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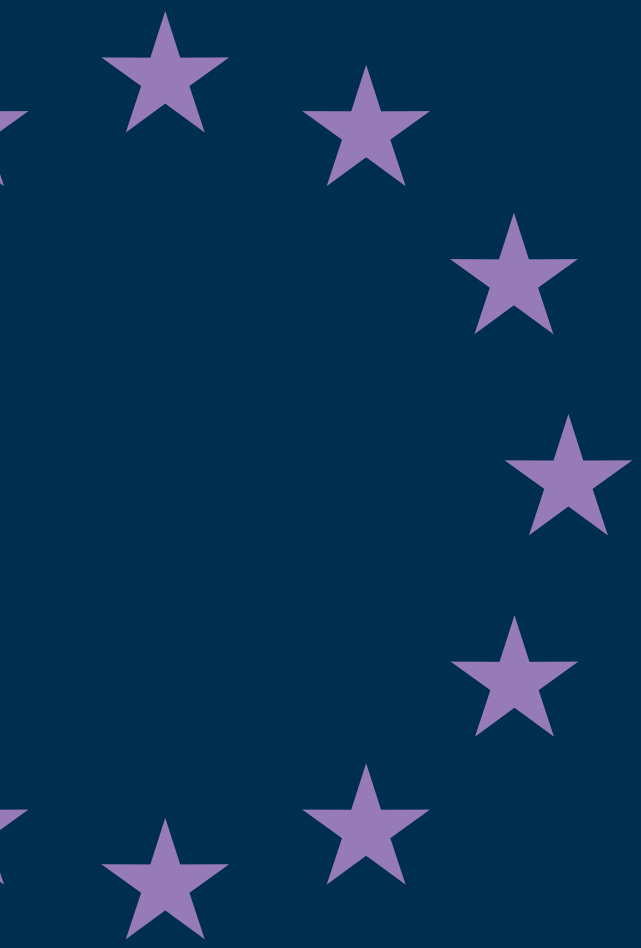

Quality and efficiency in education

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Abbreviations and symbols used

Member States

BE	Belgium
CZ	Czech Republic
DK	Denmark
DE	Germany
EE	Estonia
EL	Greece
ES	Spain
FR	France
IE	Ireland
IT	Italy
CY	Cyprus
LV	Latvia
LT	Lithuania
LU	Luxembourg
HU	Hungary
MT	Malta
NL	The Netherlands
AT	Austria
PL	Poland
PT	Portugal
SI	Slovenia
SK	Slovakia
FI	Finland
SE	Sweden
UK	United Kingdom

EUR-12	European Union Member States having adopted the single currency (BE, DE, EL, ES, FR, IE, IT, LU, NL, AU, PT, FI), i.e. countries participating in economic and monetary union without a derogation
EU-25	European Union, 25 Member States
EU-15	European Union, 15 Member States before 1 May 2004 (EUR-12 plus DK, SE and UK)
EU-10	European Union, 10 Member States that joined the EU on 1 May 2004 (CZ, EE, CY, LV, LT, HU, MT, PL, SI, SK)

Currencies

EUR	euro
ECU	European currency unit
DKK	Danish krone
GBP	Pound sterling
SEK	Swedish krona
CAD	Canadian dollar
CHF	Swiss franc
JPY	Japanese yen
SUR	Russian rouble
USD	US dollar

Other abbreviations

SCPs	Stability and convergence programmes
PEPs	Pre-accession economic programmes
NMS	New Member States
SGP	Stability and Growth Pact

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Introduction and overview

Chapter 1

Overview: Quality and efficiency of education and training in Europe

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([1]) European Commission, Directorate-General for Economic and Financial Affairs. Views expressed in this paper are exclusively those of the authors and do not necessarily correspond to those of the European Commission. The authors are grateful to Declan Costello and Margaret Raymond for helpful comments and suggestions.

1. Introduction

Education and training policies in Europe have aroused growing interest in recent years, at both national and EU levels, and from economists and labour market specialists as well as from educationalists. There are several reasons for this:

- the emergence of firmer evidence of education's role in stimulating productivity growth (see European Commission, 2003a, and references therein);
- increasing recognition of the role of the education system in assuring social cohesion. Failure to complete upper-secondary level is now viewed officially as an indicator of exclusion ([1]);
- the apparent links between rising educational attainment and the development of the knowledge-based economy. Individual returns to education in some countries have risen over the past decade or so, seemingly in response to rapid technological progress;
- the possible role of education and training in solving the problem of high unemployment and low employment rates faced by most EU Member States; and
- the possibility that the higher level of tertiary-level investment and attainment in the USA may be a key factor behind recent EU–US differences in economic performance (though it is not always seen this way by US observers, many of whom focus on perceived weaknesses in the US school system).

These and perhaps other reasons led EU leaders to call in March 2000 for a 'substantial annual increase in per capita investment in human resources'. This is a key strand of the Lisbon strategy by which the EU aims to become 'the most competitive and dynamic knowledge-based economy in the world capable of sustaining economic growth with more and better jobs and greater social cohesion' ([2]). Presumably Heads of State or Government did not mean merely an increase in spending on human resources, but rather an increase in real investment, i.e. in the number of people achieving given levels of education and/or in the quality of outcomes. Indeed, the Barcelona European Council in 2002 endorsed a further objective: to make Europe a worldwide reference for the quality of its education and training systems ([3]).

In the economics and finance sphere, discussions focus on shifting public resources away from areas considered relatively unproductive towards investment in human capital as a way to improve the quality of public finances (see European Commission, 2004, Part IV). Even so, not every expenditure item labelled as education is always good for growth. Even investments that generate net social benefits are not necessarily efficient public investments, strictly speaking, because a large share of the benefits may accrue to individuals who are not required to contribute to the costs but would be willing and able to do so if required. Under such conditions, investments could be financed privately, thus freeing public funds for other projects that generate net social surplus but cannot be financed in any other way, or allowing for tax reductions.

All of the above explains why there is growing interest in quality and efficiency in education. To explore these themes, the Directorate-General for Economic and Financial Affairs hosted a workshop in May 2004, with

([1]) The structural indicators collected by Eurostat and used to benchmark Member States' performance against various economic, social and environmental objectives include one on 'early school leavers'. This is included in the category 'social cohesion' and is defined as the share of 18–24 year-olds who have not completed upper-secondary level education and are not in further education or training. See http://europa.eu.int/comm/eurostat/ for further details.

([2]) Presidency conclusions, Lisbon European Council, 23 and 24 March 2000.
([3]) Presidency conclusions, Barcelona European Council, 15 and 16 March 2002.

the aim of providing a broad overview of quality and efficiency issues from an economic perspective. Participants included representatives of national ministries (Economics and Finance, Education, Employment and Social Affairs), national central banks and the ECB, national and regional EU representations, academic institutions, think tanks, non-governmental organisations and EU institutions (including the European Parliament and several different DGs within the European Commission).

Subjects ranged from the determinants of quality in schools to reforms of higher education funding to the efficiency of policies to promote workplace training. The papers collected here offer a mix of perspectives, from the frontier of academic economic research to work aimed more directly at influencing policy.

This introductory chapter briefly sets out some working definitions of quality and efficiency in education and then surveys some of the main issues, drawing on the subsequent contributions to provide a foretaste of the main findings of the workshop.

2. Quantity, quality and efficiency in education

2.1. Working definitions

The **quantity** of educational attainment in the population is often defined as the share of people having successfully completed a given level of education (e.g. upper-secondary). Alternatively, an individual's attainment may be expressed in effective years of schooling — the standard number of years it takes to reach the highest qualification achieved. A variable often used in studies of the impact of education on economic growth is average years of schooling in the working-age population.

Of course, this is an imperfect proxy for the stock of human capital in the economy. Adult education and formal workplace training, not to mention on-the-job training, are mostly ignored (in part for lack of data). Standard durations of school attendance and higher education courses vary from country to country, but it is questionable whether there is a linear relationship between the length of studies and the amount learned. In some countries, repeated years and relatively high drop-out rates mean that one year of effective attainment requires significantly more than one year of enrolment on average. More generally, a year of schooling may not be fully comparable across countries if the quality of educational output differs.

The **quality** of output has to be judged according to how successful the education system is at meeting its multiple objectives — such as contributing to the productivity of future members of the labour force, stimulating technical progress and providing benefits in terms of greater citizenship, health and culture, and the democratic value of access to education.

Dixit (2002, cited in Dolton, 2002), for example, specifies the goals of the public education system (schools) as follows:

- imparting basic skills of literacy, mathematics, and science for communication, reasoning, and calculation;
- fostering the emotional and physical growth of children;
- preparing students for work, by teaching them vocational skills and attitudes suitable for employment;
- preparing them for life, by teaching them skills of health and financial management;
- preparing them for society, by instilling ideals of citizenship and responsibility;
- helping them to overcome disadvantageous circumstances at home, including in many cases poor nutrition and poor study environments; and
- providing an environment free from drugs and violence.

There are several different aspects of **efficiency** that together cover a range of issues across the education and training system.

First, one may regard a school or university as a unit of production and focus on the way in which it 'produces' (or adds value to) human capital. There are two key aspects of efficiency in production: choosing the correct mix of inputs given input prices, and producing the maximum amount of output possible with given inputs. Assessing efficiency in this sense is not entirely straightforward. To start with, it is difficult to identify a set of homogeneous inputs. For example, 'teaching skill' involves 'a series of important production decisions (reflected in behaviour, process choices, and so forth)' that cannot be easily captured by a few objective or subjective characteristics (Hanushek, 1986). In other words, we may have data on teachers' backgrounds and experience, and even head teachers' subjective evaluations of staff, but this may not be sufficient to model a highly complex production process.

A second aspect of efficiency that is of particular interest when comparing different national education systems is how resources are allocated between different outputs. Efficiency in this respect must be judged according to whether the choices made reflect social preferences in some sense. Even if we focus only on readily measurable proxies of output, there may be trade-offs to be resolved, for example between the length of studies and the number of graduates.

Thirdly, economic efficiency at the level of firms involves choosing the right mix between human capital and other inputs, including physical capital. Here, it is often argued that public policies are required to remedy market failures that might lead to sub-optimal levels of investment in human capital. The efficiency of such policies may be judged according to how successful they are in generating additional, productive training and how far the benefits of this exceed the costs of intervention.

At the level of the economy as a whole, the public sector plays a central role in education. It sets the regulatory framework within which the education sector operates — with implications for the overall efficiency of the economy at least as important as in the case of, say, telecoms or energy. It is also the majority investor, with a decisive influence on whether the chosen mix of inputs and outputs is efficient, and with the responsibility for ensuring that the social benefits of public investments in education represent an adequate return on public funds.

Sometimes the term efficiency is used as a euphemism for spending cuts, but this is not what is meant here. Clearly, if it were possible to produce the same outputs using fewer resources, then that would represent an efficiency improvement. But it does not follow that spending fewer resources is always more efficient, or that improvements in efficiency necessarily imply lower expenditure. Spending too little on education as a whole or on a particular area of education may also be inefficient. Moreover, efficiency improvements that raise the rate of return on investments in education and training are likely to lead to more, not less, investment.

2.2. Measuring quality and efficiency

Arguably the best available evidence on quality in schools comes from standardised academic achievement tests, which are designed to be as comparable as possible across different schools, regions and, more recently, across countries. Clearly this evidence pertains mainly to the first of the public education goals outlined above. Although good performance in literacy, maths and science tests is perhaps not entirely unrelated to other objectives, it would be stretching the argument to claim, for example, that test scores accurately measure the extent to which education instils good citizenship. There is some concern about whether tests provide sufficiently comparable indicators of academic performance, especially when used to assess students from different educational systems. Some argue, for instance, that students who are used to taking similar tests as part of the national education system may be at an advantage compared with those from other countries.

Thus, test scores and similar quantitative indicators of quality cannot fully substitute informed qualitative judgments. Indeed, if resources are concentrated on improving test scores, this might be to the detriment of other, less easily measurable, objectives. On the other hand, there is a link between performance in standardised tests and some of the presumed primary objectives of the education system, in particular productivity growth. The evidence suggests that an improvement in quality, as measured by performance in tests, might have a considerably larger impact on economic growth than a proportionate increase in average years of schooling (Hanushek and Kimko, 2000; see also Hanushek in this volume).

There is, to our knowledge, relatively little comparable data on quality in other areas of the education system. International rankings of universities, such as the one produced by Jiao Tong University in Shanghai, make for interesting cross-country comparisons — see François Orivel's contribution in this volume. Official assessments of research and teaching quality might be a useful source for investigating influences on quality at national level (see McGuiness, 2003, for an example of a study using the results of the research and teaching quality assessments in the United Kingdom).

There is probably no such thing as a simple indicator of efficiency. In principle, one could measure inefficiency by graphing the production function of the education sector (or an individual institution within it) and taking the distance between the actual bundle of outputs and the frontier. In practice, there is not nearly enough information on inputs, outputs and the production process to be able to do this. There are, however, several indicators and other sources of information that may shed a good deal of light on efficiency issues.

2.2.1. Education production functions

The economic literature on education production functions attempts to identify the determinants of output along at least one dimension — that of quality as proxied by student performance in standardised tests. It considers the influence of several inputs, some school-related (such as class sizes, teachers' backgrounds and experience, administrative structure and so on), others to do with students' family background.

If the output of education is well proxied by test scores, and if inputs are allocated to optimise output for a given budget, then the marginal product of different inputs should be equalised (Filmer and Pritchett, 1999). Yet some inputs, such as teachers' education or class size, vary significantly between schools but do not seem to be correlated with student performance. Other factors, such as the autonomy of schools to hire teachers, do seem to make a difference. These results suggest that some schools are not choosing the optimal mix of inputs.

2.2.2. Output(s) of tertiary education

Diversity of national education systems is only to be expected given differences in national preferences and other economic and social institutions. Yet the output of tertiary education differs between EU countries to such an extent that one wonders whether the choices made genuinely reflect social preferences, or whether resources in some cases are allocated inefficiently. As Table 1 shows, there is wide variance in enrolment rates (which, by the way, are only weakly correlated with GDP per capita), the age distribution of tertiary students, the average duration of studies, expenditure per student and the survival rate (i.e. the share of people starting a course who successfully complete it).

Several of these figures might be combined to derive indicators that are relevant to efficiency issues. For example, one might obtain an impression of cost per graduate from the table as follows:

cost per graduate	≈	expenditure per student	·	average length of studies	·	1 / survival rate

Even though such an indicator would require considerable refinement, it is nonetheless remarkable how much it varies between countries. Whether a higher or lower cost is more or less efficient is of course wide open to debate, and a deeper investigation would be needed to understand the reasons for the cross-country variance. For instance, high expenditure per student in the USA is partly due to the extent of private investment in education. High drop-out rates in some EU countries are partly due to the lack of entry requirements for the first year of tertiary education, which some regard as a democratic imperative. A wide age distribution may be explained by large numbers of advanced research students and/or adults taking first degrees, or it may be largely due to undergraduates taking more than the standard number of years to complete their first degree. A low cost per graduate in some countries may simply reflect underfunding of universities.

Thus, a simple indicator like cost per graduate is not in itself an indicator of efficiency. But, as this discussion hopefully illustrates, further investigation of the reasons for cross-country differences may be a fruitful way to approach efficiency issues.

2.2.3. Evaluation of public policies

Evaluations of education policies, programmes and reforms are an important source of information on the efficiency of public interventions and how this might be improved (see Margaret Raymond, this volume).

The main problem with evaluations, especially in Europe, is that there are not enough of them, and the design of those there are often leaves much to be desired. It is striking, for example, that most of the evidence on the effects of pre-school education comes from the USA, even though pre-school enrolment is higher in several EU Member States. Another example is training programmes for the unemployed. Official evaluations of these often go little beyond noting the share of participants who subsequently found a job ([1]). More rigorous evaluations have been carried out in recent years, and these have often uncovered flaws in the design of programmes that might have been corrected earlier.

([1]) The relevant question is how much additional employment was due to the training scheme. To answer this, one needs to compare the effect on participants with a control group of non-participants with similar characteristics (taking into account possible selection biases, since the participation decision is non-random). Further complications include the point that those who do find jobs as a result of the training scheme may displace other workers, either directly or via increased wage pressure. On the other hand, a small increase in employability may yield very long-term benefits, which should also be taken into account.

The development of an evaluation culture in the EU would strengthen the design of education and training policies and programmes — both *ex post* and, since rigorous evaluations need to be carefully thought out at the stage of programme design, perhaps *ex ante* as well.

Table 1

Selected indicators of tertiary education inputs and outputs, EU-25 and USA

	Enrolment rate 2001	Expenditure per student 2001		Survival rates 2000		Duration 2000	Age distribution 2002		
	% 20–29 pop.	(PPS)	% GDP per cap (PPS)	Type A	Type B	Average in years	Median	15th percentile	85th percentile
Belgium	27.4	10 671	42.7	60	88	:	20.4	18.2	25.8
Czech Republic	15.2	5 128	36.4	61	77	:	21.8	19.2	26.5
Denmark	27.2	13 654	50.7	69	84	4.2	24.8	21.4	32.7
Germany	21.8	9 807	41.8	70	75	4.9	24.0	20.2	31.6
Estonia	30.5	5 385	56.2	:	:	:	21.7	18.7	29.8
Greece	30.1	3 944	25.1	:	:	5.2	20.6	18.2	25.0
Spain	28.0	7 105	36.1	77	74	4.6	21.7	18.7	27.2
France	26.0	8 041	32.9	59	72	4.7	20.6	18.3	24.8
Ireland	26.0	9 281	33.8	85	50	3.2	20.0	17.9	26.1
Italy	22.5	7 691	32.9	42	51	5.5	22.4	19.2	27.9
Cyprus	11.7	16 809	91.9	:	:	:	20.0	18.2	23.5
Latvia	31.7	:	:	:	:	:	22.4	18.7	33.6
Lithuania	28.7	3 335	37.7	:	:	:	21.0	18.5	27.9
Luxembourg	4.4	:	:	:	:	:	:	:	:
Hungary	20.7	6 934	57.7	:	:	4.1	22.1	19.1	29.4
Malta	12.8	6 293	41.6	:	:		20.2	18.0	28.6
Netherlands	24.4	:	:	69	58	3.9	21.6	18.6	28.8
Austria	26.2	10 765	41.2	59	:	6.2	23.5	19.6	31.5
Poland	29.0	3 580	36.6	:	84	:	21.6	19.2	26.5
Portugal	24.2	6 750	41.0	:	:	:	22.2	19.0	29.9
Slovenia	30.6	:	:	:	:	:	21.8	19.2	28.8
Slovakia	15.8	4 895	46.9	:	:	:	21.0	18.5	25.6
Finland	44.0	9 070	37.3	75	:	6.0	24.2	20.4	35.7
Sweden	32.5	13 793	55.6	48	85	4.6	25.3	20.6	38.7
United Kingdom	26.7	:	:	83	:	3.5	22.9	18.5	39.5
EU-15	25.4	8 426	36.1	:	:	:	22.1	18.9	30.6
EU-25	25.3	7 727	36.3	:	:	:	22.0	18.9	29.9
USA	36.6	18 885	58.2	66	62	:	21.3	18.4	32.9

NB: Enrolment rates for small countries such as Cyprus, Luxembourg and Malta are low in part because many students study abroad. The survival rate is given by the number of graduates in the current year divided by the number of new entrants in the typical year of entry. Survival rates for Belgium are for the Flemish community only.

Source: Eurostat, OECD, AMECO database for purchasing power standards (PPS).

3. How to increase real investment in education

3.1. Implications for human capital policy in Europe

One way to increase real investment in human resources is to increase the number of students and the length of time they remain in education. In the EU as a whole, average years of schooling in the 25–64 year-old population have been rising at a roughly constant rate of 0.8 years per decade over the past 40 years. However, with participation in secondary education already near-universal, one cannot necessarily expect the quantity of attainment to continue growing indefinitely.

Table 2 gives an idea of how the quantity of educational attainment might change over the next 10 and 50 years. The projection is built on assumptions of a significant further increase in (gross) enrolment, along the lines of recent trends and converging in the long run to 100 % in the case of upper-secondary education and, more debatably, 50 % of the 20–29 year-old population in the case of tertiary education. (See Montanino, Przywara and Young, 2004, for further details.)

Over the next 10 years, the mechanical increase in average attainment due to the replacement of older workers with better-educated younger workers dominates the effect of current increases in enrolment. This cohort effect is evidently largest in countries, exemplified by Spain, where enrolment has risen sharply in recent decades. In other countries, such as Denmark and Germany, where mass education spread earlier and younger workers are not much better educated than their older colleagues, the effect is much smaller. Hence the growth impact from rising educational attainment is likely to be relatively small too ([1]). Over the next 50 years, the same will increasingly apply to the EU as a whole. With the above assumptions, growth in average years of schooling is projected to slow from 0.8 years per decade in recent decades to 0.6 years over the next decade, and to fall further thereafter.

Therefore, if governments wish to maintain the positive contribution of education to economic growth, they may need to look increasingly towards quality and efficiency, not just quantity. Table 2 provides only an indication of cross-country differences in the EU; estimates based on more detailed administrative (as opposed to survey-based) national data sources might give slightly different results for individual Member States. Nevertheless, the point applies a fortiori to countries where attainment is already high and there is relatively little scope for further growth.

3.1.1. School quality

The available evidence suggests that the growth impact of quality improvements might dwarf the effects of an extra year or two of schooling. Hanushek and Kimko (2000) found that a difference of one standard deviation (across countries) in test performance is related to a difference of one percentage point in the annual growth rate of GDP per capita ([2]). Although the authors express some uncertainty about the precise magnitude of the causal effect of school quality on growth, they present additional evidence to suggest that there is indeed a causal effect.

([1]) Although the most recent evidence indicates that the change in attainment over time is the major influence on growth, the absolute level of attainment may also be relevant. In this case, growth prospects due to education in high-attainment countries such as Denmark and Germany would not be as poor, relative to other countries, as the table implies.

([2]) To get an idea of the magnitude of this effect, note that GDP doubles in 35 years if it grows at an annual rate of 2 %. If instead it grows at 3 %, it will double in a little over 23 years.

Table 2

Projected increase in average years of schooling, EU-15

		Increase with constant enrolment		Increase due to upper-secondary		Increase due to tertiary		Total attainment (increase since 2000)			
	2000	2010	2050	2010	2050	2010	2050	2010		2050	
Belgium	11.1	0.5	1.1	0.01	0.26	0.06	1.06	11.6	(0.6)	13.5	(2.4)
Denmark	12.5	0.2	0.4	0.02	0.32	0.06	1.12	12.9	(0.3)	14.4	(1.9)
Germany	12.6	0.1	0.1	0.02	0.30	0.04	0.87	12.8	(0.2)	13.9	(1.3)
Greece	10.5	0.8	1.5	0.02	0.35	0.07	1.16	11.3	(0.9)	13.5	(3.0)
Spain	9.4	1.0	2.2	0.04	0.74	0.07	1.16	10.5	(1.1)	13.5	(4.1)
France	10.8	0.5	1.2	0.02	0.27	0.08	1.49	11.4	(0.6)	13.7	(2.9)
Ireland	10.7	0.8	1.8	0.02	0.34	0.11	1.57	11.7	(0.9)	14.4	(3.7)
Italy	9.8	0.6	1.3	0.04	0.82	0.05	0.98	10.5	(0.7)	12.9	(3.1)
Luxembourg						0.02	0.85				
Netherlands	11.7	0.3	0.6	0.01	0.21	0.07	1.49	12.1	(0.4)	14.1	(2.3)
Austria	11.9	0.6	1.1	0.02	0.28	0.03	0.59	12.5	(0.6)	13.9	(2.0)
Portugal	8.3	0.5	1.1	0.05	1.05	0.05	0.97	8.8	(0.6)	11.4	(3.1)
Finland	11.9	0.8	1.7	0.01	0.19	0.02	0.34	12.8	(0.8)	14.2	(2.3)
Sweden	11.9	0.4	0.8	0.01	0.16	0.03	0.57	12.3	(0.4)	13.4	(1.5)
United Kingdom	12.0	0.4	0.8	0.02	0.37	0.09	1.64	12.5	(0.5)	14.8	(2.9)
EU-15	11.1	0.5	1.1	0.02	0.43	0.06	1.19	11.7	(0.6)	13.8	(2.7)

NB: Average years of schooling in the 25–64 year-old population are estimated from labour force survey data, using the standard durations of studies given in de la Fuente and Doménech (2001). LFS data from 1992 to 2002 are used to make rough projections of years of schooling assuming constant enrolment. Increases in enrolment are projected using the observed growth of tertiary enrolment in the USA from 1900 to 2000, fitted to a logistic (S-shaped) curve. It is assumed that upper-secondary attainment becomes universal in the long run, while tertiary enrolment approaches the equivalent of 50 % of 20–29 year-olds.

Source: Commission services.

Eric Hanushek's contribution in this volume lays the emphasis on teacher quality as a key determinant of school quality, and one over which policy-makers may have a real influence. But an increase in real expenditure on schools in the USA and a rise in the number of teachers with college degrees over the past 20 years has not had the desired effect. The benefits of higher quality could support substantial performance incentives to reward good teachers — as identified on the basis of actual classroom performance and the impact on student achievement — and thus promote a renewal of the teaching labour force.

One issue faced by researchers in trying to determine the impact of school quality is that parents try to secure places for their children in better-performing schools, and are quite willing to relocate and pay higher house prices in order to do so. Since family background is known to be a strong influence on student performance, it follows that students in areas with good schools tend to be of above-average potential, which makes it difficult to isolate the effect of schools. Similarly, good teachers are more likely to be able to secure jobs in good schools, with better working conditions. Hanushek notes that researchers interested in teacher quality have to focus on differences between teachers within the same school in order to avoid contamination from selection and matching of students and teachers.

The results of international standardised achievement tests, such as those underlying the OECD's PISA study, have proved to be a fruitful source for economists working on education production functions. Woessmann (2003) and Fuchs and Wößmann (2004) for instance, use data from the Trends in International Mathematics and Science Study (TIMSS) and the PISA study to investigate the determinants of student achievement within. As in the extensive US literature, family background is found to have a strong effect on student performance. Among the variables over which education policy-makers have most control, institutional aspects such as schools' hiring autonomy,

arrangements for testing, and homework requirements appear to be the most important influences on test scores. From the PISA data, it appears that expenditure per student is also positively, albeit weakly, related to student performance in maths and science.

3.1.2. Tertiary education

A recurring theme in the workshop was the point that early learning pays off. The earlier the investment in human capital, the higher the rate of return is likely to be (Carneiro, this volume). This is partly because the returns are reaped over a longer period, and partly because early learning facilitates later learning and training, whereas early skill deficits are difficult to remedy later on. Both Pedro Carneiro and Nicholas Barr (this volume) stress that the main barrier to access to university for young people from disadvantaged family backgrounds is not financial, but rather low levels of achievement in earlier education. Similarly, promoting workplace training is more difficult if individuals are not adequately prepared in school (and before).

Barr advocates the reform of tertiary education funding — and, in particular, the introduction of variable fees and income-contingent repayments — precisely in order to promote mass tertiary enrolment. Public expenditure could then be focused on areas that would genuinely help to widen access: pre-school education, quality in schools, upper-secondary attainment and grants for those from poor backgrounds. Allowing universities to charge higher fees would free them from resource constraints, which are a major obstacle to raising both quantity and quality. The UK reforms maintain that tax-funded higher education is an essential ingredient of the European social model, and are also progressive. Tax-funded higher education, at least in the United Kingdom, has apparently done little to promote wider access, yet is mostly paid for by taxes on those whose families do not have access.

Another mechanism through which quality might be influenced is competition between universities. Alexander Kemnitz's paper is one of the few so far to address this issue. Competition is imperfect and, in some variants of the specific model proposed, universities have an incentive to engage in excessive quality differentiation. Thus, there would be quite a wide range of institutions, from an elite group where the most able students (who are assumed to benefit the most) receive the best teaching and pay the highest fees, to institutions offering more modest teaching quality and lower fees. As in the industrial organisation literature, differentiation is a source of market power, which autonomous fee-setting universities exploit ([1]). Therefore, fee-setting by a benevolent central authority remains, in this setting, a more efficient solution. Optimal funding arrangements (pure loans, income-contingent loans or a graduate tax) depend on the precise nature of the strategic interaction between universities.

From an efficiency perspective, an important point in the debate on higher education funding is the balance between social and private benefits. Some argue that the social benefits of an extra year of schooling outweigh the private gains in lifetime earnings, and that there may therefore be a case for subsidies to promote access (see Gemmell, 1997; de la Fuente and Ciccone, 2002). Others argue that there is very little robust evidence of such externalities (e.g. Pritchett, 2003). In any event, few would disagree that the private benefits account for at least a large share of the social ones. Assuming, therefore, that prospective students are reasonably well-informed, and that liquidity constraints and risk aversity can be addressed (for example through income-contingent loans), the idea that higher education should be almost entirely publicly funded seems hard to sustain on economic principles alone.

3.1.3. Workplace training

Turning to training in the workplace, there is a similar debate about the case for public intervention, but the status quo is reversed. That is, most training is paid for by employers or individuals, although there are some plausible market failure arguments about why the amount of training provided might be sub-optimal and why governments should therefore consider intervening. Becker (1964) argued that firms have an incentive to pay for specific training (of use only to the firm), while — in a competitive labour market — individuals capture all the returns to any general training they undertake. However, in uncompetitive labour markets — in particular, those that compress the structure of wages — workers do not receive the full marginal product of any general training they undertake (Acemoglu and Pischke, 1999). The rest is an additional rent for firms, who therefore have an incentive to provide general training. The possibility that firms will provide a sub-optimal amount of training for fear of trained employees being poached by competing

([1]) Although educationalists will be pleased to see that, in the model, the resulting rents are spent on research.

firms is thereby resurrected. Moreover, firms do appear to pay for a good deal of general training, even if part of the cost is paid by employees (especially apprentices) in the form of lower wages (ibid.).

The evidence on returns to workplace training is mixed. Many studies suggest significant returns to training in the form of higher wages for employees who participate. However, some employees may have characteristics which lead both to greater participation in training and to higher wages without there necessarily being a causal link between training and wages. Leuven and Oosterbeek (2002) utilise a unique (albeit small) data set for the Netherlands to compare employees who undertook training with those who would have liked to but for some random reason did not. Thus the control group and the group undertaking training are much more similar than in most studies. Leuven and Oosterbeek find that training has no significant impact on wages.

However, over and above the returns to participating employees, firms may also benefit. Recent evidence suggests that the returns to firms in the form of higher productivity may be higher than the returns to participating employees in the form of higher wages (see Dearden et al., 2000, and Ballot, 2003, for some recent European evidence). Nevertheless, one has to wonder whether market failures can really be so large that firms require rates of return of several hundred per cent, as suggested in some of the studies cited by Ballot (2003), in order to invest in training.

Andrea Bassanini's paper in this volume provides evidence that suggests a further possible source of returns to training, namely higher employment, especially among older workers. Using data from the European Community household panel survey, he finds that older workers who participate in training do not appear to benefit much in terms of higher wages, but that they may well benefit from a higher probability of continued employment. One possible interpretation is that pay scales based on seniority leave older workers vulnerable to dismissal if their productivity does not keep pace with rising wages. By undertaking training, they justify their continued increase in seniority wages and are less likely to be made redundant.

In the absence of market failures, firms and/or individuals would be expected to invest in training up to the point where the risk-adjusted expected returns match those on alternative investments (e.g. in physical capital or on the stock market). The evidence of high average returns to training, albeit not fully conclusive, supports the view that market failures indeed lead to a sub-optimal amount of training. Therefore, a case for public policies to encourage training could be made, provided that it is possible to design policies that lead to additional, productive training at reasonable cost (taking into account the shadow price of public funds, administrative costs, deadweight costs and so forth).

In practice, this last proviso has not received as much attention as it deserves. One example, highlighted in Bassanini's paper, is training levies aimed at promoting workplace training. The basic idea is that firms are required to spend a small percentage (e.g. 1.5 %) of their payroll on training, otherwise they are taxed that amount and the revenues from the tax may then be redistributed to fund other training programmes. Such schemes operate in essence as a payroll tax and a lump sum subsidy to firms who undertake training, and closer examination of the incentive effects reveals that they do very little to promote truly additional, productive training. In general, experience (both recent and not-so-recent) of the mixed results of public training policies suggests that more rigorous design and evaluation should be a high priority.

3.2. Member States' experience and current reform efforts

We will not attempt to provide here an exhaustive overview of recent reforms in education and training policies. Some useful EU-wide sources on this include the publications of Eurydice, the European information network, as well as the open methods of coordination on education and training policies and on employment policies, in which officials from Member States meet regularly to compare performance and to exchange good practices ([1]).

A look at these comparative sources, as well as at national debates on, for example, school organisation or higher education funding, reveals that many if not most EU countries have made efforts to improve quality and efficiency in recent years. National policy-makers are

([1]) See http://www.eurydice.org/ for comparative reports on subjects including financing, organisation and evaluation of education, as well as details of reforms in Member States. A mapping exercise of efficiency related initiatives is under way in the open method of coordination on education and training. See http://europa.eu.int/comm/education/policies/2010/doc/best-use-of-resources_en.pdf for progress reports on this. Member States' national action plans for employment frequently refer to recent or planned reforms of education and training systems. These can be found at: http://europa.eu.int/comm/employment_social/employment_strategy/national_en.htm.

targeting quality and efficiency in different ways, and in different areas of the education system.

Recent examples of quite fundamental reforms of the school system include the 2002 Basic Law on quality in education in Spain, and the 2003 reforms in Italy which, among other things, will entail raising the duration of compulsory schooling by two years. Significant reforms of higher education funding have been undertaken or are on the agenda in many countries, including several of the new EU Member States. Jan Koucký's contribution notes how recent education policy measures in the Czech Republic have emphasised quality and the need to raise the supply of knowledge economy skills as the economy shifts away from its traditional industrial structure. The intergovernmental Bologna process is also stimulating reforms of higher education systems in many European countries. The process aims to improve mobility and the mutual recognition of qualifications, in part by moving towards a common structure of Bachelors and Masters degrees, and encouraging cooperation in quality assurance. Lifelong learning is another clear priority, with policy-makers in many countries studying ways to promote adult education and workplace training.

Without a more complete historical review, it is difficult to be certain whether education is a higher priority for policy-makers than it was in the past. Wolf (2002) points out that education and training seem to have been a top priority for as long as one can remember. Moreover, not all of the resulting initiatives are judged to have succeeded. Indeed, it is notable that some of the far-reaching educational reforms in the countries mentioned above serve partly to undo far-reaching reforms of the previous decade. Therefore, widespread interest in educational reforms does not necessarily provide grounds for optimism; it may just reflect the difficulty of education policy-making.

Either way, there ought to be much interest in the policy-making community in the findings of the papers in this volume. The level of interest in the economics of education in Europe certainly is a fairly recent phenomenon ([1]) — perhaps the careful application of economic principles in this area can serve to improve policy-making in some respects. Also encouraging, from the perspective of the workshop, is the explicit focus on quality and (albeit to a lesser extent) efficiency in many of the recent national debates on education and training policies.

([1]) See the recently established website www.education-economics.org which aims to promote and disseminate research on the economics of education in Europe.

4. Some tentative conclusions and issues for discussion

As Pedro Carneiro points out in his contribution, there is much diversity across Europe both in the organisation of education systems and in the particular challenges they face. Furthermore, a successful policy in one country may be very difficult to replicate elsewhere under different circumstances — as successive would-be emulators of the German apprenticeship system have discovered.

This said, European education systems do face a number of common challenges, as we shall outline below. Moreover, policy evaluation in the area of education and training is difficult and complex, and there is potential for making costly errors. It may take many years for the economic and social impact of educational reforms to fully materialise. Thus, although the exchange of best practice is not always straightforward, it seems essential in this context to draw as far as possible on other countries' experiences.

The EU has very little direct competence in the areas of education policy addressed in this volume. EU actions in education and training focus largely on areas where the encouragement of transnational cooperation has the potential to improve the quality of education and cultural exchange more generally, for example through the exchange of students and teachers under the Socrates-Erasmus programme ([1]). What the EU also increasingly does in areas like education and training is to provide a forum for Member States to coordinate national policies, exchange information and promote best practices — this is the procedure known as the open method of coordination.

([1]) See http://europa.eu.int/comm/education/index_en.html for details of the Leonardo da Vinci, Socrates, Tempus and other programmes.

Discussions in the workshop touched on several common challenges faced by EU countries (or a large subset thereof). Given the broad terms of reference of the workshop, it was perhaps only to be expected that as many questions would be raised as were answered.

The poor performance of **labour markets** is a factor that is common to more than half of the EU's Member States. Education and training is seen by many as a partial solution to some of these problems, in particular that of relatively high unemployment among the low-skilled. However, an evenly distributed increase in the average level of education, leaving relative skill levels unchanged, may do little to affect some of the main structural causes of unemployment. If raising aggregate employment (as opposed to productivity) is a goal of education and training, then policy-makers may need to be more specific about how they expect to achieve this aim. Early interventions focused on those at risk of becoming low-skilled young adults are one possible answer.

Lifelong learning — especially if this can help people to adapt their skills and remain longer in the labour market — is another possibility. A key open question is whether the possible impact of training on older workers' employment probabilities might compensate for the relatively low impact on productivity. Increases in average retirement ages, in response to **population ageing**, will increase the returns to investment in human capital especially for older workers.

The view that labour market institutions such as union bargaining scales, minimum wages and tax and benefit systems are an important part of the explanation for high structural unemployment in many EU countries is well-known. It is less often remarked that, because these institutions have the effect of compressing the wage distribution, they also directly reduce **individual incentives to invest in human capital**. An employee who undertakes

training to improve productivity will see a smaller increment in take-home pay in countries where wages are heavily compressed. A clear pattern emerges when one looks at formal estimates of individual returns in EU countries, which range from around 5 % in the Nordic countries to upwards of 10 % in the UK and Ireland (Harmon et al., 2001). The very high levels of public investment in education in the Nordic countries may be partly explained by the need to maintain individual incentives to invest. In any event, a by-product of labour market reforms aimed at raising the employment rate may well be increased rewards for participation in education and training. Whether this increases economic inequality will depend on the distribution of skills and qualifications.

Public-sector involvement in the education sector is traditionally high in most EU countries, at least compared with most other OECD partners, in two senses. Public investment is high relative to private investment, and national or local governments tend to be more deeply involved in the administration of educational institutions. In some respects, the economic evidence suggests that strong national standards — for example, centralised examinations — are beneficial. In other respects, greater autonomy for schools and universities might increase the quality of outcomes. The challenges are perhaps clearest in tertiary education. As participation in higher education grows, it may be difficult to sustain current high levels of public investment per student — for the practical reason that public budgets are constrained, but also for the (better) economic reason that higher social returns to public investment may be available in other areas of the education system (such as early interventions, or research funding). If participation continues to grow, so too will the range of students' abilities. Consequently, many observers foresee a move towards a more differentiated system of higher education in which individual institutions would have greater autonomy in determining funding arrangements and curricula.

The EU's Lisbon strategy can be interpreted partly as a reaction to concerns that the region risks falling behind the global technological frontier. But what kind of education system is required to promote **technological progress**? Greater use of information and communication technologies in classrooms probably will not suffice ([1]). Here again there may be tension between the need to raise attainment levels for all (in part so as to promote diffusion of new technologies) and the need to promote advanced research. Aghion and Cohen (2004), for example, emphasise the latter in the case of countries such as France that aspire to innovate rather than imitate. This view is consistent with François Orivel's contribution to this volume, in as much as he laments the fact that many of the best students in France are attracted to administrative careers via the grandes écoles, rather than to high-level research.

On the other hand, the education system in the EU as a whole is already highly focused on science and technology. Around 26 % of graduates in the EU graduate in mathematics, science and technology, compared with only 17 % in the USA ([2]). However, the USA has a higher share of graduates overall, as well as a significantly higher share of people actually working as researchers in the labour force — 8.7 per 1 000 people compared with 5.4 in the EU (European Commission, 2003b).

Perhaps one reason why education is consistently prioritised, at both national and EU levels, is that it is a universally popular theme. Few people (at least of voting age) are against 'more education'. As a response to economic and social challenges, it sounds more palatable than some of the alternative remedies, such as 'more competition' or 'more flexible labour markets'. The above discussion highlights two potential dangers. One is the temptation to promise more than the education system alone can deliver. For example, it may be little use training more and more high-level scientists and engineers in Europe unless the conditions for them to be productively employed as scientists and engineers are improved at the same time.

The second danger is that the potential contribution of the education system itself may not be fully realised because of a lack of attention to detail on the kinds of quality and efficiency issues discussed in the workshop. The policy implications of some of the contributions to this volume are harder to sell than simple messages about more education, more computers in schools, more science and technology graduates and so forth. In turn,

([1]) In fact, the available economic evidence suggests that extra computers, software and Internet connections in schools has no significant positive impact on student attainment (Angrist and Lavy, 2002; Goolsbee and Guryan, 2002). Similarly, Fuchs and Wößmann (2004), using PISA data, find that computers at home have a statistically significant negative effect on student performance once other family background factors (e.g. whether the student lives with none, one or both parents, parents' education and work status and the number of books at home).

([2]) Indeed, the charge levelled by US advocates of greater investment in high-level education and research in order to promote endogenous growth is precisely that the US higher education system is biased towards the liberal arts (Romer, 2000).

the basic messages of some of these contributions will no doubt benefit from further refinement — based, in an ideal world, on rigorous evaluations and exchange of best practice. We hope that the workshop and this volume play a small part in raising consciousness of some of these issues among those interested in public finance and employment policy as well as education and training more generally.

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Chapter 2

Opening address: Education, growth and the quality of public finances in EMU

Klaus Regling, Director-General, Economic and Financial Affairs DG

Welcome to Brussels, distinguished speakers and discussants, ladies and gentlemen. I am delighted to see so many people here. Interest in the workshop has exceeded our expectations.

You may wonder why the European Commission — and in particular the Directorate-General for Economic and Financial Affairs — is organising a workshop on quality and efficiency in education.

Well, we all know that education is important for many reasons. But for economic policy-makers two in particular stand out:

- First, the available evidence suggests that education is a strong influence on economic growth.

- Secondly, education accounts for a sizeable share of public expenditure — around 11 % in the EU as a whole.

I would like to say a few words about education and growth before turning to quality and efficiency and, finally, public finance issues.

Recent evidence suggests that rising educational attainment may be behind quite a significant share of **economic growth** over the past 40 years. The estimates come, of course, with a large margin of error. But some studies suggest as much as half a percentage point of annual GDP growth. In any event, it seems quite clear that investments in human capital have on the whole been sound investments, both privately and socially.

Whether this continues in the future remains to be seen.

What is clear is that, four years ago at the Lisbon summit, EU Heads of State or Government saw increased investment in human resources as critical to the EU's bid to become a more competitive and dynamic knowledge-based economy.

The question is, where and how should these additional investments be made?

One possibility would be to target the variable used in the studies I mentioned — that is, to try to raise average years of schooling in the population aged between 25 and 64.

In the EU as a whole, average years of schooling seem set to continue rising in the near future, at not too far below the rate of previous decades. This is mainly because of the rapid increase in enrolment of young people in countries like Spain, Ireland, Italy or Portugal over the past 30 years. Average attainment in the workforce grows naturally as better-educated younger cohorts replace those who retire.

But in other countries where mass education took off much earlier — Denmark or Germany, for example — it is already the case that younger workers are not much better educated than their older colleagues. Any further increase in average years of schooling in these countries depends basically on raising enrolment rates in higher education.

Now, in basic education, enrolment is close to 100 % throughout the EU. In upper-secondary education, it is approaching 100 % in many cases — and, by the way, more so in the new Member States than in the former EU-15. There are still important economic and social benefits to be had from extending upper-secondary enrolment. But the main scope for increasing years of schooling in future lies in tertiary-level education and in adult education and training.

At the university level, it is probably a question of more students rather than longer courses. I think we could all name a few countries where some students might benefit from studying for fewer years!

