8. DO WE NEED ALL THAT HIGHER EDUCATION? EVIDENCE FROM 15 EUROPEAN COUNTRIES [1]

Erling Barth and Marianne Røed

8.1 Introduction

Over the last twenty years the labour markets of the European Union have experienced a boom in higher education. On average, the relative number of employees with a tertiary education to those educated at a lower level has doubled from 1980 to 1996 in the 15 European countries covered by the PURE project. Behind this development lies educational policies in each of the countries, boosting enrolment into higher education. As we report below, the real value of total public expenditure on higher education has increased by more than 75% over the same period.[2] The questions we try to answer in this study are the following[3]: How have national labour markets responded to these changes in the composition of the labour force? In which way has public funding of higher education affected the formation of relative wages between higher and lower educated workers? Is the labour market willing to absorb all higher educated workers, and how do such changes in demand affect the value of education?

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[1] This chapter reports from the work of the PURE "sub-group" that has focused on labour market implications of public funding and educational policies. The analysis is restricted to tertiary education only. The chapter draws on the work by Erling Barth, Arnauld Chevalier, Gauthier Lanot, Marianne Røed and Josef Zweimüller reported in Barth et al. (2001). We have benefited from other results produced within the PURE project, especially those on private returns to education (see Asplund and Pereira (1999), Harmon et at. (2001) and Chapter 2 of this volume). We are indebted to all PURE partners for providing us with national data on labour supply, educational systems, student support and public funding. Thanks also to Michael Wallerstein, who provided us with data on bargaining institutions. We have also benefited much from the comments received at PURE's user-oriented Lisbon seminar, particularly from Lord Richard Layard.

[2] This number is calculated on the basis of data from the thirteen countries for which information about public expenditure on higher education was available for each year over the entire period, see Figure 8.2.

[3] See Barth et al. (2001) for a thorough report of the analyses undertaken.

The first two questions are related to the consequences of openness and international trade (see Johnson and Stafford 1999). According to standard trade theory, relative factor prices are affected by changes in the factor endowment in a single country, only to the extent that these changes affect the world supply of factors. This theory also states that changes in the educational policies of a country impact on industry structures and trade patterns, not on relative factor prices. Here we investigate this topic by studying the relationship between educational wage premiums and educational policies of individual countries. As we report below, we find, for all countries, a significant relationship between the level of public funding of the educational system, the supply of highly educated workers and the wage premium for education.

The finding that relative wages do react on changes in relative demand and supply has consequences for the interpretation of European unemployment as well. Jackman et al. (1997) argue, based on evidence mainly for the USA and the UK, that relative wage rigidity cannot be the cause underlying European unemployment.

The third question raised above concerns the evaluation of education in the labour market. The observation of a positive wage premium for education implies that employers value education.[4] A standard demand curve for education is downward sloping, indicating that an increase in supply has to be met with a decline in the observed wage. However, if supply and demand shift simultaneously, wages may go either up or down, depending on the size of the shifts and the slopes of the curves.[5] An extensive literature has documented that skill-biased technological change has increased in importance during the last decades (see e.g. Berman et al. 1997). If this is the case, then the value of education in the labour market is increasing over time. Below we calculate the size of the increase in relative demand for education based on estimates from all PURE countries for 1980 to1995.

To get a flavour of the subsequent analysis, consider the illustration in Figure 8.1. The vertical axis measures the wage premium of education in the labour market; that is, the wage for higher educated employees relative to the wage of employees educated at a lower level.[6] The horizontal axis measures the relative employment of highly educated;

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[4] Educated workers earn more, see Chapter 2 of this volume.

[5] See Katz and Autor (1999) for an elaborate discussion.

[6] Note that relative wages between educational groups provide a measure of the return to education in the labour market. See Chapter 2 of this volume for a thorough discussion.

that is, the number of employees with a higher education divided by the number of employees without a higher education. The downward sloping curve illustrates relative demand for higher education.[7] When the relative wage falls, firms demand relatively more higher education. The upward sloping curve illustrates relative supply of higher education. The level of supply is determined by the number of persons in the labour force with higher and lower education as well as by the employment rate of those two groups of workers. In the figure, we have drawn the supply curves very steep, indicating small or negligible effects of relative wages on relative supply of the two groups. The equilibrium relative wage is given by the interception of the supply and demand curves.

Figure 8.1.   *The race between technology and education*
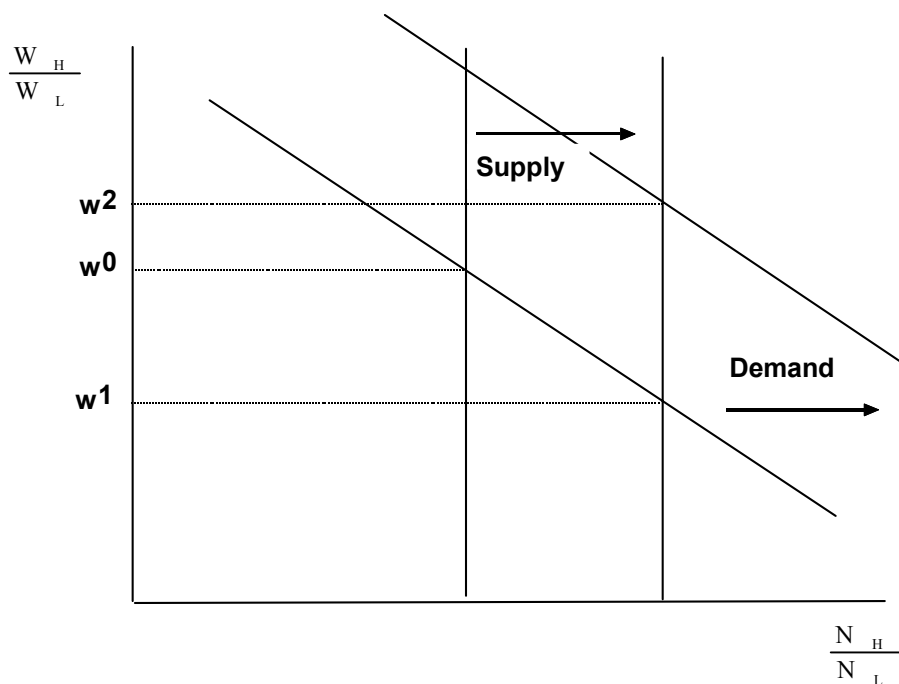
Let w^0 be the initial equilibrium level of relative wages. Consider next a positive shift in relative supply, for instance as a result of increased public expenditure on higher education. Firms are willing to employ a higher share of educated workers only if the relative wage is reduced. Consequently, a new equilibrium level of relative wages is given by w^1. Thus, higher relative supply implies lower relative wages. However, if

