Although Anglo-Saxon countries have higher shares of jobs which are suited for workers with low cognitive skills, the demand for the low skilled relative to the supply of low skilled workers is smaller in Anglo-Saxon than in Continental-European countries (t-test: 2.92, 8.df., p.=.019).

Figure 5 Net labour supply and expected relative wage of low-skilled workers
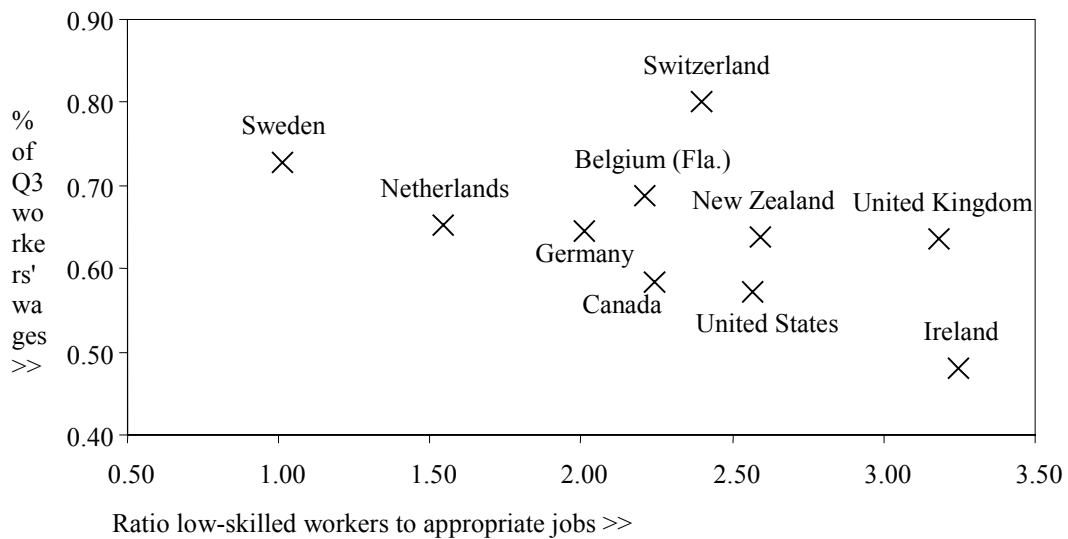
Can the demand for low skilled workers relative to their supply explain the country-differences in the relative position of low skilled workers? Figure 5 plots the net-supply index for the lowest literacy quintile workers $S_{1+2,j}/D_{1+2,j}$ against the expected wage of lowest literacy quintile workers relative to median workers (3rd quintile). There is an obvious relationship between the ratio of workers and jobs and the relative expected wage of low skilled workers, with the Swiss case as an outlier. However, the relationship between the supply-index and the relative expected wage is weaker than the relationship between the country-grouping variable and the relative expected wage. The same holds for the wage differential between Quintile 1 and Quintile 3 workers and for the measures of relative employment chances (see Table A13 Appendix).

Summary

- Low skilled workers have higher wages relative to median workers in Continental European compared with Anglo-Saxon countries.
- Low skilled workers have better employment chances relative to median workers in Continental European countries compared with Anglo-Saxon countries (although the difference between the country groups may be not significant depending on the employed measure of relative employment chances).

- The overall position as measured by the product of wages and employment chances of low skilled workers relative to median workers is better in Continental European countries than Anglo-Saxon countries.

- The trade-off hypothesis that low skilled workers of countries with 'rigid labour markets' (i.e. Continental European countries) may have higher wages than low skilled workers of countries with 'flexible labour markets' (i.e. Anglo-Saxon ones) but have to pay for this by reduced employment chances, is not consistent with the data.

- The supply-and-demand hypothesis that low skilled workers do relatively better in countries with few low skilled workers (i.e. Continental European countries) than in countries with may low skilled workers (i.e. Anglo-Saxon ones) is consistent with this data.

- However, the country grouping is the variable most closely related to relative wages, employment chances and the overall position of low skilled workers. It is more closely related to these variables than the more direct measure 'share of low skilled workers'.

- Although Anglo-Saxon countries have more employment opportunities for low skilled workers than Continental-European countries in absolute terms, the Continental-European countries have more employment opportunities for low skilled workers relative to the supply of low skilled workers. While all countries may have not 'enough' jobs for the low skilled, this problem is less salient in Continental-European countries, given the smaller numbers of potential workers with poor cognitive skills.

- The supply-and-demand hypothesis that low skilled workers do relatively better in countries with a low net-supply of low skilled workers is consistent with this data.

- However, the country grouping is the variable also more closely related to relative wages, employment chances and the overall position of low skilled workers than a net-supply index for low skilled workers, i.e. the ratio of low-skilled workers and employment opportunities for low skilled workers.

Taken together, the main findings are that the economic situation of the low skilled is better in the sampled countries of Continental-Europe than in the sampled Anglo-

Saxon countries. The trade-off hypothesis found no support by the data since the employment chances of low skilled workers are not worse in countries with more rigid and regulated labour markets. The supply-and-demand hypothesis is broadly consistent with the data: the supply and the net-supply of workers with poor cognitive skills is positively related with the relative wages and relative employment chances of low skilled workers. However, the support is limited by the fact that neither the measure of supply nor the measure of net-supply for low skilled workers was able to explain variance of the situation of the low skilled within the country groups (Anglo-Saxon and Continental-European countries).

References

Acemoglu, D. (1999):"Changes in Unemployment and Wage Inequality: An alternative theory and some evidence", *American Economic Review 89*: 1259-78

Acemoglu, D. (2000): "Technical Change , Inequality, and the Labour Market". NBER Working Paper 7800

Aoki, M. (1988): *Information, Incentives, and Bargaining in the Japanese Economy.* Cambridge, MA: Cambridge University Press

Barrett, A., Callan, T., Nolan, B. (1999): "Raising Wage Inequality, Returns to Education and Labour Market Institutions: Evidence from Ireland", *British Journal of Industrial Relations, 37 (1)*, 77-100

Barrett, A., Callan, T., Nolan, B. (2000): "Earnings Inequality, Returns to Education and Immigration into Ireland". IZA Discussion Paper 167, June 2000

Beaudry, P. and Green, D. (2000): "The Changing Structure of Wages in the US and Germany: What explains the difference", NBER Working Paper 7697

Berman, , E., Bound, J., S, Machin (1998): "Implications of Skill-biased Technological Change: International Evidence", *Quarterly Journal of Economics* 63: 1245-1280