The other possibility, of course, is to focus on the **quality** of education and training. Quality is not usually taken into account in the studies that relate years of schooling to economic growth. But the available evidence suggests that the quality of education and training is probably at least as important as the quantity.

Quality has to do with the impact of the education system on the academic, economic and social capabilities of students. We don't have perfect measurements of quality, but the data we do have — mainly from standardised tests of achievement in maths, science and literacy — raise issues that are too big to be ignored while we wait for refined indicators.

In basic education in the EU, where participation is already near-universal, quality is really the only margin for expansion. Moreover, the results of comparative

studies, such as the OECD's PISA study, suggest that quality varies a great deal from country to country.

Quality is also important in other areas of education. For example, if tertiary enrolment continues to rise in Europe, policy-makers will be forced to ask themselves whether we can continue to maintain the notion that all universities and colleges are equal, or whether the needs of an increasingly diverse body of students require greater differentiation.

Let me turn now to **efficiency**. I want to make it clear that we view 'efficiency' here in quite a broad sense, covering both the allocation of resources and the productive use of resources.

As I said before, EU leaders have called for a substantial increase in overall investment in human resources. Now, I think it's safe to say that they did not mean: 'Increase spending on education just for the sake of it'! Of course they want to see increased investment in real terms — which in essence must mean more students or higher quality of educational outcomes, or both. This is efficiency in the general sense of making the most out of given resources.

More specifically, while adequate resources are quite obviously a necessary condition for a high-quality education system, we know that higher spending does not always lead to higher-quality outcomes. There are many other complex influences — such as examination systems, how the curriculum is established, the degree of autonomy of teachers, the nature of staff representation, spending on salaries versus books and equipment, and so forth. Comparing EU countries along these dimensions leads one to the conclusion that either we are all a lot more different than we thought, or some countries must be quite a long way from the best practice frontier.

Efficiency is also a question of allocating scarce resources among different areas of the education and training system. This is particularly relevant for policy-makers when it comes to public investment.

The general criterion for efficient public investment is that the additional benefits of the investment for society as a whole should exceed the additional costs. Education in general yields many benefits to society, in addition to the direct benefits to pupils and students, so that public investments are often justified, even taking into account the cost of raising public funds.

But this is not necessarily true for all potential investments in education. One important efficiency question is whether further increases in tertiary enrolment should be entirely publicly funded. Another is how to find efficient ways to promote training in the workplace. We strongly suspect there are significant market failures in this area. But there are also examples of remedies that proved to be worse than the disease!

Now, one of the key responsibilities of the Economic and Financial Affairs DG is the surveillance of public finances in the EU, and that means not only deficit and debt levels but also the **quality of public finances**.

In this context, let me make clear one thing that efficiency does not mean: it is not a euphemism for 'spending cuts', as I think is sometimes suspected.

Firstly, increased efficiency means a higher rate of return on investments, which usually leads to more, not less, investment.

Secondly, the Commission's regular reports on *Public Finances in EMU* have made it quite clear that a shift in the composition of public spending in favour of education and training would, broadly speaking, be seen as an increase in the quality of public finances. But not unconditionally so. One of the main aims of the workshop, if you like, is to shed some light on the necessary conditions.

In closing, let me say a few words on education policy at the EU level. Of course, today we are dealing mainly with issues that fall within the sphere of policy coordination. In other words, we are talking about national and often regional-level responsibilities. There is no question of EU-level legislation, but Member States may still find it useful to compare experience and exchange best practice.

I am very pleased that several colleagues from other Commission services, as well as different national ministries, are here today and indeed actively involved. I hope that, during the course of the day, we will hear a few words about policy coordination on education and training issues, especially the open method of coordination organised by the Education and Culture DG, and the European employment strategy run by the Employment and Social Affairs DG.

It seems to me that, although there are many reforms of education and training systems on the agenda, there are also many unanswered questions about the design and

evaluation of these reforms. In other words, it may be an area where there is genuine scope for exchange of good practice.

Ladies and gentlemen, you have a very broad agenda before you today, and we don't expect to hear the last word on all these issues! We have tried to strike a balance between papers that are at the forefront of economic research, while at the same time being of direct interest to policy-makers. That is not always an easy task, but looking at today's programme I think the organisers should be hopeful for at least a B grade.

Part I:
Basic education

Chapter 3

Economic analysis of school quality

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Abstract

Most empirical analyses of human capital have concentrated solely on the quantity of schooling attained by individuals, ignoring quality differences. This focus contrasts sharply with policy considerations that almost exclusively consider school quality issues. This paper presents basic evidence about the very substantial impacts of school quality on individual earnings and on economic growth. It then discusses the policy issues facing nations.

1. Introduction

Economists have devoted considerable attention to understanding how human capital affects a variety of economic outcomes. The underlying notion is that individuals make investment decisions in themselves through schooling and other routes. The accumulated skills that are relevant for the labour market from these investments over time represent an important component of the human capital of an individual. The investments made to improve skills then return future economic benefits in much the same way that a firm's investment in a set of machines (physical capital) returns future production and income. In the case of public education, parents and public officials act as trustees for their children in setting many aspects of the investment paths. This paper demonstrates that investments in quality — of the type frequently measured with standardised examinations — have a very high payoff if quality improvements are actually achieved.

In looking at human capital and its implications for future outcomes, economists are frequently agnostic about where these skills come from or how they are produced. Although we return to that below, it is commonly presumed that formal schooling is one of several important contributors to the skills of an individual and to human capital. It is not the only factor. Parents, individual abilities, and friends undoubtedly contribute. Schools nonetheless have a special place because they are most directly affected by public policies. For this reason, we frequently emphasise the role of schools.

The human capital perspective immediately makes it evident that the real issues are ones of long-run outcomes. Future incomes of individuals are related to their past investments. It is not their income while in school or their income in their first job. Instead, it is their income over the course of their working life.

The distribution of income in the economy similarly involves both the mixture of people in the economy and the pattern of their incomes over their lifetime. Specifically, most measures of how income and well-being vary in the population do not take into account the fact that some of the low-income people have low incomes only because they are just beginning a career. Their lifetime income is likely to be much larger as they age, gain experience, and move up in their firms and career. What is important is that any noticeable effects of the current quality of schooling on the distribution of skills and income will only be realised years in the future, when those currently in school become a significant part of the labour force. In other words, most workers in the economy were educated years and even decades in the past — and they are the ones that have the most impact on current levels of productivity and growth, if for no reason other than that they represent the larger share of active workers.

Much of the early and continuing development of empirical work on human capital concentrates on the role of school attainment, that is, the quantity of schooling. The revolution in the USA during the 20th century was universal schooling. This has spread around the world, encompassing both developed and developing countries. Quantity of schooling is easily measured, and data on years attained, both over time and across individuals, are readily available.

Today, however, policy concerns in most corners of the world revolve much more around issues of quality than issues of quantity.

1.1. Quality and individual incomes

One of the challenges in understanding the impact of quality differences in human capital has been simply knowing how to measure quality. Much of the discussion of quality — in part related to new efforts to provide better accountability — has identified cognitive skills as the important dimension. And, while there is ongoing debate about the testing and measurement of these skills, most parents and policy-makers alike accept the notion that cognitive skills are a key dimension of schooling out-

comes. The question is whether this proxy for school quality — students' performance on standardised tests — is correlated with individuals' performance in the labour market and the economy's ability to grow. Until recently, little comprehensive data have been available to show any relationship between differences in cognitive skills and any related economic outcomes. Such data are now becoming available.

Much of the work by economists on differences in worker skills has actually been directed at the issue of determining the average labour market returns to additional schooling and the possible influence of differences in ability. The argument has been that higher-ability students are more likely to continue in schooling. Therefore, part of the higher earnings observed for those with additional schooling really reflects pay for added ability and not for the additional schooling. Economists have pursued a variety of analytical approaches for dealing with this, including adjusting for measured cognitive test scores, but this work generally ignores issues of variation in school quality ([1]).

There is mounting evidence that quality measured by test scores is directly related to individual earnings, productivity, and economic growth. A variety of researchers documents that the earnings advantages to higher achievement on standardised tests are quite substantial ([2]). While these analyses emphasise different aspects of individual earnings, they typically find that measured achievement has a clear impact on earnings after allowing for differences in the quantity of schooling, the experiences of workers, and other factors that might also influence earnings. In other words, higher quality as measured by tests similar to those currently being used in accountability systems around the country is closely related to individual productivity and earnings.

Three recent US studies provide direct and quite consistent estimates of the impact of test performance on earnings (Mulligan (1999); Murnane et al. (2000); Lazear (2003)). These studies employ different nationally representative data sets that follow students after they leave schooling and enter the labour force. When scores are standardised, they suggest that one standard deviation increase in mathematics performance at the end of high schools translates into 12 % higher annual earnings.

Murnane et al. (2000) provide evidence from the high school and beyond and the national longitudinal survey of the high school class of 1972. Their estimates suggest some variation with males obtaining a 15 % increase and females a 10 % increase per standard deviation of test performance. Lazear (2003), relying on a somewhat younger sample from NELS88, provides a single estimate of 12 %. These estimates are also very close to those in Mulligan (1999), who finds 11 % for the normalised AFQT score in the NLSY data. By way of comparison, estimates of the value of an additional year of school attainment are typically 7–10 %.

There are reasons to believe that these estimates provide a lower bound on the impact of higher achievement. First, these estimates are obtained fairly early in the work career (mid-20s to early 30s), and other analysis suggests that the impact of test performance becomes larger with experience ([3]). Second, the labour market experiences that are observed begin in the mid-1980s and extend into the mid-1990s, but other evidence suggests that the value of skills and of schooling has grown throughout and past that period. Third, future general improvements in productivity are likely to lead to larger returns to skill ([4]).

A limited number of additional studies are available for developed countries outside of the USA. McIntosh and Vignoles (2001) study wages in the United Kingdom and find strong returns to both numeracy and literacy ([5]).

([1]) The approaches have included looking for circumstances where the amount of schooling is affected by things other than the student's valuation of continuing and considering the income differences among twins (see Card, 1999). The various adjustments for ability differences typically make small differences on the estimates of the value of schooling, and Heckman and Vytlacil (2001) argue that it is not possible to separate the effects of ability and schooling. The only explicit consideration of school quality typically investigates expenditure and resource differences across schools, but these are known to be poor measures of school quality differences (Hanushek, 2002). Early discussion of ability bias can be found in Griliches (1974).

([2]) These results are derived from different specific approaches, but the basic underlying analysis involves estimating a standard 'Mincer' earnings function and adding a measure of individual cognitive skills. This approach relates the logarithm of earnings to years of schooling, experience, and other factors that might yield individual earnings differences. The clearest analyses from the USA are found in the following references (which are analysed in Hanushek, 2002). See Bishop (1989, 1991); O'Neill (1990); Grogger and Eide (1993); Blackburn and Neumark (1993, 1995); Murnane, Willett, and Levy (1995); Neal and Johnson (1996); Mulligan (1999); Murnane et al. (2000); Altonji and Pierret (2001); Murnane et al. (2001); and Lazear (2003).

([3]) Altonji and Pierret (2001) find that the impact of achievement grows with experience, because the employer has a chance to observe the performance of workers.

([4]) These analyses typically compare workers of different ages at one point in time to obtain an estimate of how earnings will change for any individual. If, however, productivity improvements occur in the economy, these will tend to raise the earnings of individuals over time. Thus, the impact of improvements in student skills are likely to rise over the work life instead of being constant as portrayed here.

([5]) Because they look at discrete levels of skills, it is difficult to compare the quantitative magnitudes directly with the US work.

Finnie and Meng (2002) and Green and Riddell (2003) investigate returns to cognitive skills in Canada. Both suggest that literacy has a significant return, but Finnie and Meng (2002) find an insignificant return to numeracy. This latter finding stands at odds with most other analyses that have emphasised numeracy or mathematics skills.

Another part of the return to school quality comes through continuation in school ([1]). There is substantial US evidence that students who do better in school, either through grades or scores on standardised achievement-tests, tend to go farther in school ([2]). Murnane et al. (2000) separate the direct returns to measured skill from the indirect returns of more schooling and suggest that perhaps one third to one half of the full return to higher achievement comes from further schooling. Note also that the effect of quality improvements on school attainment incorporates concerns about drop-out rates. Specifically, higher student achievement keeps students in school longer, which will lead among other things to higher graduation rates at all levels of schooling.

The US evidence on continuation may not generalise to all countries. The key element for the USA is that supply of higher education is essentially unconstrained. In other words, individuals meeting some minimal entry level of performance can for the most part attend an institution of higher education. For countries where the supply is more constrained, higher performance in school will generally have distributional impacts but will not yield the same returns from increased attainment that are found in the USA.

The impact of test performance on individual earnings provides a simple summary of the primary economic rewards to an individual. This estimate combines the impacts on hourly wages and on employment/hours worked. It does not include any differences in fringe benefits or non-monetary aspects of jobs. Nor does it make any allowance for aggregate changes in the labour market that might occur over time.

1.2. Impacts of quality on economic growth

The relationship between measured labour force quality and economic growth is perhaps even more important than the impact of human capital and school quality on individual productivity and incomes. Economic growth determines how much improvement will occur in the overall standard of living of society. Moreover, the education of each individual has the possibility of making others better off (in addition to the individual benefits just discussed). Specifically, a more educated society may lead to higher rates of invention; may make everybody more productive through the ability of firms to introduce new and better production methods; and may lead to more rapid introduction of new technologies. These externalities provide extra reason for being concerned about the quality of schooling.

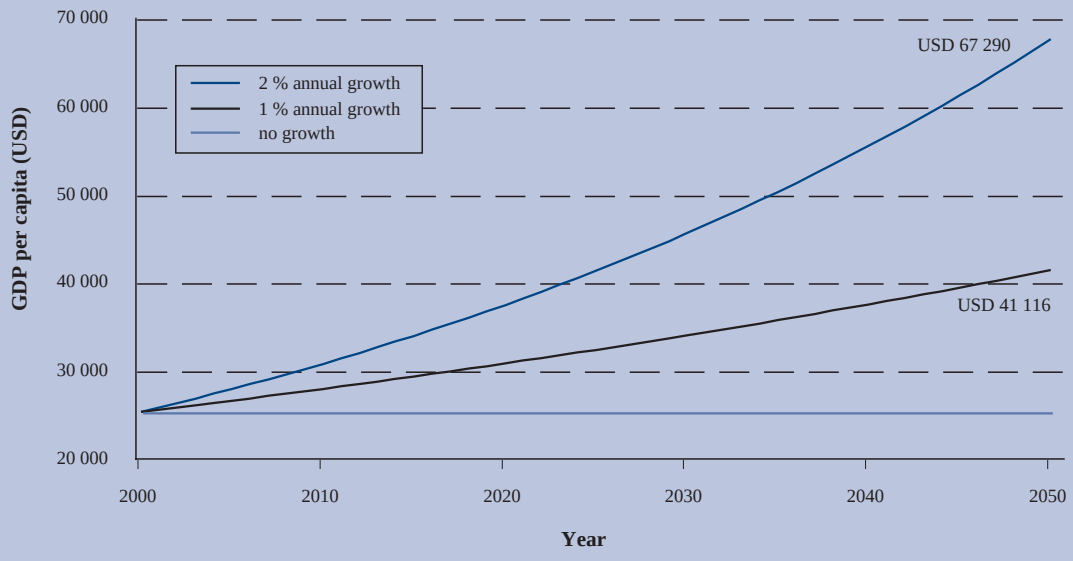
The potential effect of differences in growth rates on economic well-being is easy to see. Figure 1 begins with the value of gross domestic product (GDP) per capita for a medium income OECD country in the year 2000 and shows its value in 2050 under different growth rates. If it grows at 1 % each year, this measure (in US dollars) would increase from USD 25 000 to over USD 41 000 — or increase by almost two thirds over the period. If it were to grow at 2 % per year, it would reach USD 67 000 in 2050! Small differences in growth rates have huge implications for the income and wealth of society.

The current economic position of the USA, for example, is largely the result of its strong and steady growth over

([1]) Much of the work by economists on differences in worker skills has actually been directed at the issue of determining the average labour market returns to additional schooling. The argument has been that higher-ability students are more likely to continue in schooling. Therefore, part of the higher earnings observed for those with additional schooling really reflects pay for added ability and not for the additional schooling. Economists have pursued a variety of analytical approaches for dealing with this, including adjusting for measured cognitive test scores, but this work generally ignores issues of variation in school quality. The approaches have included looking for circumstances where the amount of schooling is affected by things other than the student's valuation of continuing and considering the income differences among twins (see Card, 1999). The various adjustments for ability differences typically make small differences on the estimates of the value of schooling, and Heckman and Vytlacil (2001) argue that it is not possible to separate the effects of ability and schooling. The only explicit consideration of school quality typically investigates expenditure and resource differences across schools, but these are known to be poor measures of school quality differences (Hanushek, 2002).

([2]) See, for example, Dugan (1976); Manski and Wise (1983)). Rivkin (1995) finds that variations in test scores capture a considerable proportion of the systematic variation in high school completion and in college continuation, so that test score differences can fully explain black–white differences in schooling. Bishop (1991) and Hanushek, Rivkin, and Taylor (1996), in considering the factors that influence school attainment, find that individual achievement scores are highly correlated with continued school attendance. Neal and Johnson (1996) in part use the impact of achievement differences of blacks and whites on school attainment to explain racial differences in incomes. Their point estimates of the impact of cognitive skills (AFQT) on earnings and school attendance appear to be roughly comparable to that found in Murnane et al. (2000). Behrman et al. (1998) find strong achievement effects on both continuation into college and quality of college; moreover, the effects are larger when proper account is taken of the various determinants of achievement. Hanushek and Pace (1995) find that college completion is significantly related to higher test scores at the end of high school.

Figure 1: **Effect of economic growth on GDP per capita (from base of USD 25 000 in 2000)**



the 20th century. Economists have developed a variety of models and ideas to explain differences in growth rates across countries — invariably featuring the importance of human capital ([1]).

The empirical work supporting growth analyses has emphasised school attainment differences across countries. Again, this is natural because, while compiling comparable data on many things for different countries is difficult, assessing quantity of schooling is more straightforward. The typical study finds that quantity of schooling is highly related to economic growth rates. But, quantity of schooling is a very crude measure of the knowledge and cognitive skills of people — particularly in an international context.

Hanushek and Kimko (2000) go beyond simple quantity of schooling and delve into quality of schooling ([2]). We incorporate the information about international differences in mathematics and science knowledge that has been developed through testing over the past four decades. And we find a remarkable impact of differences in school quality on economic growth.

The international comparisons of quality come from piecing together results of a series of tests administered over the past four decades. In 1963 and 1964, the International Association for the Evaluation of Educational Achievement (IEA) administered the first of a series of mathematics tests to a voluntary group of countries. These initial tests suffered from a number of problems, but they did prove the feasibility of such testing and set in motion a process to expand and improve on the undertaking ([3]).

Subsequent testing, sponsored by the IEA and others, has included both mathematics and science and has expanded on the group of countries that have been tested. In each, the general model has been to develop a common assessment instrument for different age groups of students and to work at obtaining a representative group

([1]) Barro and Sala-I-Martin (1995) review recent analyses and the range of factors that are included.

([2]) Barro and Lee (2001) provide an analysis of qualitative differences that also includes literacy.

([3]) The problems included issues of developing an equivalent test across countries with different school structure, curricula, and language; issues of selectivity of the tested populations; and issues of selectivity of the nations that participated. The first tests did not document or even address these issues in any depth.

of students taking the tests. An easy summary of the participating countries and their test performance is found in Figure 2. This figure tracks performance aggregated across the age groups and subject area of the various tests and scaled to a common test mean of 50 ([1]). The USA and the United Kingdom are the only countries to participate in all of the testing.

There is some movement across time of country performance on the tests, but for the one country that can be checked — the USA — the pattern is consistent with other data. The National Assessment of Educational Progress (NAEP) in the USA is designed to follow performance of US students for different subjects and ages. NAEP performance over this period, shown in Figure A1, also exhibits a sizeable dip in the 1970s, a period of growth in the 1980s, and a levelling off in the 1990s.

Kimko's and my analysis of economic growth is very straightforward. We combine all of the available earlier test scores into a single composite measure of quality and consider statistical models that explain differences in growth rates across nations during the period 1960 to 1990 ([2]). The basic statistical models, which include the initial level of income, the quantity of schooling, and population growth rates, explain a substantial portion of the variation in economic growth across countries.

Most important, the quality of the labour force as measured by mathematics and science scores is extremely important. One standard deviation difference on test performance is related to 1 % difference in annual growth rates of gross domestic product (GDP) per capita ([3]).

([1]) The details of the tests and aggregation can be found in Hanushek and Kimko (2000) and Hanushek and Kim (1995). This figure excludes the earliest administration and runs through the Third International Mathematics and Science Study (TIMSS) (1995). Other international tests have been given and are not included in the figure. First, reading and literacy tests have been given in 1991 and very recently. The difficulty of unbiased testing of reading across languages plus the much greater attention attached to mathematics and science both in the literature on individual earnings and in the theoretical growth literature led to the decision not to include these test results in the empirical analysis. Second, the more recent follow-up to the 1995 TIMSS in mathematics and science (given in 1999) is excluded from the figure simply for presentational reasons.

([2]) We exclude the two TIMSS tests from 1995 and 1999 because they were taken outside of the analytical period on economic growth. We combine the test measures over the 1965–91 period into a single measure for each country. The underlying objective is to obtain a measure of quality for the labour force in the period during which growth is measured.

This quality effect, while possibly sounding small, is actually very large and significant. Because the added growth compounds, it leads to powerful effects on national income and on societal well-being. One needs only to return to the calculations presented in Figure 1 to understand the impact of such skill-based improvements in economic growth.

1.3. Importance of quality

The frequent focus of governmental programmes has been increasing school attainment and expanding on the years of schooling of the population. The previous discussion, however, highlights the central importance of quality. While years of schooling attainment are important, that holds only if quality is maintained.

The impact of improved quality can be calculated from the considerations of how quality affects growth rates for economies. Consider the effects of beginning a successful school improvement programme in 2005. Of course school reform takes time. And, even if successful, it takes some time before the school graduates work their way into the labour force and thus some time before the impact will be felt.

Figure 3 illustrates the impact that reform could be expected to have over time if it is successful at achieving moderately strong knowledge improvement (corresponding to a 0.5 standard deviation increase in test score achievement) ([4]). The curves sketch out the path of GDP improvement that would occur with a reform plan that reaches its improvement goal within 10, 20, or 30 years.

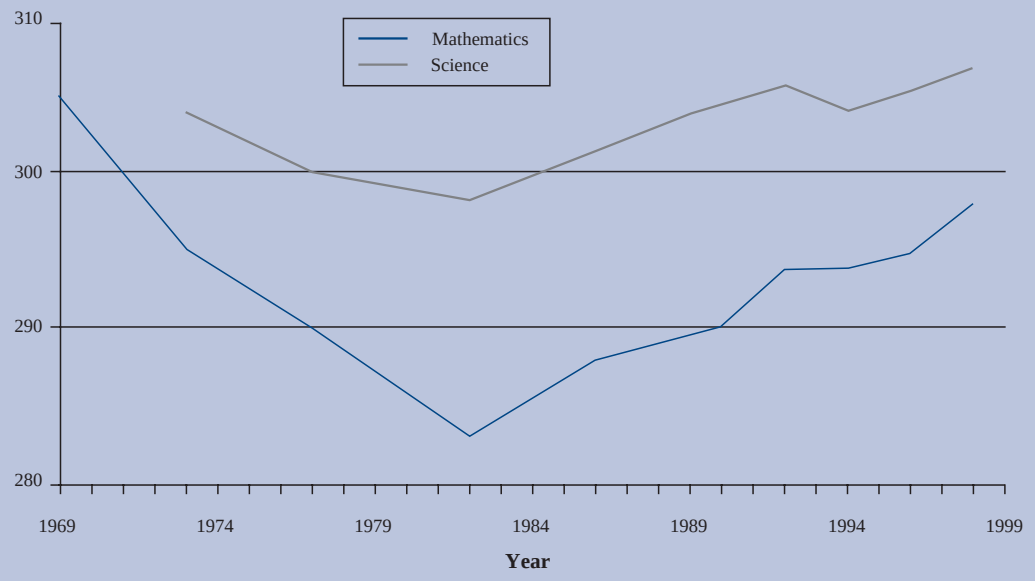
Consider just the slow improvement of schools over a 30-year period. In 2040, the GDP would be almost 4 % higher than projected without the schooling reforms. Of course, faster reforms would yield even greater gains in GDP. This magnitude would cover total school spending in most countries of the world.

([3]) The details of this work can be found in Hanushek and Kimko (2000) and Hanushek (2003b). Importantly, adding other factors potentially related to growth, including aspects of international trade, private and public investment, and political instability, leaves the effects of labour force quality unchanged.

([4]) These calculations are calibrated to scores on international mathematics and science exams. The 'moderately strong' improvement implies an increase in scores by 0.5 standard deviations across the international comparisons. This is equivalent of bringing a country at the 31st percentile of performance up to the median for the world.

Figure 2: **Normalised test scores on mathematics and science examinations, 1970–95**

Figure A1: **National assessment educational progress (NAEP), age 17**



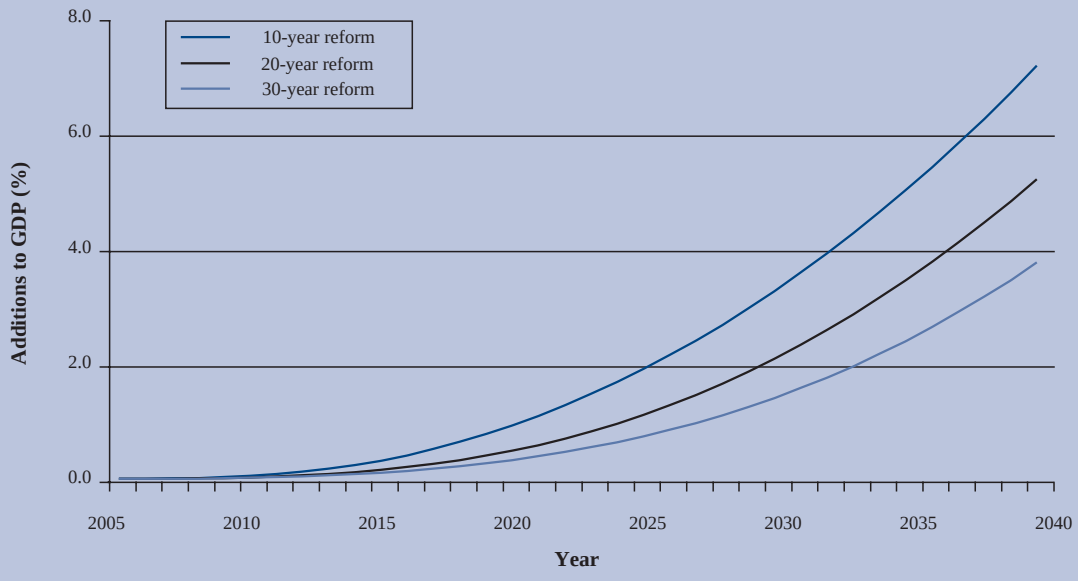
1.4. Causality

One common concern in analysis such as this is that schooling might not be the actual cause of growth but, in fact, may just reflect other attributes of the economy that are beneficial to growth. For example, as seen in Figure 2, the East Asian countries consistently score very highly on the international tests, and they also had extraordinarily high growth over the 1960–90 period. It may be that other aspects of these East Asian economies have driven their growth and that the statistical analysis of labour force quality simply is picking out these countries. But in fact, even if the East Asian countries are excluded from the analysis, a strong — albeit slightly smaller — relationship is still observed with test performance. This test of sensitivity of the results seems to reflect a basic importance of school quality, a factor that contributes also to the observed growth of East Asian countries.

Another concern might be that other factors that affect growth, such as efficient market organisations, are also associated with efficient and productive schools — so that, again, the test measures are really a proxy for other attributes of the country. In order to investigate this, we concentrate on immigrants to the USA who received their education in their home countries. We find that immigrants who were schooled in countries that have higher scores on the international mathematics and science examinations earn more in the USA. This analysis makes allowance for any differences in school attainment, labour market experience, or being native English-language speakers. In other words, skill differences as measured by the international tests are clearly rewarded in the US labour market, reinforcing the validity of the tests as a measure of individual skills and productivity.

Finally, the observed relationships could simply reflect reverse causality, that is, that countries that are growing rapidly have the resources necessary to improve their schools and that better student performance is the result of growth, not the cause of growth. As a simple test of this, we investigated whether the international mathematics and science test scores were systematically related to the resources devoted to the schools in the years prior to the tests. They were not. If anything, we found relatively better performance in those countries spending less on their schools.

Figure 3: **Improved GDP with moderately strong knowledge improvement**



In sum, the relationship between mathematics and science skills on the one hand and productivity and growth on the other comes through clearly when investigated in a systematic manner across countries. This finding underscores the importance of high-quality schooling.

1.5. Why has US growth been so strong?

Figure 2 on international test score differences does introduce an important issue of interpretation. Namely, the USA has not been competitive on an international level in terms of tests. It has scored below the median of countries taking the various tests. Moreover, this figure — which combines scores across different age groups — disguises the fact that performance on tests of US students is much stronger at young ages but falls off dramatically at the end of high school (Hanushek, 2003b).

Earlier, we introduced the discussion of the importance of growth by recounting the USA's successful economic growth during the 20th century. Yet, looking at Figure 2, we see that the USA has been at best mediocre in mathematics and science ability. Regardless of the set of countries taking the test, the USA has performed in the middle of the pack or below. Some people find this anomalous. How could mathematics and science ability be important in light of the strong US growth over a long period of time?

The answer is that the quality of the labour force is just one aspect of the economy that enters into the determination of growth. A variety of factors clearly contribute, and these factors work to overcome any deficits in quality. These other factors may also be necessary for growth. In other words, simply providing more or higher-quality schooling may yield little in the way of economic growth in the absence of other elements, such as the appropriate market, legal, and governmental institutions to support a functioning modern economy. Past experiences investing in less developed countries that lack these institutional features demonstrate that schooling is not itself a sufficient engine of growth.

Indeed, some have questioned the precise role of schooling in growth. Easterly (2002), for example, notes that education without other facilitating factors such as functioning institutions for markets and legal systems may not have much impact. He argues that World Bank invest-

ments in schooling for less developed countries that do not ensure that the other attributes of modern economies are in place have been quite unproductive. As discussed below, schooling clearly interacts with other factors, and these other factors have been important in supporting US growth. They are also surely relevant for other countries.

It is useful to describe some of the other contributing factors to US growth. This is done in part to understand more fully the character of economic growth, but more importantly to highlight some important related issues that are central to thinking about human capital policies.

2. Economic structure

Almost certainly the most important factor sustaining the growth of the US economy is the openness and fluidity of its markets. The USA maintains generally freer labour and product markets than most countries in the world. The government generally has less regulation on firms (both in terms of labour regulations and in terms of overall production), and trade unions are less extensive than those in many other countries. Even broader, the USA has less intrusion of government in the operation of the economy — not only less regulation but also lower tax rates and minimal government production through nationalised industries. These factors encourage investment, permit the rapid development of new products and activities by firms, and allow US workers to adjust to new opportunities. While identifying the precise importance of these factors is difficult, a variety of analyses suggest that such market differences could be very important explanations for differences in growth rates ([1]).

Because of the generally favourable institutional conditions, US growth has been strong, even if some of the underlying factors are not as competitive. In other words, the economic structure can mask problems within the economy. But this does not negate the fact that improving our schools and the quality of our labour force would enhance growth and incomes.

([1]) See, for example, Krueger (1974); World Bank (1993); Parente and Prescott (1994, 1999).

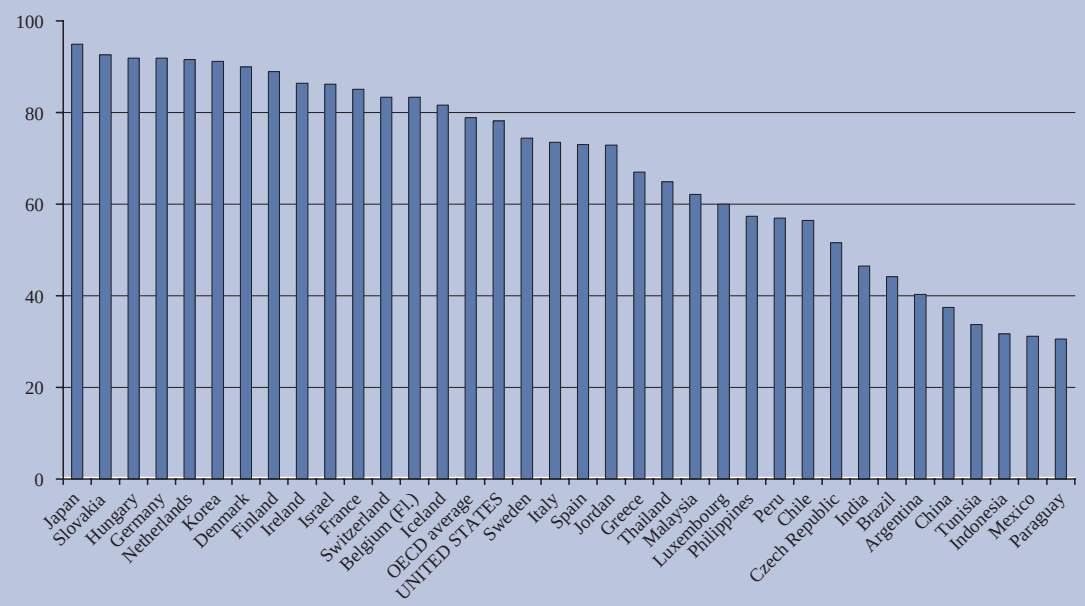
3. Substitution of quantity for quality

Over the 20th century, the expansion of the education system in the USA outpaced that around the world. The USA pushed to open secondary schools to all citizens. With this came also a move to expand higher education with the development of land grant universities, the GI bill for veterans, and direct grants and loans to students. In comparison with other nations of the world, the US labour force has been better educated, even after allowing for the lesser achievement of its graduates. In other words, more schooling with less learning each year has yielded more human capital than found in other nations that have less schooling but learn more in each of those years.

This historical approach, however, appears on the verge of reaching its limits for the USA. Other nations of the world, both developed and developing, have rapidly expanded their schooling systems, and many now surpass the USA. Figure 4 shows secondary school completion rates for both Organisation for Economic Cooperation and Development (OECD) countries and a selection of others in 1999 ([1]). Remarkably, the USA trailed a

([1]) Data come from the Organisation for Economic Cooperation and Development (2001) which has made an effort to use standardised definitions. The non-OECD countries are included in the World Education Indicators project.

Figure 4: **Secondary school completion rates, 1999**



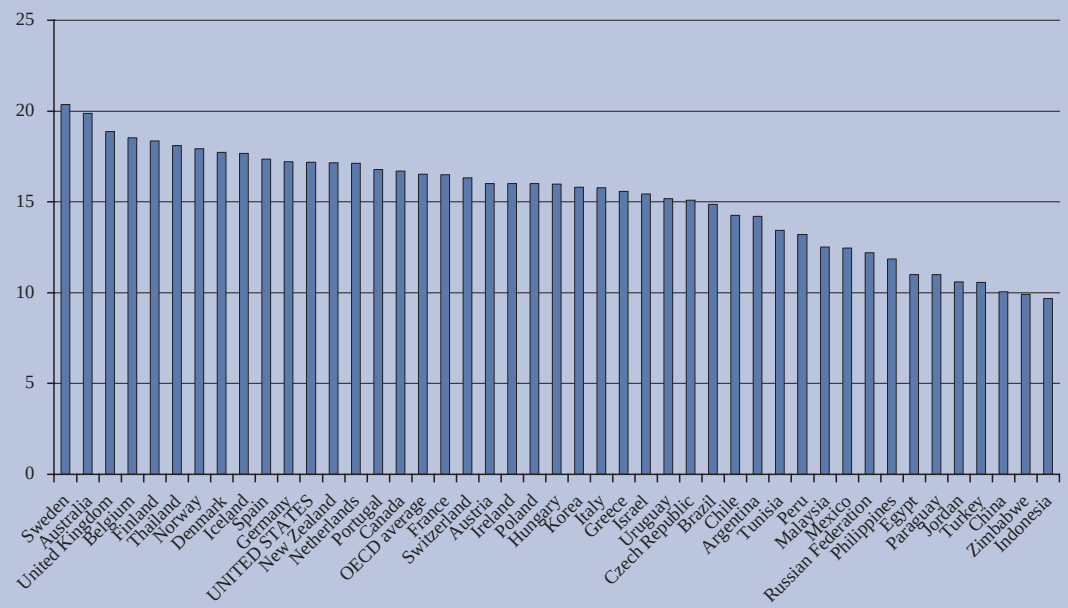
large number of other countries in 1999 and falls just slightly below the OECD average completion rate. The USA gains some by having rates of college attendance above the typical OECD country. Nonetheless, as summarised in Figure 5, US students are not likely to complete more schooling.

The past advantage of the USA in amount of school completed has gone away as other nations have discovered the importance of schooling. Thus, going into the future, the USA appears unlikely to continue dominating others in human capital unless it can improve on the quality dimension.

Note, however, that this story about US school quality does not generalise well to developing countries — countries that are often not close in any quality dimension. Thus, the US success with expanding mediocre schools does not imply that the practice seen in many developing countries of expanding totally dysfunctional schools is the right path ([1]). Indeed, as argued in Hanushek (1995), it appears to be a considerable mistake for developing countries to expand quantity or access to schools while ignoring quality. Indeed there is an argument that improving quality would actually make it easier to expand access by reducing repetition and other counterproductive aspects of schools (Hanushek, 1995).

([1]) A direct discussion and analysis of poor schools in rural Brazil is found in Harbison and Hanushek (1992).

Figure 5: **Expected years of schooling, 1999**



4. Quality of US colleges

The analysis of growth rates across countries emphasises quality of the elementary and secondary schools of the USA. It did not include any measures of the quality of US colleges. By most evaluations, US colleges and universities rank at the very top in the world. No direct measurements of quality of colleges across countries exist. However, there is indirect evidence. Foreign students by all accounts are not tempted to emigrate to the USA to attend elementary and secondary schools — except perhaps if they see this as a way of gaining entry into the country. They do emigrate in large numbers to attend US colleges and universities. They even tend to pay full, unsubsidised tuitions at US colleges, something that many fewer US citizens do.

A number of the economic models of economic growth in fact emphasise the importance of scientists and engineers as a key ingredient to growth. By these views, the technically trained college students who contribute to invention and to development of new products provide a special element to the growth equation. Here, again, the USA appears to have the best programmes. If this view is correct, US higher education may continue to provide a noticeable advantage over other countries.

But the raw material for US colleges is the graduates of our elementary and secondary schools. As has been frequently noted, the lack of preparation of our students leads to extensive remedial education at the post-secondary level, detracting from the ability of colleges and universities to be most effective. And, pre-college preparation is likely an important factor driving the increased proportions of foreign-born graduates from the science and engineering programmes of US colleges and universities.

4.1. Improving quality

Much of school policy is traditionally thought of as an exercise in selecting and ensuring that the optimal set of resources, somehow defined, is available. Matched with this policy perspective has been a line of research considering the relationship between resource usage and student performance. If the effectiveness of different resources or combinations of resources were known, it would be straightforward to define an optimal set of resources. Moreover, we could often decide about policies that would move us toward such an optimal set of resources. Unfortunately, this alludes us.

Schools in the USA have been the focus of extensive research. Both aggregate data about performance of schools over time and more detailed school and classroom data point to a simple conclusion: there is a lack of any consistent or systematic effect of resources on student achievement. While controversial, partly because of the conflict with existing school policies, the evidence is very extensive (Hanushek, 2003a).

Most other countries of the world have not tracked student performance over any length of time, making analyses comparable with the US discussion impossible. Nonetheless, international testing over the past four decades permits an overview of spending across countries. Seven different mathematics and science tests (the data for the growth analysis) were given between the early 1960s and 1995 to students at different grade levels in a varying set of voluntarily participating nations. Performance bears little relationship to the patterns of expenditure across the countries. Hanushek and Kimko (2000) estimate models that relate spending, family backgrounds, and other characteristics of countries to student performance for the tests prior to 1995. This estimation consistently indicates a statistically significant negative effect of added resources on performance after controlling for other influences. Similar findings hold for the OECD countries.

In sum, a wide range of analyses indicate that overall resource policies have not led to discernible improvements in student performance. It is important to understand what is and is not implied by this conclusion. First, it does not mean that money and resources never matter.

There clearly are situations where small classes or added resources have an impact. It is just that no good description of when and where these situations occur is available, so that broad resource policies such as those legislated from central governments may hit some good uses but also hit bad uses that generally lead to offsetting outcomes. Second, this statement does not mean that money and resources cannot matter. Instead, as described below, altered sets of incentives could dramatically improve the use of resources.

The evidence on resources is remarkably consistent across countries, both developed and developing. Had there been distinctly different results for some subsets of countries, issues of what kinds of generalisations were possible would naturally arise. Such conflicts do not appear particularly important.

Many countries have of course attempted to improve their schools. While some have succeeded, many have not. One explanation for past failure is simply that insufficient attention has been paid to teacher quality. By many accounts, the quality of teachers is the key element to improving student performance. But the research evidence also suggests that many of the policies that have been pursued around the world have not been very productive. Specifically, the chosen policies of individual countries may have led to changes in measured aspects of teachers such as degrees or teacher qualifications, but they have not tended to improve the quality of teachers — at least when quality is identified by student performance ([1]).

Rivkin, Hanushek, and Kain (2001) describe estimates of differences in teacher quality on an output basis. Specifically, the concern is identifying good and bad teachers on the basis of their performance in obtaining gains in student achievement. An important element of that work is distinguishing the effects of teachers from the selection of schools by teachers and students and the matching of teachers and students in the classroom. In particular, highly motivated parents search out schools that they think are good, and they attempt to place their children in classrooms where they think the teacher is particularly able. Teachers follow a similar selection process (Hanushek, Kain, and Rivkin (2004a); Hanushek, Kain, and Rivkin (2004b)). Thus, from an analytical viewpoint, it is difficult to sort out the quality of the teacher from the quality of the students that she has in her classroom. The analysis of teacher performance in Rivkin, Hanushek, and Kain (2001) goes to great lengths to avoid contamination from any such selection and matching of children and teachers.

Estimates that the differences in annual achievement growth between an average and a good teacher are large. Within one academic year, a good teacher can move a typical student up at least four percentiles in the overall distribution (equal to a change of 0.12 standard deviations of student achievement). From this, it is clear that having a series of good teachers can dramatically affect the achievement of any student. In fact, a series of good teachers can erase the deficits associated with poor preparation for school.

The difficulty, as pointed out in the preceding discussion, is that hiring good teachers is not easily done. Teaching ability is not closely related to training or experience. Moreover, common salary systems do not target particularly high-quality teachers. Although a discussion of alternative policies is beyond the scope of this paper, an outline of alternatives can be found in Hanushek (2003a).

From a policy viewpoint the primary objective should be improving the overall quality of the teaching force. If one were simply to redistribute existing teachers, the overall policy goals would not be achieved.

4.2. Conclusions

In making decisions about schools, countries always face limited budgets. If there are the two commonly accepted objectives of expanding access and of improving quality, these objectives will conflict because they must compete for the same budget. Thus, by this standard formulation policy-makers are faced with a particularly unpleasant dilemma: choose between broad availability of schools and good schools.