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[7] The curves are linear for expositional reasons only. In the subsequent analysis, the model is estimated under the assumption of constant elasticities rather than constant slopes, as indicated in the illustration. In this case, the relative demand and supply curves, measured in logarithms, would be linear.

demand – due to a change in the underlying technology – shifts as well, the drop in relative wages is counteracted, possibly even to the point where relative wages rise, as illustrated by w^2 in the figure. Hence the figure illustrates that "the race between technology and education"[8] may shape the time path of relative wages.

The analysis reported below uses two-stage regression techniques to estimate the elasticity of supply and demand as well as relative wages. The analysis uses variation in public expenditure on education, in student support and in lagged relative supply between countries and over time to identify the underlying parameters. Differences in bargaining regimes and unionism over time and across countries are also used to identify the parameters of the model. The analysis is undertaken under the assumption that the underlying shifts in technology within industries are similar in the European countries. It is also assumed that there are barriers (costs) to labour mobility across national borders; that is, capital and technology are considered to be more mobile than labour.

At the national level, the demand curve is determined both by the technology of firms within industries and by the composition of industries in the economy. A positive demand shift may come about either by a technological change favouring higher education within all firms and industries or by a change in the distribution of total production from less to more education-intensive industries. Below we calculate the implied demand shift based on estimated slopes of the demand and supply curves and observed changes in wage and supply. We estimate the average increase in relative demand for tertiary education in the European labour markets to have amounted to about 5% per year over the period 1980 to1995. Demand has increased even more in the 1990s than in the 1980s.

In the contemporary European economies, wages do not necessarily reflect the forces of demand and supply only. Unions and bargaining institutions may also influence relative wages. In the analysis, we also allow for the influence of wage-setting institutions on relative wages in addition to supply and demand forces. It turns out that co-ordinated bargaining as well as high levels of union membership and coverage of collective agreements tend to compress wages, producing a lower relative wage for workers with a higher education. Still, both demand and supply forces influence wages as well.

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[8] This expression was originally coined by Tinbergen (1974).

The next section outlines the expansion in public expenditure on higher education, the increase in enrolment rates for higher education, and trends in relative supply for the PURE countries. Section 8.3 describes the trend in relative wages. Section 8.4 reports on results from a simultaneous analysis of relative demand, supply and wages. Section 8.5 provides the calculated demand shifts, and Section 8.6 concludes.

8.2   Public expenditure on higher education and the supply of higher education 1980–1995(96)

In this section we illustrate the changing pattern of higher education in the Western European countries during the past two decades. We focus on the growth of public expenditure, enrolment rates and the development of the relative supply of workers with a higher education. Differences between countries and changes over time are at the centre of interest.

Figure 8.2 describes the growth of real current public expenditure on higher education in the period 1980 to 1996. This figure gives the total sum of expenditure in 13 Western European countries, together with one per cent of GDP for the same group of countries. The figure clearly illustrates the expansion in public financial support to higher education during this period. In the 13 countries the real value of public expenditure on higher education increased with about 80% between 1980 and 1996. The rate of growth is low in the first part of the investigated period and then increases sharply towards the end. In the first five years, the increase was only 1.7%. The next five years, from 1985 to 1990, reveal an increase by 29% and from 1990 to 1996 by 39%. In the eighties, the real growth of public expenditure on higher education follows closely, or is slightly lower than, the real growth of GDP. Thus, public investment in higher education per unit of output remained quite stable. In the early nineties this relationship changed dramatically: the growth rate of public expenditure clearly exceeded the growth rate of GDP.

Table 8.1 of the appendix gives the real value of current public expenditure on higher education as a percentage of GDP for 14 Western European countries. The numbers reveal that there are great differences between the countries with respect both to the level and the growth rate of this indicator. The development of the standard deviation indicates that the average difference in levels declined during the eighties, but grew

sharply during the first part of the nineties. The Nordic countries in particular increased the public expenditure on higher education relative to GDP in this period. With regard to the growth rate, Denmark is lagging behind the other Nordic countries. However, Denmark started out at a considerably higher level in 1980. The Southern European countries that started from a relatively low level have also experienced a high rate of growth in real public expenditure on higher education. The exception in this group of countries is Italy, which saw a decline in the value of public expenditure relative to GDP during the investigated time period.