Blau, F.D. and Kahn, L.M. (1996): "International Differences in Male Wage Inequality: Institutions versus Market Forces." *Journal of Political Economy 104:* 791-837

Blau, F.D. and Kahn, L.M. (2000): "Do Cognitive Test Scores Explain Higher US Wage Inequality", mimeo, Cornell University and NBER

Card, D., Kramarz, F., Lemieux, T. (1999): "Changes in the Structure of Wages and Employment: a comparison of the United States, Canada and France", *Canadian Journal of Economics* 32: 843-877

Denny, K.J., C.P. Harmon and S.Redmond (2000): "Functional Literacy, Educational Attainment and Earnings – Evidence from the International Adult Literacy Survey". The Institute for Fiscal Studies, Working Paper 00/09

Devroye,D. and R. Freeman (2000): "Does Inequality in Skills Explain Inequality of Earnings Across Countries", mimeo, Harvard University

Edin, P.-A., B. Holmlund (1995): "The Swedish Wage Structure: The Rise and the Fall of Solidarity Wage Policy?", in: Freeman, R.B. and Katz, L.F. (eds.): *Differences and Changes in Wage Structures.* Chicago: University of Chicago Press,

Freeman, R.B. and Katz, L.F. (eds., 1995): *Differences and Changes in Wage Structures.* Chicago: University of Chicago Press

Freeman, R.B. and Schettkat, R. (2000): "The Role of Wage and Skill Differences in US-German Employment Differences", NBER Working Paper 7474

Glyn, A.and W. Salverda (2000): "Employment Inequalities", M. Gregory et al. (eds.): *Labour Market Inequalities: Problem and Policies in International Perspective*. Oxford: Oxford University Press

Gosling, A., Machin, S., Meghir, C. (2000): "What Has Happened to Male Wages?", *The Review of Economic Studies* 67

Gottschalk, P. and Smeeding, T.H. (1997): "Cross-National Comparison of Earnings and Income Inequality", *Journal of Economic Literature* 35: 633-687

Howell, D.R. (2000): "Increasing Earnings Inequality and Unemployment in Developed Countries: A Critical Assessment of the 'Unified Theory'". CEPA Workings Papers Series A, No. 22, New York

Kahn, L.M. (2000): "Wage Inequality, Collective Bargaining and Relative Employment: Evidence from 15 OECD Countries", *Review of Economics and Statistics 82: 564-79*

Katz, L.F. and K.M. Murphy (1992): "Changes in Relative Wages, 1963-87: Supply and Demand Factors", *Quarterly Journal of Economics 107: 35-78*

Katz, L.F. and A. Ravenga (1989): "Changes in the Structure of Wages, the U.S. vs Japan", *The Journal of the Japanese and International Economics 3:*

Koike, K. (1996): *The Economics of Work in Japan.* Tokyo: LTCD Library Foundations

Krueger, A.B. and Pischke, J.-S. (1997): "Observations and Conjectures on the US employment miracle" NBER Working Paper 6146

Krugman, P. (1994): "Part and Prospective Causes of High Unemployment", Federal Reserve Bank of Kansas City: *Reducing Unemployment: Current Issues and Policy Options, Proceedings of a Symposium in Jackson Hole.* Kansas City: 68-81

Layard, R., S. Nickell and R. Jackson (1991): *Unemployment.* Oxford: Oxford University Press

Leslie, D. and Pu, Y. (1996): "What Caused Rising Wage Inequality in Britain? Evidence from Time Series 1970-93", *British Journal of Industrial Relations* 34: 111-130

Leuven, E., H. Oosterbeek and H. van Ophem (2000): "Explaining International Differences in Male Wage Inequality by Differences in Demand and Supply". Mimeo, Amsterdam

Machin, S. and J. Van Reenen (1998): "Technology and Change in Skill Structure: Evidence from Seven OECD Countries", *Quarterly Journal of Economics* 113: 1215-1244

Nickell, S. and Bell, B. (1995): "The Collapse in Demand for the Unskilled and Unemployment Across the OECD", *Oxfort Review for Economic Policy,* 11(1): 40-62

Nickell, S. and Bell, B. (1996): "Changes in the Distribution of Wages and Unemployment in the OECD", *American Economic Review, Paper and Proceedings, 86 (5), 302-308*

Nickell, DS. and L. Nunziata (2000): "Employment Patterns in OECD Countries", mimeo, London: Centre for Economic Performance

OECD (1994): *Jobs Study*. Paris: OECD

OECD (1996): *Education at a Glance 1996*. Paris: OECD

OECD and Statistics Canada (1995): *Literacy, Economy and Society.* Paris: OECD

OECD and Statistics Canada (1997): *Literacy skills for the knowledge society: further results from the International Adult Literacy Survey.* Paris: OECD

OECD and Statistics Canada (2000): *Literacy in the Information Age: Final Report of the International Adult Literacy Survey.* Paris: OECD

Piore, M.J. and Sabel, C.F. (1984): *The Second Industrial Divide: Possibilities for Prosperity.* New York: Basic Books

Sanders, M. and Ter Weel, B. (2000): "Skill-biased Technical Change: Theoretical Concepts, Empirical Problems and a Survey of the Evidence"

Snower, D.J. (1999): "Causes of Changing Earnings Inequality", IZA Discussion Paper 29

Statistics Canada and OECD (1998): *International Adult Literacy Survey. Microdata Package.* Ottawa, Ontario

Statistics Canada and OECD (1998a): "User's Guide", in: Statistics Canada and OECD (1998): *International Adult Literacy Survey. Microdata Package.* Ottawa, Ontario

Streeck, W. and Sorge, A. (1988): Industrial Relations and Technical Change: The Case for an extended Perspective. In: R. Hyman and W. Streeck (eds): *New Technologies and Industrial Relations.* Oxford: Basil Blackwell, p.19-47

Ter Weel, B. (2000): "Insights in the Job, Skill and Wage Structure of the Netherlands: 1986-98", Maastricht: MERIT, mimeo

Appendix A

Table A1: *Labour market policies/collective bargaining measures and wage dispersion*