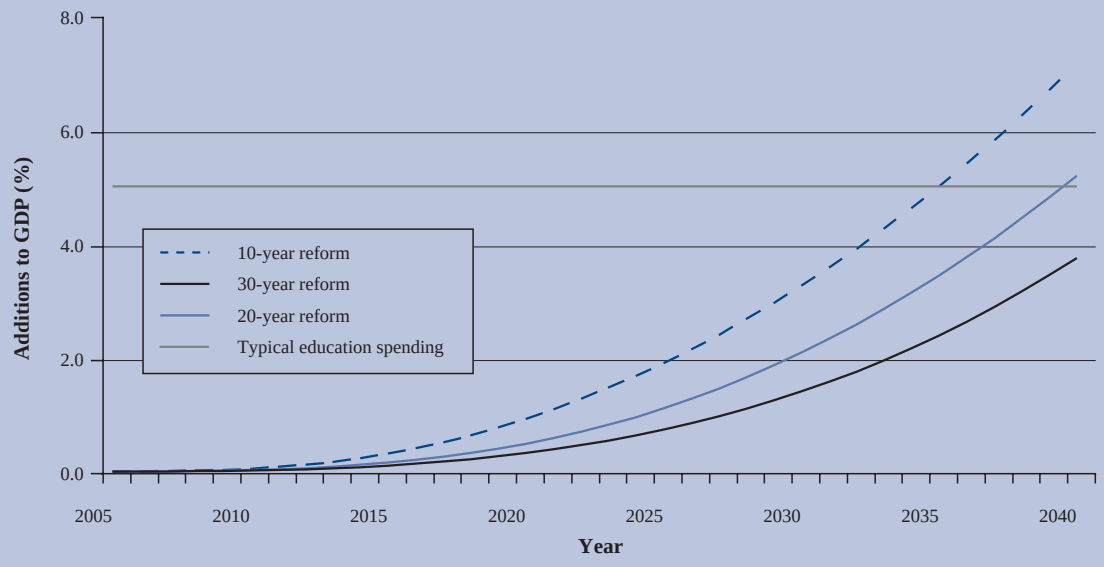
An alternative view that is set out here is that such a trade-off is not the right way to think about it when there are productive investments being made. To obtain some feel for this, consider a typical developed country that is spending 5 % of its GDP on education. Figure 6 displays such spending but superimposes the effects of real school reform that increases quality. Again, for illustrative purposes, this plot shows the implications of a moderately strong school

([1]) For a review of existing US literature, see Hanushek and Rivkin (2004). This paper describes various attempts to estimate the impact of teacher quality on student achievement. Similar studies are currently much less available in other countries.

reform that lifts performance by one-half standard deviation over varying periods of time. From this graph, it is apparent that by 2040 all of education expenditures could be absorbed into the growth dividend from either a 10-year or a 20-year reform. Even a 30-year reform would cover a majority of educational expenditure.

The message is quite simple. Real reform of schools — defined as reform that actually increases the knowledge of students — can be expected to have truly substantial impacts on the well-being of society. The difficult part of course is ensuring the reform of schools really accomplishes its objectives.

Figure 6: **Improved GDP with moderately strong knowledge improvement**



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Chapter 4

Discussion

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([1]) European Commission, Directorate-General for Education and Culture. The views expressed in the paper are exclusively those of the author and do not necessarily represent those of the European Commission. The discussion refers to Hanushek (this volume) and Nesheim (2004), a preliminary version of which was presented at the workshop. Unfortunately it was not possible to include Nesheim (2004) in this volume.

1. Introduction

Following the Lisbon mandate to undertake a general reflection on the future objectives of education and training systems, the Education Council adopted a report which was endorsed in March 2001 by the Stockholm European Council ([1]). This landmark report identifies three broad objectives: (1) Improving the quality and effectiveness of education and training systems in the EU; (2) Facilitating the access of all to education and training systems; (3) Opening up education and training systems to the wider world. At the request of the Stockholm European Council, EU Education ministers and the Commission agreed on a work programme to implement these 3 broad objectives and 13 associated objectives (the 'Education and Training 2010' programme ([2])). The issue of efficiency and quality is central to this work programme. It covers objective 1.5 'Making best use of resources' for which I am responsible for. The main message is that more and better investment in human capital is necessary to improve the efficiency and ensure equity in our E&T systems.

The papers by Hanushek and Nesheim present a thorough empirical analysis of the major issue in basic education: schooling quality. To better grasp the importance of these two contributions, it may be useful to replace the papers in the broader context of the literature (Part I) before discussing their methodological approaches (Part II). The conclusions of these two papers lead to some policy implications that are worth discussing (Part III). Indeed, they suggest important institutional reforms and incentive changes that are needed to improve the efficiency and quality of our primary and secondary education systems.

([1]) http://register.consilium.eu.int/pdf/en/01/st05/05980en1.pdf
([2]) http://ue.eu.int/ueDocs/cms_Data/docs/pressdata/en/educ/69473.pdf

2. The papers in the broader context of the literature

2.1. The definition of schooling quality

Several definitions of schooling quality have been used. They have varied from input-oriented measures to output oriented indicators. However, a complete measure of quality is still missing.

1. The older definition was an input measure based on characteristics of the teacher and school. Several input-based indicators have been used in regressions. One of the favourite tools used by Card and Krueger in their seminal paper (1992) was pupil/teacher ratio and per student expenditure. Other possible measures include class size and contact hours (time on task) (Krueger, 1999). Likewise, teacher degrees and experience were part of the toolbox. However, long ago, Griliches and Mason (1972) had shown that changes in these input policies had a high cost though a rather low impact on earnings. That conclusion was also later reached by Heckman et al. (1996). It seems that the main interest of these input measures based on characteristics of the teacher and school was that they did seem to increase quantity and equity through higher enrolment. However, they did not seem to affect efficiency or quality as such.

2. Indeed, a new definition of schooling quality in the form of an output measure based on student performance seemed better suitable to assess the characteristics of quality and efficiency. We owe this new impetus on performance to Hanushek (1998, 2002, 2003). The definition would mean that 'quality of education refers to the knowledge base and analytical skills that are the focal point of schools' and 'a good quality teacher is a teacher whose students achieve high test scores'. More precisely, performance and thus quality would relate to cognitive skills measured by students' performance on standardised tests. However, we might wonder whether such a simple measure could capture a teacher's role in the school's production function. The obvious risk would be that teachers may teach to the test. Therefore, we might need some additional measures of schooling quality.

3. Other definitions may provide some additional features necessary to better grasp the complexity of the 'efficiency' and 'quality' concepts. One approach is to integrate non-cognitive skills such as motivation, monitoring, discipline, etc. This is mainly the approach followed by Heckman (1999). Another major concern is to take into account external efficiency with non-market outcomes both direct and indirect. Here, we could profit from the work of McMahon (2002) and the interesting work done in the area of social capital (*Economic Journal*, 2002). Unfortunately, we still suffer from a lack of data on non-cognitive skills and non-monetary outcomes although longer series begin to be available (PISA, 2003).

2.2. The effect of schooling quality on test scores

The main way to measure student performance is to use test scores. Standardised tests indeed seem to provide an interesting indicator of performance although they should not be considered as the panacea.

In a standard achievement function, we would have on the left hand side of the equation as explained variable student achievement in terms of test scores. On the right hand side, the explicative variables would comprehend school, family, student ability and peers features. Using such achievement functions, several studies have shown that external examinations indeed raise achievement (Bishop, 1997; Costrell, 1994). Here lies the essential role of assessment standards. However, we should keep in mind that there might be a trade-off between quality and quantity that clearly needs to be overcome. Indeed, how to produce both high outcomes scores and high absolute numbers of students is a question to address.

2.3. The effect of test scores on private and social returns

Once the impact of schooling quality on test scores has been assessed, it is natural to envisage the effects of test scores on private and social returns.

1. The impact of test scores on private returns in the form of individual earnings and employability has been widely studied. Such an analysis is mostly based on 'Mincerian' earnings functions. Mincer (1997) gave his name to these equations because of the function he suggested to calculate private returns in terms of earnings. And indeed, these functions have shown a rather robust relationship between scores and earnings. Since test scores reflect ability, it is usual to conclude that variations in measured cognitive ability seem to have an impact not only on earnings but on employability as well. However, this requires well-functioning labour markets to measure the true impact of investment in human capital on employability.

2. Private returns are obviously of major importance, notably to provide proper incentives for individuals to invest in their own education. But, one of the main characteristics of education and training is that, being partly a public good, they also encourage social returns that benefit the whole society thanks to strong economies of scale. In order to estimate these social returns, it may be interesting to measure the impact of test scores on productivity. Although harder to assess than the effects on earnings, there also seems to be an impact on aggregate productivity according to Hanushek and Kimko (2000).

3. Finally, the last area for research would be to study the impact of test scores on growth. And at this more aggregate level, we also dispose of major theories based on strong microeconomic foundations. Endogenous growth theories (Barro, 1990; Lucas, 1988; Romer, 1986 and 1990) have acknowledged the impact of human capital on growth through production functions. They have been sometimes criticised for not having analysed the impact of an output measure of human capital rather than an input measure. However, based on endogenous theories, it is still possible to assess the quantitative impact in terms of level effect (input) and growth effect (output). Indeed, this simply requires a distinction between quantity (the stock of human capital as an input: e.g. the number of scientists) and quality (the stock of knowledge as an output: e.g. the number of patents for instance; see Dion, 2004). Most recently, by measuring actual skills (key competences measured thanks to literacy testing such as the IALS) rather than educational qualifications, a team of economists at the University of Ottawa (Coulombe et al. 2004) has shown that human capital becomes a strong predictor of economic growth.

3. Methodological problems

3.1. The determinants of achievement

In order to explain achievement, we need to refer to several determinants. As stated above the main contributors to achievement are ability, family, peers and school features. Concerning family influences, these concern for instance average parents' education, family size and location (Nesheim, 2004). Peers usually represent totals of a student population's socio-demographic features for a school or class. Finally, schools refer to teacher quality or teaching inputs.

3.2. The risk of biases

However, there are some risks of biases especially regarding the location measure. This is clearly the main interest of the work done by Nesheim (2004). Indeed, regressions that seek to estimate the effects of school quality on educational outcomes are biased because people choose where their children go to school. Therefore, we would need a consumer location choice equation based on several determinants to address the sorting process of where people choose to live. This approach followed by Nesheim clearly answers the main flaws of the standard approach. However, it may be useful to integrate the latest theories of new economic geography where the parental choice for location is limited by a core-periphery pattern and concentration-dispersion forces. This implies that households may be less free than previously thought in deciding where to locate due to other external forces imposing a different choice. By integrating these economic and social forces, the location decision and its implications on student achievement would be clearly enriched.

4. Issues for the general discussion

These two papers lead us to discuss three main areas for reforms that are indeed on the agenda in every country to raise the efficiency and the quality of our schools. These reforms concern: (A) policies to improve teacher accountability and quality based on incentives; (B) greater decentralisation of decision-making; and (C) introduction of national systems of examinations.

4.1. Policies to improve teacher accountability and quality based on incentives

These initiatives relate to the characteristics of the teacher force.

1. The teacher force in terms of teaching pay represents between two thirds and three quarters of all education expenditure. And it seems that teacher supply is sub-optimal notably in comparison with the returns of other education inputs (Pritchett and Filmer, 1999). The quality of the teacher force is indeed essential, since an increase in teacher quality has a stronger effect than class size reduction (Rivkin et al., 2002).

2. To improve the supply of high-quality teachers, we would need selective policies aimed at the desired outcome: that is, student performance. Possible approaches include more selective hiring or tenure as well as more selective retention or promotion. It may also relate to pay for performance and distinction between the taught disciplines to raise motivation. The obvious risk is that the definition of 'merit' may be too subjective and political and hence individual rewards would lead to undesirable competition among teachers.

3. Therefore, a general quality upgrading of the teaching force necessitates setting appropriate training and hiring standards. This also implies to come up with standards that are correlated with teaching quality and finally open the supply of teachers instead of solely insisting on more stringent requirements.

4.2. Greater decentralisation of decision-making

Decentralisation is an important leitmotiv that simply states that we need to better use local knowledge and introduce more choice and competition in the system while being well aware of all shortcomings.

1. Use of local knowledge implies giving principals or head teachers more discretion in rewarding teachers (Yes for Armor et al. 1976 and Murnane, 1975; No for Ballou, 1996). Principals or head teachers should then be held responsible for their decisions. This move towards more autonomy would reduce red tape that usually hinders the benefits of local knowledge and often leads to duplication and dispersion of efforts and funding.

2. Choice and therefore competition among schools to attract pupils will force schools to decrease costs and increase the quality of services provided (Friedman, 1997; Hoxby, 2000). It is often thought that choice should increase the degree of parental participation in schooling.

3. Obviously such approaches can be risky. The main risks are for instance to increase stratification and inequality or dilute basic schooling standards. However, such inequities already exist (with or without vouchers) since wealthier families already 'choose' their schools. Besides, better information on performance as well as 'cream skimming' or more school autonomy might intensify that trend. Therefore, rather than rejecting choice and competition, we should better look to measures to counteract their potential related risks.

4.3. Introduction of national systems of examinations

When dealing with standardised tests to assess the performance of schools, it may be necessary to provide a centralisation of the systems of examination while developing a culture of independent evaluation.

1. Centralisation of national systems of examination joined with standardised tests seems to provide rather positive results. And indeed, rewarding teachers and principals on the basis of school performance requires national examinations. However, this should not be in contradiction with local-based merit pay systems. On the contrary, an equal, transparent merit system requires a central system of evaluation. In the meantime, we need to keep in mind that systems of national examinations and school accountability incur costs both psychological (for teachers and pupils) and financial (extensive exam taking).
2. The introduction or development of a culture of independent evaluation would imply the introduction of an assessment system of teaching. This is clearly useful since teacher scores on achievement tests seem to have a good correlation with student outcomes. This requires designing robust evaluation methods to answer the need of a more comprehensive evaluation of educational systems. The integration of new methods of evaluation and more and better data (PISA) are prerequisites.

5. Conclusion

Several important messages stemming from the results of research should indeed be brought to the attention of policy-makers. Institutional reforms and incentives changes are necessary to foster higher quality in our education and training systems.

Besides, when dealing with initiatives encouraging efficiency, we should never forget the possible implications on equity. Since the trade-off between efficiency and equity does not necessarily exist, all policies to implement should aim at fostering both objectives. In our Working Group E responsible for 'Objective 1.5: Making the best use of resources', we have decided that each recommendation should indeed meet both efficiency and equity concerns.

Furthermore, in order to close the gap between research and policy the Education and Culture DG has launched several initiatives in the field of the economics of education to identify the main conclusions and policy implications of the results obtained by the research community. We have also established a network of experts in the field that advise the Commission on issues related to educative policies (see the Internet website at: http://www.education-economics.org/).

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Part II:
Post-compulsory education

Chapter 5

Higher education funding ([1])

Nicholas Barr ([2])

([1]) This chapter first appeared in the *Oxford Review of Economic Policy*, Volume 20(2) 2004, pp. 264–283, and is reprinted here by kind permission of Oxford University Press.

([2]) London School of Economics. This paper draws on Iain Crawford's and my 15-year collaboration (see Barr and Crawford, forthcoming), on assistance from Colin Ward and his team at the Student Loans Company on factual matters and administrative feasibility, and on work by the three of us advising the Hungarian government. I am also grateful for helpful comments from Howard Glennerster, Michael Shattock, the editors, and an anonymous referee, and for help on factual matters from officials at the New Zealand Ministry of Education.

Abstract

The expansion of higher education throughout the OECD — and beyond — is both necessary and desirable. But it is costly, and faces competing imperatives for public spending. Higher education finance is therefore salient to an extent that is not yet fully appreciated in all countries, and is also immensely sensitive politically. This paper sets out the core lessons for financing higher education deriving from economic theory and puts them alongside lessons from country experience. The UK reforms announced in 2004 are assessed against the backdrop of those two elements. A concluding section briefly maps out unfinished business.

1. Introduction

Higher education matters. No longer only a consumption good enjoyed by an elite, it is an important element in national economic performance. So it is no accident that the numbers in higher education have increased in all advanced countries. However, a mass, high-quality university system is expensive and competes for public funds with other imperatives.

Though in part about the UK reforms announced in 2004, the paper is general in its application. It starts with some background issues. Section II sets out lessons from economic theory, largely rooted in the economics of information. Section III considers lessons from country experience, which complement and illustrate the theoretical analysis. Section IV assesses the 2004 Higher Education Act in England against the backdrop of the previous two sections, on the assumption that the legislation going through Parliament at the time of writing is not substantially changed. The concluding section considers the unfinished agenda.

Some caveats about what the paper is not about. The emphasis on funding does not imply the crude fallacy, against which Wolf (2002) rightly cautions, that increased spending automatically increases economic growth. The quality of higher education and its ability to adapt to changing economic conditions are critically important, and central to later arguments that market forces do a better job than central planning in matching the skills of graduates with their own preferences and the demands of the labour market.

Second, the concentration on the economic importance of higher education does not diminish the pursuit of knowledge for its own sake, nor downplay the centrality of academic freedom, nor deny that for many people getting a degree has important consumption benefits and is not simply an investment in their career. Third, the paper focuses on the finance of teaching, setting to one side the issues raised by research funding (see McNay, 1999; Roberts, 2003). Fourth, it is rooted in economic theory, but is not quantitative. Finally, though country experience is discussed, this is not a comparative paper.

1.1. Background issues

Higher education matters, first, because of the nature of technological change. Though it can reduce the need for skills (e.g. computers are increasingly user-friendly), it mostly increases the demand for skilled workers. Amplifying the trend, skills date more quickly and need to be replenished. The 'information age' can be taken to mean a need for education and training that is larger than previously, more diverse, and repeated, in the sense that periodic retraining is required.

Demographic change offers a second reason for expansion. The rising proportion of older people foreshadows increased spending on pensions, medical care, and long-term care. Part of the solution is to increase output sufficiently to meet the combined expectations of workers and pensioners. If workers are becoming relatively more scarce, the efficient response is to increase labour productivity. Demographic change is thus an argument for additional spending on investment in both technology and human capital.

Two debates shed light on implicit assumptions which often underpin opposing arguments. The first is about the nature of higher education, which can be characterised in terms of two stylised models.

- In the 'Anglo-American' model, policy sees higher education as heterogeneous, regards this as proper, and encourages diversity, varied forms of provision, and quality comparisons between them.

- In the 'Scandinavian model', policy is based on the assumption that institutions are homogeneous, and therefore treats them equally and regards all programmes as equal.

This paper argues that the second model, whatever its merits, is incompatible with mass higher education, and that funding should therefore support a diverse, decentralised system. That line of argument is supported by the theoretical discussion in Section II.

The second debate is about ability to pay. There is agreement that this should be a central element in policy design, but disagreement about how it should be measured. Should it be based on current income, i.e. on where people start? The strategy to which this leads is support for people whose family is poor, even if recipients end up becoming rich. Or should ability to pay be based on future income — that is, on where people end up? This approach leads to finance based on income-contingent loans or graduate taxes, with more generous support, *ex post*, where someone derives little financial benefit from his or her degree.

Section II argues that the second approach is correct for people who are well informed. Thus support for the generality of students should derive from a mix of tax funding and income-contingent loans (i.e. loans with repayments calculated as *x* per cent of the borrower's subsequent earnings). However, there is a socioeconomic gradient in the extent to which people are well informed, so that children from disadvantaged backgrounds may not even think of going to university. For such people, the first approach may be required.

Policy objectives

Higher education in the United Kingdom faces three widely agreed problems.

- Universities have too few resources: real funding per student almost halved in the 20 years to 2000 (Greenaway and Haynes, 2002, Figure 1).

- Student support is inadequate (Callender and Wilkinson, 2003).

- Access is unequal. In 2002, 81 % of children from professional backgrounds went to university; the comparable figure for children from manual backgrounds was 15 % (UK Education and Skills Select Committee, 2002, p. 19).

There is also widespread agreement about two core objectives: strengthening quality and diversity, both for their own sake and for reasons of national economic performance; and improving access, again for both efficiency and equity reasons. At least in the UK, therefore, the argument is less about what policy is trying to do than about the best way of doing so.

1.2. Blind alleys

Before proceeding, it is helpful to clear the undergrowth by considering a series of often-asserted propositions.

Higher education is a basic right and should therefore be free.

The assertion that access to higher education is a right is a value judgement that commands widespread agreement. But it does not follow that higher education must be free. We all agree that food is a basic right, yet competitive supply at market prices is uncontentious. The equity objective is not free higher education, but a system in which no bright person is denied a place because he or she comes from a disadvantaged background.

In arguing for free higher education, however, people are reaching towards an important point: there is a strong case for making higher education free at the point of use. The arrangements set out below are designed to make that possible.

It is immoral to charge for education.

The same arguments apply. It is immoral (in my view) if people with the aptitude and desire are denied access to higher education because they cannot afford it; it is also immoral if underfunded earlier education means that they never even aspire to university. Similarly, it is immoral if someone is malnourished. But that is not an argument for making food free for everyone, including the rich; rather, it argues for income transfers so that everyone can afford a healthy diet.

Making something free for everyone can be justified in efficiency terms, where market failures make consumer choice problematic, and in equity terms, where the commodity is consumed by everyone — for example, school education and healthcare. As discussed below, higher education conforms with neither criterion. As a result, taxpayer subsidies are regressive and, as already noted, free higher education has done badly on access.

Elitism has no place in higher education.

Argument often blurs two separate elements. Many people, including me, agree with the value judgement that social elitism is wrong — social background per se should not influence access to the best universities. In contrast, intellectual elitism is both proper and desirable. The best musicians and athletes are chosen precisely because of their abilities, irrespective of whether their background is poor (Pele) or middle class (Tiger Woods). There is nothing inequitable about intellectually elite universities. The equity objective should be a system in which the ability of the brightest students to study at the most intellectually demanding universities is unrelated to their socioeconomic background.

Graduates pay for their higher education through income tax.

It is sometimes argued that higher education should be wholly tax funded because graduates earn more than non-graduates and therefore pay for their higher education through subsequent higher income tax payments. There are three counter-arguments.

- Income tax raises only one quarter of government revenue and is paid by many more non-graduates than graduates: 82 % of working-age adults in the UK do not have a degree (OECD, 2002, Table A3.1a).

- Suppose a person with a degree pays an additional GBP 100 000 in tax, of which GBP 20 000 is deemed to pay for his higher education. By implication, he therefore pays GBP 80 000 towards the National Health Service, schools, etc. — less than the GBP 100 000 contributed to those services by someone with identical lifetime income who has not been to university. This is horizontally inequitable.

- If the argument is that the taxpayer gets a 'good deal' by paying for people's investment in higher education, the same logic says that the US taxpayer should pay all Microsoft's development costs.

A further argument against sole reliance on taxpayer funding is a practical one. There are limits to taxation, not least because of political pressures, which collide with other priorities for public spending. Thus it is no accident that real funding per student declined sharply over the years as UK student numbers increased.

2. Lessons from economic theory

Economic theory offers three strong lessons for financing higher education (for fuller discussion, see Barr, 2001a, Chapters 10–13): the days of central planning have gone; graduates should share in the costs of higher education; and well-designed student loans have core characteristics.

2.1. Lesson 1: The days of central planning have gone

Present arrangements

Central planning of UK universities has increased considerably since the mid-1970s. The problem has not been academic freedom, but reduced economic freedom through price control, quantity control, and heavily bureaucratic quality control.

Price control. UK universities are free to set fees for non-EU undergraduates and for all postgraduates. For UK and other EU undergraduates, fees were forbidden until 1998; since then, universities have been required to charge a flat fee (GBP 1 150 in 2004/05), i.e. the same for all subjects at all universities. It is illegal to charge more and illegal to charge less.

Quantity control. Universities in England and Wales contract with the Higher Education Funding Council for England to teach a specified number of students. Though those controls have varied, universities have been penalised for recruiting fewer students than their quota and for recruiting too many ([1]).

Monitoring quality. Universities are rightly held accountable for their receipt of public funds and rightly subject to quality control in the interests of consumer protection. However, the specific methods, notably the regime to assure teaching quality in the late 1990s, have been roundly criticised ([2]).

The following analysis argues that central planning is no longer feasible and, separately, that it is not desirable.

Central planning of higher education: no longer feasible

The literature on the communist system (see Kornai, 1992, Chapter 9) distinguishes extensive and intensive growth. The former refers to an era when surplus inputs, notably agricultural labour, could be brought into the industrial sector, characterised by rapid growth in the Soviet Union in the 1930s. Intensive growth, when surplus inputs had been used up, depends on technological advance and more efficient use of inputs. Central planning was not able to cope with the more complex problems that arose when inputs became scarce and with more advanced technology, as manifested by declining, and in some countries negative, growth rates in the 1980s and 1990s.

The analogy with higher education is instructive. Forty years ago, with a small university system offering degrees in a limited range of subjects, it was possible, as a polite myth, to assume that all universities were equally good and hence fund them broadly equally. Today there are more universities, more students, and much greater diversity of subjects. As a result, the characteristics and the costs of different degrees at different institutions vary widely, so that institutions need to be funded differentially. In principle, this could be done by an all-knowing central planner. In practice, the problem is too complex. A mass system in an increasingly complex world needs a funding mechanism which allows

([1]) 'Prince William's university has been fined GBP 175 000 for attracting too many students. Applications ... leapt by 45 % after it was revealed that the prince planned to start his studies there last autumn. However, higher education funding rules penalise universities that exceed their recruitment targets.' (*Independent* (London), 29 March 2002).

([2]) A prized possession is the photograph I took of the 14 filing cabinets of material for the three-and-a-half day visit to assess LSE's teaching of politics in October 2000.

institutions to charge differential prices to different costs and missions. Central planning is no longer feasible.

Central planning of higher education: undesirable

Prices give signals to buyers and sellers. In contrast with communist central planning, the OECD countries all have mixed economies in which most resources are allocated by the market.

However, markets can fail — information failures being key — giving a robust case for public provision of healthcare and school education (see Barr, 2004, or, more briefly, Barr, 1998). Consider the following stylised facts about healthcare: consumers are imperfectly informed because much healthcare is highly technical; treatment is frequently not by choice but because of an external event, such as breaking a leg; and there is often only limited choice about the type of treatment. Much of the efficiency case for the National Health Service is based on these facts. With food, the story is different. We are generally well informed about what we like and about its costs, and there is considerable choice over how we meet those needs. These technical differences start to explain why we ensure access to healthcare by giving it to people (largely) free; with food, in contrast, we ensure that a person has access to nutrition by paying her a pension and letting her buy her own food at market prices.

In the case of school education, small children are not well informed; attendance is compulsory, so that education is consumed by all young people; for younger children, the range of choice about content is constrained; and a case can be made in terms of social cohesion for providing all children with a similar educational experience. These arguments and others provide a compelling case for publicly funded and publicly organised schools.

Higher education contrasts strongly. Students are generally well informed and can and should be made better informed. The process is assisted because going to university can be anticipated (unlike finding a doctor to deal with injury after a road accident), so that students have time to acquire the information they need, and time to seek advice. Second, people can choose whether or not to go to university — it is precisely that fact that has made taxpayer-funding of higher education so regressive. Finally, the choice of which subject to study and at which university is, quite properly, large and growing.

It can be argued that students are well informed, or potentially well informed, and hence better able than planners to make choices which conform with their own interests and those of the economy. To maintain otherwise is to argue that even with extensive regulation, students (the best and the brightest, by assumption) are unable to choose sensibly. The argument of well-informed choice is central, and underpins the efficiency case for variable fees in Section II(v). It implies that price signals will be useful and hence that competition will improve welfare by making universities more responsive to the preferences of students and the needs of employers.

Though that proposition is robust, two caveats are discussed below. First, students from poorer backgrounds might not be fully informed, with implications for access generally and debt aversion in particular. Second, though the approach gives a greater role to students, employers, and universities in making choices about subject, content, and mix, it does not imply unrestricted markets. Rather, the analysis points to regulated markets.

2.2. Lesson 2: Graduates should share in the costs of higher education

There are strong qualitative arguments that higher education creates benefits to society above those to the individual — benefits in terms of growth, social cohesion and the transmission of values (Bynner and Edgerton, 2001; Bynner et al., 2003), and the development of knowledge for its own sake. Those arguments suggest that taxpayer subsidies to higher education should be a permanent part of the landscape. Quantifying those benefits, however, entails a series of difficulties, not least because it is hard to separate the effects of education from other determinants of a person's productivity ([1]). Thus the division of costs between the taxpayer and the graduate — like the definition of poverty — has no definitive answer.

In contrast, there is much firmer evidence of the substantial private returns from a degree (e.g. Blundell et al., 2000). Such estimates are based on data for an earlier,

([1]) The screening hypothesis argues, first, that education beyond a basic level does not increase individual productivity and, second, that firms seek high-ability workers but are unable, prior to employing them, to distinguish them from those with low ability. Individuals, therefore, have an incentive to make themselves distinctive by some sort of signal. According to the screening hypothesis, post-primary education fills exactly that function: it gives a signal to prospective employers. Just as an individual's good health may be due more to a strong constitution than to medical care, so, according to this view, is productivity the result of natural ability rather than post-primary education.

smaller cohort of graduates, suggesting that increased numbers may drive down those returns. But Blundell et al. rightly point out that the demand for graduates is also increasing. To the extent that demand and supply increase broadly in step, there is no reason why private returns should fall.

In sum, there is limited quantitative evidence of external benefits and robust evidence of private benefits. The latter suggests that it is efficient that graduates bear some of the costs. In that case, however, the design of student loans becomes critical.

2.3. Lesson 3: Well-designed student loans have core characteristics

Discussion thus far argues for a graduate contribution for the following reasons.

- It is efficient in microeconomic terms because of the private benefits of a degree and, given earlier arguments, because price signals in higher education are useful.
- It is necessary for fiscal reasons, given the high cost of mass higher education and competing fiscal pressures, such as population ageing and combating social exclusion.
- It improves equity by reducing the regressivity of a system in which the degrees of mainly better-off people are paid for by people who on average are less well off.

This section argues that graduate contributions should be based on student loans which have income-contingent repayments, charge a rational interest rate, and are large enough to cover tuition charges and realistic living costs.

Income-contingent repayments

I have argued for many years (Barr, 1989), as have others before me (Friedman, 1955; Peacock and Wiseman, 1962; Prest, 1962; Glennerster et al., 1968) that student loans should have income-contingent repayments, i.e. repayments calculated as *x* per cent of the borrower's subsequent earnings, collected alongside income tax or national insurance contributions, until the borrower has repaid. There are both efficiency and equity arguments for that position.

Problems with conventional loans. It is useful to use a conventional loan — for example, to buy a house — as a benchmark. The loan will have a fixed duration (e.g. 25 years) and a positive interest rate. Monthly repayments are entirely determined by three variables: the size of the loan, its duration, and the interest rate. Apart from adjustments reflecting changes in the interest rate, the monthly repayment is fixed.

Buying a house is a relatively low-risk activity.

(a) The buyer generally knows what he is buying, having lived in a house all his life.

(b) The house is unlikely to fall down.

(c) The real value of the house will generally increase.

(d) If income falls, making repayments problematic, he has the option to sell the house.

(e) Because the house acts as security for the loan, he can get a loan on good terms.

For these reasons, the market provides home loans. The contrast with lending to finance investment in human capital — for example, a university degree — is sharp.

Demand-side problems. Earlier discussion concluded that university students are well informed (element (a)). However, some people, particularly from poor backgrounds, may be poorly informed, an issue taken up in Section II(v). In addition, all borrowers face risk and uncertainty because (b), (c), and (d), though true for housing, are less true for investment in skills. A qualification can 'fall down', because a borrower may fail his exams. He still has to make loan repayments, but without the qualification that would have led to the increased earnings from which to make those repayments. Separately, even well-informed students face risk: though the average private return to investment in human capital is positive, there is considerable variation about that average. Finally (element (d)), someone who has borrowed to acquire a qualification, but then has low earnings and high repayments does not have the option to sell the qualification, further increasing exposure to risk.

For all these reasons, borrowing to finance investment in human capital exposes the borrower to more risk and uncertainty than borrowing to buy a house. The problem arises for all borrowers, and most acutely for those from poorer backgrounds. As a result, borrowing to finance investment in human capital will be inefficiently low.

Supply-side problems. Lenders also face risk and uncertainty. If I borrow to buy a house, the house acts as security. If I am unable to repay, the lender can repossess the house, sell it, and take what he is owed. Deliberate default is not a problem: though I could disappear, I could not take the house with me. For both reasons, loans are available on good terms. An analogous arrangement with human capital would allow the lender, if I default, to repossess my brain, sell it, and take what he is owed. That being ruled out, lenders have no security: they face uncertainty about the riskiness of an applicant — whether the person will acquire the qualification and whether their subsequent earnings will allow him or her to repay — and therefore charge a risk premium ([1]). A risk premium assessed by a well-informed lender is efficient (analogous to higher automobile insurance premiums for bad drivers). But since lenders are not well informed about the riskiness of an applicant, they face incentives to cherry pick, i.e. to find ways of lending only to the best risks, analogous to private medical insurance. An obvious way to do so is to lend only to students who can provide security, e.g. a home-owning parent. The resulting lending will be inefficiently low.

Thus conventional loans lead to inefficiently low borrowing and lending. They are also inequitable. The various efficiency problems impact most on people from poor backgrounds, women, and ethnic minorities, who may be less well informed about the benefits of a qualification and therefore less prepared to risk a loan. In addition, these groups are likely to be on the wrong end of cherry picking.

The case for income-contingent loans. Income-contingent repayments have a profound effect in ways that are not widely understood (Barr, 1991, 2001a, Chapter 12). Low earners make low or no repayments. People with low lifetime earnings do not fully repay. A larger loan (or a higher interest rate) has no effect on monthly repayments, which depend only on the person's income; instead, a person with a larger loan will repay for longer.

In efficiency terms, income-contingent loans are designed explicitly to protect borrowers from excessive risk; in equity terms, they assist access because they have built-in insurance against inability to repay. Following through the consumption-smoothing analogy, we pay national insurance now to finance our pension later; income-contingent graduate contributions are the mirror-image ([2]).

A rational interest rate

Well-designed loans have income-contingent repayments. They should also charge a rational interest rate. However, many schemes incorporate an interest subsidy whose aim is to promote access by preventing excessive debt. The aim is commendable, but blanket interest subsidies will not achieve it. Like many price distortions, they cause inefficiency and inequity. Current UK arrangements, like those in some other countries (e.g. Australia), charge a zero real interest rate.

The first resulting problem is cost. In the UK, about one third of all money lent to students is not repaid because of the subsidy, partly because loans extend over a long duration, and partly because of arbitrage (i.e. students who do not need the loan nevertheless borrowing as much as they are allowed and putting the money into a savings account to make a profit). Second, the subsidy impedes quality because student support, being politically salient, crowds out the funding of universities. Third, it impedes access: loans are expensive, therefore rationed and therefore too small.

Finally, interest subsidies are deeply regressive. They do not help students (graduates make repayments, not students). They help low-earning graduates only slightly, since unpaid debt is eventually forgiven. They do not help high-earning graduates early in their careers: with income-contingent loans, monthly repayments depend only on earnings; interest rates only affect the duration of the loan. Thus the major beneficiaries are successful professionals in mid-career, whose loan repayments are switched off earlier because of the subsidy (for fuller discussion, see Barr, 2003, Section 4.3).

The discussion thus far leads to the question of what interest rate is efficient. The simplest arrangement would charge the government's cost of borrowing. If all students repaid in full, this would make it possible for the loan to stand on its own feet. In practice, however, there will be losses because of low lifetime earnings, early death, etc. — such non-repayment being a deliberate

([1]) The problem is compounded by adverse selection; see Barr (2001a, pp. 177–178).

([2]) It was for this reason that my first specific UK proposal (Barr, 1989) argued that income-contingent repayments should be an add-on to national insurance contributions, an idea originally suggested by Mervyn King.

design feature of income-contingent loans. The taxpayer could cover those losses, as currently in the UK. Alternatively, the cohort of borrowers could cover at least some of the loss through what is, in effect, a form of social insurance. In New Zealand in the 1990s, for example, the interest rate on student loans was set about 1 % above the government's cost of borrowing, thus, according to official estimates, covering about half the loss on the portfolio, the taxpayer covering the remaining loss ([1]). There is also a case, discussed in Section II(v), for interest subsidies targeted at low earners.

Large enough to cover tuition fees and realistic living costs

Loans are an instrument for consumption smoothing. Where there are no distortions such as interest subsidies, the amount people choose to borrow should not be strongly constrained. An implication is that loans should be large enough to cover tuition fees and realistic living costs, resolving such problems as student poverty, excessive reliance on expensive credit-card debt, long hours spent earning money, and/or forced reliance on family support. A ceiling on borrowing each year and on the number of years for which a student may borrow would offer protection against improvidence.

Entitlement to a loan that covers all costs is not an argument against earning opportunities or family support, but for allowing individuals to make choices in the face of an efficient budget constraint (for fuller discussion, see Barr, 1993). A rational interest rate — another price signal — is thus central to ensuring adequate student support.

2.4. The balance between market and State

As discussed in Section II(i), the case against central planning does not mean, and should not mean, that government is marginalised.

Part of the government's role is to empower demand:

- as partial funder of higher education, not least because of its external benefits;
- as organiser of student loans, to provide a mechanism for individual consumption smoothing in the face of the capital-market imperfections discussed earlier ([2]);
- as promoter of access. Options for consumption smoothing may be sufficient for people who are well-informed, but further action, including grants and other activities discussed in Section II(v), is necessary for those who are not.

On the supply side, government has a role:

- as regulator, to ensure that satisfactory quality assurance is in place. Consumers may be well-informed, but that does not mean that they are perfectly informed, justifying quality assurance for reasons of consumer protection. But this task does not necessarily mean a State-run bureaucracy (Brown, 2000). A minimalist approach would require universities to publish timely, accurate performance data on their websites — for example, the destinations of its recent graduates — giving prospective students the information they need to vote with their feet ([3]);
- as setter of incentives. In addition to targeting resources at particular individuals for reasons of access, government properly sets incentives in other ways. It can target resources at particular subjects. Even if we agree that students and employers are well informed, that does not deny government the right to have views about subject mix. It can be argued that subjects such as accounting, law, and economics can look after themselves. But governments might wish to target additional resources at subjects such as classics, music, or drama, or (a perennial worry of governments) at engineering. Government might also wish to target resources at particular institutions for reasons of regional balance.

([1]) In New Zealand the Student Loan Scheme Act 1992 requires that the student loan scheme interest rates be set annually and that, in determining the rates, the Governor-General has regard to, but shall not be bound by: 'the movements, as determined by the government statistician, that have occurred in the consumer price index in the year to the 30th day of September immediately preceding the making of the regulations' and 'the costs to the Crown of the student loan scheme, including the cost of government borrowing in the year to the 30th day of September immediately preceding the making of the regulations'. In the late 1990s, the interest rate was based on the 10-year bond rate.

([2]) See Palacios (2004) for a proposed arrangement for private income-contingent loans.

([3]) Students themselves are an important source of information. Student satisfaction is not all that matters, but that is not a reason for ignoring it. The 2004 UK legislation includes help for student organisations in gathering relevant information.

One further set of incentives — the degree of competition — requires separate discussion. At one extreme, the government could intervene only minimally on the supply side. Universities would compete for students; those attracting large numbers flourish and expand, those failing to do so go to the wall. Universities, however, are not the conventional firms of economic theory: they do not make a homogeneous product; they do not maximise profit; and the 'product' is not well defined (see Winston, 1999). Thus red-in-tooth-and-claw competition is not the best environment for higher education. But this is not the only approach. The more government ties funding to specific subjects or institutions, the less powerful is competition — in the extreme, mimicking a system of central planning. Competition is more usefully thought of as a continuum, from completely unconstrained (law of the jungle) to 100 % constrained (pure central planning), or anywhere in between.

The approach thus allows intervention to foster both distributional and educational objectives. The system can be as redistributive as desired; and the degree of competition is a policy variable, with different answers possible for different subjects. The resulting system is efficient, because outcomes are determined not by a single, dominant — and often badly informed and ineffective — arm of government, but by the interacting decisions of students, universities, and employers, subject to transparent influence by government. Particularly with complex mass systems of higher education, this approach is more likely than central planning to achieve individual and national objectives.

2.5. A general funding strategy

The preceding analysis points to a strategy with three elements: variable fees (i.e. prices) assist the efficient allocation of resources within higher education; well-designed loans provide consumption smoothing, thereby assisting efficient allocation over a person's life cycle; and measures to promote access improve equity.

Leg 1. Variable fees

Universities should be free to vary their tuition fees, though, as discussed later, there is a case for a ceiling. Students should be helped to pay through Legs 2 and 3, discussed below. Charges should be deferred: thus graduates make repayments, not students.

Variable fees — not least because they are so contentious in Europe (though taken for granted in the USA) — require careful justification.

The efficiency case. A major conclusion of the theoretical argument in Section 2.1 is that price signals are useful in higher education, improving efficiency and, through competition, making the system more responsive to student and employer preferences.

Resources are misallocated if students face no price signals between subjects. Employers want people with quantitative skills and computer literacy. Both mathematics and engineering graduates have these skills, but one degree is considerably more expensive than the other. In the absence of price signals, students are indifferent; the taxpayer is not.

The same is true of the choice of university: a well-taught cheaper course at a local university might well suit a student better than a more expensive course; there are gains for the student, the taxpayer, and (through increased competition) the higher education system if the student can give the right signal in responding to the price mechanism.

As well as distorting demand, fixed prices also have adverse effects on the supply side. Price ceilings erode incentives to improve quality (whose costs cannot be covered by price increases); price floors erode incentives to increased efficiency (whose benefits cannot be appropriated through lower prices). Flat fees, including zero fees, are both a floor and a ceiling, and thus particularly inimical to efficiency gains.

These arguments are rooted in the economics of information, not in ideology. The argument that price should have no effect on a student's choice of subject or university is wrong because it uses a price subsidy to pursue equity objectives. This is inefficient and, as argued shortly, also inequitable.

The previous paragraphs relate to microeconomic efficiency. A second efficiency aspect is more macroeconomic, in that variable fees make funding open ended. With flat fees, the Treasury controls the funding envelope. If tax funding falls (for example, because of the competing claims of nursery education and healthcare), so does university income — the example of Australia, discussed later, being a case in point. With variable fees,

in contrast, funding is open ended. Universities have at least some autonomy over their income stream.

The equity case. Perhaps counter-intuitively, variable fees are not only more efficient than flat fees, but also fairer, notably by facilitating redistribution from better-off to worse-off. One of my earliest newspaper articles criticised the 1974 Labour government for restoring universal milk subsidies. The aim was to help the poor, but the subsidy was worth more to the middle class because they drank more milk. It would have been much more progressive to have charged an unsubsidised price and used the resulting savings to increase pensions, child benefit, and poverty relief.

Variable fees replace the former strategy, price subsidies for milk, by the latter, income transfers targeted at particular people. The strategy has two elements.

- Variable fees introduce higher charges for those who can afford them (note that with income-contingent loans, 'can afford' refers to a person's earnings as a graduate, not to family circumstances while a student).

- Redistributive policies help poor people to pay those charges.

To an economist, these elements are staggeringly familiar: the first, a price increase, represents a movement along the demand curve. Taken alone, this element would harm access. However (a) the fees are deferred (Leg 2, below), and (b), there are targeted transfers to groups for whom access is fragile (Leg 3). This moves their demand curve outward.

Thus the strategy is deeply progressive. It shifts resources from today's best-off (who lose some of their fee subsidies) to today's worst-off (who receive a grant) and tomorrow's worst-off (who, with income-contingent repayments, do not repay their loan in full).

As well as redistributing between people, variable fees facilitate redistribution between institutions. With flat fees or tax funding, the volume of resources going to the sector is fixed by government, so that prestigious universities and local institutions compete for the same pot of money in a zero sum game. Variable fees start to address this gridlock.

Third, variable fees are directly fairer. Flat fees force someone going to a small local university to pay the same fee as someone going to an internationally renowned one. This is inequitable. With the milk subsidy, at least everyone got broadly the same quality of milk. In countries with a diverse higher education system, charging everyone the same fee is more like taxing beer to subsidise champagne.

A fourth part of the equity puzzle arises if a country controls fees for home students but allows greater freedom for overseas students. In the UK context, this causes a problem that was both predictable and predicted.