Figure 8.2.   *Real total public expenditure on higher education and GDP/100.*
             Sum of 13 Western European countries*, measured in Euro (mill. 1985 value).
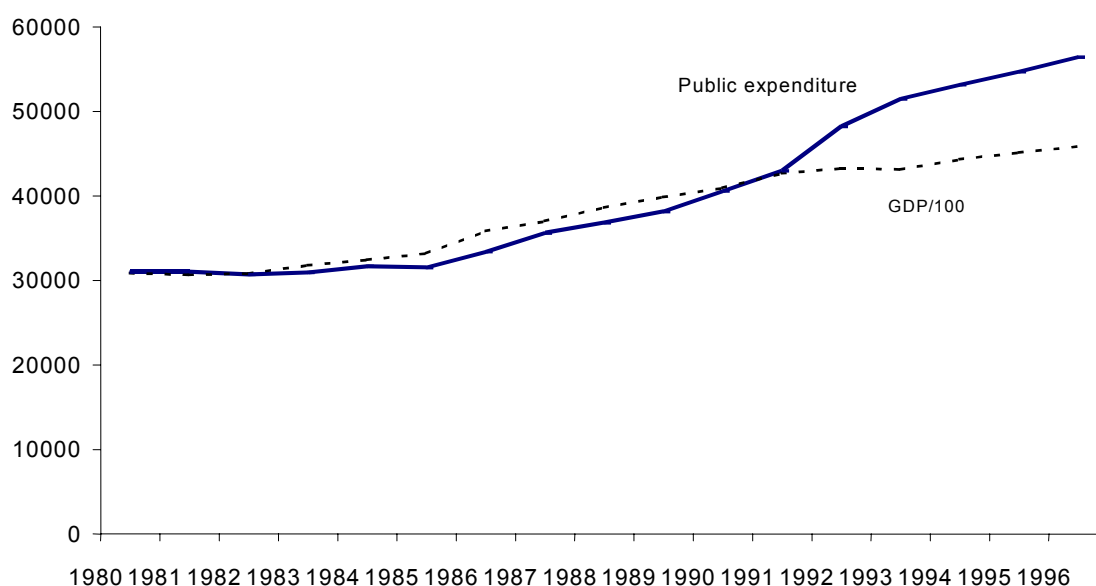
* Norway, Sweden, Finland, Denmark, Switzerland, UK, Netherlands, Germany, Portugal, France, Austria, Italy, Ireland.

Source: *UNESCO Institute for Statistics (2000)*

The 18 to 24 year-olds may be considered as the age group with the highest disposition to enrolment in higher education. Differences in the value of public expenditure per person in this group indicate variations across countries in private investment costs related to higher education. Put differently, provided that the production costs of a certain level and type of education are given, the more the government contributes per individual in this age group, the less each person has to invest to attain a certain level and type of education.

Figure 8.3.   *Public expenditure on higher education per person in the age group 18–24, mill. Euro 1985 value. The total sum for 13 Western European countries *, divided by the total number of persons in that age group.*
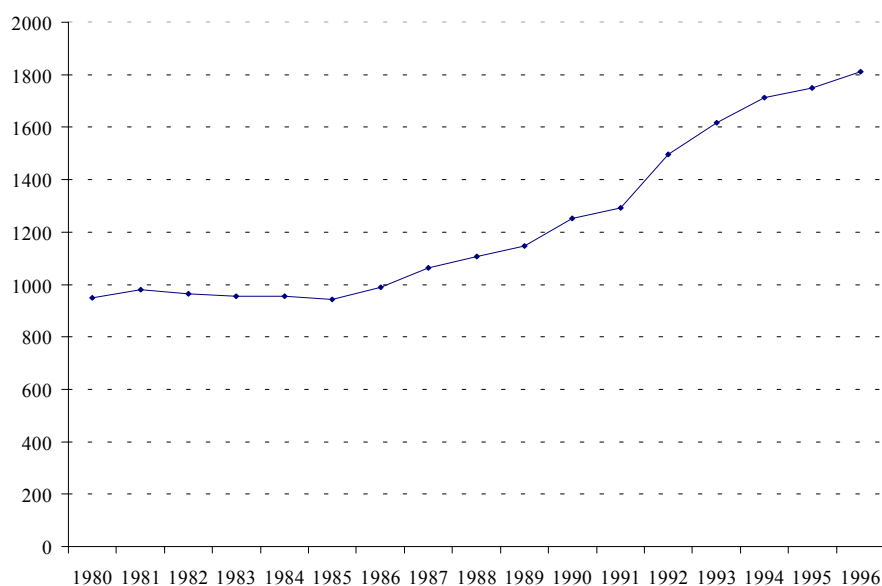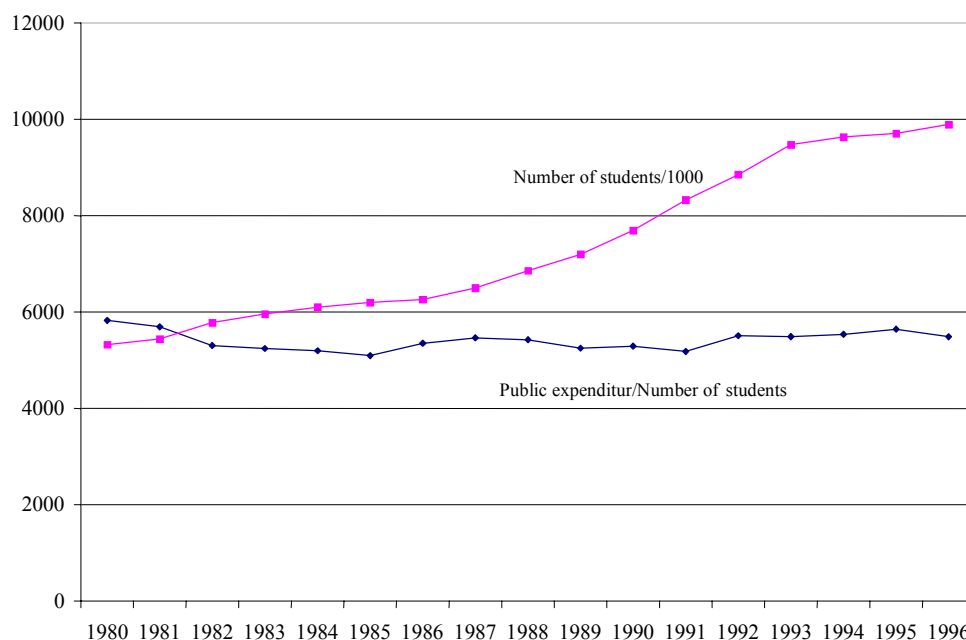

* Norway, Sweden, Finland, Denmark, Switzerland, UK, Netherlands, Germany, Portugal, France, Austria, Italy, Ireland.