Non-parametric Correlations, n=10

		D9/D5	D5/D1
Country Group (AS=0; CE=1)	**Correlation Coefficient**	-.907	-.855
	Sig. (2-tailed)	.000	.002
Employment Protection	**Correlation Coefficient**	.554	.730
	Sig. (2-tailed)	.104	.016
Labour Standards	**Correlation Coefficient**	.650	.774
	Sig. (2-tailed)	.042	.009
Replacement Rate	**Correlation Coefficient**	.721	.726
	Sig. (2-tailed)	.019	.017
Union Density	**Correlation Coefficient**	-.088	.086
	Sig. (2-tailed)	.810	.814
Union Coverage	**Correlation Coefficient**	.081	.766
	Sig. (2-tailed)	.778	.010
Centralisation Collective Bargaining	**Correlation Coefficient**	.778	.890
	Sig. (2-tailed)	.028	.001

Table A2: *Labour market policies/collective bargaining measures and wage dispersion*

Parametric Correlations, n=10

		D9/D5	D5/D1
Country Group (AS=0; CE=1)	**Correlation Coefficient**	-.906	-.813
	Sig. (2-tailed)	.000	.004
Employment Protection	**Correlation Coefficient**	.527	.736
	Sig. (2-tailed)	.118	.015
Labour Standards	**Correlation Coefficient**	.621	.745
	Sig. (2-tailed)	.055	.013
Replacement Rate	**Correlation Coefficient**	.597	.549
	Sig. (2-tailed)	.068	.101
Union Density	**Correlation Coefficient**	.071	.291
	Sig. (2-tailed)	.845	.415
Union Coverage	**Correlation Coefficient**	.562	.765
	Sig. (2-tailed)	.091	.010
Centralisation Collective Bargaining	**Correlation Coefficient**	.723	.822
	Sig. (2-tailed)	.018	.004

Table A3: Literacy Deciles (cut-off values)

NTILES of LITER	Minimum	Maximum
1	28,50	205,08
2	205,09	238,17
3	238,17	257,86
4	257,86	273,11
5	273,12	285,06
6	285,07	297,24
7	297,24	309,32
8	309,33	322,71
9	322,71	341,00
10	341,04	469,73

		Country										Total
		Canada	Ireland	New Zealand	United Kingdom	USA	Belgium (Flanders)	Germany	Netherlands	Sweden	Switzerland	
Literacy Deciles	**1**	12,1%	14,9%	12,9%	15,0%	13,0%	11,0%	4,9%	5,0%	3,0%	8,0%	10,0%
	2	8,1%	13,9%	10,9%	14,0%	10,0%	10,0%	9,8%	8,0%	5,0%	9,0%	10,0%
	3	10,1%	11,9%	11,9%	11,0%	11,0%	8,0%	9,8%	9,0%	6,0%	11,0%	10,0%
	4	8,1%	11,9%	10,9%	9,0%	8,0%	10,0%	13,7%	10,0%	8,0%	12,0%	10,0%
	5	10,1%	8,9%	9,9%	8,0%	9,0%	10,0%	12,7%	11,0%	9,0%	11,0%	10,0%
	6	9,1%	8,9%	8,9%	9,0%	9,0%	10,0%	10,8%	13,0%	10,0%	12,0%	10,0%
	7	9,1%	8,9%	8,9%	7,0%	8,0%	12,0%	10,8%	12,0%	10,0%	12,0%	10,0%
	8	10,1%	7,9%	8,9%	9,0%	10,0%	11,0%	8,8%	13,0%	11,0%	11,0%	10,0%
	9	10,1%	6,9%	8,9%	9,0%	10,0%	10,0%	9,8%	12,0%	16,0%	9,0%	10,0%
	10	13,1%	5,9%	7,9%	9,0%	12,0%	8,0%	8,8%	7,0%	22,0%	5,0%	10,0%
Total		100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

Table A5: Literacy Deciles by Country : Native Speakers
% within Country

NATIVE			Country										Total
			Canada	Ireland	New Zealand	United Kingdom	USA	Belgium (Flanders)	Germany	Netherlands	Sweden	Switzerland	
native speaker	**Literacy Deciles**	**1**	7,3%	15,4%	9,6%	12,9%	7,7%	9,7%	3,6%	4,4%	1,9%	3,0%	7,7%
		2	8,1%	14,2%	10,8%	14,1%	9,7%	10,7%	9,1%	8,0%	4,6%	8,1%	9,8%
		3	9,3%	11,8%	11,5%	10,9%	11,5%	8,3%	9,9%	8,7%	6,1%	11,5%	9,9%
		4	8,7%	11,5%	10,7%	9,5%	7,6%	9,9%	13,9%	9,9%	7,1%	12,4%	10,1%
		5	9,5%	9,5%	10,0%	8,2%	9,3%	10,4%	12,9%	11,2%	9,0%	12,1%	10,2%
		6	9,2%	8,6%	9,6%	9,3%	10,0%	9,8%	10,9%	13,4%	10,0%	12,5%	10,3%
		7	10,7%	8,9%	9,9%	7,7%	9,1%	12,1%	10,7%	12,0%	10,2%	13,0%	10,4%
		8	11,0%	7,8%	9,2%	8,8%	10,6%	10,5%	9,8%	13,5%	11,8%	12,2%	10,5%
		9	11,1%	6,6%	9,5%	9,1%	10,8%	10,4%	10,2%	11,9%	16,1%	9,5%	10,5%
		10	15,1%	5,5%	9,2%	9,4%	13,7%	8,4%	9,1%	7,0%	23,2%	5,7%	10,5%
	Total		100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

Table A6: Literacy Deciles by Country: Immigrants

% within Country

NATIVE			Country										Total
			Canada	Ireland	New Zealand	United Kingdom	USA	Belgium (Flanders)	Germany	Netherlands	Sweden	Switzerland	
other language	Literacy Deciles	1	33,0%	14,5%	38,1%	40,9%	49,1%	27,2%	18,6%	17,8%	15,7%	32,4%	31,7%
		2	9,6%	15,6%	10,6%	13,4%	12,3%	6,4%	19,8%	11,9%	11,8%	12,3%	11,8%
		3	14,4%	8,7%	12,4%	11,1%	7,2%	8,3%	9,2%	13,2%	8,2%	10,6%	10,7%
		4	5,2%	11,6%	10,0%	7,8%	7,0%	6,1%	13,7%	11,4%	11,2%	9,6%	8,7%
		5	10,3%	4,0%	7,4%	3,7%	6,5%	11,1%	10,4%	10,3%	6,5%	8,2%	8,2%
		6	7,8%	10,4%	7,1%	5,5%	5,4%	9,4%	4,8%	7,6%	10,1%	6,9%	7,2%
		7	2,3%	11,6%	5,0%	3,7%	4,5%	6,7%	12,4%	13,5%	8,9%	5,8%	6,3%
		8	6,1%	9,2%	3,2%	5,8%	2,9%	12,7%	4,3%	4,9%	8,2%	5,4%	5,7%
		9	5,9%	9,8%	4,9%	2,6%	2,6%	9,9%	2,1%	7,5%	12,0%	4,6%	5,7%
		10	5,5%	4,6%	1,1%	5,5%	2,5%	2,2%	4,8%	1,9%	7,3%	4,3%	4,0%
	Total		100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