A further impediment to access is the incentive to discriminate against UK students. A flat fee will continue the erosion of quality at the best universities, which face the biggest shortfalls in funding. UK students could suffer in one of two ways. The quality of the best institutions might fall; though UK students could still get places, the quality of the degree would be less. Alternatively, the best institutions will largely stop teaching UK undergraduates (for whom they receive on average GBP 4 000 per year) and will use the fees from foreign undergraduates (around GBP 8 000 per year) to preserve their excellence. The government is considering trying to prevent UK universities from charging additional fees to UK/EU students which ends up harming the very people it is aimed at helping (Barr and Crawford, 1998, p. 80).

Variable fees, by reducing or eliminating the price differential, avoid such discrimination.

The resulting landscape. Each university sets a fee for each of its degrees, though, for the reasons set out in Section 3.1, subject to a maximum. Fees would be influenced by the level of demand for each degree and by its cost. Demand would be influenced by educational factors (the university's reputation for teaching, completion rates, subsequent destinations, and employment rates) and by broader aspects (ancient buildings, access to the city centre).

Under such a system, economics at Oxford might charge a higher fee than classics, with potential adverse effects on staff–student ratios in classics and on the ability of students from poor backgrounds to afford economics. These are valid worries in a pure market system. That, however, is not the model to which economic theory points. The major continuing role of government was discussed earlier, notably in promoting access and

through its ability to target resources at particular subjects, for example classics. The result is a market that can make beneficial use of price signals, but a regulated market. In an English context, universities will have more freedom, but constrained by the Higher Education Funding Council, the Access Regulator, and the fees cap.

Why not fees decided by government? As argued in Section 2.1, with a mass and diverse higher education system, the problem is too complex for a central planner to decide the different efficient price for each degree at each university. Why not flat fees that rise over time? As argued above, this is equivalent to a simultaneous price floor and price ceiling.

Variable fees alone, however, would impede access — hence the other two legs of the strategy.

Leg 2. A well-designed loan scheme

Loans should have income-contingent repayments and should charge an interest rate broadly equal to the government's cost of borrowing. The full loan should be large enough to cover tuition fees and realistic living costs, and all students should be eligible for a full loan, i.e. entitlement should not be income tested. As a result, higher education is free at the point of use, unless students choose to pay in part through earning activities or family support. With a rational interest rate, there is no major distortion to such choices.

Some amplification is needed about interest rates. The default rate should be related to the government's cost of borrowing. However, if someone has extended spells out of the labour force, his or her loan can spiral upwards. In terms of strict rationality that should not matter, since repayments will never exceed *x* per cent of monthly earnings; and if the person never fully repays that is not a problem. But in practice, large nominal debts worry people. Thus, though there is a strong case against blanket interest subsidies, there are good arguments for targeted subsidies, discussed below, for people with low earnings or out of the labour force.

Leg 3. Action to promote access

At this stage we return to the debate about whether ability to pay should be assessed relative to a student's current income, i.e. where he starts from, or his future income, i.e. where he ends up. The latter is philosophically appealing, and it is therefore sometimes argued (a) that income-contingent loans have built-in insurance against inability to repay and, to that extent, are a no-lose bet, and therefore (b) that provided loans are large enough to make higher education free at the point of use, such loans are all that is needed. Leg 2 is sufficient.

If all students were well informed, that argument would be strong, and consumption smoothing through income-contingent loans would be all that is necessary. But not all potential students are well informed. In particular, if they underestimate the benefits of higher education and/or overestimate the costs, it might be rational for them, given what they know, to be unwilling to take out a loan. This is the origin of so-called debt aversion.

Addressing the problem requires measures to tackle exclusion which, it can be argued, has three roots: financial poverty, information poverty and poor school education.

Measures to address financial poverty should be wide-ranging.

- An income-tested stipend for children above the minimum school-leaving age would encourage them to complete school.

- An income-tested grant should cover some or all costs at university. There are advantages in offering full scholarships to first-year students from poor backgrounds, who may not be well informed about whether they are well suited to university. By the end of their first year they are no longer badly informed and, if doing well, are more prepared to finance the rest of their degree, at least in part, through a loan.

- Both policies could be supported by financial incentives to universities to widen participation, and by extra resources to provide additional intellectual support at university for students from disadvantaged backgrounds.

A second set of money measures supports access by offering assistance for people with low incomes after graduation.

- Targeted interest subsidies could freeze the real value of debt of people with low earnings, including people who are unemployed.

- People with low lifetime earnings could be protected by writing off any loan not repaid after (say) 25 years.

- The loans of workers in the public sector could be progressively written off. In the UK, 10 % of the loan of new teachers in shortage subjects is written off for each year in the State system. That scheme could be extended to other groups.

- People caring for young children or elderly dependants could be granted loan remission — for example, 10 % of outstanding debt for each year caring for a pre-school child and 5 % per year if the child is of school age.

Information poverty, the second strategic impediment to access, is inadequately emphasised. Action to inform schoolchildren and raise their aspirations is therefore critical. The saddest impediment to access is someone who has never even thought of going to university.

Finally, problems of university access cannot be solved entirely within the higher education sector. More resources are needed earlier in the system, not least because of the growing evidence (Feinstein, 2003) that the roots of exclusion lie in early childhood.

3. Lessons from country experience

Country experience supports the strategy just discussed ([1]).

3.1. Financing universities: Lessons about fees

Three lessons should be pondered: fees relax the supply-side constraint; big-bang liberalisation is politically destabilising; but no liberalisation is also a mistake.

Fees relax the supply-side constraint

The funding of higher education faces a paradox. Large taxpayer subsidies can create supply-side constraints because of the desire to contain public spending. Where qualified students have no automatic entitlement to a place, the constraint takes the form of a view (typically by the Treasury) about student numbers. The result can be a high-quality system, but one which turns away qualified applicants. In countries where students have a right to a place, cost containment impacts mainly on quality.

([1]) For a survey of higher-education finance in different countries, see UK Department for Education and Skills (2003).

In contrast, in countries which offer less public funding per student (e.g. the USA), there are no externally imposed supply-side constraints. Unless limited taxpayer funding is sufficiently redistributive, however, students from lower-income backgrounds will be deterred from applying. Thus high subsidies can harm access on the supply side, but their absence can harm it on the demand side. This is the dilemma which Legs 2 and 3 of the strategy are designed to alleviate.

Table 1 shows public and private spending on higher education in OECD countries, and also participation rates. Given the differences in country systems and in definitions, comparisons should not be pushed too far. However, in a range of countries (Australia, New Zealand, Korea, and (from other data sources) Canada and the USA), high private spending goes along with high participation rates. A few countries combine high participation with little private spending, notably Finland and Sweden, but only because those are the two countries with the highest public spending on higher education — levels that might be unsustainable given other budgetary demands and international competitive pressures.

Table 1

Spending on tertiary education and participation rates, OECD

	Spending as % of GDP, 2000			Net entry rate 2001 ([1])
	Public	Private	Total	
Australia	0.8	0.7	1.6	65
Austria	1.2	0.0	1.2	34
Belgium	1.2	0.1	1.3	32
Canada	1.6	1.0	2.6	n.a.
Czech Republic	0.8	0.1	0.9	30
Denmark	1.5	0.0	1.6	44
Finland	1.7	0.0	1.7	72
France	1.0	0.1	1.1	37
Germany	1.0	0.1	1.0	32

(Continued on the next page)

Table 1 (continued)

Greece	0.9	negligible	0.9	n.a.
Hungary	0.9	0.3	1.1	56
Iceland	0.8	0.0	0.9	61
Ireland	1.2	0.3	1.5	38
Italy	0.7	0.1	0.9	44
Japan	0.5	0.6	1.1	41
Korea	0.6	1.9	2.6	49
Mexico	0.8	0.2	1.1	25
Netherlands	1.0	0.2	1.2	54
New Zealand	0.9	n.a.	0.9	76
Norway	1.2	negligible	1.3	62
Poland	0.8	n.a.	0.8	67
Portugal	1.0	0.1	1.1	n.a.
Slovakia	0.7	0.1	0.8	40
Spain	0.9	0.3	1.2	48
Sweden	1.5	0.2	1.7	69
Switzerland	1.2	n.a.	1.2	33
Turkey	1.0	negligible	1.0	20
United Kingdom	0.7	0.3	1.0	45
United States	0.9	1.8	2.7	42
OECD average	0.9	0.9	1.7	47

([1]) The net entry rate is based on the probability of a 17-year-old entering higher education for the first time by the age of 30.
NB: n.a. = not available. Numbers do not always add up, due to rounding.

Source: OECD (2003).

What matters is not only the total amount of private spending, but also how it is determined. With flat fees, government controls total funding. If fees go up and public spending on higher education declines, all that happens is a change in balance between public and private funding. In 1989, Australia introduced centrally-set tuition fees to address a funding crisis. Over the years, fee income increased but tax funding fell back. By 2000, the system was back in crisis, leading to reform, announced in 2003, partially liberalising fees.

Big-bang liberalisation can be politically destabilising

In 1992, New Zealand introduced twin reforms: fees set by universities, with no constraint on fee levels; and student loans which (a) had income-contingent repayments, (b) charged a positive real interest rate related to the government's cost of borrowing, and (c) covered all fees and realistic living costs.

On the face of it, these arrangements were close to the strategy outlined above, but mistakes were made. First, reform was to some extent big-bang. Student loans were new, and fees, though not new, were fully liberalised. Second, though the system included targeted interest subsidies for low earners, more could have been done. In addition, the third leg of the strategy — active measures to promote access — was not strongly emphasised. Fourth, and equally important, the politics were not handled well: the government treated reform as an event not a process and, having implemented the reforms, stopped campaigning for them; in particular, the government did not do enough to explain to students and parents the considerable advantages of income-contingent repayments. As a result, when nominal student debt rose over the years, worried middle-class parents created political pressures. The scheme was diluted in 2000 (for assessments, see Larocque, 2003; McLaughlin, 2003).

Without liberalisation quality and access suffer

The opposite policy direction — no liberalisation — is equally a mistake. 'Free' higher education or low fixed fees create two problems. Quality suffers because the education budget has to compete with other budgetary imperatives; and, within the education budget, universities compete with nursery education, school education, and vocational training. As a result, real funding per student declines.

Access also suffers. If places are scarce, it will disproportionately be middle-class students who get them; and if places are not scarce, the need to finance a mass system typically means that resources for the pro-access strategy are limited.

3.2. Student support: Lessons about loans

This section focuses on four lessons: income-contingent loans do not harm access; interest subsidies are expensive; positive real interest rates are politically feasible; and the design of the student loan contract matters.

Income-contingent loans do not harm access

Australia introduced a system of income-contingent loans in 1989 to cover a newly introduced tuition charge, and thus offers the longest historical record. Chapman (1997; see also Chapman and Ryan, 2003) notes the increase in overall participation since 1989 and finds, superimposed on that trend, that women's participation grew more strongly than men's, and that the system did not discourage participation by people in the lowest socio-economic groups. Similarly, though participation by Maoris and Pacific Islanders needs continuing work (McLaughlin, 2003, p. 37), participation in New Zealand since the introduction of fees has increased for all groups.

There are two sets of reasons why we should expect these results. First, the income-contingent mechanism is designed explicitly to reduce the risks borrowers face. Second, fees supported by loans free resources to promote access.

A recent study emanating from Statistics Canada offers empirical support for the overall strategy in Section 2.5. Canada liberalised fees (Leg 1) in the early 1990s with no changes to Legs 2 and 3. Predictably, access suffered. In the mid-1990s, the loan limits on the student loan scheme were raised, with knock-on increases in other forms of loan and student support. Again, predictably, access improved, notwithstanding that the Canadian loan scheme is not income-contingent. The report concluded that:

> 'There is a clear positive correlation between parental income and university attendance, and this correlation ... became stronger during the mid-1990s when tuition fees began increasing significantly. This change reflected declines in participation rates of youth from middle income families ... The correlation, however, declined during the latter half of the decade reflecting rises in participation of those from the lowest income groups. This pattern is consistent with the fact that the changes in the Canada student loans programme raising the maximum amount of loan occurred only after tuition fees had already begun to rise' (Corak et al., 2003, p. 14).

Interest subsidies are expensive

Simulations by Barr and Falkingham (1993, 1996) found that for every 100 the government lends, only about 50 is repaid. Of the missing 50, 20 is lost because some graduates have low lifetime earnings and so never repay their loan in full, and 30 is not repaid because of the interest subsidy. In other words, the interest subsidy converts nearly one third of the loan into a grant. Sales of student debt by the UK government in the late 1990s offer independent evidence. The debt was sold for about 50 % of its face value. Official estimates suggest that of the missing 50, about 15 was because of low lifetime income, etc., and 35 because of the interest subsidy. The evidence is compelling because the two sets of results are independent, the latter with a market test.

New Zealand offers parallel evidence. A government elected in 1999 acted early on a manifesto commitment. It introduced an interest subsidy in the form of a zero nominal interest rate while a student was still at university (previously a real interest rate was charged from the time the student took out the loan). In addition, the real interest rate charged after graduation was frozen at somewhat below its previous rate. The impact of these changes was startling. Previously, according to official estimates, of every 100 that was lent, 90 would be repaid. As a result of the changes, it was estimated that only 77 out of every 100 would be repaid (New Zealand Ministry of Education, 2002, p. 7). The change is so expensive precisely because the subsidy to students while still at university applies to all students. A key message is that seemingly small adjustments can be very expensive.

Not least for these reasons, an official inquiry, echoing the discussion in Section 2.3, concluded:

> 'Participation goals should continue to be supported through a Student Loan Scheme with income-contingent repayments as at present. The Commission believes, however, that the current policy of writing off interest on loans for ... students while they are studying is not an effective use of the government's resources. While this policy has decreased the length of time taken to repay loans after graduation, it has also led to an increase in the number of students taking out loans and in the overall level of student debt. To compound matters, the policy has made it possible

> for learners to borrow money and invest it for private gain (arbitrage). Consequently, the Commission believes that this policy should be discontinued — or that, as a minimum, the incentives for arbitrage should be removed. Any savings ... should be reinvested in the tertiary education system and be used for the benefit of students' (New Zealand Tertiary Education Advisory Commission, 2001, p. 14).

Positive real interest rates are feasible

In the Netherlands and Sweden (and, no doubt, elsewhere), as in New Zealand until the changes in 2000, a real interest rate is charged from the moment the student takes out the loan. As noted earlier, with income-contingent loans a higher interest rate does not increase a graduate's monthly repayments, only the duration of the loan.

Contract design is important

International labour mobility is high and, with EU enlargement, likely to increase, raising questions about potential default if a person emigrates. In Australia, loan repayments are part of a person's tax liability, so that someone outside the Australian tax net has no liability to make repayments. With interest subsidies this is a costly error. In the UK, in contrast, there is an explicit loan contract which includes the collection of repayments through the tax system, but does not exempt a person outside the UK from making repayments. Clearly, default and administrative costs are higher for people working abroad, but the effect is not large. Certainly there is no question of emigration causing a repayment black hole.

4. The 2004 reforms in the UK

4.1. Assessment

Reforms in 1998 brought in income-contingent loans, for which there were loud cheers ([1]). Beyond that, however, the system had serious problems (Barr and Crawford, 1998; Barr, 2002):

- central planning continued;
- fees were introduced, set by central government and the same for all subjects at all universities, and fees were an upfront charge, since there was no loan to cover them;
- loans displayed serious design problems — they were too small to cover realistic living costs (let alone fees), and incorporated an interest subsidy;
- on the access front, the 1998 reforms abolished the previous system of grants which partially covered a student's living costs.

I strongly support the UK reforms of 2004 because they address most of these problems (see Barr, 2003). They simultaneously conform with the strategy in Section 2.5, based on economic theory, and accommodate the main lessons from country experience. Other countries had attempted to move in the same direction for the same reasons (Commonwealth of Australia, 1998; New Zealand Ministry of Education, 1998), but were unable to move forward for a variety of reasons, not least political opposition.

Leg 1. Tuition fees

From 2006, the reforms replace the upfront flat fee with a variable fee between GBP 0 and 3 000 per year. Within those limits each university can set the fee for each of its courses. Students can pay the fee upfront or take out a loan. In the latter case, the student loans administration pays the fee directly to the university, whose financial position is therefore independent of how students choose to pay their fees.

As discussed earlier, variable fees improve efficiency by making funding open-ended, hence increasing the volume of resources going to higher education and, by strengthening competition, improve the efficiency with which those resources are used. Both trends are assisted by appropriate regulation, for example the cap on the maximum fee.

The equity advantages of variable fees were also discussed earlier. They contribute to access by redistributing from better-off to worse-off; they facilitate redistribution from universities with more market power to those with less; they are directly fairer, in that students do not have to pay the same fee at a small local university as at an internationally famous one; and they reduce discrimination against home students if there is a differential between home and overseas fees.

Alongside these advantages of principle, the fees regime also draws on international experience by liberalising fees, but not completely. The fees cap is crucial in this context. It should ideally be high enough (a) to pay the best universities the rate for the job and (b) to bring in competition, but low enough (c) to ensure that the new regime is politically sustainable by giving students and parents time to adjust, and (d) to give universities time to put in place management suitable for a competitive environment.

Leg 2. Loans

The 1998 reforms introduced income-contingent loans, but they did not cover tuition fees and were too small to cover realistic living costs. The 2004 reforms improve the system by extending loans to cover tuition fees and by increasing the loan for living costs. They also raise

([1]) Repayments were 9 % of income above GBP 10 000 per year.

the threshold at which loan repayments start: from 2006, graduates will repay 9 % of earnings above GBP 15 000 per year, up from GBP 10 000.

From the point of view of the student, the situation is little different from the days of 'free' higher education: their fees are paid on their behalf, and money is paid into their bank accounts to cover living costs. From the point of view of the graduate, the arrangements are like a system financed out of income tax, except that the repayments (a) are only made by people who have been to university and benefited financially and (b) do not go on forever.

Notwithstanding public anxiety, these repayments should not be exaggerated. The taxpayer will continue to pay the bulk of the costs of higher education. And a loan of (say) GBP 20 000 should not be daunting compared with other expenditure: over a 40-year career, a typical current graduate will pay (in cash terms) about GBP 850 000 in income tax and national insurance contributions ([1]), and will spend about GBP 0.5 million on food. As an alternative comparator, it is possible to pay off GBP 10 000 of student debt in about 10 years by giving up a smoking habit of 20 cigarettes per day (Barr, 2003, para. 84). Part of the problem is that people continue to conflate credit-card debt (rightly a concern to parents), with income-contingent loan repayments.

In one important respect, however, the loan arrangements conform neither with theory nor country best practice — the 2004 reforms continue the interest subsidy.

Leg 3. Action to promote access

Grants to cover at least part of living costs, abolished in 1998, will be restored. From 2006, students from poor backgrounds will be entitled to a grant of GBP 2 700 per year, in addition to a loan ([2]); and universities charging fees of GBP 3 000 will be expected to provide students from poor backgrounds with bursaries of at least GBP 300 per year to help to pay those fees. The intention is that no student from a poor background will be made worse off by the reforms.

The act also brings in an access regulator, whose formal task is to ensure that institutions have satisfactory plans to widen access as a quid pro quo for charging higher fees. Those plans can include scholarships for students from poor backgrounds; importantly, they can also include outreach to schools to improve the information available to schoolchildren.

4.2. Remaining issues

In sum, the arrangements, which are intended to come fully into effect in 2006, bring in additional resources and strengthen competition, both of which contribute to quality, and redistribute from better- to worse-off, contributing to access. Those desirable features do not, however, mean that the scheme is perfect.

Fees

The desirability of a cap on fees was discussed earlier. Some commentators argue that the cap is too low and/or that it will be kept at GBP 3 000 for too long (roughly the life of a Parliament). This is a balancing act. If the cap is too high, it risks destabilising the system politically, but if it is too low for too long, most universities will charge the maximum, approximating a system of flat fees. The result would be to reintroduce closed-ended funding and to restore central planning by the back door.

Loans

Notwithstanding the improvements, loans display continuing problems. The interest subsidy is expensive and regressive. In addition, the reforms raised the threshold at which graduates start to make repayments. The change reduces the repayments of all graduates, hence increasing the average duration of repayment, and the leakage caused by the interest subsidy.

Digging more deeply, matters are even worse. Student loans are currently off-budget, thus eliminating the interest subsidy yields saving only off-budget. Redirecting those savings towards larger grants (for example) would involve on-budget spending; that is, it would increase measured public spending.

What is needed, therefore, is a twofold reform: eliminating the blanket interest subsidy and replacing it by a targeted subsidy; and bringing loans on-budget for reasons

([1]) Dearden et al. (2004) estimate payments of income tax and national insurance contributions of GBP 330 000. Their figure is lower than mine mainly because it (a) covers a shorter time period, (b) is in real terms, and (c) starts from a lower starting salary. The point is not the exact number, but that loan repayments are small relative to income tax and national insurance contributions.

([2]) Students receiving the maximum grant are entitled to a somewhat reduced loan.

of rational public budgeting ([1]). These reforms would make it possible to offer somewhat larger loans, and to offer all students a full loan; they would also free considerable resources for pro-access policies.

Access measures

More could be done to protect low-earning graduates as described in Section 2.5; for example, targeted interest subsidies, loan-write-off for some public-sector workers, and loan remission for people undertaking caring activities.

A second area of potential progress is to address public concerns by improving information. Some of these worries are that:

- the new system will leave students with large debts;
- higher participation will lower the return to getting a degree;
- student debt will make it harder to get a mortgage;
- variable fees are inequitable;
- variable fees will harm access;
- variable fees will create a two-tier system;
- it is morally wrong to charge for higher education.
- this is the start of a slippery slope.

Some of these concerns have been discussed in this paper. For responses to the others, see Barr (2003, paragraphs 121–130).

([1]) For more detailed discussion of targeted interest subsidies and a critique of the Education Department's position, see Barr (2003, paragraphs 104–120); see also UK Education and Skills Select Committee (2003).

5. The unfinished agenda

Economic theory and practical experience offer solutions to avoidable problems: (a) unsustainable public spending; (b) public spending which is hijacked by the middle class; (c) loans absent, or badly designed, so that they bring in few, if any, extra resources; (d) economic constraints on universities, which reduce incentives to efficiency; and (e) specific design features that are costly (interest subsidies), administratively demanding (income testing), or both.

These are widespread in OECD countries, though (b) and (d) are less of a problem in countries which allow variable fees. They also occur elsewhere: an account of Latin America reported that:

> 'Most of the public institutions ... have argued that low or no tuition fees have provided greater equality of educational opportunity by providing greater access ... Such reasoning is simply incorrect ... the overwhelming public subsidy has been and continues to accrue to students from middle and high-income families' (Lewis, 1999).

The policy in Section 2.5 is designed as a strategic whole explicitly to address these problems. Each of the elements — deferred variable fees, income-contingent loans, and active measures to promote access — can be crafted in various ways and with differing weights, to reflect differences in national objectives and different constraints. Broadly, the strategy is applicable to any country which can do an effective job in collecting income tax — and hence student loan repayments.

The three elements offer a benchmark against which countries could assess future policy directions. The USA, for example, does well on Leg 1 (variable fees) but less well on Leg 2 (loans are not income-contingent, nor collected as a payroll deduction, and generally attract an interest subsidy) and Leg 3 (where scholarship arrangements can be criticised both for parsimony and complexity). Canada, too, might consider action on the second leg. Australia has recently moved partially to liberalise fees under Leg 1, but its loan scheme, though with income-contingent repayments collected by the tax authorities, does not cover living costs for most students, and continues to include a blanket interest subsidy. New Zealand came close to getting all three elements right in the 1990s but was burnt by moving too fast. Most countries in mainland western Europe and in the Nordic countries have yet to address fees under Leg 1, and with few exceptions, have work to do on the loans front.

In these western countries, the unfinished agenda has more to do with politics and administration than with policy.

- In many of the European countries, tuition fees for higher education are a no-go area — a Nordic education minister used the word 'taboo'. The UK government showed considerable courage in addressing these serious political obstacles. Other governments will have to do the same, sooner or later. Their task should be made easier by the example of countries such as England, Canada, Australia, and New Zealand.

- Greater public understanding both of the centrality of higher education and of the nature of income-contingent repayments has thus far been slow in coming, and merits continuing effort.

- International cooperation in collecting loan repayments (discussed briefly in Barr, 2001a, Chapter 14) requires attention with increasing urgency as international labour mobility increases both generally and within the wider EU.

Outside the OECD a challenge that continues to haunt commentators is how to design a loan scheme which mimics income-contingent repayments in poorer countries with a large informal sector and only limited capacity to collect income tax. This is, perhaps, the greatest challenge of all.

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Chapter 6

Tuition fees and higher education quality

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1. Introduction

Market-oriented proposals, like the introduction of tuition fees, have gained considerable popularity in the recent debate on university finance reform. In fact, a number of countries, like the UK, have introduced fees recently, whereas discussions become increasingly intense in other countries like Germany (Greenaway and Haynes, 2003, Jahresgutachten, 1998). For its proponents, tuition fees promise twofold beneficial effects. First, they enhance the efficiency of enrolment by confronting students with some of the direct cost of their study (Garcia-Penalosa and Wälde, 2000). Second, they may establish a closer link between university revenue and student attendance, with advantageous effects on teaching quality competition. However, the latter is only true if tuition revenues accrue directly to universities and do not perish in the general budget. Hence, tuition fees are often demanded to be combined with more university autonomy, in particular the ability to charge and keep fees in the amount desired ([1]).

Maybe surprisingly, the economic profession has shown little concern with university competition, apart from the general critique of applying standard economic theory to education (Winston, 1999). Del Rey (2001) investigates the strategic choice of universities between teaching and research activities, focusing on how the final allocation can be controlled by a proper choice of the governments' parameters. De Fraja and Iossa (2002) explore how strategic admission setting can lead to quality differentiation between higher education institutions.

With these two approaches building on the standard financing scheme of general transfers plus per student grants, the question how tuition fees affect university competition, teaching quality and efficiency in the higher education sector, is by and large ignored. As a first attempt to tackle this issue, we present a simple analytical framework to discuss the effects of three popular reform proposals, pure loans, graduate taxes and income contingent loans ([2]). In doing so, this contribution reports on some results of the much richer analysis in Kemnitz (2003). For a fully-fledged analysis and formal statements and proofs, the reader is referred to that paper.

The main insights of this exercise are as follows. Efficient higher education requires some differentiation of teaching qualities according to student ability. However, the standard student grant scheme is clearly inefficient as it provides insufficient incentives for quality differentiation. But this problem can be resolved by the introduction of a graduate tax scheme, replicating the efficient solution for a proper government choice of subsidy and fees. This option dominates the alternative proposals which never attain efficiency. Moreover, university autonomy is an important factor in assessing the introduction of tuition fees: when universities compete in both quality and fees, none of the tuition fee systems are efficient. Additionally, the welfare under the graduate tax is lower than under the pure loan scheme.

The paper is organised as follows. Having laid out the basics of the model and the efficient solution in Section 2, Section 3 investigates the working of grants and fees under government regulation. Section 4 analyses the working of tuition fees under university autonomy. We conclude with some policy implications in Section 5.

([1]) See, for the UK, Greenaway and Haynes (2003). In Germany, extending university autonomy is advocated, e.g., by the German Council of Economic Advisors (Jahresgutachten, 1998). This is not to deny that there are a number of other arguments for abandoning the traditional system of the general taxpayer subsidising students, the most prominent one being the reverse redistribution implied by such a scheme (Garcia-Penalosa and Wälde, 2000).

([2]) See Barr (1993) for a general overview of alternative financing schemes.

2. A framework for analysis

Consider two universities, engaged in both teaching and research. Basically, both institutions are interested only in the reputation from research, measured by the funds available for that purpose. In order to focus on the problems of teaching quality, we assume that marginal benefits and costs of research are equal. The marginal cost of providing a student with a given teaching quality is increasing in that quality.

Prospective students differ with respect to their learning capabilities, as measured by the probability of graduating from university. For convenience, we assume that abilities follow a uniform distribution. University attendance augments individual earnings in two ways. First, network effects or the fact that even unsuccessful students have learned something, raises later income for all who have attended university. Second, the income of a graduate increases due to his higher productivity certified by the diploma. This increase depends on the teaching quality provided by the university attended. To keep matters simple, we assume that going to university is worthwhile for all individuals, but there exists an exogenous admission standard: only those students exceeding a certain threshold ability are allowed to study. Thus, like in a number of other studies (Del Rey, 2001), the total number of students is constant.

Under these premisses, the efficient solution, maximising the surplus generated in the higher education sector entails a differentiation of teaching qualities according to student ability: the brighter half of students should visit university 1, which provides a higher quality than university 2, attended by the other students. This differentiation reflects the diversity of failing probabilities, generating higher expected returns from human capital investment for the more able.

3. Government regulation

In many OECD countries, the university sector is more or less monopolised by the State and subject to numerous regulatory constraints. Typically, universities are funded by a combination of State-financed per-student grants and a general budget (Fausto, 2002). In the light of the well-reported effect of reverse redistribution, it is appropriate to approximate the revenue side by taxes that are unrelated to income.

Despite tight regulatory constraints, universities can hardly be monitored perfectly with respect to all spending decisions. There are vivid everyday examples of this leeway to be observed in academic life, like the time spent for preparing lectures, staff teaching loads or the type and number of books ordered for the library. In terms of the model, universities have the option to control their own teaching quality.

Under the grant scheme, universities have an incentive to engage in educational activities only if students are allowed to select their institution. However, due to the absence of any financial involvement, all students either choose the institution with the higher teaching quality or enrol randomly when both qualities are the same.

Given this application pattern, universities have an incentive to exceed the competitor's quality and attract all students, unless the per-student teaching cost exceeds the grant. In economic terms, universities find themselves in a tight Bertrand-like competition: both academies offer identical qualities, and the per-student loss in research funds just equals the per student grant.

Consequently, free student choice establishes a link between financial rewards and teaching performance and precludes any diversion of teaching funds for research purposes. However, the maximum surplus that can be attained by this scheme is inefficiently low, because both universities offer the same quality.

At least partially, this inefficiency is due to students' incentives: without any fiscal involvement, only quality matters. Therefore, tuition fees, which make students think about the cost of their study, are a promising alternative.

The recent discussion about introducing tuition fees is dominated by three proposals (Garcia-Penalosa and Wälde, 2000): the pure loan scheme, the graduate tax and income contingent loans. Under either alternative, students receive a government loan covering the fee to be repaid later, in order to cope with the apparent problems of inefficiencies and injustices due to social and/or wealth biases in demand. However, the proposals differ markedly with respect to repayment facilities. The pure loan scheme requires students to pay back their loan irrespective of educational success. The graduate tax scheme, in contrast, subsidises some part of educational costs, to be financed by a tax on the successful students only. Thence, the pure loan scheme is equivalent to a graduate tax with the subsidy set to zero. Income contingent loans, however, relieve unsuccessful students from any repayment and cover the resulting deficit by a general tax.

Indeed, with non-uniform tuition fees, enrolment choices depend not only on the quality, but also on price differences. However, compared with pure loans, fees matter less for student choice under the graduate tax, because the subsidy narrows the effective price differential. For income contingent loans, in contrast, fees are only relevant in case of success, such that all students apply at the institution with the higher quality-fee differential.

But for any constellation of centrally administered tuition fees, neither pure nor income contingent loans implement the efficient solution. This is due to the number of problems an efficient scheme has to solve. While the fees must be set so as to ensure efficient teaching by rewarding either university with the marginal

social benefit of quality enhancements, they must also equalise the absolute private benefit across universities for the proper student in order to have efficient sorting. Obviously, the latter task is not just a side product of the former. With just two instruments under control, the government is bound to fail to achieve all three aims simultaneously. However, this is not true for the graduate tax scheme, which disposes of one more instrument, namely the subsidy rate. Affecting student enrolment without compromising university behaviour, this subsidy can be set such that efficiency can be reached for a proper choice of differentiated fees.

4. Finance reform and university autonomy

To what extent is government action necessary for efficiency in higher education? While the role of the State as a provider of educational loans is generally acknowledged, interference with price mechanisms is much more controversial. Many advocates of university autonomy, including university representatives, argue that efficiency would also prevail in a decentralised setting where universities are autonomous to decide on tuition fees.

Scrutinising this argument under full strategic interaction, that is, institutions anticipate how quality choices affect fee competition, pure loans turn out to be successful in the sense that they lead to a differentiation of teaching qualities and tuition fees and a proper sorting of students among institutions. But unfortunately, qualities are distorted: compared with the efficient solution, the low-quality institution offers too low quality, whereas the high-quality university provides excessive teaching excellence.

This finding can easily be interpreted in terms of the maximum differentiation principle known from the vertical product differentiation literature (Shaked and Sutton, 1982). The more similar the qualities offered by two universities are, the fiercer is the fee competition: when both universities offer the same quality, only the one with the slightly lower fee will attract all students. To avoid this, both institutions differentiate with respect to their teaching endeavours. This allows them to charge higher tuition fees which creates a per-student rent to be diverted towards research.

Due to this logic, university autonomy reverses the efficiency ranking between the graduate tax and pure loans. The subsidy inherent to the graduate prevents students from being confronted with the full cost of their enrolment decision. On the one hand, this shifts enrolment towards the higher quality institution for given qualities and fees, and in turn leads to quality improvements on the part of the low-quality academy. On the other hand, fee increases matter less for students in general, so that both universities can charge higher fees for given qualities. This strengthens incentives for quality differentiation.

In total, the high-quality institution provides an even higher quality and attracts more students than under pure loans. This efficiency loss dominates the quality improvement for the students remaining at the other institution. Thus, while a properly administered graduate tax leads to efficiency, it performs worse than a pure loan scheme under university autonomy.

Finally, income contingent loans, introduced in a number of countries, including Australia and the UK, provide even stronger quality incentives than pure loans. Because the university with the higher quality-fee differential attracts all students, it can extract the whole rent students enjoy from choosing this academy rather than the competitor. But this creates a Bertrand-like situation with no diversion, but uniform and hence inefficient qualities. Moreover, that rent is too high from a social perspective, because it encompasses also the taxpayer's coverage of the losses of failing students. As a consequence, teaching qualities are excessive at both institutions.

5. Conclusion

This paper deliberates on the question how the introduction of tuition fees affects competition between universities and hence the quality of higher education. The results argue clearly in favour of introducing a graduate tax system under proper government control. Both pure and income contingent loans as well as university autonomy do not lead to an efficient solution.

However, the analysis has abstracted from a number of issues that may be relevant for a general assessment. First, it is imperative to have a well-designed fee administration to achieve the desired solution. With that administration conducting its own interests, university autonomy may constitute the better solution. Alternatively, limited autonomy in the form of fee ceilings may be worthwhile. While such caps are typically favoured on distributive grounds, they can have beneficial effects on both quality and welfare when there is strategic interaction in both prices and qualities (Hemmasi and Kemnitz, 2003).

Second, this contribution has treated university autonomy just as the right of universities to determine their fee revenues. However, the scarce theoretic literature on competition in higher education equates university autonomy with the right to set admission standards (De Fraja, 2001; De Fraja and Iossa, 2002). While this is an equally important point, it should be stressed that both rights are intertwined, for setting a tuition fee defines an implicit standard on student ability. Moreover, given the results of this work, one can conjecture that providing universities with an additional tool to exert market power might aggravate the inefficiencies of the reform proposals.

Third, the choice between alternatives should also be guided by the effects on the total number of students. Taking the quality of higher education as exogenous, Garcia-Penalosa and Wälde (2000) have shown that the pure loan scheme is dominated by both the graduate tax and income contingent loans, with the efficiency ranking between the latter two being ambiguous. The present analysis, however, favours the graduate tax over income contingent loans both under government control and under university autonomy when the subsidy is low. Given the fact that most countries which have reformed higher education finance have pursued the income contingent loans option, a proper empirical appraisal of both effects is important.

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Chapter 7

Discussion of N. Barr and A. Kemnitz contributions

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1. The arguments of N. Barr and A. Kemnitz

1.1. The elements justifying reforms in tertiary education finance

A. Quantity problem (Barr)

More human capital is needed to cope with current labour market trends (technology, trade and relocation of low-skilled jobs) and the rising cost of an ageing population. To put it simply, average productivity of the average active person should rise, and the necessary (although not sufficient) condition to achieve this is to increase the number of people who graduate at tertiary level.

Expanding tertiary education requires more resources if quality is to be preserved. This is the logical consequence of a growing number of students but also of the so-called cost disease. Baumol would indeed remind us that productivity gains are limited within that industry. In itself, the asymmetry of productivity gains between education and the other sectors of the economy should lead — *ceteris paribus* — to an increase of the share of GDP dedicated to education.

N. Barr judiciously explains that current level State funding — the main source of resources in most EU countries — is inadequate, partially because available margins tend to be used to serve the needs of the elderly (health and pensions) or to support basic education. The evidence is that of a constant decline in (real terms) spending per student in many EU countries.

B. Quality problem (Kemnitz, Barr)

Both contributors share a concern for more quality within EU tertiary education. And both papers share the view that public funding combined with central planning of provision and allocation of students leads to inefficiency of teaching.

N. Barr's point of view is based on the idea that central planning and administered prices (uniform fees) distort the allocation of individuals and resources from the optimum. Some price flexibility should allow a better allocation of students between subjects (e.g. mathematics departments cost less than engineering although they are equivalent in producing programming skills. Students interested by IT programming jobs should be confronted with adequate price signals, and the results would be less expensive for the taxpayer).

The view underlying the Kemnitz paper has less to do with the lack of market-like signals but more with the lack of incentives for typical university institutions to specialise (some focusing on the less able students and others on the elite) and to concentrate resources on the elite. His analysis mainly rests on the assumption that the return on human capital investment (teaching quality q) is strongly affected by the ability of students (θ).

$$HC = \theta * q$$

C. Equity (Barr)

Finally, the Barr paper also puts forth the idea that current arrangements are regressive. Public financing in a context where access is still very socially biased means using everyone's tax money to finance the additional human capital of a privileged minority. There is thus a case for increasing the private contribution to tertiary education costs.

1.2. The logic of the reform proposed

More resources, better quality and less inequity: this triple objective can be achieved via higher and more differentiated fees.

But to avoid more selectivity or worsening the problems of socially selective access to tertiary education due to liquidity constraints, payment should be made after graduation. Equity concerns as well as risk aversion problems plead in favour of either income contingent-loans (graduates reimburse only if they earn money) or graduate tax.

2. Comments, remarks, critics, suggestions

2.1. Loans: A response to rising mobility and free riding

In addition to quantity, quality and equity problems, there might be a fourth reason to reform higher education finance across the EU. Implementing alternatives to the current system (direct public funding) might indeed be a logical consequence of the current EU integration process. Mobility is on the rise, particularly among tertiary education students and high-skilled workers. Mobility can be asymmetric and thus synonymous with 'free riding'. Mobile EU students enjoy free tertiary education in one country and then move to another, escaping contribution via taxation. If unbalanced mobility is marginal, the point is not worth raising. Otherwise the implicit contract which links them to the local taxpayer is potentially broken, unless some explicit or implicit compensation mechanisms exist (Vandenberghe, 2002). For example in the French-Speaking Community of Belgium, up to 15 % of university students are potential free riders, as their final residence is likely to be outside the French-Speaking Community.

Increasing fees (and making students pay them via explicit loans contract) might simply be a way to limit the effects of free riding and ensure long-term sustainability of national (i.e. local public) funding of tertiary education, or at least to avoid the emergence of some kind of protectionism.

2.2. Raising fees … and offering deferred (and income contingent) payment options: A top priority?

Both authors suggest that tertiary education should be free at the point of use, which means — in a context of higher fees — that explicit or implicit loans should be offered to students. The two authors then deploy a lot of energy examining the merits of the different ways of implementing these loans as well as their repayment by individuals. If we refer to N. Barr's paper, we discover that loans should be income-contingent. These mechanisms are relatively difficult to implement (they require some knowledge of income levels) and require a public subsidy to eliminate the relatively high risk-premium that is attached to human capital investment (by comparison with housing).

The question I would like to raise is whether it is totally relevant to focus on student loan designs (Barr) and their probable effect on the functioning of universities (Barr and Kemnitz).

I am perfectly aware that higher fees without income-contingent loans or any other deferred payment scheme is political suicide in most EU countries. But as an academic I wonder whether it is pertinent to put so much emphasis on these mechanisms. In other words, why do we need to care so much about postponing the payment of higher fees? What do we know about the (instantaneous) price elasticity of the demand for tertiary education, globally and for low socioeconomic groups in particular? What do we know about what economists call the intensity of the liquidity or credit constraint?

On the one hand, Heckman and Carneiro (2003), examining US data, suggest that this elasticity is relatively low, even among low SES groups.

'We find only a limited role for tuition policy or family income supplements in eliminating schooling and college attendance gaps. At most 8 % of American youth are credit constrained in the traditional usage of that term.'

On the other hand, the evidence in many EU countries is that the traditional payers of all costs that are not covered by public money (fees and living costs) are parents. But even if their capacity to pay can be increased, it could be that policy-makers should no longer take for granted that all students (even those from rich families) will enjoy the benefit of their family's wealth. Should we still assume that most adults aged 20–24 are still supported by their families? Or should we adopt the view that they must be considered as totally independent? If the latter option prevails, then the liquidity constraint should receive a lot of attention.

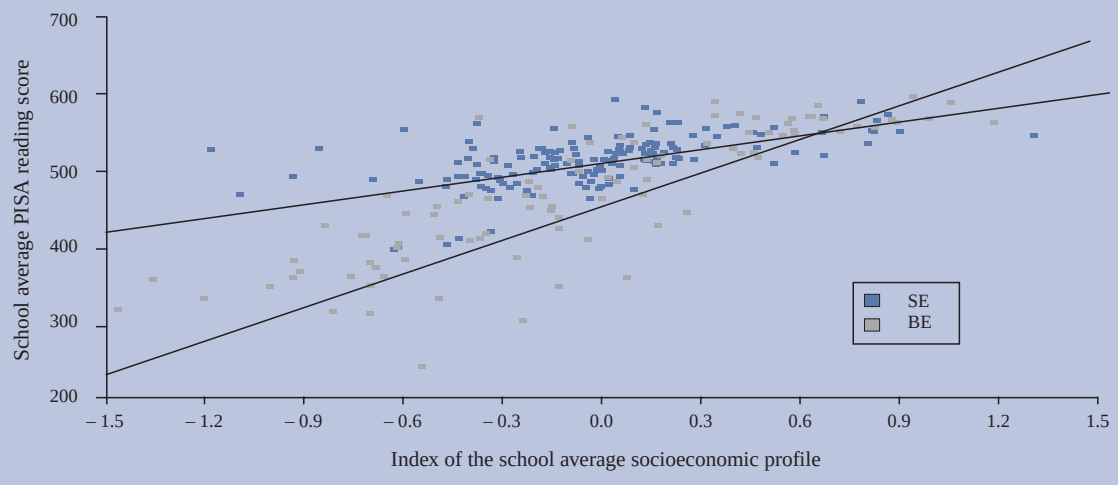
2.3. Liquidity constraint or basic knowledge constraint?

The Heckman and Carneiro (2003) result can be interpreted as an indication that the problem of low SES individuals is not primarily a lack of financial resources to cover fees and living costs. Yet, it is still the case that many low SES individuals never show up at the admission office of universities. One reason for this is simply that they don't possess the right level of basis skills.

The latest OECD survey of literacy levels at the age of 15 gives a good illustration of this idea. According to the pedagogues who designed PISA any score below 450 should be interpreted as a sign that students do not properly understand the meaning of a text. If you make the (fairly reasonable) assumption that being able to decipher a text is an absolute prerequisite to successful tertiary education, then you end up with the conclusion that offering income contingent loans as a way to mitigate the effect of higher fees is likely to have no effect for all those whose real constraint is a lack of literacy skills.