Source: *UNESCO Institute for Statistics (2000)*

Figure 8.3 shows the total sum of real public expenditure on higher education in the same 13 Western European countries as in Figure 8.2, divided by the total number of persons in the age group 18 to 24. Measured by the total growth rate in these countries, the real value of public expenditure per person among the 18 to 24 year-olds has increased by almost 90%. As can be seen from the figure, however, the increase did not start until the mid-80s.

As is apparent from Table 8.2 of the appendix, there are great differences between countries with regard both to the level and the growth rate also of this indicator. Measured by the standard deviation the average differences between countries increased between 1985 and 1996. The Nordic countries, which were located more or less in the middle of the distribution in the early 1980s, had clearly moved to the top of the distribution by the mid-90s. With the exception of Italy, the growth rate has been high also in Southern Europe.

Figure 8.4.   Enrolment into higher education and public expenditure on higher education per student enrolled (in mill. Euro 1985 value). Total sum of expenditure and enrolment for 13 Western European countries*.

* Norway, Sweden, Finland, Denmark, Switzerland, UK, Netherlands, Germany, Portugal, France, Austria, Italy, Ireland.

Source: *UNESCO Institute for Statistics (2000)*

Figure 8.4 shows the sum of enrolment into higher education and the sum of real public expenditure on higher education in the 13 Western European countries. While the number of students has increased by about 85%, public expenditure per student has decreased slightly (about 6%) during the investigated time period. Measured by these indicators, it is clear that the increase in public funding during the last two decades has expanded the Western European system of higher education quantitatively rather than qualitatively.

Again there are large differences between countries. Table 8.3 of the appendix displays the number of students as a percentage of the number of individuals in the age group 18 to 24 for the period 1980 to 1996. In the following we refer to this indicator as the enrolment rate. The table shows that this enrolment rate has increased strongly in all countries. The table also gives the development in real public expenditure on higher education per student enrolled. In all countries in the Northern and Southern regions of

Europe expenditure per student has increased. In contrast, in some of the large countries in Central Europe it has decreased.

Figure 8.5   *Index of relative supply of highly educated workers in the PURE countries. 1980=100*
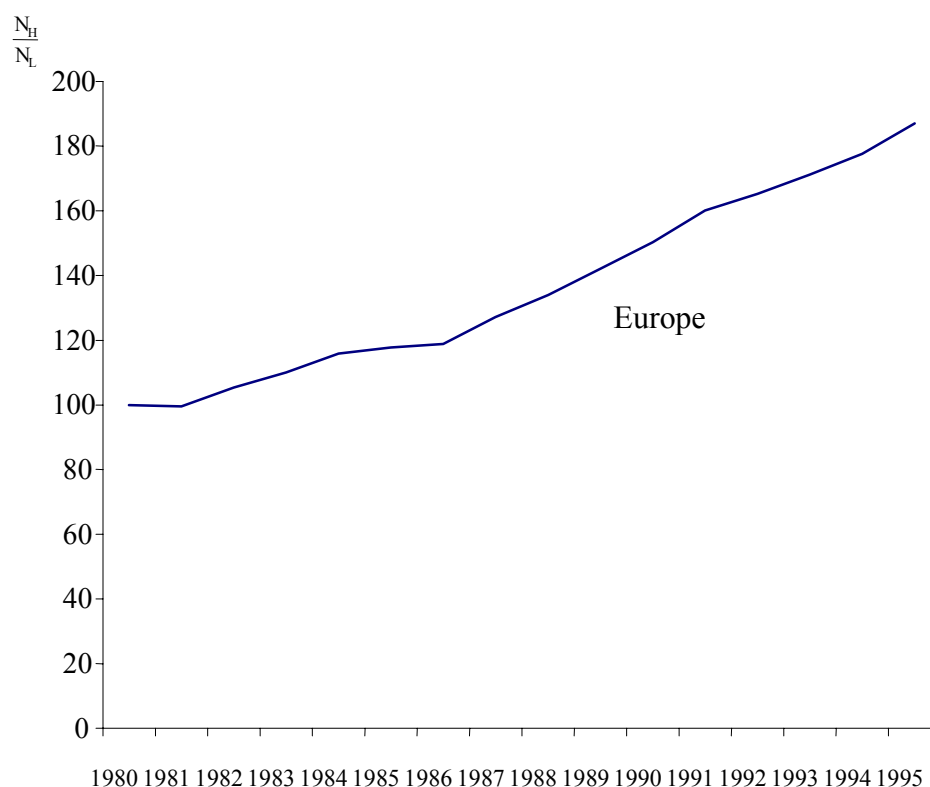
Notes: The time trend is calculated from a regression model of relative supply with only year and country dummies included. N_H is the umber of workers with a tertiary education (ISCED=5,6,7), N_L is the number of workers with a secondary or lower education (ISCED=1–4).

If the population cohorts available for the educational system have not strongly declined in number, then the increase in enrolment rates, apparent from Figure 8.4 and Table 8.3, must result in an increased supply of highly educated workers in the labour market. Based on data created within the PURE project, a time trend for the relative supply of highly educated employees was calculated (Figure 8.5). Relative supply is defined as the number of employees with a completed education above the high-school level, N_H, divided by the number with a completed education at the high-school level or below, N_L. This ratio has increased by more than 80% from 1980 to 1995.