*Table A7:   Labour market policies/collective bargaining
measures and relative position of low skilled*

Non-parametric Correlations, n=10

		b (wage) 1	b (empl.) 1	wage loss 1	b (wage) 2	b (empl) 2	wage loss 2
Country Group (AS=0; CE=1)	**Correlation Coefficient**	.661	.870	.870	.453	.870	.870
	Sig. (2-tailed)	.037	.001	.001	.189	.001	.001
Employment Protection	**Correlation Coefficient**	.624	.576	.406	.552	.491	.442
	Sig. (2-tailed)	.054	.082	.244	.098	.150	.200
Labour Standards	**Correlation Coefficient**	.575	.593	.508	.416	.618	.520
	Sig. (2-tailed)	.082	.071	.134	.232	.057	.123
Replacement Rate	**Correlation Coefficient**	.395	.790	.778	.316	.766	.760
	Sig. (2-tailed)	.258	.007	.008	.374	.010	.011
Union Density	**Correlation Coefficient**	.236	-.248	.018	.297	-.273	.042
	Sig. (2-tailed)	.511	.489	.960	.405	.446	.907
Union Coverage	**Correlation Coefficient**	.717	.498	.444	.559	.492	.486
	Sig. (2-tailed)	.020	.143	.199	.093	.148	.154
Centralisation Collective Bargaining	**Correlation Coefficient**	.688	.741	.806	.531	.780	.833
	Sig. (2-tailed)	.028	.014	.005	.114	.008	.003

1 all workers, 2 immigrants excluded

*Table A8:   Literacy and relative position of low skilled
(All workers)*

Non-parametric correlations (population=all); n=10

		b (wage)	b (empl)	wage loss
Country Group (AS=0; CE=1)	**Correlation Coefficient**	.661	.870	.870
	Sig. (2-tailed)	.037	.001	.001
Mean (Literacy)	**Correlation Coefficient**	.524	.555	.610
	Sig. (2-tailed)	.120	.096	.061
Stddev (Literacy)	**Correlation Coefficient**	-.673	-.758	-.721
	Sig. (2-tailed)	.033	.011	.019
Share low skilled (Lowest LitQuint)	**Correlation Coefficient**	-.430	-.673	-.673
	Sig. (2-tailed)	.214	.033	.033

Table A9:   Literacy and relative position of low skilled
(Native Speakers)

Non-parametric correlation (population=natives), n=10

		b (wage)	b (empl)	wage loss
Country Group (AS=0; CE=1)	**Correlation Coefficient**	.453	.870	.870
	Sig. (2-tailed)	.189	.001	.001
Mean (Literacy)	**Correlation Coefficient**	.382	.236	.358
	Sig. (2-tailed)	.276	.511	.310
Stddev (Literacy)	**Correlation Coefficient**	-.224	-.782	-.782
	Sig. (2-tailed)	.533	.008	.008
Share low skilled (Lowest LitQuint)	**Correlation Coefficient**	-.225	-.614	-.693
	Sig. (2-tailed)	.532	.059	.026

Table A10: NTILES of GRWJR by COUNTRY
% within COUNTRY

		Canada	Ireland	New Zealand	United Kingdom	USA	Belgium (Flanders)	Germany	Netherlands	Sweden	Switzerland	Total
							COUNTRY					
NTILES of GRWJR	**1**	12,4%	19,4%	7,7%	8,8%	12,2%	16,6%	5,9%	9,1%	6,5%	6,5%	10,5%
	2	11,6%	15,5%	10,8%	10,2%	10,1%	12,1%	7,0%	11,3%	8,9%	7,4%	10,5%
	3	8,6%	12,7%	9,4%	11,3%	8,0%	10,7%	7,6%	11,4%	8,1%	7,7%	9,6%
	4	11,0%	7,1%	9,8%	11,1%	6,9%	12,5%	10,4%	10,4%	11,5%	9,4%	10,0%
	5	10,6%	6,4%	6,4%	8,7%	7,8%	8,7%	9,3%	9,5%	10,1%	11,4%	8,9%
	6	6,9%	8,0%	8,7%	10,1%	9,3%	8,2%	12,4%	8,8%	10,7%	11,7%	9,5%
	7	7,8%	7,8%	10,4%	10,2%	11,1%	9,1%	14,5%	8,9%	12,0%	13,6%	10,5%
	8	8,8%	9,0%	10,0%	11,3%	11,5%	6,9%	11,6%	10,3%	11,9%	13,3%	10,5%
	9	8,0%	7,5%	12,4%	9,1%	10,0%	7,1%	11,4%	10,5%	9,1%	10,6%	9,6%
	10	14,3%	6,7%	14,3%	9,0%	13,1%	8,1%	9,9%	9,8%	11,3%	8,4%	10,5%

Table A11: NTILES of LITERACY by NTILES of GRWJR % within NTILES of GRWJR

					NTILES of GRWJR							
		1	2	3	4	5	6	7	8	9	10	Total
NTILES of LITER	1	25,3%	9,2%	5,7%	3,8%	4,1%	2,2%	1,7%	1,8%	1,5%	1,2%	5,8%
	2	16,0%	15,8%	13,7%	7,9%	7,2%	4,7%	5,4%	5,1%	3,6%	3,2%	8,3%
	3	11,9%	14,9%	12,7%	10,2%	8,5%	8,0%	7,6%	4,9%	5,4%	5,1%	8,9%
	4	11,1%	11,0%	13,5%	11,0%	10,2%	7,9%	8,4%	7,3%	8,1%	8,0%	9,6%
	5	9,8%	11,1%	9,4%	11,1%	10,2%	9,6%	9,0%	11,1%	9,4%	8,7%	9,9%
	6	7,2%	9,0%	12,1%	10,3%	12,5%	13,0%	11,4%	9,1%	11,4%	13,8%	10,9%
	7	7,8%	9,2%	10,5%	11,9%	10,1%	12,2%	11,8%	11,4%	13,4%	12,2%	11,0%
	8	5,0%	8,6%	9,4%	10,6%	12,7%	12,6%	12,8%	13,7%	13,0%	13,8%	11,2%
	9	3,9%	6,1%	7,9%	12,4%	11,8%	15,2%	15,1%	15,6%	13,4%	16,0%	11,7%
	10	1,9%	5,2%	5,1%	10,9%	12,5%	14,6%	16,9%	19,9%	20,7%	18,1%	12,6%
Total		100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