As an illustration, we take the French-Speaking Community of Belgium, and Sweden. Access to university is significantly higher in Sweden. But both Belgium and Sweden rely mainly on public funding to cover teaching costs (i.e. fees are low). So the explanation of the gradient in access rates has probably little to do with financing mechanisms. We would suggest that it has more to do with the rather higher (lower) efficiency of basic education in Sweden (French-Speaking Belgium) to ensure that low SES pupils score above the 450 score at the age of 15 (see Figure 1).

Figure 1: **Reading scores and socioeconomic profile: schools in Sweden and the French-speaking community of Belgium**



2.4. Loans and admission/selection mechanisms

With respect to the implementation of student loans (from the supply side), the selectivity at the entry to higher education institutions could be positively perceived as reducing the academic risks related to the completion of a degree. Indeed, although there is an important uncertainty in predicting which students will obtain high-ranking jobs, the success to admission exams is a useful predictor of the students' subsequent job placement, reducing in parallel the likelihood of non-repayment of the loan. In other words, the introduction of loans mechanisms would probably lead to a generalisation of selective admission mechanisms.

Another way of reducing the academic risk (i.e. risk of failure/drop-out) would be to implement loans at the Master's level, maintaining the current system of funding for Bachelor's degrees.

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Part III:
Adult education and training

Chapter 8

Improving skills for more and better jobs? The quest for efficient policies to promote adult education and training ([1])

Andrea Bassanini (OECD) ([2])

([1]) This paper partially draws on the work done by the author for the 2003 and 2004 editions of the OECD *Employment outlook*. However, the views expressed here are those of the author and cannot be attributed to the OECD or its member countries. I thank Wooseok Ok, Peter Tergeist and Greg Wurzburg for their help in collecting policy examples and useful discussions about policy issues. Useful comments from Ken Swinnerton, Matthew James, Raymond Torres, Martine Durand, John Martin, David Young and Thomas Zwick on different parts of this paper are also acknowledged. Sebastien Martin provided excellent research assistance. All errors are mine.

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1. Introduction

Viewed from the point of view of employment policy, the rationale behind stressing the importance of life-long upgrading of skills and competences is threefold. First, technological and structural changes render jobs and skills obsolete at such a rate that the slow renewal of the labour force through the entry of young qualified workers might not suffice to satisfy the demand for new qualifications, thereby increasing the risk of skill shortages that, in a global economy, may depress employment (OECD, 1994, Chapter 7). Second, people with low qualifications face higher unemployment prospects or, in countries where they can price themselves into jobs, a higher risk of being persistently in low pay and often in poverty. Policies for initial education and adult training can, therefore, be seen as complementary to making-work-pay policies and job-search assistance as regards to 'minimising the number of people who do not attain and maintain the skills required to command earnings that bring them above the poverty threshold' (OECD, 1999, p. 12). Third, as skills become outdated more quickly than workers retire from the labour force, there is a strong risk of older workers losing their current jobs, while lacking the competencies to move into new jobs. Indeed, since increasing labour market participation of older workers has become a policy priority of many industrialised countries, 'promoting access to training for all regardless of age and developing life-long learning strategies, in particular workplace training for older workers' (European Commission, 2004, p. 46) has gained paramount attention.

It can be argued, however, that there is still little empirical evidence that can support the policy-maker's emphasis on adult learning. The evidence on the impact of government funded training programmes for the unemployed is mixed ([1]). The evidence on the impact of training for employed workers is essentially limited to its average effect on wages and productivity ([2]), while only few studies look at the relationship between employee training and employment security, and their results are somewhat inconclusive due to selection bias ([3]). Furthermore, the fact that, while workers' participation in education and training is relatively high in certain countries, the number of hours of training received by each participant is much smaller than those received by full-time students enrolled in front-end education might cast doubts on how much a marginal improvement in training provision can affect labour market performance, in general, and, more specifically, individual and aggregate employment perspectives. Finally, deadweight and efficiency are seldom considered in the policy discourse.

This paper is a very partial attempt to contribute to bridge this gap. First, I use data from the European Community household panel to try to assess the effects of adult education and training on individual labour market performance. My findings seem to confirm that training makes a difference. Although I find that employee training has a clear impact on wage growth only in the case of young or highly educated employees, it appears to have a stronger impact on employment security — at least insofar as it is perceived by the workers — in the case of both older and low-educated workers. To reconcile this apparent contradiction, we need to take into account that training wage premia are estimated on a censored sample including only employed workers. Due to the existence of downward wage rigidity, one can expect that those workers who are unable to maintain their productivity (due, for instance, to skill obsolescence) are more frequently laid off — rather than experiencing a fall in wages and be retained in employment — and thereby excluded from our sample. In particular, it can be conjectured that, in the case of older

([1]) See for example Heckman et al. (1999), Martin and Grubb (2001), Layard (2003), and Betcherman et al. (2004).

([2]) Two exceptions to be noted are Leuven and Oosterbeek (2004) and Arulampalam et al. (2004a).

([3]) See Bishop (1997) and Ok and Tergeist (2003) amongst others.

workers, training enables employers to match individual productivity with constant individual wages and therefore retain the worker. Conversely, workers not receiving training are more likely to enter non-employment because their productivity has fallen below their wage. This argument can be generalised to all low-productivity workers and suggests that, for those people who find it more difficult to price themselves into jobs, training allows attaining and maintaining the competences required to match productivity and wages, thereby sustaining their employment prospects. Once foregone income due to unemployment spells is taken into account, it turns out that training positively affects earnings at any age and level of educational attainment.

Second, by looking at the recent experience of many industrialised countries, I argue that, to compensate for the effect of possible market failures, which might justify training policy in spite of high *ex post* private return, co-financing arrangements — under which governments, employers and/or employees jointly finance training — can better leverage the required resources to upgrade the competences of those in employment. Co-financing schemes, if carefully designed, can minimise deadweight losses, although specific programmes for the unemployed or the inactive might require full government funding.

The paper is organised as follows: Section 2 sets forth and estimates a simple empirical model for evaluating the effect of training on individual wages and subjective perceptions of employment security. Section 3 discusses the main sources of market failures affecting training outcomes and the empirical evidence on their relevance. Section 4 explains the logic underlying the co-financing approach to training policy and reviews recent policy innovation adopted in this area by several OECD countries. Few concluding remarks are contained in the final section.

2. Do workers benefit from training?

2.1. Empirical framework

The general empirical model used in this paper can be considered an extension of that proposed by Loewenstein and Spletzer (1998). Denote with V_{ijt} the value for the worker *i* of a job match with the firm *j* at time *t*. In the simplest case this value can be seen as the stream of expected revenues that the worker *i* can obtain from being employed in firm *j* at time *t*. In a narrow sense we can think of this value as the current wage. However, more generally, this value may include the worker's valuation of his/her employment security and/or expected future wages. Our objective is to estimate the effect on V_{ijt} of the stock of previously taken training courses.

Whatever the precise definition of V_{ijt}, which will depend on the specific empirical application, let us assume that it can be written as

$$V_{ijt} = \beta X_{it} + \gamma T^{c}_{ijt} + \delta T^{p}_{ijt} + y_t + \mu_i + v_{ijt} + \varepsilon_{it} \qquad [1]$$

where X_{it} is a vector of time-varying individual characteristics, T^{c}_{ijt} is the stock of training taken while working for the current employer, T^{p}_{ijt} the stock of training taken while working for previous employers, while y_t, μ_i, v_{ijt} are year (or country per year) effects, individual fixed effects and job-match-specific effects (with v_{ijt} taking value v_{ij} if the worker *i* has a job with firm *j* at time *t* and 0 otherwise), respectively, and ε_{it} is a standard random disturbance.

Assuming that [1] is valid, it is equivalent to ruling out time-variant heterogeneity, which is not due to observable characteristics (such as the training stock), the job-match or a serially uncorrelated random disturbance. The inclusion of an individual fixed effect in the empirical specification allows identifying the coefficient of all stock variables (such as training) for which only changes within the sample period are observable (depreciation is ruled out for convenience). However, if in addition match-specific effects are included in the empirical specification, the impact of T^{p}_{ijt}, being invariant within each specific job-match, cannot be identified.

Loewenstein and Spletzer (1998) show that if $\gamma < \delta$ then estimating [1] by omitting match-specific effects (but including individual fixed effects) would yield an estimate $\hat{\delta} < \delta$, provided that dummies for the number of job changes are included in the specification. Equivalently, the same result can be obtained by estimating model [1] in first differences using OLS, omitting match-specific effects and including a dummy for job change. Conversely, to obtain unbiased estimates of γ, job-match-specific means can be subtracted from the stock of training taken with the current employer. Indeed, corr $((T^{c}_{ijt} - \bar{T}^{c}_{ij}), v_{ij}) = 0$ by construction ($\bar{T}^{c}_{ij}$ denoting the job-match-specific mean of $\bar{T}^{c}_{ijt}$).

2.2. The data

I use longitudinal data from the 2003 release of the European Community household panel (ECHP). This survey provides a wealth of information on individual income and socioeconomic characteristics for 15 EU countries and aims to be representative, both in cross-sections and longitudinally. Due to the common questionnaire, the information contained in the ECHP is, in principle, comparable across countries, which is its main strength. Moreover, releases of the ECHP contain additional longitudinal data from other sources for certain countries — such as the German socio-

economic panel (SOEP) and the British household panel survey (BHPS), whose questions are made comparable with those of the ECHP questionnaire.

The main question on vocational training in the ECHP is as follows 'Have you at any time since January (year before the survey year) been in any vocational education or training, including part-time and short courses?'. From this question, a dichotomous variable 'participation in vocational training', which takes the value 1 if the individual responded 'yes' and 0 if he/she responded 'no', is constructed. Conditional on a positive answer, the individual is asked to report additional information on the last course only (including duration but, in the case of education courses, not including whether the course was paid for or provided by the employer). The distinction between formal education and vocational training is based on the categories used by national labour force surveys.

In the year of the interview, the stock of vocational training and formal education is increased by 1 if the individual reported to have participated in one of them in the period covered by that interview. Each training stock is further decomposed in two aggregates: training taken with the current employer and training taken with previous employers. Due to the scattered nature of the information on course duration (with many missing values for many countries), start and end dates are not used for the analysis of this paper. This has two consequences. First, training reported in one interview is attributed to belong to the period between that interview and the previous one, although it might have been taken before the latter. This is equivalent to increasing the risk of false reporting, which, as shown by Frazis and Loewenstein (1999), is likely to bias returns towards zero. Second, training reported in one interview is considered to have been taken with the current employer at the time of the interview. If, at a given interview, the individual says he/she has separated from the employer he/she was working for at the time of the previous interview, the training reported in previous interviews as training with the current employer is added to the stock of training taken with previous employers and the stock of training with the current employer is re-set to either 0 or 1 (depending on whether any training is reported in the current interview). Additional information on the data used is reported in the appendix.

2.3. Empirical results

Training wage premia

There are various ways to compute a training wage premium ([1]). The simplest method, when longitudinal data are available, is to compare wage growth rates ([2]) between two interviews for workers receiving/not receiving training between the same two interviews. This procedure already controls for time-invariant heterogeneity without resorting to sophisticated regression techniques. Chart 1 shows simple average measures of the wage premium computed along these lines, by pooling together all countries and years for which the information is available.

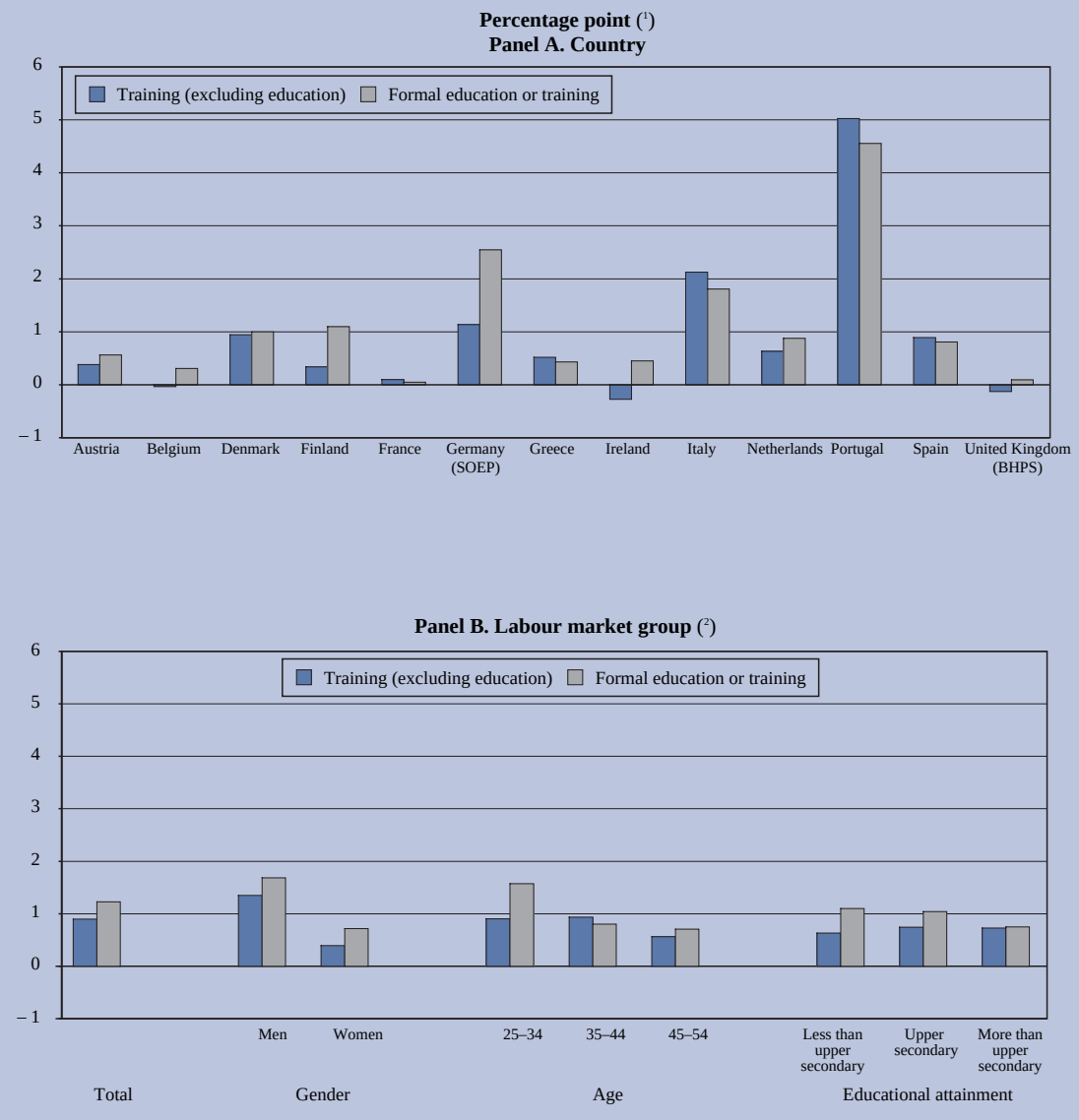
Cross-country differences in the bivariate training–wage growth relationship are large (ranging from wages 0.1 % greater after participation in some education and training in France and the United Kingdom to wages 4.5 % greater in Portugal). Raw training premia are lower in many countries when computed with respect to vocational training only (excluding education), but remain positive in all but three countries (Belgium, Ireland and the United Kingdom). On average, the bivariate training–wage growth relationship seems to decline with age and educational attainment, although this pattern is much less evident in the case of vocational training only. Finally, contrary to what is suggested by simulation exercises based on cross-section information only (see OECD, 2003b), once individual heterogeneity is controlled for, training wage premia seem to be lower for women than for men, possibly due to heterogeneity in the quality of training courses and/or occupational gender segregation (see OECD, 2002).

As discussed above, workers employed by high-performing establishments (for example those belonging to more innovative firms) might receive more training and experience faster wage growth. Furthermore, for policy purposes, it is important to know whether workers' ben-

([1]) The economic literature is crowded with empirical results on the issue. See Bishop (1997), Leuven (2003) and Ok and Tergeist (2003) for recent surveys. Among the papers not covered by these review articles, see also Parent (1999) and Hill (2001), Kurosawa (2001), Hui and Smith (2002), Schøne (2002), Gerfin (2003), Kuckulenz and Zwick (2003) and Arulampalam et al. (2004a) for the USA, Japan, Canada, Norway, Switzerland, Germany, and European Union countries, respectively. For Canada, see also OECD (2003b), although the estimates contained in this study refer only to individuals who actually upgraded their formal education diploma.

([2]) The wage concept used in this paper is gross hourly wage in the main job, including paid overtime and overtime hours.

Chart 1: **Wage growth difference between trained and untrained employees, by country and by labour market group**



(1) Percentage-point difference in average annual wage growth rates between employees receiving training between two interviews and those not receiving it. Figures are adjusted to take into account that the time spell between two interviews can be different from one year. Data refer to wage and salary workers aged 25–54 years and working more than 15 hours per week.
(2) Estimates based on the countries shown in Panel A.
Source: Own calculations based on the European Community household panel, waves 1 to 7 (1994–2000).

efits from training are transferable across jobs and employers. This is particularly important in the context of policy reforms geared towards making the labour market more flexible and the resource allocation more rapid and smoother. Chart 2 decomposes the raw training premia presented above into the premium to training

taken with the current employer — estimated by correcting for match-specific heterogeneity ([1]) — and the premium to training taken with previous employers, while Table 1 presents fully-fledged multivariate estimates of the training premia, after correcting also for changes in observable individual and firm characteristics ([2]).

In all countries for which data are available, continuous education and training taken with previous employers have, on average, a positive impact on wages, although this impact is not always significant in Belgium, Italy and Portugal. Using the most reliable model (Table 1), participating in formal education and training in one year is estimated to increase earnings by up to 5.8 % (in Austria). Workers usually reap a lower (and sometimes insignificant) premium while staying with the same employer. These results are also broadly confirmed when wage premia to training and education are estimated separately, although estimates are less precise — and somewhat lower in the case of vocational training ([3]). The fact that the wage premium to training taken with previous employers is smaller in the case of vocational training than in the case of formal education is not surprising because competences acquired through formal education are more easily signalled and recognised. Accreditation and recognition of competences acquired through short vocational training spells and informal training is indeed a crucial issue (and policy problem) for the transferability of training (see below).

([1]) Match-specific effects on wage premia to training taken with current employers are eliminated by subtracting job-match-specific means from the stock of training taken with the current employer. A sensitivity analysis (not presented here) was undertaken by estimating wage equations with job-match fixed effects, and revealed that the two procedures give extremely close results as regards to training taken with the current employer. As far as training taken with previous employers is concerned, there is less need to correct for the effect of match-specific events because, as shown by Loewenstein and Spletzer (1998), to the extent that returns to training taken with previous employers are no smaller than those to training taken with the current employers, the former are underestimated.

([2]) Controlling for changes in observable characteristics allows partial correction for other sources of time-variant heterogeneity. However, it is cautious to compare this model with simpler ones without covariates (such as the model behind Chart 12) because, if returns to training are heterogeneous and selection bias is not fully eliminated by including match-specific effects, mis-specification of the linear regression model may result in large estimation biases (see, for example, Lalonde, 1986, Heckman et al., 1999, and Smith and Todd, 2004). A more sophisticated approach to correct for time-variant heterogeneity and selection bias would be to use instrumental variables. However, the difficulty to find appropriate instruments makes this approach infrequent in the literature, the only example known to us being an unpublished paper by Blundell et al. (1999).

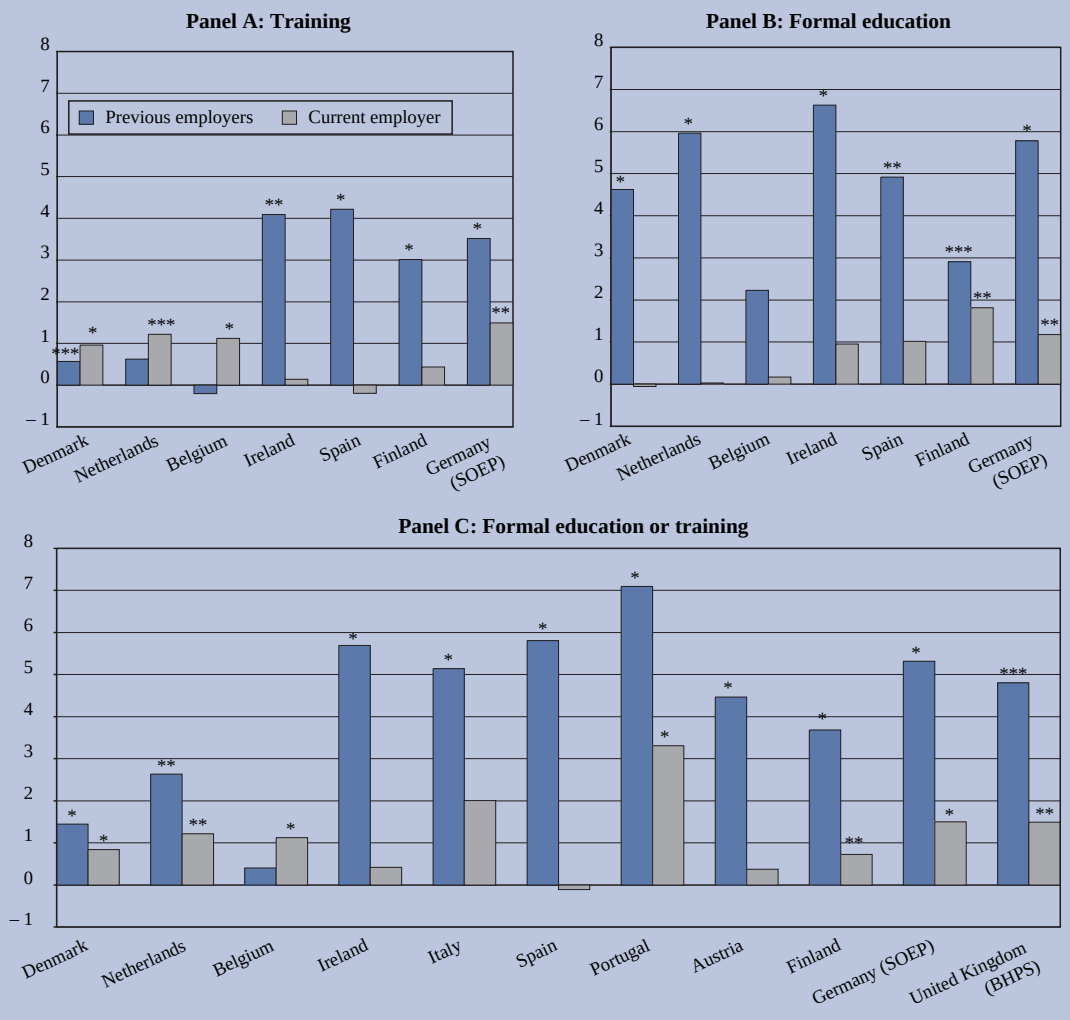
([3]) Still, in both specifications, they are significant at the 10 % level in almost all countries for which separate premia could be estimated (to limit the risk of unreliability, country-specific estimates are not computed when there are less than 100 individuals who received some training before a job change within the sample window and/or when these individuals represent less than 2 % of the sample of individuals).

Overall, these findings are consistent with previous studies that typically find the training premium increases in the aftermath of a job change (see Loewenstein and Spletzer, 1998, 1999 and Parent, 1999, for the USA; Fougère et al., 2001, for France; Blundell et al., 1999, and Booth and Bryan, 2002, for the United Kingdom; and Gerfin, 2003, for Switzerland). These papers tend to interpret the fact that the training wage premium increases in the aftermath of job change as evidence of employers' market power (I will get back to this point in Section 3). However, there are at least two other possible explanations. First, the training firm does not always have a high-pay position to offer to the trained worker. In this case — if competences acquired through training are transferable — trained workers may have better options outside the firm. Second, workers might accept to be paid less than their marginal product in the current job if they are sensitive to reciprocity. In particular, workers might interpret the firm's investment in general training as a kind action which deserves reward. Anticipating this, the firm might invest more in general training than it would have done in the presence of purely opportunistic behaviour. Consistent with the latter explanation, Leuven et al. (2004) use Dutch data to show that the probability of receiving employer-sponsored training for workers that are greatly sensitive to reciprocity is 15 % higher than for workers who are not ready to reciprocate.

Looking at the pooled country sample and breaking this sample by labour market groups is instructive in many respects. First, the wage premium to participating in training in one previous year while already working for the current employer has an impact which is relatively homogeneous across groups (about 1 %), with in most cases a lower premium to formal education than to vocational training. Although this finding is partially due to too few education spells in the sample, it might be also ascribed to the fact that adults enrol in general education to qualify for different jobs rather than to improve the competencies they can use within the same job or occupation. Second, the impact of vocational training on wages seem to be transferable across jobs only in the case of relatively young and/or high educated workers, while the pattern is less clear for formal education, again partially due to the lack of precision of the estimates because of the limited number of education spells in the sample.

Should one conclude that education and training does not lead to a durable economic return for other categories, and particularly for those who have already lower

Chart 2: **Training premia, by country and training history (1)**



*, **, *** Statistically significant at 1% level, 5% level and 10% level, respectively.

(1) Estimates of the wage premium of participating in training in one additional year obtained from the estimation of a simple wage equation with additional controls only for individual fixed effects, the number of previous jobs and interaction terms between country dummies, year dummies and date of interview. Training taken with the current employer has been demeaned by subtracting job-match-specific means. Wage premia to training and formal education are estimated through a specification that simultaneously includes both variables.

Source: Own calculations based on the European Community household panel, waves 1 to 7 (1994–2000).

earnings, greater employment insecurity as well as more imperfect access to training opportunities? As said above, this conclusion would be unwarranted. In fact, these returns are biased by the fact that the sample is censored: they are computed only for workers that are employed, excluding persons that are expelled from employment. To put it another way, these estimates do not take into account the impact of training on employment prospects and on containing the loss of income associated with unemployment spells.

Table 1

Panel data estimates of training premia, by country and labour market group

	Percentage ([1])					
	Training taken with		Formal education taken with		Formal education or training taken with	
	Previous employers	Current employer	Previous employers	Current employer	Previous employers	Current employer
	Panel A. Country					
Denmark	1.60*	0.87*	4.39*	0.17	2.26*	0.78
Netherlands	0.48	0.44	6.12*	0.23	2.78**	0.58
Belgium	2.30***	1.84*	–1.20	–1.84	2.12***	1.57*
Ireland	3.31***	0.21	6.15*	0.67	4.46*	0.39
Italy	..	..	..	..	1.65	2.21*
Spain	3.83*	0.32	5.99*	0.20	5.05*	0.24
Portugal	..	..	..	..	2.41	2.98*
Austria	..	..	..	..	5.81*	0.88**
Finland	2.78*	0.66**	2.70***	1.22***	3.47*	0.83*
Germany (SOEP)	0.67	1.02	4.06*	2.11	3.08*	1.82*
United Kingdom (BHPS)	..	..	..	..	5.09**	0.92
	Panel B. Labour market group					
Total	1.19*	1.11*	5.28*	0.91*	2.65*	1.22*
Gender						
Men	1.65*	1.25*	5.51*	1.49*	3.12*	1.43*
Women	0.70	0.93*	4.97*	0.34	2.17*	0.97*
Age						
25–34	2.13*	1.55*	6.21*	1.41*	4.40*	1.65*
35–44	0.55	0.92*	2.70**	0.78***	0.83***	1.06*
45–54	0.56	0.71*	1.47	0.17	0.81	0.72*
Educational attainment						
Less than upper secondary	1.09	1.29*	2.58	0.64	1.39***	1.24*
Upper secondary	0.11	0.93*	6.87*	0.35	2.44*	0.96*
More than upper secondary	1.43*	0.95*	3.03*	0.95*	1.97*	1.10*

*, **, *** Statistically significant at 1% level, 5% level and 10% level, respectively.
.. Not enough observations with at least one job change after a training spell.
([1]) Estimates of the wage premium of participating in training in one additional year, obtained from the estimation of a wage equation controlling for individual fixed effects, age, age squared, tenure, tenure squared, firm size, public sector dummy, occupation, permanent contract dummy, log of hours worked, log of hours worked squared, the number of previous jobs, reason of last job change and interaction terms between country dummies, year dummies and date of interview. Training taken with the current employer has been demeaned by subtracting job-match-specific means. Wage premia to training and formal education are estimated through a specification that simultaneously includes both variables.

Source: Own calculations based on the European Community household panel, waves 1 to 7 (1994–2000).

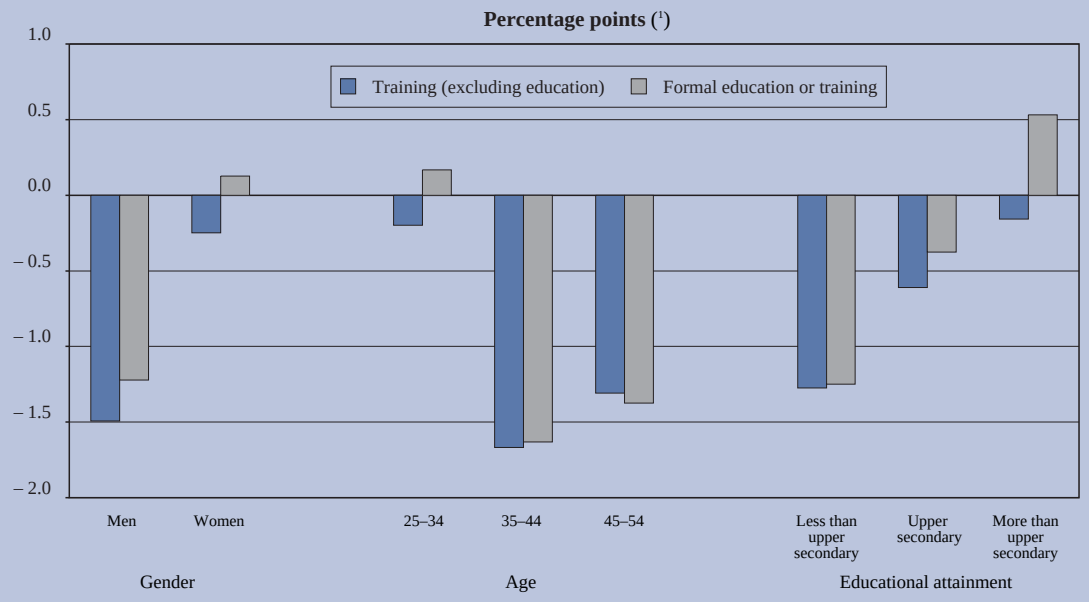
Training and the perception of employment security

In the literature, the term employment insecurity is generally used to denote the risk that a worker will experience a significant fall in earnings (and/or well-being) due to job loss or the threat of it (see Nickell et al., 2002; see also Green, 2003, for a more extensive concept). Job loss is intended to refer to separations that are involuntary from the perspective of the worker. In practice, this means that employment security is composed of two elements: the likelihood of maintaining the employment relationship with unmodified working conditions (including pay) and the expected cost of job loss, which, in turn, can be seen as the product of the probability of job loss and its cost conditional on losing the job.

The probability of experiencing an involuntary separation is a natural objective measure for the risk of job loss. A quick look at the data shows that workers who previously received education or training tend to separate less often from their employer against their will (Chart 3). However, the figures presented here must be handled with special caution. Indeed, the fact that lay-offs seem to be less frequent in the presence of training does not prove that training reduces the probability of being laid off. Providing an employee with training might be the consequence (and not the cause) of the employer's decision of not laying him/her off, which in turn might be dependent on individual characteristics (including unobserved ability). The natural framework to deepen this analysis and address this issue would be a standard hazard model with controls for individual fixed effects. Unfortunately, there is no cross-country comparable dataset with sufficiently long individual time series where two complete job spells can be observed for a large portion of the sample. For this reason, a formal multivariate analysis of separation rates cannot be developed further in this paper. The route we follow here is rather to look at the impact of training on the subjective perception of employment security.

There is an increasing interest in the economic and sociological literature for subjective measures of job security (see OECD, 1997; Schmidt, 1999; Green et al., 2000; Burchell et al., 2001; Green, 2003). Subjective measures offer a synthesis of different aspects of employment security but they have the disadvantage of muddling up the expected cost of job loss (or threat of it) with subjective judgements on what level of job security would be desirable, which might be influenced by social norms as well as by attitudes towards risk, that may evolve during the lifecycle. These norms and attitudes might have little to do with objective security but — even worse — might affect the propensity to participate in training courses. Furthermore, subjective perceptions might be influenced by information disclosures that are only imperfectly correlated with real changes in objective risks. However, there seems to be a relatively good correspondence between

Chart 3: **Differences in involuntary separation rates between trained and untrained employees by labour market group and type of training**



(1) Percentage-point difference in annualised rates of involuntary separations between trained and untrained employees. Involuntary separation rates are defined as the share of employees at date t who have lost their job against their will by date t+1. Trained employees are defined as those who received some training between date t-1 and t. Data refer to persons aged 25–54 years.

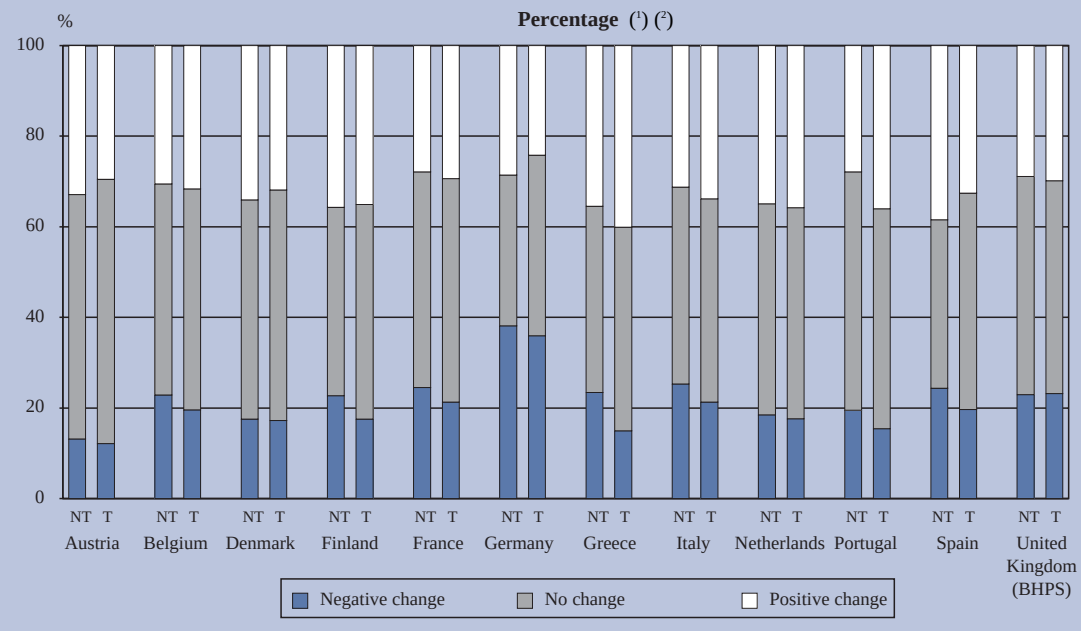
Source: Own calculations based on the European Community household panel, waves 1 to 7 (1994–2000).

subjective and objective measures of job insecurity, both at the individual and at the aggregate level (OECD, 1997, 2002, 2004; Wanner and Neumark, 1999; Farber, 2003). Subjective perceptions might also have an independent impact on workers' well-being: for instance, Burchell et al. (2001) report a strong link between perception of job insecurity and stress, and find that such a relationship becomes stronger as employees' exposure to insecurity increases. Last but not least, subjective feelings might affect the political economy of structural reforms.

Chart 4 focuses on the two-year variation of perceptions of job security (measured on a 1–6 Likert scale) and compares the share of employees for which their perception of job security has increased, decreased, or stayed the same, by country and training status. In all countries for which data are available except the United Kingdom, the percentage of workers who report a negative change in perceived job security is smaller in the case of those who received some education or training in the meantime than in the case of those who received none (with a 3 percentage point gap on average). Conversely, there is a less clear relationship between training and positive changes in job security. On average, about 32 % of workers report to have experienced an increase in job security, independently from whether they have also received training.

The figures presented in the previous chart are, however, particularly difficult to interpret. Besides the general problems directly related to the use of subjective measures, a (temporary) improvement in the job match may simultaneously increase the amount of training individuals receive and their perception of job security. As done before, it is partially possible to sort these problems out by distinguishing between training with the previous employers and training with the current employers. In this case, however, the effect of training with the current employer cannot be identified by controlling for match-specific effects. In fact, the quality of the job-match might not be acknowledged by workers at the moment of hiring and training provision by the employers might be one of the channels through which information is disclosed: receiving employer-sponsored training, employees realise that their employer does not intend to lay

Chart 4: **Changes in job security and formal education or training, by country**



NT: Employees who received no training in the reference period.
T: Employees who received some training in the reference period.
(1) Two-year changes in the individual perception of job security.
(2) Data refer to employees working more than 15 hours per week and aged 25–54 years.
Source: Own calculations based on the European Community household panel, waves 1 to 7 (1994–2000).

them off or, in the case of temporary workers, that their contract will be renewed or transformed, thereby improving their perception of job security, with no causal effect of training.

Following the literature on job satisfaction, one could estimate a fixed effect linear model (Heywood et al., 2002) or a fixed effect logit model (Winkelmann and Winkelmann, 1998), by collapsing the measure of job security into a dichotomous variable. However, neither of these methods is ideal, since in the first case the qualitative (or at least double censored) nature of the data is not taken into account, while in the second case a great deal of information is thrown away. In this paper, I choose to follow the first route and estimate the model in first differences, using observations at relatively distant dates — two years. The advantage of estimating the model in first-difference is that I can perform a sensitivity analysis by checking that results are not due to heterogeneity of returns at different levels of initial employment security. Accordingly, Table 2 reports estimates by labour market groups, while Table 3 reports estimates by lagged levels of employment security.

Table 2

Panel data estimates of the impact of training on security, by labour market group

	Percentage ([1])([2])			
	Panel A. Formal education or training			
	Training taken with previous employers	Training taken with the current employer	Training taken with previous employers	Training taken with the current employer
	Model 1 ([3])		Model 2 ([4])	
Total	1.7*	2.0*	1.5*	1.8*
Gender				
Men	2.0*	2.0*	1.6*	1.8*
Women	1.0***	2.0*	1.3**	1.9*
Age				
25–34	1.1**	2.0*	0.9*	1.7*
35–44	2.0*	1.7*	1.8*	1.6*
45–54	1.8***	2.2*	2.0**	1.9*
Educational attainment				
Less than upper secondary	3.1**	2.7*	3.1**	2.5*
Upper secondary	1.0***	1.7*	0.7	1.5*
More than upper secondary	– 0.1	0.7*	0.0	0.6**
	Panel B. Formal education ([5])			
	Training taken with previous employers	Training taken with the current employer	Training taken with previous employers	Training taken with the current employer
	Model 1 ([3])		Model 2 ([4])	
Total	0.1	0.7**	0.0	0.7**
Gender				
Men	0.6	1.0**	0.2	1.1**
Women	– 0.1	0.3	– 0.4	0.4
Age				
25–34	0.6	0.0	– 0.2	– 0.1
35–44	– 0.7	1.2**	– 0.7	1.2**
45–54	– 2.7	1.4***	– 2.3	1.7**
Educational attainment				
Less than upper secondary	2.4	0.9	1.9	0.7
Upper secondary	– 0.4	0.2	– 1.0	0.3
More than upper secondary	– 0.8	– 0.1	– 0.6	0.0

(Continued on the next page)

Table 2 (continued)

	Percentage ([1])([2])			
	Panel C. Training ([5])			
	Training taken with previous employers	Training taken with the current employer	Training taken with previous employers	Training taken with the current employer
	Model 1 ([3])		Model 2 ([4])	
Total	1.6*	2.1*	1.6*	1.8*
Gender				
Men	2.1*	2.0*	1.8*	1.7*
Women	0.8	2.1*	1.3**	1.9*
Age				
25–34	0.7	2.2*	0.8	2.0*
35–44	2.4*	1.6*	2.1*	1.4*
45–54	2.5**	2.1*	2.6**	1.8*
Educational attainment				
Less than upper secondary	3.0**	2.8*	3.1**	2.6*
Upper secondary	1.1***	1.8*	1.0	1.5*
More than upper secondary	0.1	0.8*	0.1	0.6*

*, **, *** Statistically significant at 1% level, 5% level and 10% level, respectively.
([1]) Estimates of the percentage impact on the average employee's perception of job security (measured on a 1–6 Likert scale) of participating in some training in one additional year. The dependent variable is the two-year change in perceived job security. Estimates are obtained by OLS, adjusting standard errors for heteroskedasticity of unkown form.
([2]) Data refer to employees working more than 15 hours per week and aged 25–54 years.
([3]) Controls are two-year differences of age and age squared, dummies for lagged level of job security, two year differences of the number of previous jobs, dummies for voluntary or involuntary separation and country per year dummies.
([4]) Controls are: two year differences of age, age squared, tenure, tenure squared, log wage, log of hours worked, dummies for public/private employment, the number of previous jobs, lagged level of perceived job security, voluntary or involuntary separations in the two-year reference period and country per year dummies.
([5]) Separate estimates for training and formal education are obtained by including both variables in the same specification.

Source: Own calculations based on the European Community household panel, waves 1 to 7 (1994–2000).

Two clear facts seem to emerge from Table 2 and Table 3. First, vocational training taken with previous employers has a positive impact on the perception of job security of all categories of workers (with the exception of those with the highest educational attainment) and, essentially, all levels of employment security ([1]). Given that these measures are partially forward-looking (that is, take into account the perceived risk of job loss), these results yield some support to the conjecture that returns to training might be positive even for those categories for which they do not show up in the wage level (conditional on being employed). Second, and more striking, training taken with previous employers has the greatest impact on perceived job security for those categories for which estimated wage premia are smaller. Conditional on changing job, for each year of previous training, employees without upper secondary qualification are estimated to increase their perceived job security by about 3 %, and employees aged from 35 to 54 years, by more than 2 %, with no smaller effect when only vocational training (excluding education) is taken into account ([2]).

As conjectured above, the fact that training seems to have a stronger impact on employment security than on wages (conditional on being employed) in the case of older prime-age workers can be easily explained through the effect of skill obsolescence on individual wages and productivity: in the presence of downward wage rigidity,

([1]) Table 2 also reports estimates for the impact of formal education only, which is insignificant. Beyond the usual caution due to the fact that few education spells are observed in the sample, it must be taken into account that the effect of education is likely to materialise only in the long run. In the short run, individuals who have got a better diploma often start new careers by accepting better paid temporary contracts.

([2]) Care must be taken in interpreting these results, however, because the estimates are likely to be biased due to the inclusion of the lagged level of perceived job security, which is endogenous. Nevertheless, a quick look at the data shows that perceived job security exhibits a clear pattern of mean reversal; therefore it is likely that omitting the lagged level of job security would have induced an even greater bias. The application of instrumental variable techniques is made complex here by the lack of obvious instruments and is left for future research.

Table 3

Estimates of the impact of training on security, by lagged level of job security

	Percentage ([1])([2])			
	Panel A. Formal education or training			
	Training taken with previous employers	Training taken with the current employer	Training taken with previous employers	Training taken with the current employer
	Model 1 ([3])		Model 2 ([4])	
Lagged level of job security ([3])				
1	28.3*	15.2*	18.9**	6.8
2	3.9	1.4	0.8	0.4
3	7.0*	2.7*	6.2*	2.4*
4	2.9*	2.1*	2.5*	1.9*
5	1.3**	1.8*	1.3**	1.6*
6	1.6*	1.4*	1.8*	1.3*
	Panel B. Formal education ([5])			
	Training taken with previous employers	Training taken with the current employer	Training taken with previous employers	Training taken with the current employer
	Model 1 ([3])		Model 2 ([4])	
Lagged level of job security ([3])				
1	– 5.4	– 12.6	– 15.8	– 21.1***
2	– 5.3	– 6.9	– 11.3***	– 5.5
3	1.1	– 0.5	– 1.2	– 1.3
4	3.9**	2.0**	3.0***	1.9**
5	1.1	1.5*	1.1	1.7*
6	– 0.4	0.1	– 0.3	0.3
	Panel C. Training([5])			
	Training taken with previous employers	Training taken with the current employer	Training taken with previous employers	Training taken with the current employer
	Model 1 ([3])		Model 2 ([4])	
Lagged level of job security ([3])				
1	33.8*	20.0*	26.4*	13.3**
2	6.3	2.8	5.6	1.5
3	8.0*	3.3*	8.0*	3.1*
4	2.0**	1.8*	1.7	1.5*
5	1.0***	1.6*	1.1***	1.4*
6	1.7*	1.4*	1.9*	1.4*

*, **, *** Statistically significant at 1% level, 5% level and 10% level, respectively.