Figure 8.6. *Relative supply of highly educated workers in the labour force of the*
PURE countries, $100 \bullet \dfrac{N_H}{N_L}$, 1996
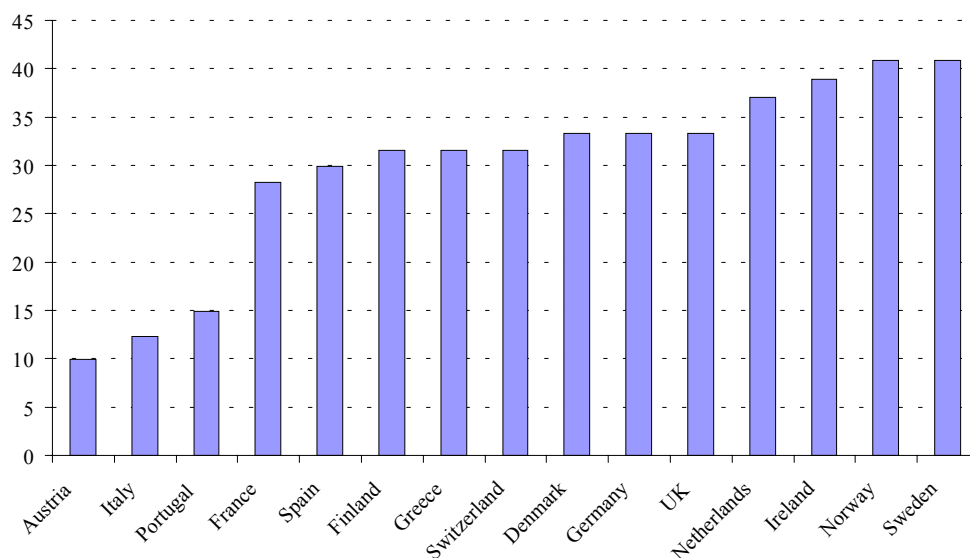
Notes: N_H is the number of workers with a tertiary education (ISCED=5,6,7); N_L is the number of workers with a secondary or lower education (ISCED=1–4).

Source: *OECD Education at a Glance (1998)*

Figure 8.6 shows the same ratio for all 15 PURE countries for 1996, calculated from OECD data. There are still large differences between European countries with regard to the composition of the labour force.

8.3 The wage premium for tertiary education

The wage premium for tertiary education is calculated as the cumulative returns to 6 years of education from Mincer-type wage equations.[9] The relative wage is calculated as the predicted wage for a person with 15 years of education divided by the predicted wage for a person with 9 years of education. In Figure 8.7 we display the overall trend in relative wages for the 15 PURE countries.

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[9] All information on relative wages is derived from the PURE reports edited by Asplund and Pereira (1999) and Harmon et al. (2001). Also see Chapter 2 of this volume.

Figure 8.7.   Relative wages for higher education, $\dfrac{W_H}{W_L}$*, 1980 – 1995.*
Estimated trend for PURE countries.
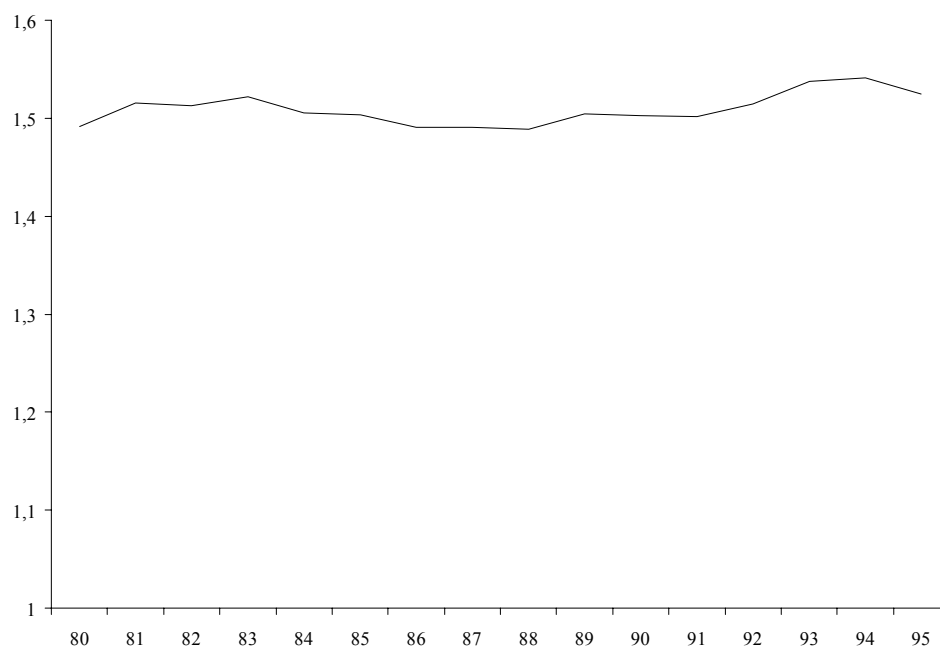
Notes: W_H is the wage of workers with a tertiary education (ISCED=5,6,7); W_L is the wage of workers with a secondary or lower education (ISCED=1–4). The trend is calculated from the year dummies of a regression model of the return to education on country and year dummies.

From 1980 to 1995 the calculated average has increased from 1.49 to 1.52. Thus, on average for the PURE countries, relative wages have risen slightly over this period. As shown in Chapter 2 of this volume, the pattern differs substantially between countries, however. Most countries have experienced a growth in relative wages or rather stable relative wages, while only a few have seen a decline in the relative wages of highly educated workers. In other words, the trend displayed in Figure 8.7 is not the result of a consistent trend across Europe, but rather a summary of different national trends. Still it remains clear that we do not observe a general decline in relative wages over this period despite a considerable boom in the supply of workers with a higher education. Thus, in accordance with our analytical framework, demand must have boomed as well. In the next section we present some results from a more elaborate analysis of supply, demand and wage setting.