Table A12: Share of Jobs by Literacy Decile by Country

COUNTRY	NL1	NL2	NL3	NL4	NL5	NL6	NL7	NL8	NL9	NL10
Canada	,0607	,0848	,0897	,0964	,0985	,1073	,1073	,1081	,1136	,1162
Ireland	,0820	,0990	,0977	,0994	,0986	,1017	,1030	,0995	,1009	,0993
New Zealand	,0510	,0784	,0863	,0948	,0987	,1097	,1113	,1126	,1211	,1263
United Kingdom	,0548	,0828	,0895	,0966	,0994	,1084	,1097	,1107	,1177	,1207
USA	,0595	,0806	,0860	,0936	,0976	,1070	,1082	,1096	,1172	,1222
Belgium (Flanders)	,0725	,0921	,0945	,0983	,0980	,1035	,1044	,1020	,1057	,1044
Germany	,0442	,0715	,0821	,0915	,0973	,1092	,1109	,1141	,1248	,1311
Netherlands	,0556	,0842	,0903	,0973	,0997	,1086	,1096	,1103	,1164	,1193
Sweden	,0464	,0750	,0842	,0928	,0977	,1085	,1096	,1127	,1217	,1271
Switzerland	,0453	,0733	,0827	,0920	,0979	,1085	,1101	,1138	,1234	,1300

Table A13: Ratio of Workers/Jobs by Literacy Decile by Country

COUNTRY	NL1	NL2	NL3	NL4	NL5	NL6	NL7	NL8	NL9	NL10
Canada	2,9652	1,5045	1,8373	1,3360	1,5016	1,2877	1,3271	1,5360	1,3849	1,8847
Ireland	3,5370	2,9202	2,3569	2,2511	1,8803	1,7124	1,6847	1,6016	1,3256	1,1297
New Zealand	3,2644	1,9375	2,0469	1,8286	1,6293	1,3354	1,2857	1,1252	1,0306	,8768
United Kingdom	3,8229	2,5408	1,8175	1,4322	1,1962	1,2305	1,0360	1,1611	1,1281	1,1557
USA	3,2898	1,8061	1,6635	1,0730	1,2018	1,1493	1,0529	1,2141	1,1195	1,3585
Belgium (Flanders)	2,5101	1,8821	1,5271	1,6439	1,7815	1,6512	1,9261	1,7795	1,6527	1,4179
Germany	1,6431	2,3338	2,1364	2,5219	2,3156	1,7108	1,6746	1,4767	1,3694	1,2089
Netherlands	1,4653	1,6128	1,6191	1,6561	1,7915	1,8833	1,8514	1,9232	1,6674	,9338
Sweden	,9147	1,0974	1,0425	1,2052	1,3213	1,3438	1,3491	1,4887	1,9278	2,5586
Switzerland	3,3076	1,5807	1,7300	1,6991	1,4808	1,4235	1,4264	1,1988	,9734	,5627

Table A14: Net-supply and relative position of low skilled

Non-parametric correlation, n=10

		b (wage)	b (empl)	wage loss
Net-Supply Index $S_{1+2,j}/D_{1+2,j}$	Correlation Coefficient	-.624	-.576	-.661
	Sig. (2-tailed)	.054	.082	.038

Appendix B: Literacy and Educational Credentials

How misleading is the practice of treating educational credentials as equivalent measures of cogntive skills? Table B1 reports for different ISCED groupings (ISCED 0-1= less than secondary education, ISCED 2= lower secondary education, ISCED 3= upper secondary education, ISCED 5-7= tertiary education) the average literacy skills per country, their dispersion and the proportion helding the degree[1]. The figures relate to the population of native speakers.

The figures indicate, first, that the comparability of educational credentials improves with the level of education. While the standard deviation of the country means of the literacy of people with tertiary education (ISCED 5-7) is only 7.5, it increases to 9.6 as far as people with upper secondary education (ISCED 3) are concerned, to 17.0 for people with lower (ISCED 2) and to 24.3 for people with less than secondary education (ISCED 0-1). Second, and more importantly, since research on the effects of educational credentials on labour market outcomes focus on relative outcomes, the differences between educational level differ largely between countries. The difference in average literacy of high-school graduates and persons with at least some college education is a substantial 41 literacy score points in the U.S. but only 14 points separate people with completed upper secondary education and higher vocational training or university education in the Netherlands. In a similar way, the difference between lower and upper secondary education is only 6 points in Sweden but 35 points in New Zealand. Finally, the distance between the average literacy score of people with less than secondary education and people with lower secondary education varies from 10 points (Switzerland) to 71 points (New Zealand).

Since it has become an established practice to identify high skilled workers as workers with tertiary education and low skilled workers as workers with secondary education or less it may be instructive to compare the differences between the former and the latter across countries. This difference ranges from 28 (Switzerland) to 54 points (Canada and Ireland). The general conclusion is - mainly due to the high between-country variance of lower educational credentials - that internationally standardised educational credentials are only of limited value for comparative studies. We suggest for future comparative research that the use of standard classifications should be confined to countries with a similar quality of educational credentials. Groups of countries within which such a comparison appear to be admissable are (1) Canada (difference between people with tertiary education and people with less than tertiary education: 54), Ireland (54), United Kingdom (51), USA (50), Belgium (Flanders, 50) and perhaps New Zealand (45); (2) Switzerland (28), Sweden (32), Germany (33) and the Netherlands (33). With the exception of Belgium, this classification goes along the line of Anglo-Saxon and Continental-European countries. Comparisons across these groups of countries invite seriously biased results and wrong conclusions regarding the effect of cognitive skills on labour market outcomes.

---

[1] Note that the educational coding in Germany deviates from the ISCED convention since persons with apprenticeship have been apparently coded as ISCED 2 rather than ISCED 3 (cp. OECD 1996).