([1]) Estimates of the percentage impact on the average employee's perception of job security (measured on a 1–6 Likert scale) of participating in some training in one additional year. The dependent variable is the two-year change in perceived job security. Estimates are obtained by OLS, adjusting standard errors for heteroskedasticity of unknown form.

([2]) Data refer to employees working more than 15 hours per week and aged 25–54 years.

([3]) Controls are two-year differences of age and age squared, two year differences of the number of previous jobs, dummies for voluntary or involuntary separation and country per year dummies.

([4]) Controls are: two year differences of age, age squared, tenure, tenure squared, log wage, log of hours worked, public/private employment, the number of previous jobs, voluntary or involuntary separations in the two-year reference period and country per year dummies.

([5]) Separate estimates for training and formal education are obtained by including both variables in the same specification.

Source: Own calculations based on the European Community household panel, waves 1 to 7 (1994–2000).

skill obsolescence compresses the wedge between productivity and wage, thereby increasing the risk of job loss without affecting the wage level conditional on keeping the job. In this case training is required to maintain workers' competences so that their productivity will match their wage. If the wage structure is compressed, a similar argument can be generalised to all low productive workers (including, potentially, those with little or no qualifications). For instance, if the minimum wage is relatively high, a greater chance of being employed constitutes the main benefit from training for workers whose productivity would otherwise not match the minimum wage under all possible contingencies (Agell and Lommerud, 1997).

3. Are training investments inefficiently low?

Overall, the previous section has shown that those workers, who do not seem to benefit from training through greater wages, can benefit from training by securing more stable employment prospects through lower job loss risk and/or greater chances to be re-employed quickly and in less precarious jobs. This is particularly the case for those categories (such as low-educated older workers) for whom their productivity-wage gap is more likely to be increasingly compressed — as they age — by companies' personnel policies and/or institutional arrangements (such as minimum wages). Once foregone income due to non-employment spells is taken into account, training premia for all groups are likely to be large.

If private returns are high ([1]), why should governments adopt a proactive approach vis-à-vis training policy? The theory suggests that imperfections in labour, capital and training markets might interact in such a way to push economic agents (employers and employees) to invest in training less than the social optimum.

First, if labour markets are not perfectly competitive, firms may have an incentive to invest in general human capital (valuable also at other firms) to the extent that the market for skilled labour is less competitive than the market for unskilled labour, so that the training firm can afford to pay a trained worker less than its marginal product while still retaining the worker (see Acemoglu and Pischke, 1999a; Stevens, 1999). This is particularly the case for skills that cannot be useful to many other employers (Stevens 1994; 2001). Nevertheless, it might occur also in the case of fully general training due to asymmetric information and lack of certification (or lack of recognition of qualifications), frictions and search costs, wage-bargaining institutions and outcomes, adverse selection affecting quits and lay-offs, or complementarity with specific investments (see Acemoglu and Pischke, 1999b). Symmetrically, these labour market imperfections reduce workers' incentive to invest in general training, insofar as they decrease workers' appropriability of its benefits. Since, in most conceivable situations, current employers cannot internalise the benefits from training that will accrue to future employers, by increasing the share of general training costs borne and benefits reaped by the firm, labour market imperfections are likely to generate non-optimal outcomes ([2]). By contrast, if pay scales reflected marginal productivity, as would be the case with perfect competition, workers would be able to internalise lifetime benefits from general training (Becker, 1975).

Second, workers may lack information on teaching quality and be unable to distinguish between different providers of educational services. Similarly, they might not be aware of what curricula are likely to yield the greatest return in the labour market. Furthermore, today's economic conditions may not reflect future demand for educated workers and the abilities to acquire and exploit skills may not be known to the prospective trainee before embarking in a course. These problems may seem less severe when firms act as training providers or intermediaries. In fact, employers might be more aware than workers of the required skills and curricula (although identification of training

([1]) In this paper we have confined our attention to workers' benefits. Nevertheless, many empirical studies show that adult training has a positive impact on productivity at the firm level and that part of these gains are appropriated by the firm (See Barron et al., 1999a; Dearden et al., 2000; and Ballot et al., 2001, for recent evidence for the USA, the United Kingdom as well as France and Sweden, respectively; see also Bartel, 2000, for a survey of previous studies). Total private returns are therefore even greater than the figures reported here.

([2]) There are some caveats to this statement that need to be spelled out. To be true, this statement requires that quitting fees cannot be imposed on workers separating voluntarily after training (see Moen and Rosen, 2002) and that quit rates are not reduced by training. While the evidence seems to point to a positive relationship between training and the probability of quitting, at least in Europe (Brunello and De Paola, 2004), quitting fees are sometimes established in employment contracts, although their use is perhaps not widespread. Indeed, creating the institutional arrangements for pay-back clauses in employment contracts is one of the most effective policy actions that government can do in support of training investments (see Section 4.2).

requirements might be a problem for some firms, particularly SMEs). There is nonetheless a conflict of interest between employers and employees insofar as the former prefer providing specific training while the latter prefer receiving general skills that can be re-sold in the labour market (Stevens, 1994; Barron, Berger and Black, 1999b). This conflict becomes particularly acute if training is not fully contractible. While the amount of training can be written down in a contract, its type and quality are less likely to be specified in a manner that is verifiable by third parties (e.g. courts of law, Malcolmson, 1997, 1999; Gibbons and Waldman, 1999). This may induce both the employee and the employer to behave non-cooperatively and invest in training separately without bargaining. In other words, the employee may refuse to treat the employer as a possible (and actually privileged) provider and the training provided by the employer will be entirely employer-paid. It can be shown (Acemoglu and Pischke, 1999a) that, under this condition, if the investments of the employer and the employee are perfect substitutes and returns to training are common knowledge, only one party will invest in general training (the one that benefits the most from that), and the amount of investment will depend on the marginal return to that party, being therefore not only sub-optimal but also lower than in the cooperative case wherein training contracts are enforceable. The intuition is that once the optimal investment of one party has been decided assuming no-investment from the other party, the latter has no incentive to top-up the former's investment, despite the fact that both parties would gain from sharing the cost of investment and invest more. The investing party might be the employer if there are labour market imperfections compressing the structure of wages over the skill dimension. If this party is the employer, the greater the monopsony power it has on its skilled workers (the wider the labour market imperfections) the greater the amount of general training provided. From a qualitative point of view, this argument can be extended to all cases of imperfect substitution, except when both parties' investments are fully complementary, but it is difficult to think about cases where this occurs in practice.

Third, human capital cannot be used as collateral (Becker, 1975). Moreover, individual human capital investment is often indivisible and therefore the risk associated to it cannot be diversified. Finally, although in a perfect information world, trainees could buy insurance to shelter against the risk, in practice, a private insurance market is unlikely to work in a proper way due to the unobservability of the trainee's effort and the size of human capital investments (the level of individual liability required to avoid adverse selection would be too high, see Stevens, 1999). The employer can partially relax the employee's credit constraint to the extent that the employee accepts a lower wage during the training period. However, there is a limit to the extent to which small knowledge-intensive firms can borrow to finance training expenditures using physical capital as collateral. Furthermore, if workers cannot borrow at a competitive interest rate, the demand for training may remain below the social optimum, since in order to smooth consumption over time the employee cannot accept large wage cuts (see Acemoglu and Pischke, 1999a). Moreover, the wage can be lowered in exchange of training provision only if the latter is contractible. Nevertheless, as said, if employers have some market power over their own skilled labour, they may have an incentive to bear part or all the cost of training without asking for a reduction in wages. As in the case of non-contractibility of training, if workers are severely credit-constrained, labour market imperfections are likely to increase training provision since they increase firms' investment with only limited effects on workers' investment, which is already low, thereby easing the negative impact of capital and training market imperfections.

The interaction between different market failures is a powerful explanatory tool for the empirical evidence. The theory points to the fact that if imperfections in the training or capital markets are not too severe, the negative effect of labour market imperfections on workers' willingness to invest will dominate, since workers can better internalise lifetime benefits from training than their employers (see Stevens, 1999, for a simple graphical explanation). Conversely, if we found that the smaller the degree of competition in the labour markets the greater the amount of training, this could be interpreted as evidence that training and capital market failures affecting training outcomes are pervasive ([1]). This is indeed what seems to emerge from the empirical literature, at least insofar as European countries are concerned. For instance, Bassanini and Brunello (2003), in their most cautious estimate, suggest that in the European Union an increase of 1 percentage point in the training premium would induce a 3–4 % fall in the share of employees undertaking general training, resulting from a reduction of 2.5–3.5 % in employer-financed training

([1]) Alternative explanations remain, however, available (see Agell and Lommerud, 1997; and Moen and Rosen, 2002).

and an almost negligible increase in self-financed training. Moreover, Brunello and Gambarotto (2004) estimate larger effects for the United Kingdom. They find that a 10 % increase in the density of local economic activity — which can be considered as a proxy of the level of local labour market competition — entails a 20 % fall in average training provision. Similar results are found by Arulampalam et al. (2004b) who estimate the impact of the introduction of a minimum wage on the level of training provision in the United Kingdom, while the US literature on minimum wages and training is less conclusive (see Neumark and Wascher, 2001; and Acemoglu and Pischke, 2003).

4. The quest for efficient training policies

Insofar as market failures are responsible for suboptimal training provision, a first-best approach would be to overcome them through structural reforms. However, some of these failures are due to 'natural' imperfections of certain markets ([1]) and effective reforms to overcome them have not been proposed yet. Furthermore, other imperfections are induced by institutions and policies that do not concern primarily training outcomes (e.g. those affecting the wedge between wages and productivity such as minimum wages; see Acemoglu and Pischke, 2003), whose reform cannot be undertaken without a careful evaluation of other relevant trade-offs. A second-best approach is to increase the economic incentives to invest in education and training, through fiscal policy and institutional arrangements favouring cost-sharing among private parties. However, policy design is crucial, since some of the possible sources of market failure (e.g. lack of contractibility of training quality) can equally lead to policy failures, with the risk of large deadweight losses and heavy burdens for the public budget.

This section reviews the experience of OECD countries with various second-best approaches to surmount financial and economic barriers to the provision of and participation in adult education and training. However, great care must be exerted when drawing general conclusions from this type of exercise for three reasons. First, strictly speaking, the case in favour of public intervention has not been made in a conclusive way. Second, in most cases, public policies focus on formal education and training. This entails a risk of inefficient substitution between formal and informal training. This risk must be taken into account in the case of policies affecting employers' incentives to provide formal training, to the extent that informal training is more likely to be employer-paid, since it imparts competencies that are less easily signalled to the external labour market (making informal training, de facto, firm-specific, see Acemoglu and Pischke, 1999b; and Barron, Berger and Black, 1999b). Third, policies are discussed here in a partial equilibrium framework — that is, without considering the effect of the distortions induced by fund-raising schemes required to finance training policies. Fourth, and perhaps more importantly, the analysis is essentially based on deductive arguments derived from the empirical results of the previous sections. In fact, there are only few empirical evaluations of existing schemes and, with few exceptions, those available are limited to descriptive statistics and do not build up counterfactuals against which a rigorous assessment could be made. For these reasons, it is only possible to discuss the problem each specific policy can try to address and, to a limited extent, whether it has been implemented in a consistent way. It is not possible to make a more general assessment of whether each intervention has been excessive, insufficient or just right vis-à-vis the target.

Since the 1960s, policies were formulated to address, first and foremost, perceived rigidities on the supply side that interfered with adult education. The underlying assumption was one of substantial economic and social demand for adults to return to formal education. Thus, the objective of recurrent education was to improve learning opportunities for individuals by enhancing the capacity of the formal education sector to accommodate those wishing to return to education. However, recurrent education never emerged as an enduring widespread practice, in part because its associated costs were never adequately funded.

More recently, greater emphasis has been devoted to the demand side. This new emphasis has entailed a shift in the target of public policy from providers and systems geared to provision of education and training with relatively homogeneous content to the demand of individuals and employers for more heterogeneous learning out-

([1]) The lower level of competition in the market for workers who have acquired imperfectly transferable skills is the easiest example. In contrast to purely general skills, imperfectly transferable skills are not valuable at every firm. Therefore, although training in these skills increases potential job opportunities for the worker, finding them may require a long and costly search process.

comes. In other words, in contrast to children in initial education, learning objectives of individual adults are ever-changing and very heterogeneous so that such needs can best be met through a more differentiated arrangement of providers and courses than the delivery mode characterising initial and recurrent education. As a consequence, policy strategies to increase human capital accumulation of adults have shifted from direct subsidisation of external (public or private) providers of training services to co-financing schemes intended to increase incentives for employers and/or individuals to invest in more specific education and training. The shift towards this policy approach is based on three general principles:

- in most societies, because of budget constraints, public authorities alone cannot provide the necessary financial resources for lifelong learning;
- as lifelong learning generates considerable private returns, employers and employees should finance most of its costs; and
- greater reliance on market forces could strengthen the incentives both for learners to seek more efficient learning options and for providers to achieve higher levels of efficiency.

Co-financing mechanisms — i.e. schemes that channel resources from at least two parties among employers, employees and governments — can be designed so as to increase incentives to invest in human capital for employers, for individuals or for both.

Since the primary reason for which employers might invest in training less than the socially optimal amount is that current employers might not be able to internalise benefits from training that will accrue to future employers, tax arrangements or grant schemes for enterprises can be used to tackle aggregate under-investment. By modifying the marginal cost of training, these schemes may raise employers' supply towards the socially optimal level. These schemes can also be complemented by policies favouring cost-sharing between employers and employees, such as regulatory provisions for pay-back clauses and time accounts, to the extent that training market imperfections are not too strong. In fact, cost-sharing is unlikely to occur if the content and quality of training are not contractible.

For workers who have less frequent opportunities to receive employer-sponsored training, it is likely to be difficult to target policies focusing on employers' incentives in an efficient way (see OECD, 2003a). Individual-based demand-side policies (such as loan and subsidy schemes), by relaxing individual borrowing constraints and increasing expected rates of return, can thus play a role. However, they require information that workers often do not have. In addition, portability of skills must be assured, particularly in the case of training not delivering formal diplomas. As a consequence, financial incentives must be accompanied by adequate framework conditions. Even in this case it might be difficult to target with precision certain workers (such as workers with poor literacy skills). Strengthening delivery of initial education emerges therefore as a necessary complementary policy instrument.

The remainder of this section provides a survey of innovative co-financing strategies put in place by OECD countries to overcome the economic and financial barriers to invest in adult learning as well as framework conditions necessary to make these strategies effective.

4.1. Incentives for firms

Tax arrangements for enterprises

Tax-based schemes have the advantage of building on existing institutional arrangements for taxation, allowing them to be generally and immediately applied with limited implementation costs; for the same reason they have the disadvantage of being difficult to target precisely. When these schemes are targeted, they may induce inefficient substitution across groups (see below). As a consequence, tax-based schemes typically leave total freedom to choose training content and participants to firms.

'Train or pay schemes', which establish training levies to be paid by employers who do not train, are a route to tackling free-riding and under-provision that was popular in the 1970s. France first adopted this approach with the *loi de 16 juillet 1971*, which introduced a minimum training expenditure and required that each firm pays, as a levy, an amount equal to the difference between this legal minimum and its actual training expenditure. The law initially required employers to invest an amount equal to 0.8 % of total payroll. That requirement has risen gradually to 1.6 % in recent years, being even higher for temporary work agencies and workers with fixed-term contracts. A number of other countries

including Australia, the Quebec province of Canada, Korea and the United Kingdom adopted similar provisions in subsequent years, but abandoned them later. Today, only Quebec is still following the French model, while a number of other countries have introduced levy/grant systems where all employers pay the levy independently of their training expenditure and can then recover part or all of it by applying for grants from specific funds financed through the levy (see below).

Train-or-pay schemes confront employers with a financially neutral choice between training (and not paying the tax), or not training (and paying the tax). Funds collected this way are then distributed to firms in the form of additional grants. Strictly speaking, firms receive no automatic subsidy, since grants are not necessarily awarded. 'Train-or-pay' levies, however, are equivalent to schemes where there is a tax of a given percentage of payroll independent of training expenditures, a 100 % automatic subsidy of training expenditures up to that percentage of payroll, and an additional grant awarded through case-by-case analysis of training projects.

The problem with these schemes is that what counts for individual or employer's decisions to invest in training is the difference between marginal expected benefits and marginal training costs. Train-or-pay schemes focus on total cost, thereby inducing large deadweight losses. This is immediately evident in the case of firms that would have spent up to the legal minimum anyway, since these firms enjoy a windfall without increasing their incentives to invest in training. However, by covering total costs up to a pre-determined ceiling, 'train or pay' levy/grant schemes also 'overpay' the increase in training investment they induce on the part of firms that would have spent less than the legal minimum in the absence of the scheme.

In other countries — including Austria (in 2000), Italy (in 2001), Luxembourg (in 1999) and the Netherlands (in 1998) — fiscal deductions represent a matched contribution from the government that never covers the totality of training costs. In these countries employers are allowed to deduct more than 100 % of the cost of training from turnover when determining taxable income (Table 4). The extra-deduction (that is the actual subsidy) amounts to 10 % of training expenditures in Luxembourg, 20 % in Austria and the Netherlands and up to 50 % in Italy.

The main differences across countries concern the type of expenditures that are eligible for deduction. In fact, although internal training expenditures are more difficult to define in a clear and transparent way, covering only external expenditures might lead to inefficient substitution of external for internal training, with little or no impact on the overall volume. While in the Netherlands and Luxembourg both external and internal training are covered by these schemes, in Austria internal training expenditures are eligible for deduction only if provided by an in-company training institution (or separate legal entity). The Italian case is more complex since before the 'Tremonti-bis' Act (*Legge 383/2001*), training expenditures were not treated as costs of business. As a consequence, the law has introduced a true extra-deduction only for those expenditures that are normally counted as operating costs (such as trainees' and internal trainers' wages) and has only partially caught-up with the legislation of most other countries for other types of training expenditures. Another key issue is whether only direct costs are eligible for the extra tax deduction or if trainees' wages are also considered. For instance, in the Italian scheme the latter are included in up to 20 % of the payroll, while in the Dutch scheme they are generally excluded. When trainees' wages are excluded, it can be expected that these types of incentives tend not to be neutral with respect to trainees' characteristics and favour those for whom employers' opportunity cost of training (in terms of wage plus foregone productivity) is lower, such as inexperienced newly-hired workers. Nevertheless, most of these schemes are very recent and therefore there are no rigorous evaluations of their impacts.

Tax deductions provide no incentive to increase training if employers do not expect positive profits in a given fiscal year. This is particularly undesirable insofar as it is precisely during slack periods that the economic cost of foregoing production during training is lowest. To address this issue, Austrian law provides that 6 % of all training expenditures incurred in a given year, which cannot be deducted in that year, can be either paid out to the firm or subtracted from the firm's tax liability in the previous or subsequent year. Similarly, deductions of training expenditures can be postponed for up to 4 and 10 years in Italy and Luxembourg, respectively, if taxable income is negative. A Swedish survey reports that employers would expect to increase training expenditures significantly if similar arrangements were introduced in their country (Håkanson, Johanson and Mellander, 2002).

Targeting certain types of firms whose training supply is particularly low (such as small firms) through additional

Table 4

Corporate tax deductions for training expenditures in selected OECD countries

Country	Main provisions	Restrictions
Austria	Deduction of 120 % of CVT cost from turnover. Alternatively, deduction of 6 % from previous or subsequent year's tax liability (since 2002).	For externally provided CVT that is relevant to company interests (since 2000); for internal CVT organised by a separate in-company training unit (since 2003).
Italy	Deduction of 150 % of CVT cost from turnover (since 2001). If no taxable income in a given year, deduction can be postponed for up to four years.	150 % deduction only for expenditures normally counted as operating costs (such as trainees' and trainers' wages). Deduction may include up to 20 % of payroll.
Luxembourg	Deduction of up to 110 % of CVT cost from turnover (since 1999). If no taxable income in a given year, deduction can be postponed for up to 10 years.	
Netherlands	Deduction of 120 % of CVT cost from turnover (since 1998). More generous schemes for small firms and low-educated workers.	Only for training that is relevant to current functions of trainee. In the case of internal training, only cost of time spent by trainer can be deducted, with the exception of training for previously unemployed workers (aged 23 years or older) that are trained to basic qualification level, for which employers can deduct also workers' wages and indirect training costs such as those due to extra supervision and modification of production plans (since 2002).

CVT: Continuous vocational training.

Source: OECD Secretariat on the basis of information supplied by the countries in question.

corporate tax deductions is feasible — at least in principle. Conversely, targeting specific worker groups may involve undesirable substitution effects. For example, Leuven and Oosterbeek (2004) show that the 40 % extra-deduction to train workers aged 40 years or older, introduced in the Netherlands in 1998 and recently abolished, induced significant substitution between training workers above the age threshold and training workers immediately below it. Once the substitution effect is taken into account, the overall effectiveness of the scheme becomes questionable.

Summarising, it can be tentatively concluded that an effective use of tax incentives to reduce the possible firms' under-investment in training requires extra-deductions of training expenditures rather than 'train or pay' schemes, which involve a large deadweight cost. It is also desirable that these deductions can be postponed for several years if companies have no positive profits in the year they make the expenditure.

Grant schemes and special funds for enterprises

In 'train-or-pay' schemes, the levy is payable only if the firm's own training effort falls short of a legal minimum. By contrast, other levy/grant schemes imply that all companies pay a training levy — normally as a percentage of payroll — after which they can try to recover (part of) their payment through applications for grants to fund training. Grants do not tend to reflect company payments and therefore allow redistribution of funds towards predefined priorities.

Prime examples of this kind of levy/grant schemes at national level are found in Spain and Belgium. In Spain, employers pay 0.7 % of payroll into a training fund administered by a Tripartite Training Foundation, where sectoral commissions staffed by employer and trade union representatives decide and manage training grants. In Belgium, a nationwide collective agreement, which was later converted into a law, requires employers to pay 0.25 % of payroll into a training fund, a sum that can be topped up by branch-level collective agreements.

In addition to systems established by nationwide legislation, a number of countries have sectoral training levies established through branch-level collective agreements. For example, the Netherlands and Denmark have followed this route, with half of the Dutch and one third of the Danish workforce currently covered by sectoral levies and training funds (Gasskov, 2001). The average contribution rate in the Netherlands is 0.5 %, but with considerable variation across branches. Other countries, such as France and Belgium, have set up many sectoral funds on top of their national levy regulation. Similarly,

the USA has compulsory schemes for making contributions to training funds in a few sectors or companies with high trade union density, such as the automotive industry. Typically, there is a bipartite or tripartite joint governance of the training funds financed through levy schemes (see Ok and Tergeist, 2003, for detailed examples), but there are some exceptions (notably Korea, where the public employment service administers the respective fund).

Apart from programmes financed through specific levies, most OECD countries (e.g. European Union countries, the Czech Republic, Korea, Japan, Mexico, Poland and the USA) have some programmes for subsidising company training expenditures that are financed out of the central government budget. However, grant schemes, whether financed through a special levy or out of the normal budget, have the drawback of high administrative costs. Also, there is a trade-off between allowing flexibility to accommodate demand-driven needs and constraining the scheme via rigid eligibility criteria to ensure transparency and minimise abuse. Furthermore, it has been argued that small firms may find it comparatively more costly to meet all the conditions required to file grant applications (Gasskov, 1998).

4.2. Institutional arrangements to enable cost-sharing

Pay-back clauses

In principle, statutory or contractual pay-back clauses can specify that a worker leaving the firm within a specified period after an education or training spell has to agree to reimburse at least part of the training costs incurred by the employer. Pay-back clauses are intended to mitigate two of the market failures potentially affecting education and training. On the one hand, they limit the extent to which future employers can appropriate the benefits from current employers' investments in training through the poaching of trained employees, thereby allowing current employers to recoup the cost of training by setting wages below productivity after the training spell. On the other hand, they permit workers to share the costs of training even in the presence of serious individual credit constraints, by de facto borrowing from their employers with low default risk.

In Luxembourg, if no collective agreement specifies differently, the *loi cadre 22 juin 1999* establishes a pay-back clause covering part of the expenses paid by the employer in the 3 years preceding a voluntary quit, except when the latter is due to the employer's misconduct. Similar provisions apply also in the case of lay-offs for serious fault by the employee. In many countries (e.g. Austria, the Czech Republic, Germany, Korea, Italy, the Netherlands, Norway, Switzerland, and the USA), pay-back clauses are not established by the law but are permitted within certain limits in individual contracts or collective agreements.

Even where pay-back clauses are legal, their application might be limited due to problems of contractibility of training contents that discourage an effective sharing of training costs (see the previous section). Pay-back clauses may be well suited for formal education or external training programmes, leading to certification, since training-related expenditures, training content and quality as well as the value of being trained for the employee (i.e. the market price for the skills acquired through education or training) can be easily assessed. However, this is not the case for many other types of training. For instance, in Italy pay-back clauses have been used particularly for newly hired managers enrolling in MBA programmes. Similarly, statutory provisions in Luxembourg apply only to training leading to certification and in the context of an agreed firm training plan, while in Germany courts have found contractual pay-back clauses admissible only if the quitting employee can benefit from the content of training in other jobs. Nonetheless, Bellmann and Düll (2001) report that about 15 % of German enterprises apply pay-back clauses. Pay-back clauses might also be more viable if stipulated through collective agreements, since trade unions are in a better position to monitor training contents than individual workers. In the Netherlands, for example, many collective agreements establish pay-back clauses (Waterreus, 2002).

Apprenticeships

Apprenticeships are another type of contract that allows sharing the cost of training in a similar way to pay-back clauses. In many countries, apprenticeships represent a longstanding system of combining training and employment so that people entering an occupation can receive instruction in the specific skills needed while working in that particular occupation. Common features of apprentice contracts are that they last for a duration specified at the start, apprentices are paid less than their productivity during most of the period covered by the contract, and a recognised qualification is delivered at the end, with the apprentice receiving a substantial wage increase if he/she

stays with the same firm. These features make apprentice contracts a valid option even for non-contractible training (Malcomson, Maw and McCormick, 2003). Similarly to contracts involving pay-back clauses, employers can recoup the cost of training by paying workers less than their marginal product in the final stage of the apprenticeship. But contrary to pay-back clauses workers can quit before the end of the contract without penalty except that, if they do, they do not receive the final certification. For this reason, workers have an interest to stay at least until the end of the apprenticeship, but firms have an interest to provide good-quality training to minimise quits. To the extent that there are no age limits, apprentice contracts can be successful also within groups of low-qualified mature workers. For instance, in Australia, since all age restrictions were removed from apprenticeships and traineeships in 1992, individuals aged 25 years and over have accounted for the majority of new apprenticeships, but this strong growth has not come at the expense of younger apprentices whose number also rose (OECD, 2003c).

Working-time and training-time accounts

In many OECD countries, increased flexibility of working-time arrangements, featuring *inter alia* the annualisation of working hours or long hours-averaging periods, has led to the creation of working-time accounts for individual employees. The basic idea behind working-time accounts is that over a certain period of time an employee is able to work longer or shorter hours than the standard working time established by the employment contract, and thereby accumulate working-time credits or debits in an individual account, which are later compensated for by additional free time or work. As a result, they can be used to share training costs in a similar way to pay-back clauses, except that with working-time accounts workers de facto anticipate their share of the cost. Additionally, they may facilitate overcoming those constraints posed by time constraints, which are one of the most important factors preventing workers from taking the desired amount of training (see OECD, 2003a).

Already in 1994, France adopted a law introducing a 'time-saving account' for employees (*compte épargne-temps*). This account allowed workers to accumulate time credits over a number of years — using, for example, overtime hours or reduced working hours in the framework of the move towards the 35-hour week — and subsequently decide whether to make use of this 'time capital' for, *inter alia*, early or gradual retirement, the take-up of part-time work, or training leave. So far, the use of the account for training has occurred only in a small minority of cases. However, legislation passed in 2003 urges social partners to negotiate about the use of working-time accounts for training purposes.

In the Netherlands, about one quarter of large collective agreements establish the possibility of saving spare time for educational purposes. Compensating accumulated overtime hours in the form of extended leave at a later date is a very common practice in Denmark (EIRO, 2001). In a recent employer survey in western Germany (excluding Berlin), 11 % of all companies that offer training — primarily the larger ones — and that operate working-time accounts offer the option of using the accumulated working-time capital for training purposes (Dobischat and Seifert, 2001). Such 'training time accounts' can be fed through accumulated overtime hours or through special employer bonuses. As in the case of other instruments that facilitate a sharing of training costs between employers and employees, time accounts are likely to be effective only to the extent that training is contractible. As such, their use is likely to be limited when training opportunities must be chosen by the employee within the training plan of the company, except when the latter has resulted from an effective negotiation among social partners (see below).

4.3. Incentives to increase individual demand

Most individual-based demand-side schemes try to address simultaneously individual borrowing constraints and low or uncertain rates of returns for specific groups who typically do not receive employer-sponsored training ([1]). The main rationale for individual-based demand-side schemes is that they can be more precisely targeted than financial incentives for employers (or training institutions), while providing the individual with a greater range of training choices.

Subsidies

Most countries have schemes to subsidise directly individuals enrolling in training courses. Subsidies are flexible instruments that can target specific groups. However, they often require careful attention to framework conditions in order to work properly (see below).

([1]) The only exception is loan schemes. However, the UK experience suggests that loan schemes may have only limited appeal because adults tend to be more reluctant than younger persons to finance learning through loans, perhaps due to existing debts (e.g. home mortgages), family responsibilities, or shorter payback periods (Callender, 2002).

Three issues are key in the economic analysis of subsidies to individuals: (i) what the subsidy covers: fees and/or living expenses and/or foregone income; (ii) what requirements individuals must satisfy to qualify for the subsidy; and (iii) to what extent individuals are free to choose the type and timing of training as well as the training provider.

There is an evident tension between, on the one hand, increasing training demand and individual choice without boosting costs and, on the other hand, conveying adequate information about training quality to individuals and preventing possible abuses. In principle, the former objective would require allowing the supply of training services to respond freely to demand through free entry and course innovations. However, a certain amount of time-consuming screening, monitoring and control is called for by the second objective. In practice, subsidy schemes that give total freedom of choice to individuals are rare (perhaps only the UK individual learning accounts fall into these categories, but their evaluation suggests that excessive freedom made the system liable to fraud and abuses; Owens, 2001; York Consulting, 2002). In most cases governments compromise between these conflicting objectives by constraining training choices within a more or less wide menu and adjusting the subsidy rate accordingly. For instance, training vouchers (used, for example, in certain regions of Italy and Switzerland) typically leave free individual choice within courses offered by accredited training providers.

In some cases, subsidies target explicitly specific segments of the population. For instance, in Germany, the government subsidises training expenditures of workers aged over 50 and workers with no vocational qualification (or those with vocational qualifications but who have been in semi-skilled or unskilled occupations for more than four years). Nevertheless, except within certain leave schemes (see below), direct training subsidies seem to be unable to radically increase training, to the extent that training outcomes are not inefficiently low because of relatively mild capital market failures. Only in a few cases, in fact, are training subsidies intended to replace income for individuals who pursue full-time learning activities. Since government contribution is relatively small, most of the burden remains on the individual, who usually has either no adequate incentives (e.g. in the case of labour market imperfections) or no adequate means (e.g. in the case of capital market imperfections) to bear it. In this respect, the evolution of the individual learning account established by Skandia — a Swedish private insurance company — offers insights into the extent to which the impact of a subsidy scheme on disadvantaged groups depends on the scale of contributions from third parties. Within this scheme workers can save up to 10 % of their salary in a saving account, with the company offering a one-to-one match. The company has gradually increased its contribution up to a three-to-one match for poorly qualified and lower paid employees, raising dramatically the participation of this group that was severely under-represented when the scheme was first introduced (see OECD, 2003c).

Tax incentives

While expenditures for formal education usually can be deducted from personal income taxes, tax systems are typically more restrictive in their treatment of training expenditure by individuals. Generally, such expenditure cannot be deducted from the taxable income of individuals, except under circumstances in which such training is required for the job they currently hold. Moreover, when employers provide financial support for training that leads to recognised qualifications, the expenditure by the employer may be treated as taxable income to the learners.

Some initiatives have been taken to relax these restrictions. For instance, starting in 2003, Austrian legislation will allow individuals to deduct costs related, not only to training required for their current job, but also for training that equips them to change jobs or enter a new profession. In spite of the interest for these policy innovations, it must be noted that tax deductions of current individual expenses for education and training are likely to be effective only for short and/or part-time training as well as for high-wage employees, since individuals can only make use of these deductions if they earn enough in a fiscal year to be liable to pay taxes. There is no such limitation only when tax deductions apply to saving schemes to finance future learning activities (e.g. individual learning accounts and leave-saving schemes).

Training leaves

Meeting the training needs of employed individuals may frequently require them to stop working for a considerable period of time. In many OECD countries access to training under these circumstances is facilitated by statutory or contractual training leave schemes that guarantee employees the right to return to their jobs after completing the training course.

Simulation exercises suggest that foregone income depresses individual rates of return to full-time adult education more than any other factor (OECD, 2003b). This implies that subsidy schemes need to compensate in part for foregone income to reach low-income/low-wealth labour force segments, in particular when training requires a prolonged period of service (and wage) reduction. For this reason, in some countries, special training leave subsidies (Table 5) are available, particularly to cover living expenses or partially replace foregone income. In Germany, a special subsidy also exists for part-time workers participating in training. Other policy alternatives include tax incentives for saving accounts, but they have been rarely established in practice by governments. One exception is the possibility for Dutch employees, introduced in 2001, to join a 'leave-saving scheme', which allows them to set aside up to 10 % of their gross yearly wage in a saving account with privileged tax treatment to finance a personal leave, with training or studies being one of the declared aims of such leave. Provisions for training leaves are also often included in collective agreements, even in countries where statutory schemes do not exist (such as Australia and Portugal).

Table 5

Training-leave schemes in selected OECD countries

Country (1)	Eligibility	Subsidies provided to	Subsidy ranges	Funding mechanism	Numbers of beneficiaries (% of total employment)	Comments
Austria	Workers with a work history of over three years and with the current employer for the past two years	Individual workers	A daily allowance of EUR 14.53 for a period of 3–12 months	Austrian Employment Service	2 263 in 2002 (0.1 %)	
Belgium	Full-time workers	Employers	Full wage costs (up to 80–120 hours for general education, 120–180 hours for vocational training, and 180 hours for workers who take both general and vocational courses during the same year) and the direct costs	Social security contribution	60 270 during 2000/01 academic year (1.5 %)	
Finland	Employees with a work history of over 10 years	Individual workers	EUR 440 per month plus an earning-related amount covering 15–20 % of the last monthly wage up to 1 year	Education and training insurance	5 236 in 2002 (0.2 %) (2)	
France	Workers with a work history of over 24 months and who worked with the current employer during the last 12 months	Individual workers	80–90 % of the foregone wage up to one year or 1 200 hours	Employers' contribution (0.2 % of the wage bill) to the accredited bipartite organisations (Opacif)	26 169 in 2001 (0.1 %)	
Japan	Employed persons who are covered by the employment insurance	Employers	One quarter of the wage costs and one quarter of the direct costs (one third for SMEs)	Employment insurance	3 265 in fiscal year 2002 (0.01 %)	A budget of JPY 0.7 billion was made available for fiscal year 2002

(Continued on the next page)

Table 5 (continued)

Country (1)	Eligibility	Subsidies provided to	Subsidy ranges	Funding mechanism	Numbers of beneficiaries (% of total employment)	Comments
Korea	n.a.	Employers	One third of the wage costs and part of direct costs	Employment insurance	7 756 in 2000 (0.04 %)	Total subsidy of KRW 5 589 million in 2000
Norway	Workers with a work history of over three years and with the current employer for the past two years	Individual workers	NOK 80 000 per year, of which 60 % is a loan, 25 % is an unconditional grant and 15 % is converted from loan to grant when the student succeeds in the examination	State Education Loan Fund	n.a.	Only for formal education
Spain	Workers who have been employed by the same firm for at least one year	Individual workers	Full foregone wages up to 200 working hours	Social partners' mandatory contribution to the Tripartite Foundation	1 394 in 2002 (0.01 %) (3)	
Sweden	Workers who have been employed for at least six consecutive months or with a work history of over 12 months during the last two years	Individual workers	Grants and loans of SEK 33 880 for 20 weeks full-time studies; a supplementary loan for the workers aged 25 or older if the income of the beneficiary during the 12 months immediately preceding the studies has been above a certain threshold	Study allowance by the government	0.7 % in 2002	Only for formal education

(1) Countries without specific subsidy schemes or where the related schemes are governed by collective agreements, such as Australia, Germany, the Netherlands and Portugal, are not included in the table.
(2) The figure refers to the number of employees who have taken alternation leaves, of which only roughly 17 % indicate studying was the major reason.
(3) The figure refers to the number of individual training permits approved by Forcem.
NB: n.a.: Information not available.

Source: OECD Secretariat on the basis of information supplied by the countries in question.

In most countries that have training leave schemes, however, only a very limited number of employees have participated in them. Belgium and Sweden, where almost 1 % of workers have been on leave each year since the establishment of the schemes, are two exceptions to this pattern. However, training leaves tend to be more popular among women than men, since they are seen as a flexible way to reconcile further training needs with family responsibilities. For instance, in Denmark there were about 2 000 men and 6 000 women on training leave in the second quarter of the year 2000 (representing about 0.1 % and 0.5 % of employment, respectively; EIRO, 2001). In Sweden, women take up training leave twice as frequently as men. In Austria, training sabbaticals were disproportionately used by women until the scheme was reformed and going on training leave soon after maternity leave forbidden. Belgium, where only one quarter of the employees on training leave were women in the mid-1990s, is an exception to this pattern, probably due to the fact that part-time workers are excluded by the Belgian scheme (Cedefop, 2001).

4.4. Framework conditions

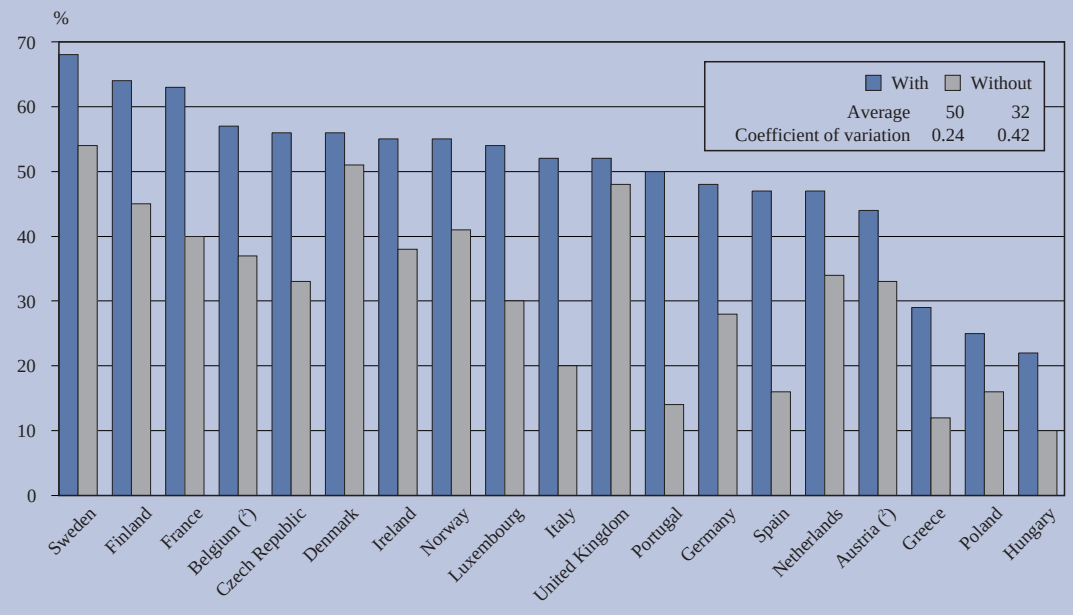
The effectiveness of co-financing policies that aim to increase demand by employers and employees

(demand in the upstream market) hinges in part on certain framework conditions — the policy and institutional environment in which they are implemented. First, barriers to entry of bona fide training providers must be relatively low to allow supply shifts accommodating demand needs without raising costs. Second, information on the nature, conditions (location, duration, timing), cost and quality of education and training opportunities must be readily available to individuals and employers in order to ensure efficient allocation of resources for investment in education and training and foster cost-sharing as well as cooperative behaviours. Third, information on the nature and level of skills and competencies that are acquired by individuals through self-financed training must be transparently signalled to external labour markets so that workers can capitalise on what they have learned when they pay for it. Many countries have introduced standardised competence-based qualification systems, according to which acquisition of qualifications is not conditioned to course attendance in vocational training or educational institutions. Under these systems, workers are allowed to take individual skill tests independently of the way skills are acquired. Yet, much remains to be done to ensure the correct functioning of these mechanisms (Bjørnåvold, 2002).

Collective agreements and trade union participation may play an important role not only in diffusing information and jointly defining curricula, but also by increasing and twisting employers' supply towards more general types of training (see Ok and Tergeist, 2003). For example, a study by the American Society for Training and Development (ASTD) of major joint labour-management training programmes suggests that these joint initiatives do result in a different mix of training activities. While only 2 % of firm-supported training addresses basic literacy skills according to the ASTD's benchmarking database, this figure soars to 15 % for the joint programmes (van Buren and Erskine, 2002). The sharing of training costs between employers and individuals can also be fostered by joint training agreements to the extent that unions and work councils are in a better place to monitor training content and quality. In most European countries, participation in employer-sponsored training is significantly greater in firms with a joint training agreement than in firms without it (Chart 5). Differences in training participation rates are particularly large in Mediterranean countries (for which the participation rate in firms with negotiated agreements is more than twice as large as in other firms). Conversely, these differences are not particularly significant in the Nordic countries (except Finland) and the United Kingdom, where however training participation rates are also high in firms without joint training agreements.

Finally, other framework conditions, whose primary effect is not on training or education, have second-order (and theoretically more ambiguous) effects on training demand and supply. For instance, institutions in the labour market affecting the distribution of wages, such as the minimum wage and employment protection legislation, modify the incentives of employers and employees to invest in training (see Acemoglu and Pischke, 1999b). Furthermore, the progressiveness of the income tax may have a bearing on individual incentives, to the extent that, on the one hand, it reduces individual appropriability of the benefits from training and, on the other hand, it reduces the opportunity cost of taking unpaid training leaves or opting for part-time work. Finally, a major obstacle for women to participate in adult learning is represented by the fact that the burden of family responsibilities is still unevenly shared within the couple (OECD, 2003a). Policies that affect the ability of households to reconcile work with family needs can have an impact on the gender-training gap.

Chart 5: **Training participation and joint training agreements — Percentage of employees in all enterprises with/without a joint training agreement with social partners participating in employer-sponsored training, 1999** ([1])



([1]) Countries are ranked from left to right in descending order of the percentage of employees in all enterprises with a joint training agreement participating in employer-sponsored training.
([2]) Estimations include a very small number of non-training enterprises due to missing values.
Source: CVTS2.