8.4 Results

Some of the results of the statistical analysis are summarised in Table 8.4 of the appendix. In the following we discuss some of the main results with respect to supply, demand and wage setting for higher education.

8.4.1 Relative supply of higher education in the labour market

As has become evident above, there are large differences with regard to public expenditure on higher education both between countries and over time. The analysis of supply, as reported in Table 8.4 (column 1), is based on within-country variation only. Not surprisingly, it reveals a strong relationship between public funding of higher education and growth in the relative supply of workers with a higher education. Keeping total expenditure on education constant, an increase in public expenditure on higher education by one percentage point of GDP (the average is slightly below one per cent) increases the relative supply of highly educated workers with 7.6%. Increasing total expenditure on education, while keeping the expenditure on higher education constant, decreases the relative supply of highly educated workers with 2.3%. When controlling for the level of public expenditure on education, we found no effects of direct student support (average grants, tuition) on the relative supply of higher education.[10] Nor did we find a significant effect of relative wages on relative supply. This result may indicate that the rather steep supply curve in the relative price-quantum diagram (Figure 8.1 above) reflects reality fairly well. Moreover, this finding is consistent with the results reported in Chapter 9 of this volume, namely that overall student enrolment into higher education is rather insensitive to relative wages.

The coefficient of lagged supply is about 0.9 and significantly less than unity, indicating a tendency of convergence in the relative supply of workers across the European countries. Countries with a high level of supply experience lower growth rates than countries with a low level of supply, given relative wages, public expenditure and student support.

Basically we model the change in the stock of human capital, rather than the level. In steady-state, where relative supply is kept constant, the effect of the explanatory

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[10] We did not obtain complete information from all PURE countries on student support. Moreover, the available information is difficult to compare across countries.

variables would be magnified (by a factor around 10 since the coefficient of the lagged variable is 0.9). The long-term effects of higher public expenditure and relative wages are thus considerably larger than the short-term effects. For instance, a doubling of public expenditure from a level of one per cent of GDP to two per cent of GDP would increase supply by 7.6% in the first year, but eventually relative supply would reach a level that is more than 76% higher than initially.

8.4.2 Relative wages

Table 8.4 of the appendix also presents results from a wage equation. In this model the elasticity of relative wages with respect to relative supply is estimated at –0.06. The interpretation of this coefficient is that an increase in relative supply of one per cent will decrease relative wages by 0.06%.[11] The model includes time-specific fixed effects in order to capture the impact of technological change from the demand side. When time dummies are included, the link between aggregate supply (of all PURE countries) and aggregate relative wages disappears as well. This suggests that the effect arises from differences in the countries' own endowment of higher education, rather than from some aggregate of European-level higher education. This result is contradictory to the predictions from trade theory, according to which the influence from supply should come from the development of aggregate international supply, rather than from the factor endowment of single countries.

The results further reveal that increased union density and/or bargaining coverage tend to compress wages between educational groups, at least for medium or lower levels of union density and coverage. This result is in line with observations in the literature that unions generally tend to compress wages (Freeman and Medoff 1984). There is a counteracting interaction effect, however, implying that at higher levels of union density, increased coverage will no longer compress wages. Likewise, for high levels of coverage, increased union density no longer compresses wages. Our tentative interpretation of this interaction effect is that at high levels of density and coverage, unionism extends well into the higher educational strata of the labour force, in which case the compressing effect of unions is counteracted by the internal pressure from members with higher education.

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[11] If wages were set at market-clearing levels and if supply were inelastic with respect to wages, we would expect to get a coefficient of $-1/E$, where E is the elasticity of demand with respect to wages. The relation between our estimate and that of a wage-setting model is discussed in detail in Barth et al. (2001).

Finally, we also find a significant compressing effect of co-ordination in bargaining on relative wages. Going from a completely decentralised country to a completely centralised one would decrease relative wages by about 15%.[12]

8.4.3 Demand for higher education

The elasticity of relative demand to relative wages is estimated at about −1.6. This means that the elasticity of substitution between the two groups of labour is about 1.6. The estimate is very close to the "preferred" 1.4 for the USA as reported by Katz and Autor (1999) and the one estimated for the UK (1.04) by Jackman et al. (1997). Furthermore, we are not able to reject the null hypothesis of an elasticity of unity (Cobb –Douglas).

With this elasticity of relative demand, a growth in relative employment of about 80%, as experienced in Europe over the investigated 15-year period, would imply a decline in relative wages of about 50%, given that the demand curve is stable. This has not been the case, however. Demand has shifted as well. Figure 8.8 shows an estimate of the shift in demand from 1981 to 1995.[13] Relative demand is fixed at 100 for 1981, and the curve displays the growth in demand that would have occurred for a given relative wage. We note from the figure that the shift in demand has been even stronger in the 1990s than in the 1980s and that the index ends up at about 190 for 1995.

As mentioned in the introduction, demand growth may come about as a result of within-industry growth or as a result of a change in the structural composition of industries. The dotted line in Figure 8.8 gives the calculated increase in demand from structural change between industries.[14] It may be concluded from the figure that, at least with a fairly coarse definition of industry, between-industry changes have contributed only marginally to the overall change in relative demand.

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[12] We have used a combination of the centralisation index created by Wallerstein (1999) and the co-ordination measures reported in OECD (1997). See Barth et al. (2001) for details.

[13] The demand shift is estimated under the assumption of an elasticity of substitution of 1.585 and the displayed trend is calculated from a regression model of these shifts including time and country dummies only.

[14] The industry demand index is constructed from average European education intensities for 1-digit industries (times gender) in 1990 and changes in employment shares for 1-digit industries (times gender) from 1980 to 1995 relative to the 1990 industry structure.