Table B1: Literacy of Native Speakers by Educational Credential

	ISCED 0-1			ISCED 2			ISCED 3			ISCED 5-7		
Country/Region	M	SD	P	M	SD	P	M	SD	P	M	SD	P
Canada	**205**	**60**	**.089**	**263**	**44**	**.203**	**294**	**38**	**.344**	**321**	**40**	**.363**
Ireland	**208**	**57**	**.233**	**255**	**44**	**.312**	**284**	**39**	**.284**	**306**	**41**	**.170**
New Zealand	**187**	**48**	**.018**	**258**	**42**	**.432**	**293**	**38**	**.264**	**314**	**36**	**.287**
UK	**224**	**67**	**.059**	**255**	**56**	**.553**	**286**	**48**	**.201**	**315**	**39**	**.188**
USA	**216**	**54**	**.092**	**242**	**54**	**.154**	**274**	**44**	**.389**	**315**	**41**	**.365**
Anglo-Saxon	208	57	.098	255	48	.331	286	41	.296	314	39	.275
Belgium (Flan)	**233**	**58**	**.107**	**276**	**43**	**.287**	**290**	**41**	**.272**	**317**	**33**	**.334**
Germany	**246**	**48**	**.006**	**277**	**41**	**.583**	**295**	**38**	**.253**	**312**	**38**	**.158**
Netherlands	**245**	**49**	**.105**	**275**	**34**	**.318**	**301**	**31**	**.325**	**315**	**29**	**.252**
Sweden	**266**	**43**	**.121**	**303**	**41**	**.158**	**309**	**40**	**.466**	**332**	**37**	**.254**
Switzerland	**249**	**35**	**.022**	**259**	**42**	**.139**	**287**	**36**	**.650**	**306**	**31**	**.189**
Cont-Europe	248	47	.072	278	40	.297	296	37	.393	316	34	.237
Across Countries	228	52	.085	266	44	.314	291	39	.344	312	37	.256

Does it depend primarily on the share of higher educational credentials or on the quality of (lower) education credentials whether a country has a high or low average literacy? Table B2 reports results of a Oxaca-Blinder type decomposition of between country differences of literacy proficiency. The first column reports the difference between the average literacy in a country/region and the mean literacy across countries[1]. The second column reports the difference between the average literacy in a country and the mean literacy across countries under the assumption that the quality of educational credentials is indeed equivalent in all countries, i.e. that countries differ only with respect to the distribution of educational levels[2]. The third column reports the difference between the average literacy in a country and the mean literacy across countries under the assumption that the distribution of educational credentials is identical for all countries, i.e. the average distribution, but that quality of educational levels differs between countries (again adjusted for the number of students who have not yet completed their education). The last column reports the determination coefficient of the country-specific regressions of education dummies on literacy proficiency.

This decomposition indicates that both the share of highly educated persons and the quality of education (in particular of the less well educated) matters. In particular, countries with the lowest average literacy (Ireland, United Kingdom) combine a high share of poorly educated people with a low quality of the grades. Sweden which has

---

[1] Different values between this column and the figures reported in Table 2 are due to the exclusion of people with unknown education. Mean literacy across countries refers to the mean of the country averages.

[2] The quality of educational credentials is estimated as the quality of educational credentials averaged across countries. Further, we adjusted for the share of people who still participate in education by adding a dummy to the regression equation for persons who see studying as their principal economic activity. The estimate for this dummy has not been averaged across countries.

the by far most literate population, in contrast, combines above-average share of higher educational credentials with a particular high quality of the grades. On the balance, the quality of educational attainment is more important than the distribution of educational grades. The standard deviation of the 'quality effect' is not only larger (11.9) than the standard deviation of the 'distribution effect' (6.9). The 'quality effect' also accounts for a larger share of the country differences in literacy (standard deviation of country means net 'quality effect': 7.6; net 'distribution effect': 9.9).

Table B2: Decomposition of Differences in Average Literacy between Countries

	Literacy$_{Country}$ - Mean (Literacy$_{Country}$)	Effect of Educational Composition	Effect of Educational Quality	R^2
Canada	+ 6.1	+ 7.2	- 4.3	.396
Ireland	-20.3	- 9.0	- 7.7	.364
New Zealand	- 6.2	- 0.7	- 1.4	.303
United Kingdom	- 13.1	- 5.8	- 5.2	.202
USA	+ 2.2	+12.3	-13.6	.312
Belgium (Flanders)	- 4.8	- 1.3	- 0.7	.352
Germany	+ 4.0	- 4.0	+ 8.8	.127
Netherlands	+ 4.7	- 3.6	+11.3	.323
Sweden	+24.8	+ 3.4	+28.1	.201
Switzerland	+ 2.2	+ 8.8	- 0.9	.176

Appendix C: Reading and writing job requirements

We developed a measure of general reading and writing requirements on the basis of a variety of items relating to reading and writing at work. See Table 1 for the items. Each of the items ask about the frequency of the occurrence of the activities (1=every day; 2=a few times a week; 3=once a week; 4=less than once a week; 5=rarely or never). A principal component analysis of these items (rotation oblimin) revealed three componenents of which the first measures general reading and writing skills. Another factor is related to commercial activities while the third contains items pertaining to technical activities. From the reversely coded items (0-4) relating to general reading and writing requirements (items 1-4, 7, 9) we formed a scale General Reading and Writing Job Requirements (GRWJR). The internal consistency of this scale as evaluated by Cronbach's Alpha is a satisfactory .84. Table 2 reports the averages of GRWJR for different occupational groups (ISCO-88, 1 digit). According to this measure the job requirements for professionals, managers, technicians and clerks are above average and the job requirements for craft, service, semi-skilled, agricultural workers and elementary occupations are below the average.