5. Concluding remarks

James Heckman has argued that 'in evaluating a human capital investment strategy, it is crucial to consider the entire policy portfolio of interventions together (training programmes, school-based policies, school reform, and early interventions) rather than focusing on one type of policy in isolation from the others. […] We cannot afford to postpone investing in children until they become adults, nor can we wait until they reach school age — a time when it may be too late to intervene. Learning is a dynamic process and is most effective when it begins at a young age and continues through to adulthood' (Heckman, 2000, p. 50). This caveat has an irreplaceable importance for policy guidance. Nevertheless, as noted by Blundell (2000), Heckman's remarks do not imply that later interventions have no pay-off. There are indeed several reasons why systematic provision of front-end formal education and training preceding entry to the labour market is increasingly insufficient and it might be desirable to flank early interventions with policies for adult learning. This paper has provided evidence that training has a positive impact on individual labour market performance. Despite this evidence, in the absence of policy interventions, training might be suboptimally provided because of imperfections in labour, capital and training markets. However, carefully designed co-financing mechanisms, by leveraging the resources of all actors that can benefit from training, could promise policy innovations to improve training outcomes, as appropriate.

6. Appendix

The analysis of this paper is limited to individuals aged from 25 to 54 years. Due to data availability a person is defined as employed if he/she works at least 15 hours per week. Moreover, employees' gross hourly wages are computed from gross monthly earnings in the main job at the date of the interview, by dividing them by 52/12 and by usual weekly hours of work. Overtime pay and hours are included.

The question on employment security in the ECHP is as follows: 'How satisfied are you with your present job in terms of job security?'. Replies are quantified on a 1–6 Likert scale from not satisfied to fully satisfied. The median reply in the sample is 4, while the mode is 5.

The ECHP release used in this paper contains data from 1994 to 2000. Although, in principle, the ECHP covers 15 European Union countries, the country sample in the different analyses is chosen on the basis of data availability. Luxembourg and Sweden never appear in the analysis — due to the small sample size for the former and the absence of longitudinal data for the latter. SOEP and BHPS sources are preferred for Germany and the United Kingdom, respectively, since data from ECHP sources on these two countries are not available after 1996. Nevertheless, due to a change in the BHPS questionnaire, starting in 1998, only the waves 1998–2000 are used for the United Kingdom; and due to the lack of information on subjective perceptions of job security in the SOEP, ECHP data are used for Germany in that analysis. Furthermore, data for Austria are not available in 1994 and data for Finland are not available in 1994 and 1995. In addition, observations for certain countries and certain years are excluded from the sample due to the lack of time-series comparability of wage data — notably, 1995 for Austria, 1994 and 1997–2000 for France, 1994–96 for Greece, 2000 for Ireland, and 1994 for Spain. Finally, employment security data are not available for Ireland.

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Chapter 9

Discussion ([1])

Thomas Zwick ([2])

([1]) The papers discussed were Bassanini (this volume) and 'An alternative approach to estimate the wage returns to private-sector training' by Edwin Leuven and Hessel Oosterbeek. The latter paper was presented at the workshop but unfortunately cannot be included in this volume.

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Both papers address important and topical problems in the empirical continuing training literature. Furthermore, they suggest innovative approaches to tackle these problems. Bassanini calculates the effect of continuing training on individual labour market performance taking not only a possible wage mark-up but also increased employment security into account. Thereby, he differentiates between effects on heterogeneous groups. In addition, he proposes elements of an optimal training policy for different target groups. Leuven and Oosterbeek react on the observation that the estimated training wage effects are frequently implausibly high. Their strategy to examine this problem is to choose the comparison group of those employees who do not participate in training very carefully. They find a drastically lower and insignificant wage mark-up and argue that this is the true causal effect of training on individual earnings.

An increase in employment security for training participants is frequently not taken into account when the effects of training are studied (Zwick, 2001). If only the wage effects of training are considered, the results may be biased, however, because some employee groups that do not enjoy a wage mark-up after training obtain some returns in the form of higher employment security. Indeed, Bassanini shows that the training effects have to be calculated separately for different groups of people: lower educated and older employees do not obtain a higher wage after training participation (compare also Kuckulenz and Zwick, 2003; OECD, 1999). Adding to the literature, Bassanini also examines the impact of training participation on the subjective sentiment of employment security. He indeed finds that especially lower skilled and older workers enjoy a higher employment security on the basis of the measure used. This leads him to the conclusion that all groups of labour market participants benefit from training — some by a higher wage and some by better employment security. A problem might be, however, that the measure of job security is based on the question 'How satisfied are you with your present job in terms of job security?' This means that only the relative and subjective employment security is measured, because people tend to compare themselves with their peer group. Therefore, no universal conclusions should be drawn from this analysis.

There are some specific comments on Chart 1 and Chart 2 in Bassanini's paper (pp. 108 and 110). It is striking that in countries with an elaborate and functioning apprenticeship system (e.g. Austria, Germany, and the Netherlands) the wage growth difference between trained and untrained employees is higher for formal education or training than for training excluding education (see also Smits and Zwick, 2004). As apprentices frequently earn a low salary during their apprenticeship but enjoy a large wage mark-up after having served their apprenticeship, the strong wage mark-up may more probably result from the termination of the probationary period of the apprentices than from a causal training effect in these countries. For Chart 2, an explanation as to why training from a previous employer raises earnings clearly more strongly than training from the current employer appears to be missing. If a large share of training financed by a previous employer was specific, it seems unclear why it should lead to higher earnings after changing job.

I wonder if it is a good idea to include explanatory variables, such as firm size, public sector dummy, occupation, permanent contract dummy, and the number of previous jobs, that are frequently interpreted as quasi-fixed into a fixed effects regression covering a relatively short time period (see also Black and Lynch, 2001; Zwick, 2005). For these variables, the signal-to-noise ratio may be very low, because a large share of the 'changes' may be measurement errors. Therefore, the additional information we get seems to be little (Dearden et al., 2000). Finally, some descriptive statistics of the data used and more information on the estimation strategy (e.g. long vs. short differences in the fixed effects estimation) would be helpful.

Some comments on the second part of Bassanini's paper on the optimal training policy: This is a very helpful and thorough overview on options for public training policies aimed at the employed and unemployed. The argument that co-financing arrangements under which governments, employers and employees jointly finance training is well founded. The main problem seems to be that there is only a weak connection between the empirical analysis in the first part and the policy applications derived in the second part. In the first part, there are no calculations of employers' returns from training or social returns (Dearden et al., 2000; de la Fuente and Ciccone, 2003). These calculations are necessary, however, to answer the question whether training investments are inefficiently low. Only if this question is answered, can we move on to derive a valid argument for policy interventions and spending public money.

Several observers mentioned that the estimated returns to training are frequently excessively high (compare e.g.

Schøne, 2003). It seems doubtful that participation at a training course which takes only a few days has a causal wage effect that is comparable to an additional year of high school. The main problem when estimating the wage returns of training is that employees are not accidentally sorted into training, but that there is (self-)selection. If the selection criteria are also related to the ability to earn money, which cannot be controlled or observed, there will be a bias in the estimation of the wage effect of training. Examples may be intrinsic motivation or hidden abilities such as social behaviour — both may be positively related with training participation and earnings. Leuven and Oosterbeek try to reduce this estimation bias by constructing the equivalent of a 'natural experiment'. The earnings of training participants are compared with those employees who by chance could not participate in training although they have been selected for training by the firm. They argue that if non-participation is indeed random, the unobservable characteristics of both groups should be similar. Leuven and Oosterbeek demonstrate that the observable characteristics of both groups get more similar if the comparison group is narrowed while the training wage mark-up dramatically declines and loses its significance. Specific remarks on this paper are that several authors indicate that employer and workplace characteristics matter in the Mincer wage equation they use (see Kuckulenz and Zwick, 2003), and therefore these explanatory variables should be taken into account here. Moreover, the insignificant wage mark-up may be a consequence of the asymmetry in group sizes. The estimation power of the empirical strategy employed is weak if group sizes are asymmetric. Finally, it may be interesting to know the response rate of the telephone interview survey, how the respondents were stratified, and if people refused to give an interview, how the cells were filled in order to obtain a representative sample.

In summary, both studies address important and topical issues on the effects of continuing training. For this they use innovative estimation techniques and strategies. They are thoroughly done and well written. In the paper by Bassanini, I would like to see a digression on the employers' returns from training and on the social returns from training. In the paper by Leuven and Oosterbeek, I would like to see an implementation of the estimation strategy using a larger comparison group.

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Part IV:
Human capital policy in the EU

Chapter 10

Human capital policy for Europe ([1])

Pedro Carneiro ([2])

([1]) This paper was prepared for the workshop on 'Quality and efficiency in education and training' organised by the Directorate-General for Economic and Financial Affairs, European Commission, Brussels, 27 May 2004. It draws on my joint work with James Heckman (see Carneiro and Heckman, 2003) and Flavio Cunha. I thank Paulo Santiago, Hillary Steedman, Jason Tsarsh and David Young for providing me with very useful references.

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1. Low skills: A problem for Europe

We live in a time of turbulence ([1]). There are large flows of individuals, capital and information and knowledge across the world. There are constant and rapid changes to which individuals need to adapt every day. In such a world the abilities to process information and to be flexible will sell at a large premium, while inflexibility and ignorance are a recipe for a most likely failure. In such a world, it is important to be highly skilled. In this paper I argue that there is a skill problem in Europe and I present some basic principles that should be in the background of a human capital strategy for Europe.

Gottschalk and Smeeding (1996) analyse trends in income inequality around the world and they conclude that in the last 25 years there has been an increase in inequality in many countries of the western world. In Anglo-Saxon countries, in particular in the USA, the increase in inequality is much larger than in continental Europe. Bertola (2003) argues that many continental European countries did not experience any increase in inequality. Figure 1 is taken from Bertola (2003), and in the top panel it displays the ratio of the 50th to the 10th percentiles of the earnings' distribution across time for different groups of countries. The bottom panel shows 90–10 earnings differentials across countries. There is only a consistent increase in earnings inequality across time for the set of countries in the first graph of each panel, which are precisely the Anglo-Saxon countries. However, Figure 2, also from Bertola (2003), shows that the countries with the smallest increases in inequality have on average experienced the large increases in unemployment. Bertola argues that labour market institutions in these countries have prevented large changes in earnings inequality at the expense of employment. Once you take this into account it is not clear whether the change in inequality in Anglo-Saxon countries has been smaller or larger than the change in inequality in continental Europe, since in Figure 1 we only use individuals who are employed ([2]).

This increase in inequality comes at a time of substantial economic growth. In the USA, individuals at the bottom 10 percentile of the wage distribution have experienced losses in real wages over the last 30 years, while those at the top benefit from large wage increases (see Juhn, Murphy and Pierce, 1993). In the UK, individuals at the bottom end of the wage distribution have stagnant wage growth while those at the top experience wage increases (see Gosling, Machin and Meghir, 2000). Rebecca Blank (1996), discussing the problem of poverty in the USA, argued that recent economic growth is very different from past economic growth. In particular, after the Second World War there was a period of rapid growth both in western Europe and in the USA, but its benefits were spread across the earnings distribution. Growth was driven by the reconstruction of Europe and the motor of economic growth was the manufacturing sector. Even low-skilled workers could experience increases in employment and earnings since good unskilled manufacturing jobs were becoming increasingly available. In such a world, the major poverty alleviation programme is economic growth. However, recent growth has mainly benefited skilled individuals. Machin and Van Reenen (1998) present evidence that recent economic growth in seven OECD countries has been driven by skill-based technical change, with important consequences for the wage structure of these countries. There are, however, countries, such as the USA and the UK, where unemployment rates are low and the low-skilled can find jobs. However, such unskilled jobs tend to be in the service sector which has grown enormously in recent years, and these are low paying jobs with slim chances of growth.

([1]) Ljunqvist and Sargent (2001) and Heckman (2001) use this term to characterise today's labour market.

([2]) Blundell, Reed and Stoker (2003) show how accounting for unemployment can dramatically change inferences about trends in aggregate wage growth in the UK. Accounting for the trend in unemployment is bound to also affect any inference we make about changes in inequality.

Nickell and Bell (1996) document that the difference between unemployment rates of low and high-skilled individuals has increased across OECD countries between the early and the late 1980s. The skill premium has also generally increased across countries, and the largest increases are in the USA and the UK

As a response to the rise in demand, the supply of skill has increased across the western world. Figure 3, from OECD (1998), shows cross-country educational attainment for two different cohorts of individuals in 1995. In all countries shown there has been an increase in educational attainment of the population across cohorts. This increase was especially large in Belgium, Korea, Greece and Spain. In contrast, it was basically zero in the USA, and it was small in many other European countries. Figure 4, from Carneiro and Heckman (2003), plots educational attainment by cohort in the USA. It shows a secular growth in educational attainment up to the cohort born in 1950. After this cohort, college participation

Figure 1: **Ratio of the 50th to the 10th percentile of countries' earnings distribution**

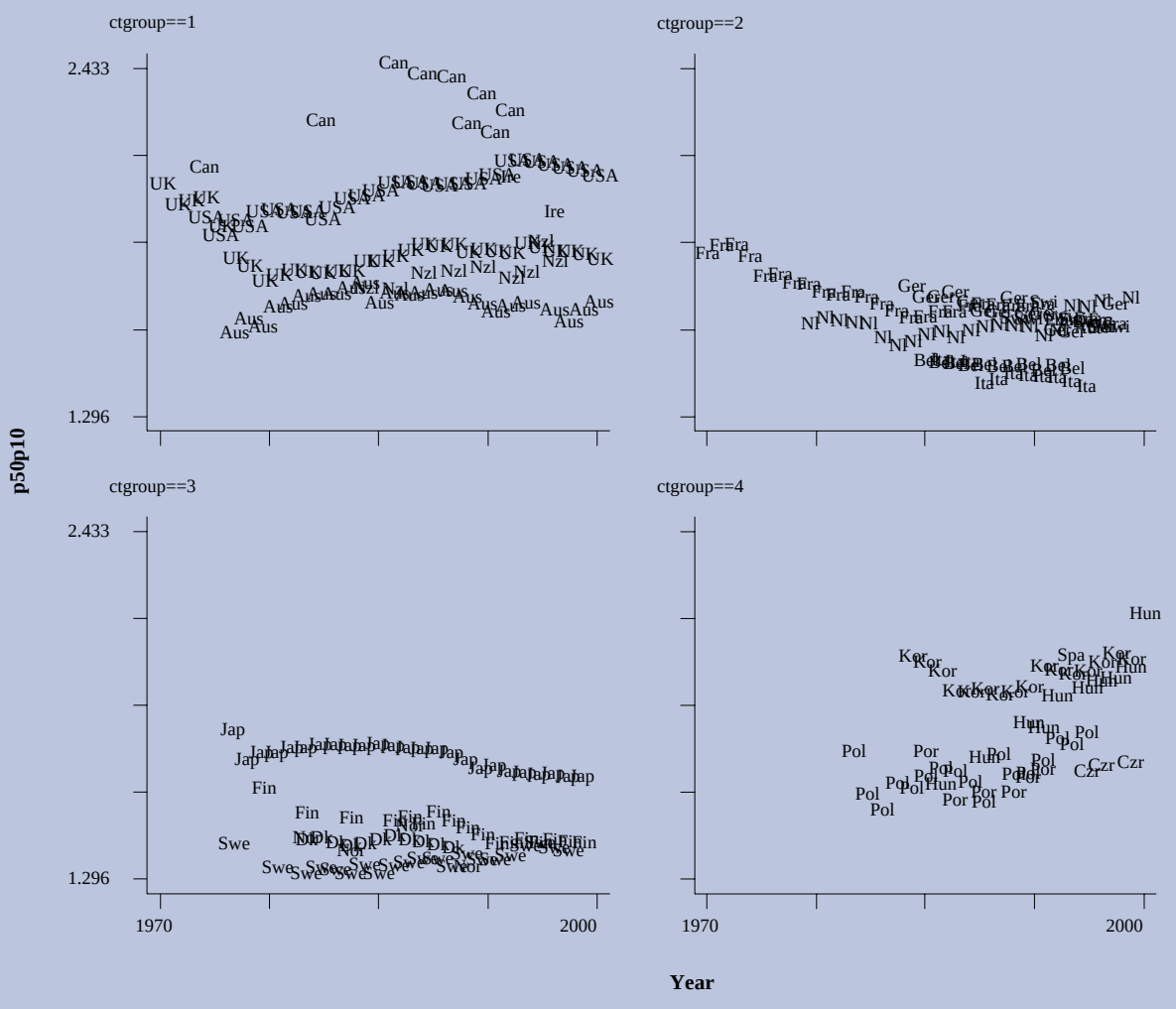

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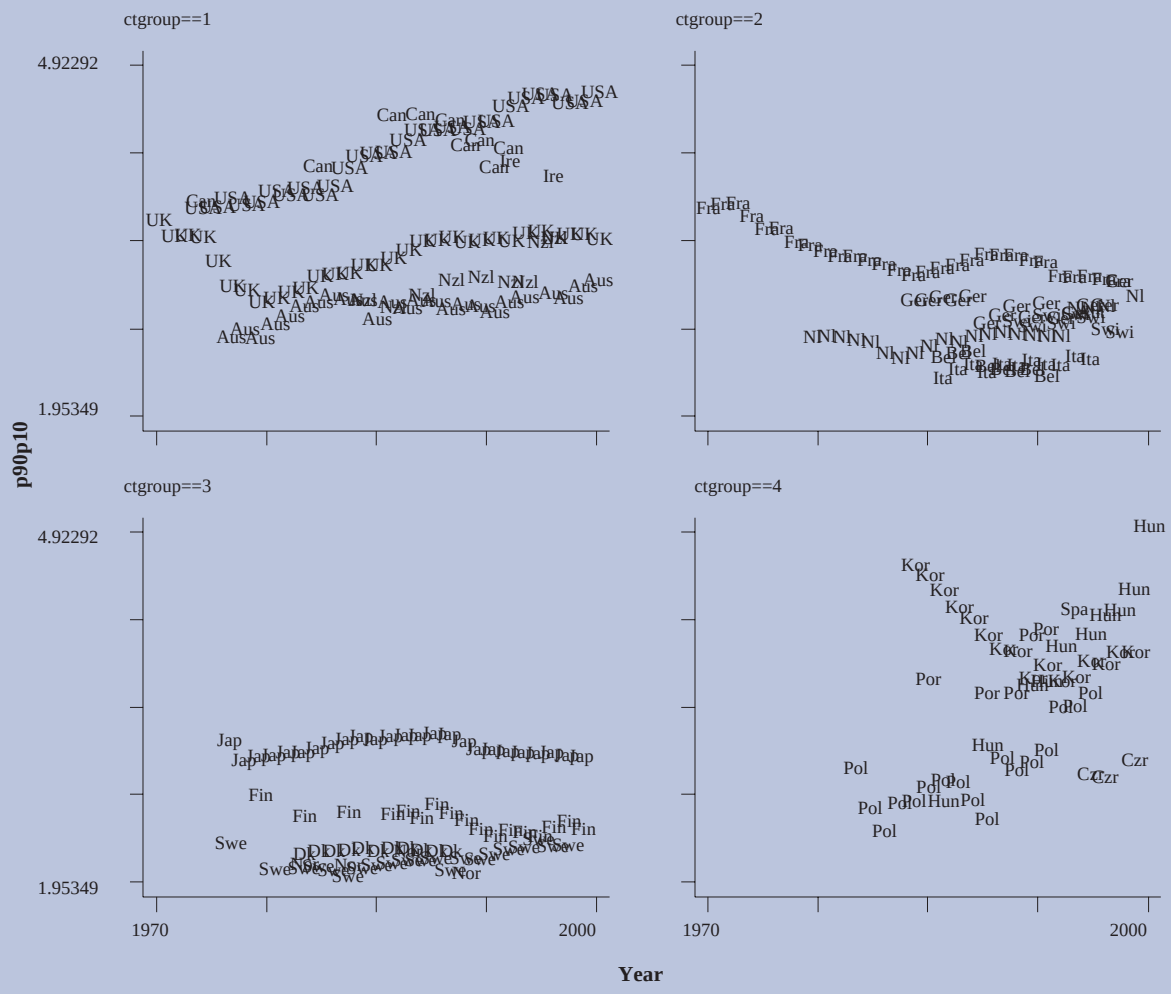
Figure 1 (continued)

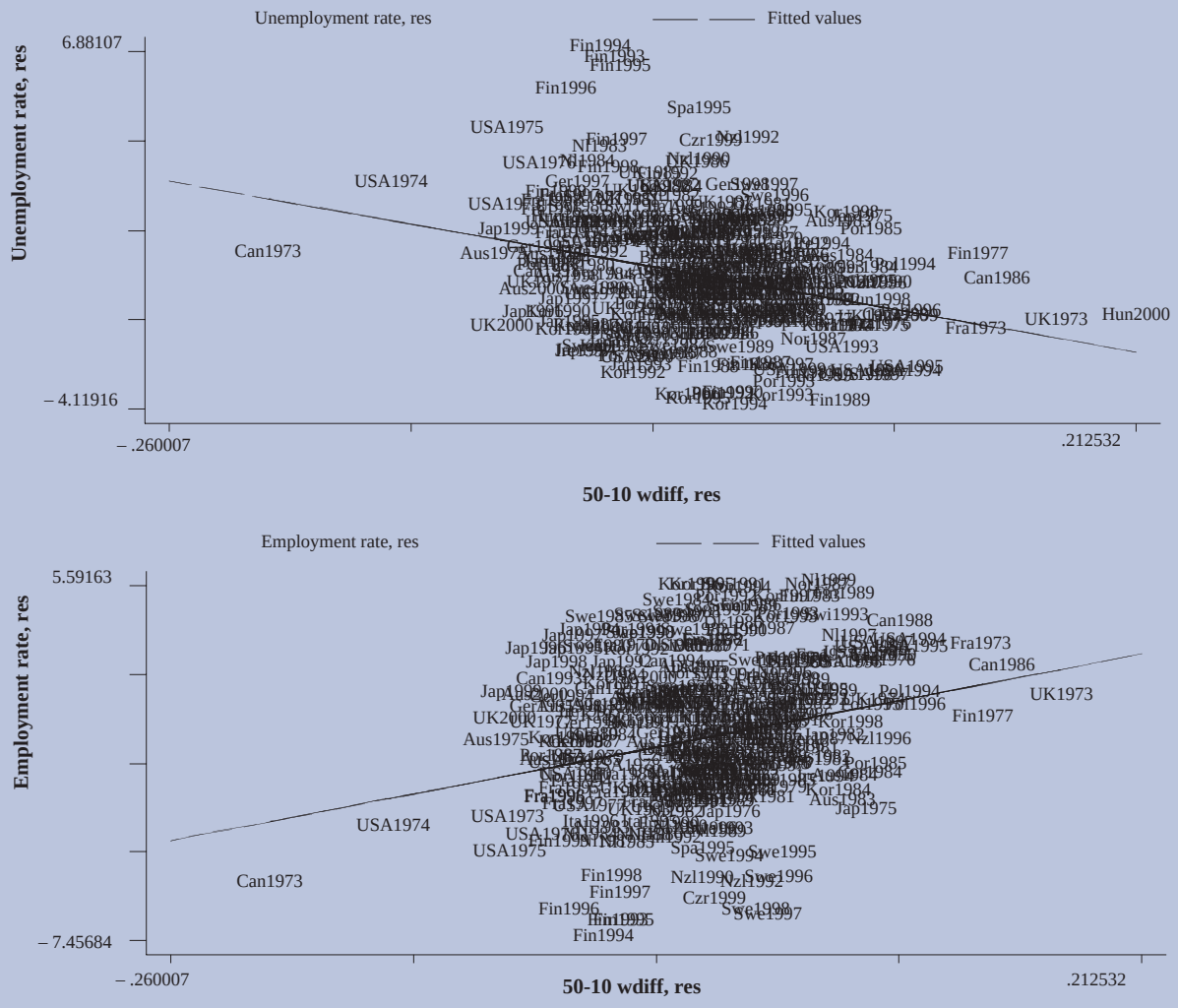
Ratio of the 90th to the 10th percentile of countries' earnings distribution



Source: OECD (2004).

rates and high school drop-out rates become flat, in spite of large increases in the returns to schooling across cohorts. In the UK we observe a similar pattern of stagnation in educational attainment for the recent cohorts. Blanden and Machin (2004) show that the age participation index is roughly flat from 1970 to the late 1980s when there is a large increase in university participation, which is not sustained later on. Similarly, after many years of rapid growth in rates of participation in post-compulsory education, staying on rates become flat after 1990. Stagnation of educational attainment is worrisome if one believes education is an important motor of growth, as is standard in modern growth theory (see Lucas, 1988; Becker, Murphy and Tamura, 1990). Furthermore, at a time of increasing demand for skill stagnation of educational attainment increases the vulnerability of individuals at the bottom end of the skill distribution who are unable to benefit from economic growth. Carneiro and Heckman (2003) interpret these findings as evidence that there is a large increase in the demand for skill and supply is not keeping up with demand. Even in the countries where educational attainment has not reached a halt the earnings and employment returns to schooling are rising rapidly.

Figure 2: **Unemployment rate versus earnings dispersion, after controlling for year and country effects**

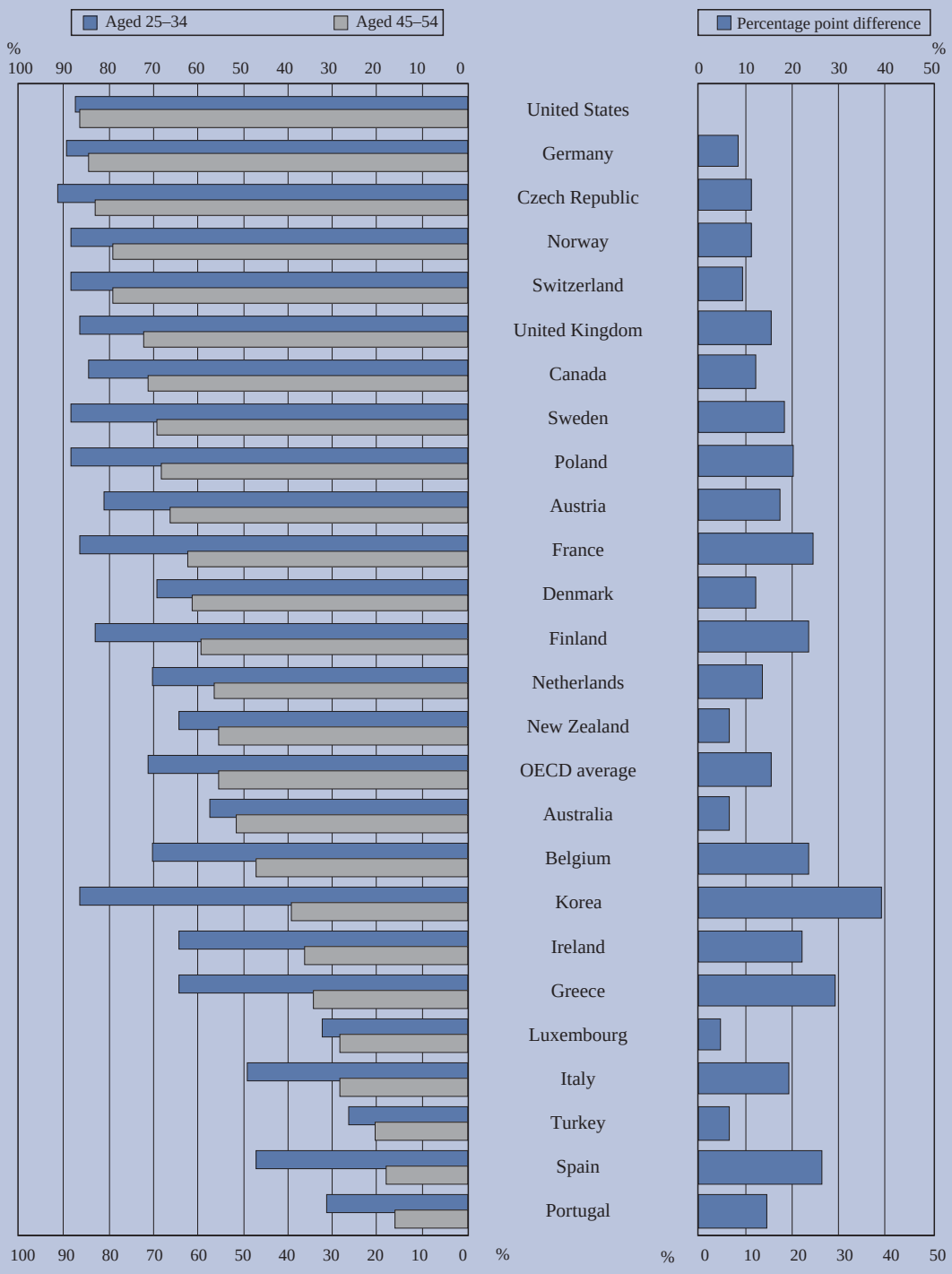


NB: For first figure, vertical axis: unemployment rate (as in Figure 6) after removing country and year effects; horizontal axis: earnings dispersion in the low portion of their distribution (as in Figure 6) after removing country and year effects. Data points are plotted along with OLS unweighted regression line.
NB: For the second figure, vertical axis: unemployment rate, OECD Economic Outlook definitions; horizontal axis: earnings dispersion in the low portion of their distribution, from OECD 'Trends in earnings dispersion' file. Data points are plotted along with OLS unweighted regression line.
Source: OECD (2004).

Figure 3 also shows that there is an enormous degree of heterogeneity in educational attainment across countries. In an attempt to get a better picture of differences in student quality and labour force quality across OECD countries (and a few others) a set of literacy tests has been developed and administered to adolescents and adults across countries. Education systems can differ across different countries and these comparable tests may provide a better measure of the stock of skills of a country, at least for the purpose of international comparisons ([1]). Hanushek and Kimko (2001) use these tests as a measure

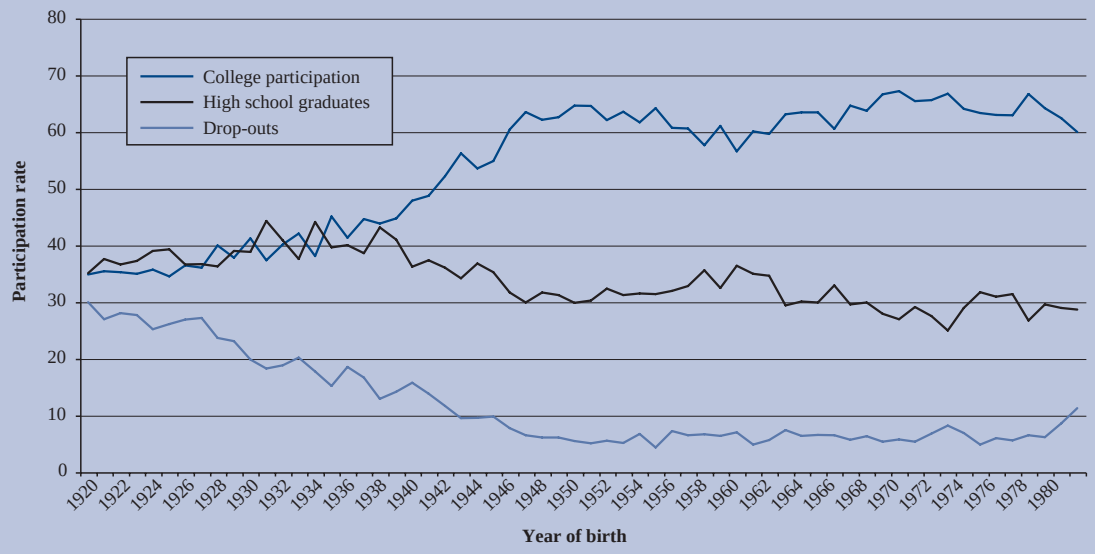
([1]) Furthermore, such tests can be used as a measure of quality of the educational system, although one needs to make sure these tests are adequately designed to be comparable in every country. Hanushek and Kimko (2001) have written extensively on issues on school quality. For example, they illustrate how in the USA there has been no aggregate growth in test scores at the same time that there has been a dramatic growth in school expenditure.

Figure 3: **Percentage of younger (25–34-year-olds) and older adults (45–54) with upper secondary education or higher, 1995**



Countries are ranked by percentage of 45–54-year-olds with upper secondary attainment or higher.
Source: Labour force survey data (see OECD, 1997b).

Figure 4: **Schooling participation rates by year of birth — Whites**

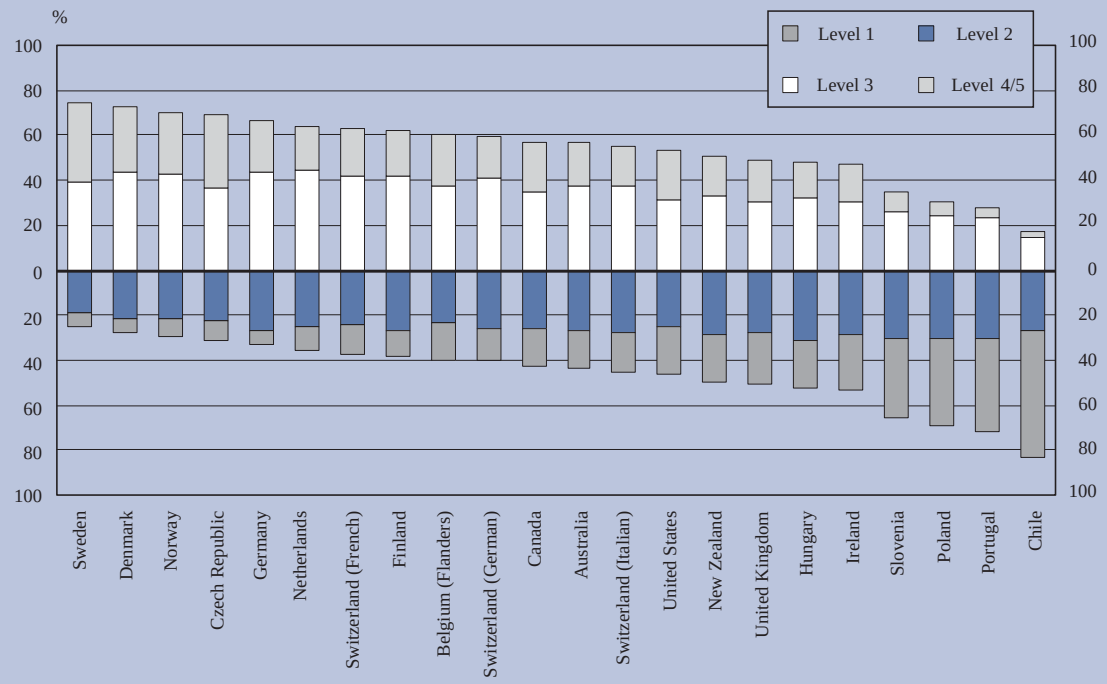


Source: OECD (2004).

of the quality of the labour force and argue that these are an important determinant of economic growth. Figure 5, from OECD (2000), shows the percentage of adults in different quantitative literacy levels in different countries. These results can be replicated for other types of literacy, as measured by the international adult literacy survey. In more than half of the countries shown in this figure, 40 % or more of their labour force scores in the bottom two levels of literacy. Figure 6 shows that there is a large gap in literacy for individuals in different levels of education. The levels of literacy for individuals with less than secondary schooling in countries such as the USA and Portugal is particularly worrisome. Across countries there is not much difference in the literacy skills of those with a tertiary education. The differences across countries emerge mostly for those who have low educational attainment. This pattern is observed even within a younger cohort of individuals who are 20–25 years of age at the date of this test. The problem of the low-skilled is not less dramatic for this younger cohort. Nickell (2003) documents that the problem of low literacy is not getting much better in the adult population across a variety of countries. In fact, for countries such as the USA and the UK it is getting worse. He also shows that there is a strong association between inequality in literacy scores and inequality in income across countries: the countries with the higher level of literacy inequality, such as the Anglo-Saxon countries and Portugal, also have the highest levels of income inequality.

The problem of the low-skilled in Europe has long been recognised. The European Commission has sponsored the Newskills programme of research which was developed to document and analyse the supply and demand of low-skilled workers in Europe. McIntosh and Steedman (2001) summarise the findings of this project in a report entitled *Low skills: A problem for Europe*, a title I also borrowed for this section. They describe that across countries there has been a steady decrease in the supply of low-skilled workers. At the same time there is also a sharp decrease in the demand for such workers that surpasses the decrease in supply, generating stagnating or falling wages and increased unemployment among the low-skilled (with the exception of Portugal). Their study emphasises two important themes of this paper, which I will develop in the next section. First, the problem of low skills does not consist only of a deficiency in cognitive skills, but also of a deficiency in what they call soft skills. Several skills are important in the labour market and a broader view of what constitutes skill is needed. Second, low-skilled individuals receive little or no amounts of training on the job, either because they opt

Figure 5: **Percentage of population aged 16–65 at each quantitative literacy level, 1994–98**



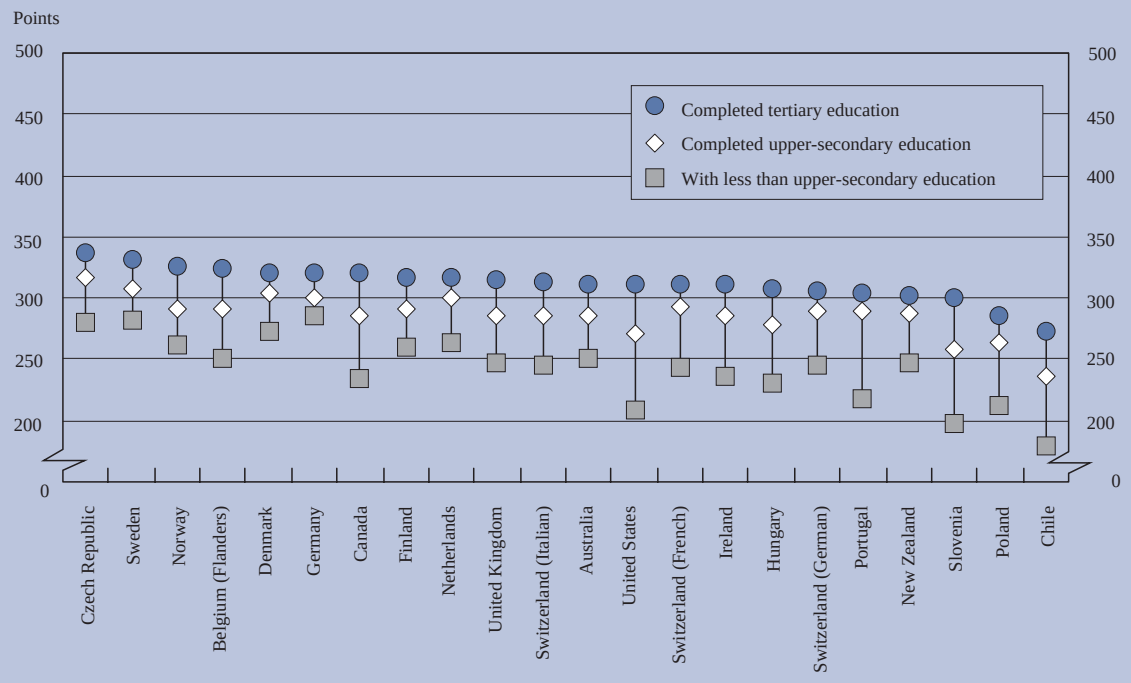
NB: Countries are ranked by the proportion in Levels 3 and 4/5.
Source: International adult literacy survey, 1994–98.

out of it when it is offered to them, or because employers choose to offer training to workers with better skills. This is illustrated in Figure 7, from OECD (2000), which shows the proportion of people at each literacy level who receive job training. As emphasised by Carneiro and Heckman (2003) there are strong complementarities between early human capital investments and adult human capital investments. Low-skilled workers have difficulty in benefiting from adult training because they have a low stock of human capital on which adult investments can build on and be productive. This says that remediation investments in adulthood may be very costly and ineffective for low-skilled individuals. Preventive investments that take place earlier in the life cycle of individuals are bound to generate much larger returns.

The recent increase in inequality and in unemployment in Europe coincides with a rise in social unrest in several dimensions, even at a time of rapid economic growth. The percentage of children living in poverty is well above 10 % for most countries in Europe and North America. There is an upward trend in the incidence of lone parenting. There is a rise in drug-related deaths in the European Union countries, and a general rise in crime victimisation rates in the 1990s (with the exception of Canada and the USA) ([1]). The incidence of poverty and social unrest tends to be more dramatic on the population of the unskilled. Charles Murray (1999) calls attention to the emergence of a UK underclass. This warning is echoed for the rest of Europe by the evidence assembled in this paper. Carneiro (2002) calls for a comprehensive minimum learning platform for all, a set of skills that not only allows each individual to participate fully in the process of economic development, but that also promotes civic behaviour and social stability.

([1]) See OECD (2001).

Figure 6: **Mean quantitative score on a scale with range 0–500 points, by level of educational attainment, population aged 16–65, 1994–98**

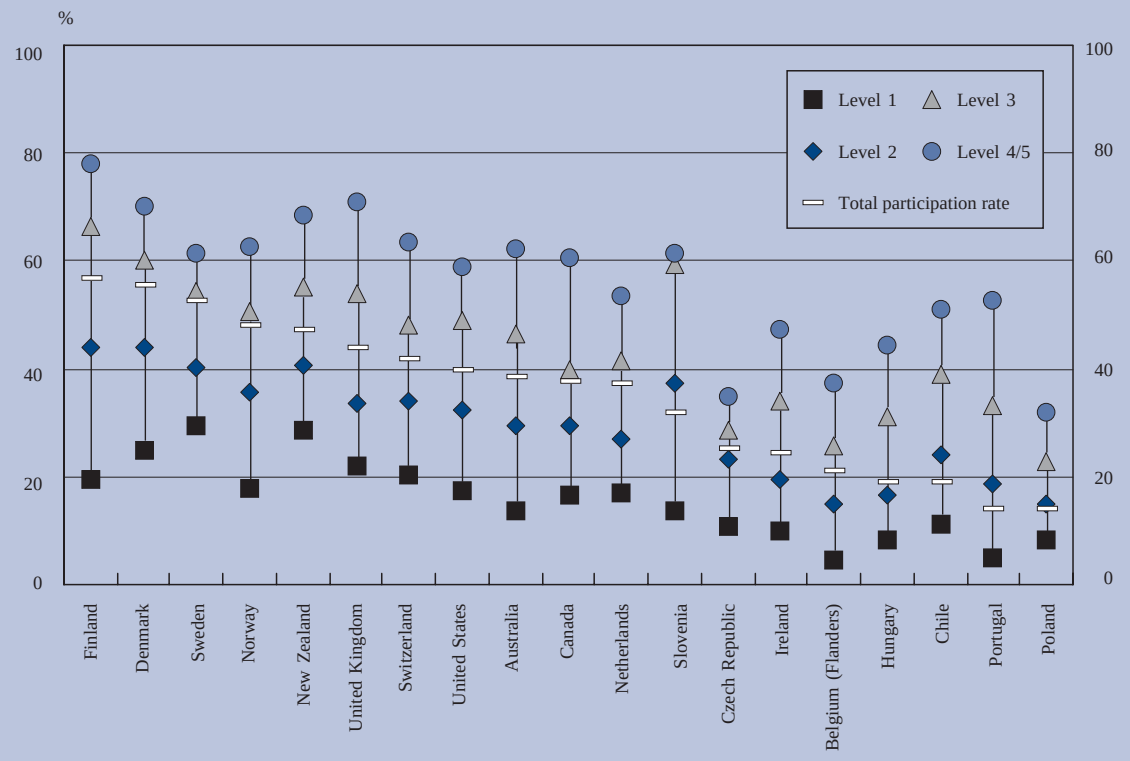


NB: Countries are ranked by the mean score of those who have completed tertiary education.
Source: International adult literacy survey, 1994–98.