Figure 8.8.   Estimated demand shift, average for PURE countries. 1981=100
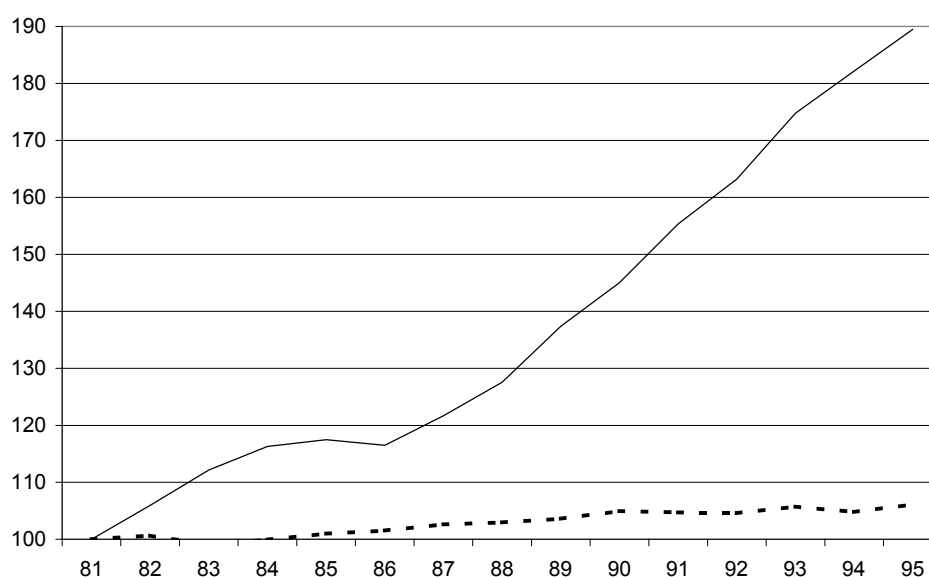
Notes: Calculated from a demand model, based on an estimated elasticity of substitution of 1.585. The trend is calculated from a model including time and country dummies only.

In Table 8.5 of the appendix, we have calculated average growth rates of relative supply, relative demand and relative wages. The first three columns report average annual growth rates (log points) of relative supply, employment and wages for the 15 PURE countries, estimated from the period 1985 to 1995. The highest growth in employment rates has occurred in Ireland, Sweden and Portugal, while Italy and Germany show the lowest growth rates in relative employment of higher education. We note that employment has risen at least as much as supply in 11 of the 15 countries. The unweighted average growth rate in relative employment is 5.0% while the average growth rate in relative supply is 4.9%. Italy and Greece have experienced the highest growth in relative wages, while Austria and Sweden show a decline. We note, once more, that the unweighted average growth rate of relative wages is positive even in a situation with a very high growth rate of relative employment.

The next two columns of the table report calculated growth rates for relative demand and supply indexes. The demand (supply) index is calculated as the annual growth rate minus (plus) the elasticity of relative demand (supply) times the annual growth rate of relative wages. These indexes are interpreted as giving the size of the shift of the

demand (supply) curves in Figure 8.1; that is, the growth in demand (supply) that has taken place at given relative wages.

We find that the underlying shifts in supply have been particularly strong in Ireland and Sweden. In Italy, in contrast, the annual growth in supply has been only 0.4%, which is extremely low for a country having experienced a growth in relative wages of 2.2% per year. The reported supply shifts should be interpreted as increased relative supply, *given relative wages*. Behind these shifts are to a large extent the expansion of the school system and increased public funding of higher education.

Large shifts in the underlying relative demand curves are found for Ireland, almost 11% per year, and for Greece, Portugal and Switzerland, all of which have experienced shifts in relative demand of more than 7% per year. Germany turns out to be the country with the lowest calculated shift in demand among the PURE countries over this period. Behind these shifts are for the most part, as we observed in Figure 8.8, technological changes within industries (at least for the industry classification used in this study).

It should, however, be stressed that the specific numbers for the single countries are uncertain and calculated on the assumption of constant elasticities of demand and supply across countries and over time. Averaging across countries gives a demand shift of 5.6% per year, which has been met by a shift in supply of 4.7%.

8.5   Conclusions

The expansion of the educational system may be considered as a nation's attempt to influence its own endowment of human capital. Public expenditure on higher education works to increase the human capital content of the labour force. We have found that such an expansion would, ceteris paribus, be accompanied by a reduction in the relative wages of the country. On the whole, however, the increasing supply of highly educated labour has not led to a reduction in relative wages in Europe. The reason is that demand has shifted as well. At the aggregate European level, the relative demand curve has shifted more than the relative supply curve. The demand for education has increased by about 5% per year and, moreover, with a higher growth rate in the1990s than in the 1980s.

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Appendix tables

Table 8.1.   Real total public expenditure on higher education, % of GDP in 14 Western European countries (Euro 1985 value)

	1980	**1985**	**1990**	**1995**	**% change 80–95**
Sweden	0.72	0.88	0.90	2.16	200
Norway	0.79	0.75	0.93	1.90	141
Denmark	1.04	1.38	2.05	2.02	94
Finland	0.94	0.98	1.36	1.96	108
Spain		0.43[1]	0.59	0.75	74
Portugal	0.38	0.49	0.64	0.87	128
Italy	0.75	0.55	0.64	0.69	–8
France	0.60	0.71	0.70	0.99	65
Ireland	1.24	1.09	1.06	1.23	0.8
Austria	0.69	0.87	0.95	1.05	52
Switzerland	0.87	0.84	0.90	0.99	14
Germany	1.2	1.17	1.25	1.37	8.3
UK	1.18	0.95	0.90	1.30	10
Netherlands	1.89	1.58	1.80	1.44	–45
STD	0.38	0.30	0.33	0.49	