Table C 1

	Extraction	Component 1	Component 2	Component 3
... read or use letters or memos (1)	**.669**	**.779**	.438	.048
... read or use reports, articles etc (2)	**.655**	**.822**	.341	.133
... read or use manuals or reference books (3)	**.561**	**.712**	.301	.391
... read or use diagrams or schematics (4)	**.615**	**.556**	.130	**.661**
... read or use bills, invoices etc (5)	**.705**	.382	**.831**	.157
... read or use material in foreign lang. (6)	**.239**	.458	.065	.174
... write letters or memos (7)	**.687**	**.772**	.484	.034
... write bills, invoices etc (8)	**.691**	.360	**.826**	.147
... write reports or articles (9)	**.496**	**.707**	.268	.222
... fill out estimates/technical specifications (10)	**.556**	.421	.402	**.654**
... use mathematics/technical (11)	**.628**	.072	.190	**.776**
... use mathematics/commercial (12)	**.668**	.235	**.792**	.313

Table C 2

Occupation	GRWJR mean
Legislators and managers	16.01
Professionals	16.71
Technicians and Associate Professionals	14.49
Clerks	13.05
Service workers and Shop & Market Sales Workers	9.11
Skilled Agricultural and Fishery Workers	7.80
Craft and related trades workers	10.06
Plant and Machine operators and assemblers	8.55
Elementary	5.15
Total	**12.19**

Appendix D: Decomposition of GRWJR Mean and Variance Differences

How can we account for the differences between the countries? On the one hanmd, higher job requirements are associated with a type of job structure where the more 'literate' occupations - such as professionals, managers, technicians and clerks feature more prominently than is the case with those occupations requiring less literacy such as blue collars workers, service and shop workers and elementary occupations. On the other hand, jobs and occupations may be differently defined. The 'lower' occupations may be enriched with more complex tasks and 'lower' jobs may be differently embedded in organisational contexts requiring more information processing on the part of the job holder. In the following, we examine whether country differences regarding the average job requirement and the spread of those requirements can be accounted for by the different occupational structures or by the different job requirements that are associated with an occupation in a country.

Table D1: **Decomposition of Differences in Average Job Requirements between Countries**

	$GRWJR_{Country}$ - Mean ($GRWJR_{Countr}$)	Effect of Occupational Composition	Effect of Occupation-specific Requirements	Interaction Effect
Canada	**-0.42**	**-0.16**	**-0.42**	**+0.16**
Ireland	**-2.67**	**-0.99**	**-1.62**	**-0.06**
New Zealand	**+0.73**	**-0.60**	**+1.25**	**+0.08**
United Kingdom	**-0.25**	**+0.09**	**-0.30**	**-0.04**
USA	**+0.19**	**+0.18**	**+0.08**	**-0.07**
Germany	**+1.13**	**-0.01**	**+1.05**	**+0.09**
Netherlands	**-0.29**	**+0.72**	**-1.07**	**+0.06**
Sweden	**+0.72**	**+0.64**	**+0.37**	**-0.29**
Switzerland	**+0.86**	**+0.12**	**+0.64**	**+0.12**

Belgium excluded since data have incompatible occupational groupings

In Table D1, we report the results of a decomposition of the deviation of the mean job requirements of a country from the average across countries and of the within-country variance of the job requirements. In this Table, we distiguish between an effect of the occupational composition and an effect of the occupation-specific job requirements (following the same methodology as the compositon of literacy differences reported in the previous section) in order to account for the devation of the mean of a country from the average across countries. Figure 2a illustrates the results of this decomposition graphically. In this figure, we plotted the GRWJR a country would have if it were to have the average occupation structure and its country-specific job requirement ('job requirement') against the average GRWJR a country would have if it were to have the average occupational job requirements and its country specific occupational structure ('occupational structure').
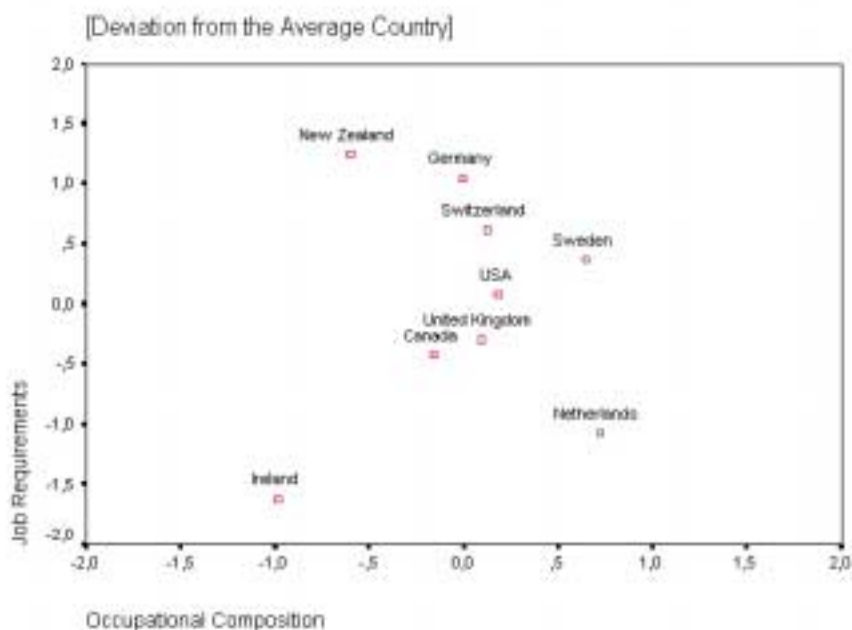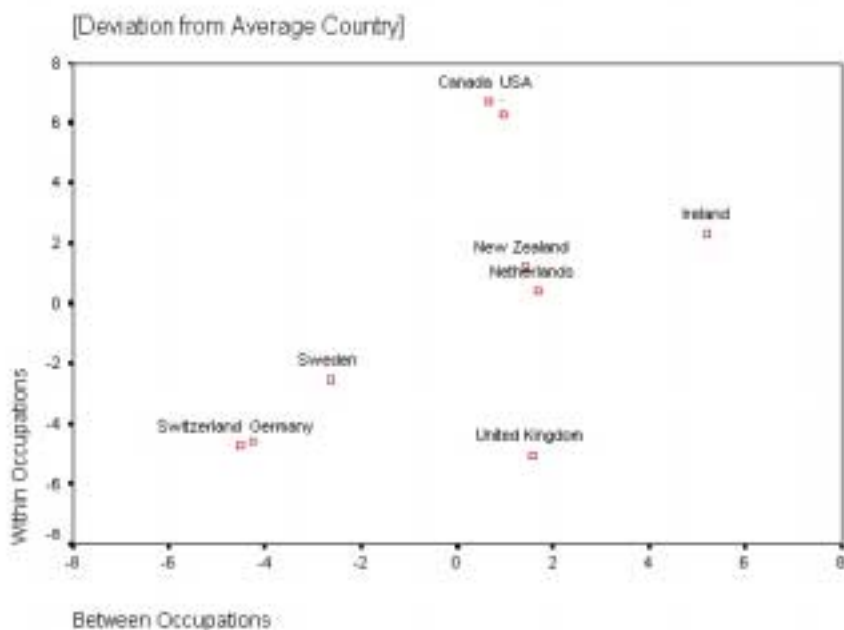
Figure 2a: Mean Job Requirements