Note: [1] 1987

Source: *UNESCO Institute for Statistics (2000)*

Table 8.2. *Real total public expenditure on higher education, per person in the age group 18–24, in 14 Western European countries, 1980–1996 (Euro 1985 value)*

	1980	**1985**	**1990**	**1996**	**% change 80–96**
Sweden	916	1122	1303	3309	261
Norway	968	1027	1280	3590	271
Denmark	1464	2020	2341[1]	4163	184
Finland	850	1050	1939	3018	255
Spain		181[2]	287	397	119
Portugal	63	73	163	248	294
Italy	347	304	511	658	90
France	671	825	981	1576	135
Ireland		660[3]	807	1235	87
Austria	752	929	1268	1975	163
Switzerland	1695[4]	1705	2343	2898	71
Germany	1671	1485	2085	2945	76
UK	1023	793	922	1796	76
Netherlands	2098	1680	2329	2487	19
STD	590	571	739	1233	

Notes: [1] 1991; [2] 1987; [3] 1986; [4] 1981.

Source: *UNESCO Institute for Statistics (2000)*

Table 8.3. *Enrolment rates and public expenditure per student, 1980–1996*

		1980	1985	1990	1996	% change 80–96
Sweden	ENROLMENT RATE		22	23	35	56[1]
	Expenditure per student		5184	5684	9442	88[1]
Norway	ENROLMENT RATE	18	21	30	44	138
	Expenditure per student	5291	4838	4220	8216	55
Denmark	ENROLMENT RATE	20	21	26	36	75
	Expenditure per student	7270	9796		11669	62
Finland	ENROLMENT RATE	23	24	34	51	126
	Expenditure per student	3724	4326	5586	5838	56
Spain	ENROLMENT RATE	17	20	26	36	119
	Expenditure per student		787	1068	1088	
Portugal	ENROLMENT RATE	9	9	17	30	246
	Expenditure per student	735	830	968	839	14
Italy	ENROLMENT RATE	19	19	23	33	67
	Expenditure per student	1784	1639	2254	2021	13
France	ENROLMENT RATE	18	21	28	36	99
	Expenditure per student	3694	3904	3489	4343	17
Ireland	ENROLMENT RATE		18	23	28	
	Expenditure per student		3709	3493	3850	4[2]
Austria	ENROLMENT RATE	16	19	23	33	101
	Expenditure per student	4604	4942	5451	5988	30
Switzerland	ENROLMENT RATE	12	15	20	25	100
	Expenditure per student	13686	11192	11692	11591	−15
UK	ENROLMENT RATE	14	16	20	36	157
	Expenditure per student	7202	5064	4663	4962	−31
Germany	ENROLMENT RATE	16	18	23	28	78
	Expenditure per student	10522	8182	9148	10402	−1
Netherlands	ENROLMENT RATE	21	22	25	32	51
	Expenditure per student	9817	7596	9397	7687	−21
STD	ENROLMENT RATE	4	4	5	7	
	Expenditure per student	3938	3074	3247	3683	

Notes: [1] 1984–96. [2] 1985–96. Enrolment rate = 100* (number of students)/(number of individuals aged 18–24). Expenditure per student = (Real total public expenditure, Euro 1985 value) / Number of students enrolled.

Source: *UNESCO Institute for Statistics (2000)*

Table 8.4.   *The market for highly educated workers in Europe. Relative supply, relative demand and the log of relative wages. Regression results, 2SLS.*

	Relative supply	**Relative demand**	**Relative wages**	**Mean values**
Relative wage	0.55 (0.350)	−1.58* (0.595)		0.42
Relative supply			−0.06* (0.014)	−1.92
Relative supply, lagged	0.91 (.031)			−1.97
Public expenditure, % of GDP:				
On higher education	0.076* (0.028)			0.94
On all education	−2.25* (1.068)			5.33
Student support	−0.01 (0.017)			390.58
Bargaining institutions:				
Co-ordination			−0.04 (0.016)	1.53
Coverage			−0.36* (0.118)	0.68
Union density			−0.93* (0.209)	0.39
Density times Coverage			1.11* (0.254)	
Country dummies	Yes	Yes	No	
Year dummies	No	Yes	Yes	
R-square	0.99	0.98	0.45	
N			240	

Table 8.5.   *Average annual growth rates in relative employment, relative wages and relative demand, 1985–1995. Log-points per country times 100.*

	Growth in Relative			Calculated growth in index	
	Supply	**Empl.**	**Wages**	**Demand**	**Supply**
Austria	5.5	5.5	−1.1	3.7	6.1
Denmark	3.0	3.1	1.0	4.7	2.4
Finland	4.1	5.1	0.1	5.3	4.0
France	3.8	3.8	0.9	5.2	3.3
Germany	1.9	2.3	−0.4	1.8	2.1
Greece	5.1	5.2	1.7	7.8	4.2
Ireland	10.7	10.4	−0.0	10.4	10.7
Italy	1.6	1.6	2.2	5.2	0.4
Netherlands	5.4	5.2	−0.1	5.0	5.5
Norway	5.2	5.5	−0.1	5.3	5.3
Portugal	6.1	6.0	0.7	7.1	5.7
Spain	5.0	5.1	−0.1	4.9	5.1
Switzerland	5.4	5.6	1.0	7.1	4.8
Sweden	6.7	7.2	−0.7	6.2	7.1
United Kingdom	3.3	3.1	0.0	3.2	3.3
Average	4.9	5.0	0.3	5.6	4.7

Notes: Average annual growth rates for relative supply, employment and wages are (100 times) the coefficients of a linear trend in semi-logaritmic regressions for each country including a constant term and the time trend only. Average yearly growth rates of the demand and supply indexes are calculated for each country on the assumption that the elasticity of substitution is 1.585 and that the elasticity of relative supply equals 0.55.