[Deviation from the Average Country]

Occupational Composition

Figure 2b: Variance Job Requirements

[Deviation from Average Country]

Between Occupations

It can be seen that countries that exhibit differences pertaining to occupation-specific job requirements (stddev: .95) play a more important role than differences regarding the occupational structure (stddev: .54). All Group A countries have above-average job requirements (averaged over all occupational groups) but (with the exception of Sweden) their occupational composition does not differ from the occupational structures of the average country. Ireland as the country with the by far lowest average GRWJR scores and the highest incidences of low-requirement jobs combines low job requirements per occupations with an occupational structure with a high incidence of

'low' occupations. New Zealand and the Netherlands are two extreme cases: New Zealand has the highest requirements per occupation of all countries but besides Ireland the lowest occupational composition. The Netherlands in contrast share with Sweden the 'top-position' as far as the occupational composition is concerned but has beside Ireland the lowest job requirements per occupation.

Table D2 reports the average GRWJR for aggregated occupational categories, managers/professional, technicians/clerks, service and sales workers and blue collar workers (including elementary occupations). This table shows that it is mainly the requirements for 'medium' and 'lower' occupations which account for the fact that it is in those countries with high GRWJR demands that there also tends to be higher job requirements per occupations. In all three Group A countries, Technicians and Clerks, Service and Sales Worker and (with the exception of Sweden) Blue-Collar workers have occupation-specific job requirements that are above the requirements of the average country. In contrast, in none of the countries are the job requirements of managers and professionals higher than the average job requirements. The combination of high requirements for the 'medium'and 'lower' occupations and relatively low requirements for the 'higher' occupations is the main factor that accounts for the shape of the job structure of these countries.

Table D2: Occupation-specific Job Requirements

Country	Managers Professionals		Technicians Clerks		Service and Sales Workers		Blue-Collar Workers	
	%	GRWJR	%	GRWJR	%	GRWJR	%	GRWJR
Canada	28.8	17.71	27.2	12.09	14.7	9.74	29.3	9.14
Ireland	24.0	15.48	26.5	14.38	13.6	8.06	35.9	5.99
New Zealand	26.5	18.39	27.5	15.73	14.8	10.22	30.1	10.27
United Kingdom	30.2	16.87	25.0	13.36	14.8	9.30	30.1	8.59
USA	32.5	17.26	20.1	13.64	24.4	10.61	23.0	8.93
Germany	19.4	17.05	33.6	16.26	14.3	12.45	32.7	11.06
Netherlands	29.0	15.65	35.4	14.06	11.0	9.07	24.6	7.62
Sweden	33.4	15.94	29.5	14.97	13.6	13.34	23.6	8.86
Switzerland	27.2	16.93	35.5	14.79	13.0	12.09	28.4	10.59
Total	**27.4**	**16.93**	**28.9**	**14.19**	**15.1**	**10.59**	**28.5**	**8.92**

Belgium excluded since data have incompatible occupational groupings

Table D3 also outlines a decomposition of the difference between the country-specific variance of GWRJR scores and the variance of the average country. Here, we distinguish between a composition effect (the share of the variance difference which is due to the occupational structure), a between-occupation effect (the share of the variance difference that is due to occupation-specific job requirement [assuming the occupational composition of the average country]), and a within-occupation effect reflecting the dispersion of job requirements within occupational groups.

Table D3:   Decomposition of Differences in Variance Job Requirements between Countries

	means (σ^2) - $\sigma^2_{Country}$	Occup. Compos.	Between-Occupat.	Within-Occupat.	Interaction Effect
Canada	+8.17	+0.82	+0.65	+6.73	-0.03
Ireland	+8.94	+0.73	+5.21	+2.33	+0.67
New Zealand	+2.78	+0.27	+1.40	+1.22	-0.11
United Kingdom	-2.16	+1.76	+1.58	-5.05	-0.45
USA	+6.98	-1.25	+0.95	+6.29	+0.99
Germany	-9.19	-1.16	-4.28	-4.58	+0.83
Netherlands	-0.01	-0.76	+1.65	+0.42	-1.32
Sweden	-5.98	-0.54	-1.27	-2.53	-0.26
Switzerland	-9.57	+0.11	-4.51	-4.75	-0.42

Belgium excluded since data have incompatible occupational groupings

LoWER

European Low-wage Employment Research Network

Working Paper Series

No.	Author(s)	Title
01	Peter GOTTSCHALK (Boston College)	*Wage Mobility within and between Jobs* (april 2001)
02	Andries DE GRIP Geralt NEKKERS (University of Maastricht)	*Skills, wage dispersion and wage mobility in the 1990s: The case of the Netherlands, Germany, France and the United Kingdom* (april 2001)
03	Stephen BAZEN (Univerisité Montesquieu, Bordeaux)	*Youth and Earnings Mobility: The Case of France in a Comparative Framework* (april 2001)
04	Mary GREGORY (University of Oxford) Sara CONNOLLY (University of East Anglia)	*Changing Status: Women's Part-Time Work and Wages in the United Kingdom* (may 2001)
05	Peter MÜHLAU (Technical University Eindhoven) Justine HORGAN (University of Groningen)	*Cognitive Skills, Job Requirements and Labour Market and wage Postion – Evidence from the International Adult Literacy Survey* (July 2001)
06	Wiemer SALVERDA (University of Amsterdam) Peter MÜHLAU (Technical Univeristy, Eindhoven)	*Long-term Changes in Wage inequality: The Role of Allocation and Compensation in the United States, France, Germany, The Netherlands and the United Kingdom* (may 2001)
07	Rannia LEONTARIDI (Univerisity of Stirling) Peter SLOANE (University of Aberdeen)	*Measuring the Quality of Jobs: Promotion Prospects, Low Pay and Job Satisfaction* (may 2001)
08	Rita ASPLUND (Research Institute of the Finnish Economy, ETLA)	*Mobility and Earnings: An Analysis of Finnish Manufacturing and Services* (may 2001)

No.	Author(s)	Title
09	Stephen BAZEN (Univerisité Montesquieu, Bordeaux) Mary GREGORY (University of Oxford) Wiemer SALVERDA	*The European-American Employment Gap, Low-Wage and -Wage Employment, Earnings Mobility and Job Quality* (July 2001)