I end this introduction with a note on heterogeneity. Anyone who looks at international data realises that there is a large degree of heterogeneity across countries. Europe is no exception. Literacy levels, educational attainment, income inequality and so many other variables are widely different across countries. The recent debate in development economics emphasises that this heterogeneity is very important, and that it is wrong to think of general best practices or policies that will have similar effects across countries. This paper will be concerned with general principles of the process of skill formation but the application of such principles to different countries has to be moderated by each country's set of problems and opportunities. Furthermore, understanding the sources of heterogeneity is likely to lead to important insights for the design of new policies. Similarly, at a more micro level, heterogeneity has been found to be pervasive and important in all aspects of economic life (Heckman, 2001). The recent literature on policy evaluation emphasises that different policies have different effects on different individuals, and that the effectiveness of a policy depends dramatically on the characteristics of the target population. How to account for heterogeneity in policy design and evaluation has to be a major theme in any policy debate, whether this heterogeneity is at the micro or macro level.

In the next Section I summarise recent work by Carneiro and Heckman (2003) on human capital accumulation throughout the life cycle. Although the evidence underlying this work is primarily for the USA, there are important general lessons we can draw on for Europe. Furthermore, similar work is being developed in Europe and part of my own goal with this paper is to begin to assemble similar evidence for European countries. In this section, I will also review the effectiveness of some policies that act on different stages of the life cycle of an individual. The last section of this paper presents a small summary and conclusion.

Figure 7: **Percentage of population aged 16–65 participating in adult education and training during the year preceding the interview at each literacy level and in total, document scale, 1994–98**



NB: Countries are ranked by the total participation rate.
Source: International adult literacy survey, 1994–98.

2. Human capital policy over the life cycle

Carneiro and Heckman (2003) review the evidence on human capital policy over the life cycle. They analyse the effectiveness of different human capital interventions that take place at different ages of an individual's life, and interpret the literature in view of a life cycle model of skill formation. They document that early childhood interventions directed towards disadvantaged children have proven to be successful, although much of their impact is on non-cognitive skills of the treated children. Non-cognitive skills are important not only for future engagement in risky and criminal behaviour, but also for educational attainment and labour market outcomes. Similarly, mentoring programmes directed toward underperforming teenagers and teenage parents have had important effects on their lives primarily through their impact of their non-cognitive skills. More traditional interventions aimed at improving school quality (such as class size reductions or increases in expenditure per pupil) have not been very effective ([1]). The apparent reason for such policy failure is our general lack of knowledge of the relative effectiveness of different inputs in the education production function. One exception is the evidence on the importance of teachers, which has been recognised in the literature for more than 30 years. Teachers are a very important determinant of quality, but it is still not well known what are the characteristics of a teacher that we should look for or that we should promote to raise the quality of our schools. Teacher quality is crucial for a successful educational experience but information about teacher quality is not easily available. Local information on an individual teacher's practices and results (information that is generally unavailable in survey data) is likely to be very relevant for evaluating a teacher's performance, and if that is the case, a decentralised system of school administration and education choice that can better acquire and use such local information is called for. With this in mind, some researchers have advocated more administrative autonomy for schools and more choice for parents, even though the evidence on the effectiveness of either is still weak. A movement in this direction would probably lead to a larger emphasis of the role of market forces in education, which are almost absent in most countries' education systems. Such a movement may lead to better local incentives for teachers and schools and to an increase in private expenditure in education. Figure 8, from OECD (2003), shows that the level of private investment in education is very low compared with the level of public investment, especially at lower levels of education. At a time of tight public budgets, turning to private investment is likely to be an attractive way to increase investment in children.

As shown in the first section of this paper, several individuals reach young adulthood with a serious lack of skills to triumph in the modern labour market. In response to this problem, governments around Europe and the USA have tried to design and implement a set of remediation programmes such as publicly provided job training for the unemployed. Unfortunately, the evidence points to the general ineffectiveness of these remediation investments, with some exceptions.

Carneiro and Heckman (2003) suggest a framework that rationalises this finding: remediation investments that build on a childhood and adolescence where skill formation was neglected may not amount to anything significant, because there is very little to build on. They argue that there are important features of the technology of skill formation that should not be neglected in policy-making. First, human capital accumulation starts in the womb and takes place throughout the whole life. Families, firms and schools are equal partners in the process of skill formation. Second, there are multiple skills and multiple abilities that are relevant for individual success in life. Non-cognitive skills are as important as cognitive

([1]) One important exception has been the 'literacy hour' in England, evaluated by Machin and McNally (2003).

Figure 8: Distribution of public and private expenditure on educational institutions, by level of education (2000)

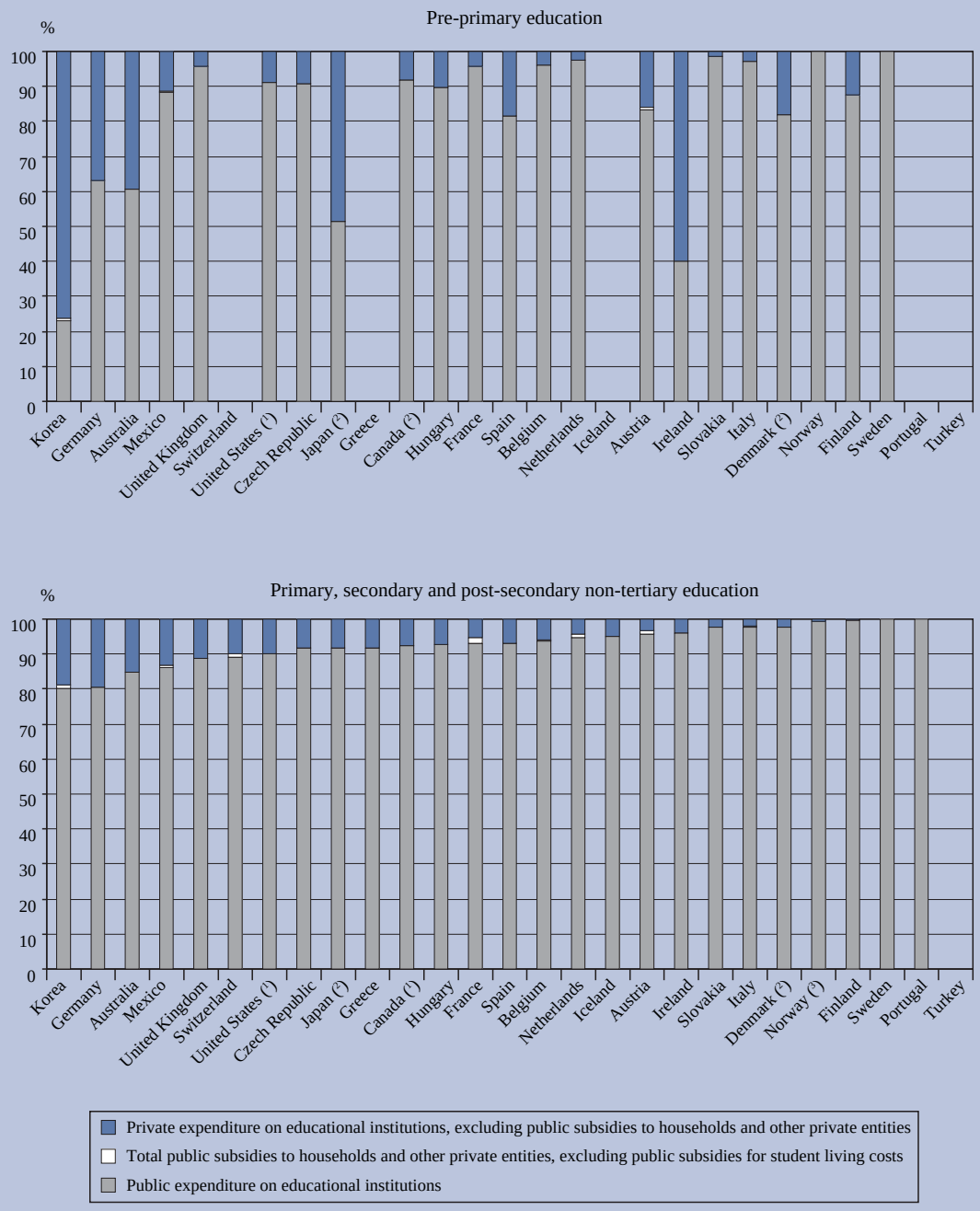


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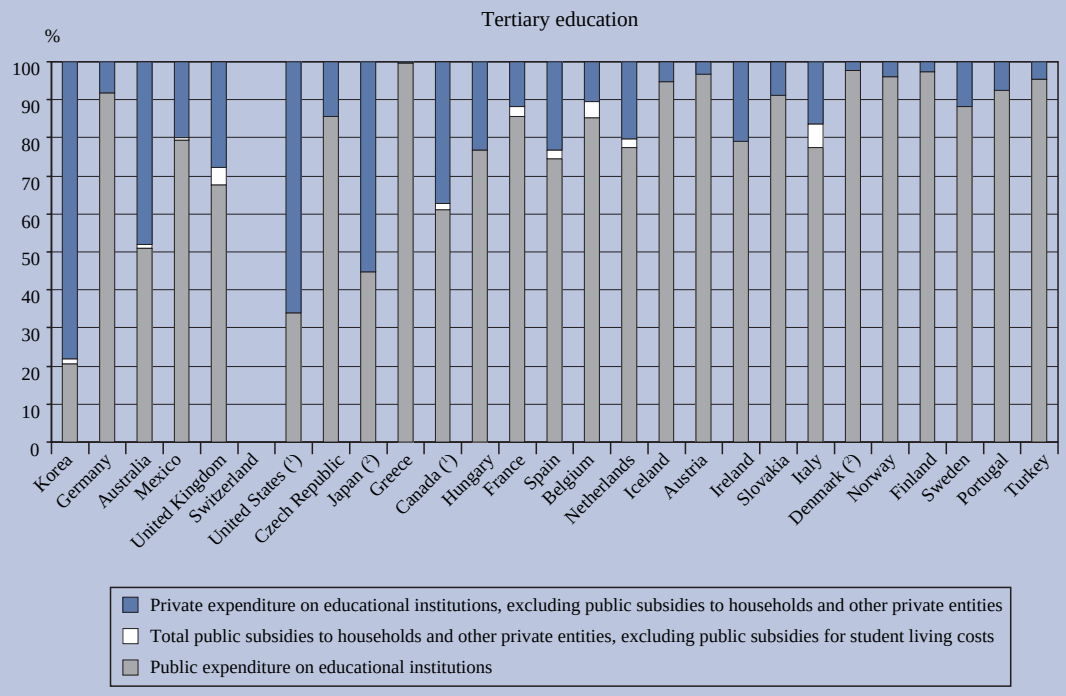
Figure 8 (continued)



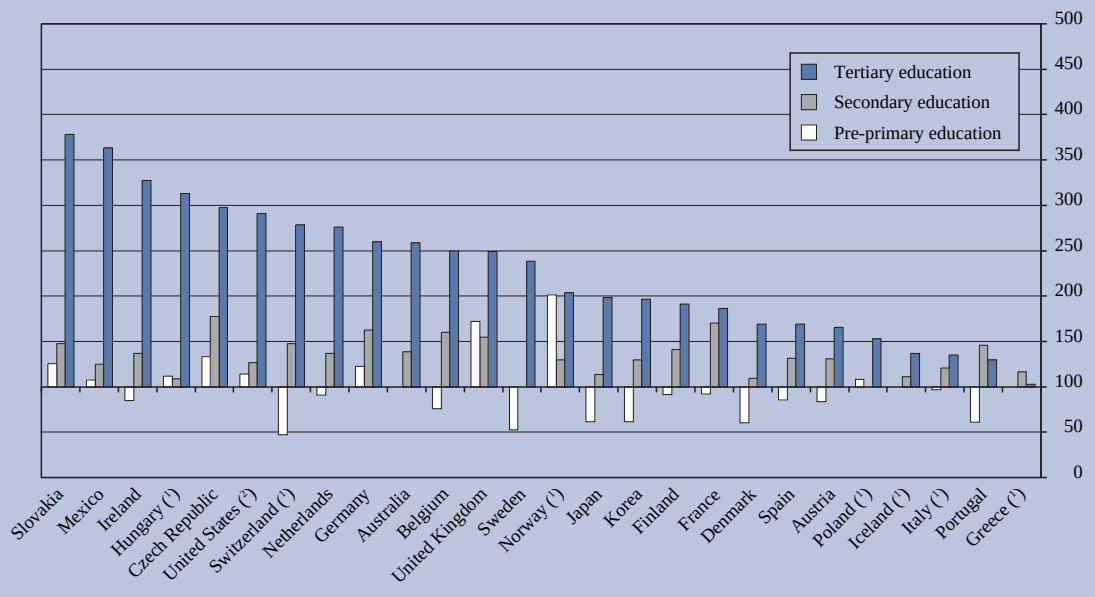
(1) Post-secondary non-tertiary data are included in tertiary education.
(2) Post-secondary non-tertiary data are included in both upper secondary and tertiary education.
(3) Total public subsidies to households data may be included in private payments data.
Countries are ranked in ascending order of the proportion of direct public expenditure in primary, secondary and post-secondary non-tertiary education.
Source: OECD. Table B3.2. See Annex 3 for notes (www.oecd.org/edu/eag2003).

skills, even though they are often neglected in research and policy. Third, these abilities are both inherited and created. The traditional debate about nature vs. nurture is outdated and of little relevance. Finally, they emphasise two main ideas. One is the idea of plasticity. Individuals tend to be more plastic in the earlier years of their lives, although the degree of plasticity varies according to the type of skill. For example, IQ is fairly stable after age eight, while many behavioural skills can be quite plastic through adolescence and adulthood. If plasticity is an important component of the technology of skill formation, a given investment will be more productive if done earlier rather than later in the life cycle, because the capacity to use such an investment is higher earlier in the life cycle rather than later. The other idea they emphasise is that investments in human capital are complementary over time. This implies that the productivity of later investments is higher the larger the amount of early investments. Heckman (2001) summarises this by saying that 'skill begets skill'. As a consequence, it may be very difficult and costly to remediate at later ages the lack of early investments. If individuals do not have a solid base to build on additional investments in them may have very low productivity. However, complementarity also implies that early investments are not productive if they are not followed up by later investments. Equipped with these ideas Carneiro and Heckman (2003) argue for strong early investments and for continuous following investments throughout the lives of individuals.

We end this section with a provocative illustration. Figure 9, from OECD (2003), displays the level of expenditure per student in different levels of schooling relative to expenditure per student at the primary level. We realise that the prices of investment at different ages are very different and even if the quantity invested at different ages is similar, the overall expenditure will be different. Nevertheless, this evidence may be suggestive of the current trends in schooling investments. Across countries, expenditures per student at the university level are much higher than expenditures per student at earlier levels of schooling. In some countries,

expenditures per student at the pre-school level are even lower than expenditures per student at the primary level. There is a lot of heterogeneity across countries. For example, in Norway the level of expenditure per student at the pre-school level is similar to expenditure per student at the tertiary level. In this paper we call for better investments at earlier ages as an effective way to improve the skills of the labour force, especially for individuals at risk of becoming low-skilled. Investments at later ages are also necessary, but a better balanced portfolio of investments may be more productive than the one we have today. Furthermore, the pattern of investments displayed in Figure 9 is highly regressive, since primary and secondary school (where investments per student are small) is usually universal, while tertiary school (where investments per student are high) is generally attended by students coming from richer families. A shift of resources towards earlier ages may lead to a more efficient and more equitable allocation of public education resources.

Figure 9: **Differences in expenditure on educational institutions per student relative to primary education (2000) — Ratio of expenditure on educational institutions per student at various levels of education to expenditure on educational institutions per student in primary education, multiplied by 100**



NB: A ratio of 500 for tertiary education means that expenditure on educational institutions per tertiary student in a particular country is five times the expenditure on educational institutions per primary student.
A ratio of 50 for pre-primary education means that expenditure on educational institutions per pre-primary student in a particular country is half the expenditure on educational institutions per primary student.
(1) Public institutions only.
(2) Public and independent private institutions only.
Countries are ranked in descending order of expenditure on educational institutions per student in tertiary education relative to expenditure on educational institutions per student in primary education.
Source: OECD. Table B1.1. See Annex 3 for notes (www.oecd.org/edu/eag2003).

3. Human capital policy in Europe

Human capital policy is a major concern of every economy in the modern world. In the Lisbon European Council held in March 2000, Heads of State or Government from the EU set a goal for 2010: 'to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion'. Subsequent councils have reinforced these aspirations, and a large emphasis has been put on human capital policy.

There has been much concern with promoting mobility of workers across Europe. Such mobility may be essential for achieving an efficient allocation of human resources across Europe and for the success of economic policy set at the European level. This mobility is impaired by institutional differences and language disparities across countries. There also has been preoccupation with increasing the skill level of the population: both endowing our economies with university educated workers and reducing the ranks of low-skilled workers in Europe, which are still of substantial size. Promoting lifelong learning is seen as important in a setting where information flows and constant change are so prevalent. At the same time, there is an aspiration for an increase in private investments in human capital, by firms and families, and for a better use of public resources. All of these are very valid goals, and they need to be tackled in a consistent and cohesive way. A message of this paper and of the work of Carneiro and Heckman (2003) is that human capital policy involves many different areas of policy (from health policy to education policy, from tax policy to crime prevention) and an integrated view of an individual over the life cycle.

For example, it will not be possible to promote tertiary education or learning on the job if individuals do not get adequate earlier preparation in childhood and adolescence. Young adult education and training builds on top of earlier investments. Firms, families and schools are equal partners in the process of skill formation. To achieve a better use of resources we need better information and common sense suggests that such information is very localised, especially in a world where heterogeneity is so important. Therefore, more school and family autonomy in the allocation of education resources is called for. Skill is in high demand in the modern world. Firm investments are important and account for more than one third of the lifetime human capital acquired by an individual. Investments in skill should be seen as investments in capital, and policies that parallel investment policies through the use of tax credits and other instruments can be (and have been) used by governments to promote investment. These are just a few examples. This paper is very incomplete and what has been achieved is far behind what the title suggests: a human capital strategy for Europe. But it serves as a springboard for future learning.

Above all, there is a fundamental difficulty with writing such a paper, and with thinking of global education strategies for Europe. Europe is composed of very different countries. The data in this paper provide a clear illustration of this heterogeneity, and are only a part of the overall picture. Heterogeneity means that different people react differently to the same policies. Policies need to be designed and implemented at the local level, making use of local information. An integrated vision of Europe is important, and the principles developed in this paper are quite general, but the implementation and design of policies needs to take into account the specificity of each country's problems and opportunities.

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Part V:
Round table discussion

Chapter 11

Learning what works

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An often-overlooked component of good policy design is that of systematic evaluation of effectiveness. Only by careful scrutiny of policies and programmes as they actually operate can we discern whether the original goals and intents of the policy choices are realised. Policy and programme evaluation provide a critical feedback link to policy-makers and programme administrators that cannot be supplied in any other way.

Surprisingly, many policy-leaders in education confuse the availability of information on student academic achievement with evidence about programme or policy effectiveness. There are better measures of student outcomes than ever before, to be sure, but we continue to be adrift in knowing which, if any, of the policy prescriptions are actually responsible for any observed changes in outcomes. If those vital links are absent, there is little chance to accumulate knowledge about how best to direct resources, develop programmes and ultimately improve learning.

This essay describes the role of evaluation in the larger context of policy-making and offers some experience in how — and how not — to adapt current practice to embrace a larger role for evidence on performance.

1. The case for evidence

On its face, a call for regular assessment of policy or programme effectiveness seems unassailable. It makes imminent sense that an element of public policy management would be an even-handed review of all policy choices to assure that impacts were positive and that resources were being appropriately allocated. Yet, modern legislative and ministry practice moves in ways to actively thwart such efforts. More often than not, policies are enacted without giving consideration to the need for evidence about their impacts. Worse, most are implemented in ways that make a rigorous evaluation impossible, because they are adopted universally in a flash-cut manner, eliminating any status-quo alternatives needed to make comparisons. Indeed, the way policies are designed and deployed today creates a form of myopia that prevents any hard looks at how well they do.

There are many reasons why evidence should be a factor in policy decision-making. Many different problems compete for attention and resources. Even if a problem is a priority, there are competing solutions for addressing it. Further, by the time a policy becomes reality, it has been modified and adapted by multiple reviews and revisions, often to the point of bearing little semblance to the original proposal. Solid evidence on performance can illuminate if the final product works well. Simply put, the policies that are put in place are typically just hunches about what we think will work — evaluation puts those hunches to the test.

There are multiple examples to show our hunches are fallible. To illustrate, four policies from the USA are highlighted:

Class size reduction For the past 10 years, its seemed that every politician running for election endorsed the policy of reducing the ratio of students to teachers in public school classes. On its face, the proposal had instant appeal — each student would get more direct contact with his or her teacher, which would lead to improvements in learning. Critics of the policy have been castigated as heretics or child-haters. And yet, the accumulating evidence is that class size reduction is only minimally effective in younger primary grades, does not have lasting effects and is more expensive than other more effective alternatives.

Alternative certification for teachers The prevailing wisdom among educators for years was that teaching was a highly specialised craft that could only be imparted through training programmes run by schools of education. The truth was so self-evident that the practice continued for decades almost without question. Only when supply shortages reached crisis proportions and alternative preparation programmes received rigorous evaluation of their effects did we learn that other methods of teacher preparation can produce equally effective teachers and often at lower cost.

Charter schools An ongoing dispute concerns the efficacy of charter schools, which are public schools that operate under relaxed regulation in exchange for demonstrating higher achievement amongst their students. This policy arena is rife with charges and counter charges, largely based on anecdotal information. Recently, after a decade of operation, rigorous evaluations of charter schools have been completed that have successfully assessed their effectiveness.

Standards and accountability Perhaps the greatest policy shift in US education in the past 50 years is the adoption of academic standards and school accountability policies. With practically no empirical basis, legislation swept through the states and culminated in the adoption by the US Congress of the 'No child left behind act'. Early predictions of the demise of US public education have been dispelled by recent programme and policy analysis that shows that states and schools perform better with accountability than without it.

These cases illustrate the variety of factors that work against the development of sound tests of programme or

policy effectiveness. They include: short planning horizons; overconfidence about the suitability of a particular policy; avoidance of accountability at the level of policy or programme; protection of turf; and unwarranted extrapolation from anecdotal reports.

Despite these typical frailties, better evidence on programme effectiveness can contribute a great deal to the evolution of more refined and more appropriate ways to address social problems. Better information on what works and what doesn't promotes better decisions and greater accountability across all levels of public service.

2. The road to better evidence

Creating better evidence of policy and programme performance takes a considerable effort over a long period of time. Bureaucracies who have succeeded in making rigorous evaluation a regular part of their activities have done so with four common foundations. First, they have struck an important balance in the weight given to evaluations: at the same time that they create a culture of evidence, they avoid the cult of research; that is, they insist that evaluation research be grounded in the day-to-day practical and applied world and not be allowed to become isolated on technocratic grounds. Second, they develop uniform standards of evidence that include minimum quality requirements and clear limits on how far any results can be generalised. Third, they have invested heavily not only in building their capacities to conduct evaluation studies, but also in the parallel management development to fold evidence into the daily fabric of the organisation. Regular consideration of programme effects has become business as usual. And finally, evidence-based organisations are aggressive and impartial about disseminating the results of the policy or programme evaluations they undertake. Their insistence on sharing results holds decision-makers accountable and contributes to the larger body of knowledge about which policies work under which conditions.

Chapter 12

Why do French universities perform so poorly in international league tables?

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The Jiao Tong University of Shanghai recently published a ranking of the top 500 universities in the world ([1]). This table makes sorry reading for French institutions, as the top French institution (Paris 6) sits in a lowly 65th place, and the second (Paris 11) comes 72nd. And that's as good as it gets: there are only two French universities in the top 100, and none at all in the leading 50. Looking at the top 20, we find 16 US universities, 3 UK and 1 Japanese.

This study has been given little coverage in the French media, which is a pity, because France is no stranger to various social movements in the fields of education and research. Most of their demands focus primarily or exclusively on resources, as if that would be enough to get us out of this rut, but in actual fact our problem is structural, and additional resources (an unlikely scenario) will not be enough to change our ranking unless we tackle the other reasons for this disappointing performance.

The Chinese use five criteria to classify universities. The first is the number of Nobel laureates to emerge from the universities. The second relates to the number of highly cited researchers/staff belonging to the university over the period 1981–99. There are 21 subject categories covering the bulk of the scientific disciplines which are usually selected. The third concerns the number of articles published in the world's two most prestigious journals, *Science* and *Nature*, between 2000 and 2002. The fourth counts the number of published articles indexed in the Science Citation Index and the Social Science Citation Index, and the last is a performance indicator, which involves dividing the previous indicators by the number of full-time equivalent academic staff/researchers at the university in question. This partly corrects the problem of the differing sizes of establishments. Each of the five criteria accounts for one fifth of the final mark.

As with any system of indicators or criteria, this ranking is of course open to debate and can be fine-tuned, but it is somewhat less controversial than most, which may well explain the embarrassed silence with which it has been greeted in France.

What then is the structural problem? An examination of the characteristics of the world's top 100 universities reveals that they have six basic features in common: they are home to the best students in the country to which they belong (and if they take in foreign students, these are also amongst the best from their country of origin). Secondly, they tend to attract the best academic staff/researchers in the country, and pay them above-average salaries (this is not always the case, but is the general rule). In addition, they have a significantly higher research potential than non-classified establishments, which is due, as one would expect, to the fourth characteristic — their above-average financial resources. The fifth characteristic is that of their multidisciplinary approach: virtually all the establishments in this group are universities in the original sense of the term, i.e. forums for the coexistence and comparison of knowledge with minimum permeability between one discipline and another, where students are encouraged to diversify as little as possible from their specialist field. This is undoubtedly an advantage for exploring new areas. Finally, these establishments have a relatively large critical mass, hosting between 10 000 and 30 000 students and a sizeable body of permanent academic staff/researchers which generally numbers over 1 000.

Unfortunately, this formula is still unusual in France for two reasons: the first relates to the misguided division between Grandes Ecoles, which attract the best students, and universities, which have to accept all the rest. The second reason is that all universities are treated in more or less the same way, so they all tend to be 'average' and are rarely able to raise themselves to the level of 'excellent'.

	Top 100 universities	French Grandes Ecoles	French universities
Students	A	A	B/C
Staff	A	B	B
Research	A	B	B
Resources	A	A	C
Multidisciplinary	A	C	A
Critical mass	A	C	A

A = excellent
B = average
C = unsatisfactory

We can see that it is very difficult for the French higher education system to be competitive internationally. The universities cannot select the best students, and although they are often multidisciplinary and almost always have the necessary critical mass, they have fewer resources than the world's best 100 universities, and are unable to

([1]) The Chinese study adopts the international definition of universities, which is that of higher education establishments whose two main tasks are to produce knowledge and award qualifications, including doctorates. This obviously includes the French 'Grandes Ecoles'.

form a tight circle which could bring together the best academic staff. The Grandes Ecoles attract the best students, and often have considerable resources per student, but they do not have the critical mass, and are not multidisciplinary. As for research, this is concentrated in around 10 % of the most prestigious establishments, and is relatively underdeveloped in the majority. These are not places which target excellence in research, whereas the criteria adopted by the researchers at the University of Shanghai are essentially of this nature. This explains why the Ecole Polytechnique, of which we are so proud, only comes in somewhere between 250th and 300th. One could argue that it is because of its small size, but even for the indicator on performance by academic staff, the Ecole Polytechnique is ranked no higher than the Université de Bordeaux 1 or Bordeaux 2.

This brings us to the final handicap impeding the French higher education system: given that the students with the greatest potential attend the Grandes Ecoles and it is predominantly the universities which award doctoral degrees, French doctoral students do not come from the most able section of an age group. In fact, if they go to the Grandes Ecoles, French students are less likely to be trained in and through research than if they went to a university. If this training was useless and of no importance, this would show, and we might wonder why other countries should squander such vast resources on this activity. In actual fact, five-year degrees (*Bac*+5) from the Grandes Ecoles give these graduates access to jobs on the labour market which are at least equivalent to those available to doctoral graduates from universities who have followed eight years of study (*Bac*+8). Why then would they do a doctorate? It would make little economic sense. The French elite stands out therefore from the elite in other comparable countries in that it is less likely to have pursued doctoral studies; and this also means that researchers and professors at French universities do not tend to come from the most brilliant section of an age group.

If the French higher education system is to be given some chance of becoming competitive internationally, it is clear that this can only be achieved by combining the advantages of some of the Grandes Ecoles with those of certain universities. This was basically the thrust of the report written by Jacques Attali in 1998 ([1]), which spoke of a 'programme to bring the universities and grandes écoles closer together'. Attali was right, and he thought that a uniform structure at European level, the so-called LMD (licence, master, doctorate) scheme would encourage this convergence. We can now see that harmonisation is proceeding by leaps and bounds, and that all France's universities will have completed these adjustments within the next two years, but it does not appear that the main objective of the Attali report, convergence between the universities and the Grandes Ecoles, is meeting with the same success. In fact, most of the Grandes Ecoles are unenthusiastic, or even opposed to the idea.

A recent report on French higher education, by Aghion and Cohen ([2]), recommends a gradual approach to promoting excellence, by creating an agency invested with substantial public resources which would be awarded to selected universities which had presented the best projects and best opportunities for attaining excellence. One needs to be an optimist to believe that in these times of budgetary stringency, it will be possible to substantially increase public funding (we are talking of a 50 % increase on current resources, or over 10 times the funds which would have had to be released to satisfy 'temporary workers'!). But even if this additional funding could be secured, would we be assured of success? No, because there is no evidence that the best students will stop attending preparatory classes for the Grandes Ecoles, and then attend the Grandes Ecoles themselves. They first of all need to be convinced that excellence can be attained, and the advantages they gain from the current system must disappear. These advantages will not simply disappear by themselves, and if the best students do not take the first steps towards frequenting these future universities of excellence, we might have to wait a long time before these materialise.

The French dream of excellence for all, but they are running a serious risk of achieving excellence for none.

([1]) Jacques Attali (1998), 'Pour un modèle européen d'enseignement supérieur: rapport à M. le ministre de l'éducation nationale, de la recherche et de la technologie', Ministry of National Education, Research and Technology, Paris, 85 pp.

([2]) Aghion, P. and Cohen, E., 2004, 'Education et croissance', *La Documentation Française*, Paris.

Chapter 13

The knowledge economy, human capital and education policy: challenges in a transition country

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1. The message

- While the structure of the economy and job structure can change rapidly, education of the labour force can happen only gradually.

- Among the very diversified job structures of the European regions, the Czech regions have a very high proportion of traditional and technological industries.

- When the economy and the labour market are changing fast and the education of the labour force only slowly, the skill gap widens.

- Growing impact of education on the labour market has greatly increased its role in transition countries.

- In consequence — and also due to education policy measures — the supply of education in the Czech Republic is responding to growing demand; now the focus is on quality.

- Relevance of education, lifelong learning and their relationship to knowledge economy are salient problems of European education policy today, particularly in transition countries.

- European education systems vary greatly in performance, costs and efficiency; the Czech one is reasonably efficient with average outcomes at low cost.

The primary aim of this presentation is to show the specific situation of the Czech Republic as one of the EU's new members, comparing it with old members of the EU. The transformation of the economy and society has widened the skill gap and changed the position of education on the labour market. The demand for education has been thus stimulated, and its supply gradually enhanced. Our main challenge now is to match the increase in quantity by a new quality, opening up the education system to the needs of society and economy.

The secondary aim of the presentation is to stress the importance of soft data in the examination of the role of human capital and education in the knowledge economy. They extend the scope of the analysis and yield more sophisticated results.

Detailed analyses of the situation in the Czech Republic, EU and other OECD countries have been conducted at the Education Policy Centre of the Charles University Prague.

2. Labour market: Industry, occupation and education

While the economy and job structure can change rapidly, the education of the labour force is able to do so only gradually.

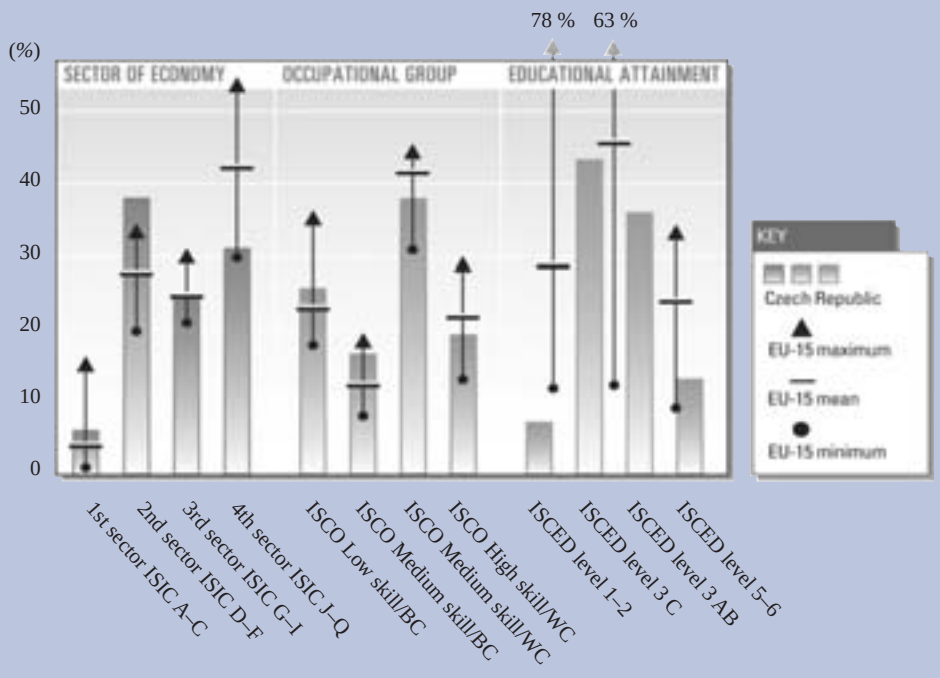
Labour market changes affect education and skill requirements in two ways. Profound structural changes in the economy increase the proportion of high-tech and knowledge industries, produce a higher proportion of high-skill jobs and greater complexity and sophistication of most jobs increase the requirements on employment.

Figure 1 clearly shows the different current position of the Czech Republic as compared with that of 15 member countries of the EU. As for the overall structure of economy (left), traditional manufacturing industry continues to be very strong, stronger than in any other EU country, while the sector of knowledge services is still rather underdeveloped, just over the minimum EU value. A similar, although less pronounced pattern applies to job structure (centre): rather strong medium skill, blue-collar jobs, much weaker high-skill, white-collar jobs. Still, in most cases the Czech Republic is placed reasonably well within the range of EU-15 members.

While changes in job structure have been quite fast, changes in education are comparatively slow, as only about 2.5 % of employment is replaced in a year. Education of employment (right) of the Czech Republic thus reflects the way the education system was formed as well as labour market requirements of the past few decades: extremely low proportion of the labour force with no qualification (one of the traditional merits of the Czech education system), overwhelming proportion of upper secondary level and unsatisfactory proportion of tertiary graduates.

NB: While only one EU value for upper secondary level — ISCED 3 — is indicated, the respective value for the Czech Republic is split, indicated separately for ISCED 3AB (general and technical studies leading to final examination, ‘maturita’) and for ISCED 3C (apprenticeship without ‘maturita’). To compare with the EU value, both partial values for the Czech Republic have to be put together.

Figure 1: **Labour market: Industry, occupation and education in the EU and the Czech Republic, 2002: Jobs by economic sector and by skill level, employment by education**



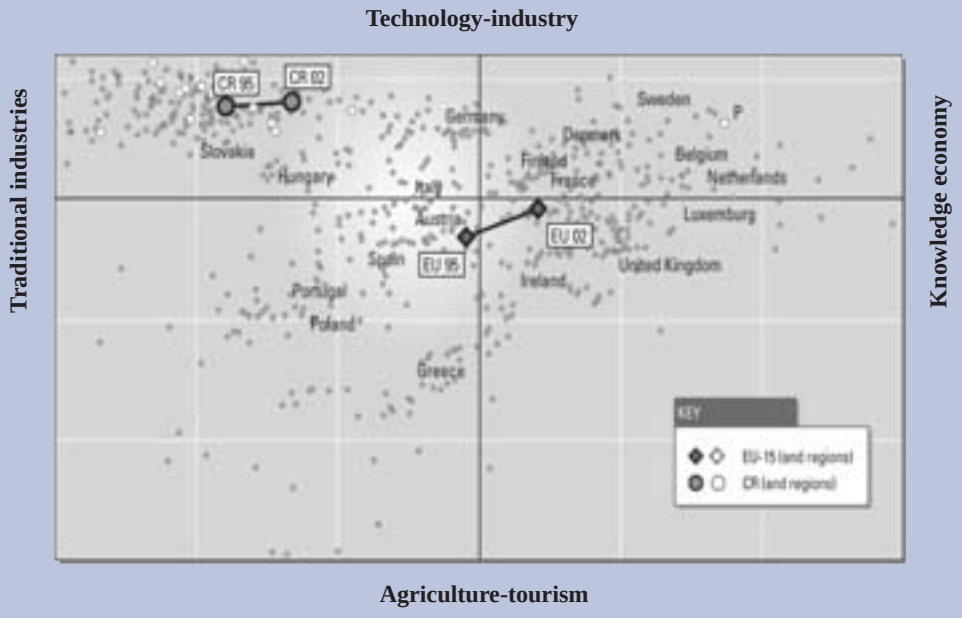
3. Jobs in the economy: Trends and clusters

Among very diversified job structures of European regions, the Czech ones have an overwhelming proportion of traditional and technological industries.

A detailed analysis of job structure (ISCO) and structure of industries (ISIC) in EU countries and regions has extracted two components — represented by the two axes of the diagram — which define the position of each country or region. It is possible to make some conclusions:

- the spread of countries and particularly of regions is quite large with regard to both components;
- Czech regions have a very distinct position with regard to the first component (i.e. a very high proportion of technology-industry);
- with regard to the second component, Czech regions still lag considerably behind most EU regions (with the exception of the capital Prague — indicated as P — which compares to most other EU capitals).

Figure 2: **Jobs in economy: Trends and clusters — the EU and Czech Republic, 1980–2002, regions 2002**



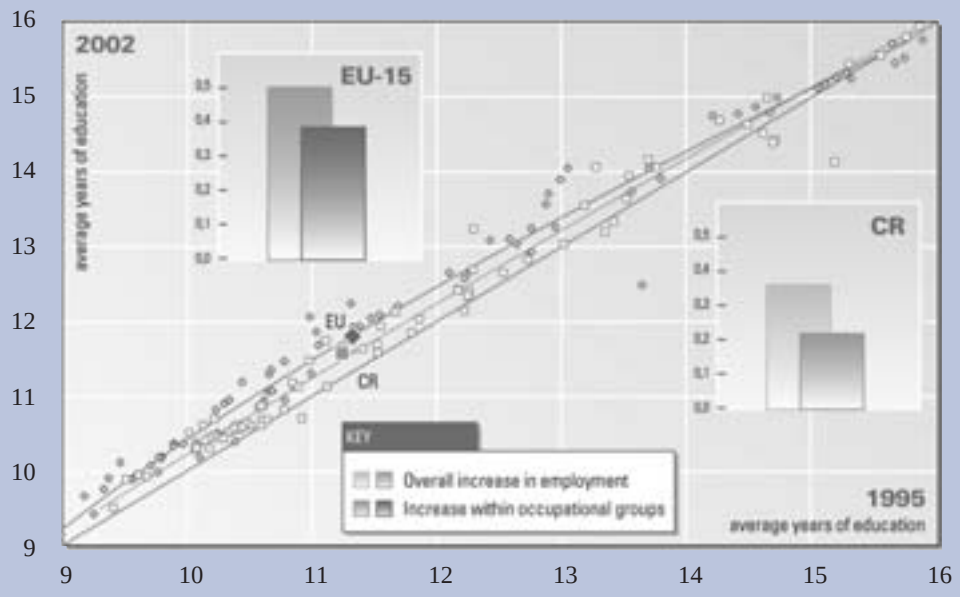
4. Education and occupation: the EU and the Czech Republic, 1995–2002

When the economy and the labour market are changing rapidly and education of the labour force only slowly, the skill gap widens.

The main diagram shows the change in education of employment in 90 occupational groups between 1995 and 2002. Although the increase (expressed in years of education) is larger for the EU than that for the Czech Republic in almost all occupational groups, the overall increase for the Czech Republic is not so much lower than that for the EU. This is due to another factor: the transformation of the Czech economy increases the proportion (and overall weight) of sophisticated, high-tech and high-skill industries, as well as the proportion of high-skill occupations. In consequence the demand for highly-skilled employment has been increasing as well.

The difference between the EU and the Czech Republic is clearly indicated on two small inserted diagrams. In the EU, a larger increase in education of employment is only partially absorbed into structural changes, and is primarily reflected in the skill level of practically all occupation groups. In the Czech Republic, on the other hand, the smaller overall increase in years of education is absorbed mostly into structural changes which play a rather more prominent role than in stable economies. The increase in skill level in respective occupational groups is thus far less pronounced. Both factors — a slower change in education of employment and a more rapid structural change — increase the skill gap.

Figure 3: **Education and occupation: the EU and the Czech Republic, 1995–2002 — Increase in years of education in employment by occupational groups**



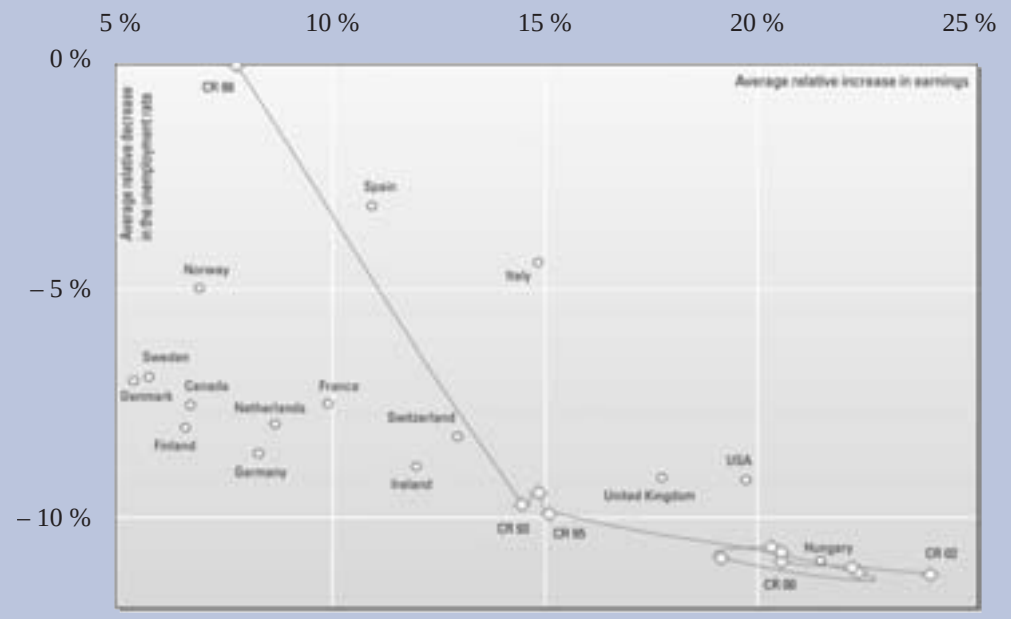
5. Education, earnings and unemployment

The growing impact of education on the labour market has greatly increased its role in transition countries.

As we know, the level of education attained affects positively both earnings and employability. On average, every additional year of education thus increases earnings by a certain percentage and reduces the rate of unemployment. This is a relatively new phenomenon for transition countries, where previously — before introducing the market economy — education had only a limited economic role. The new political, social and economic situation, a rapid structural change and only a very slow change in education of employment, and the resulting skill gap have gradually enhanced the role of education on the labour market.

The diagram shows the current position of EU-15 member countries and the USA, and the change in position of the Czech Republic since 1988. The change has been very dynamic from both points of view, the impact of education is great — greater than in EU member countries and even in the USA — and is widely perceived as such. In consequence the demand for education has increased as well.

Figure 4: **Education, earnings and unemployment — Each additional year of education increases earnings and decreases the unemployment rate**



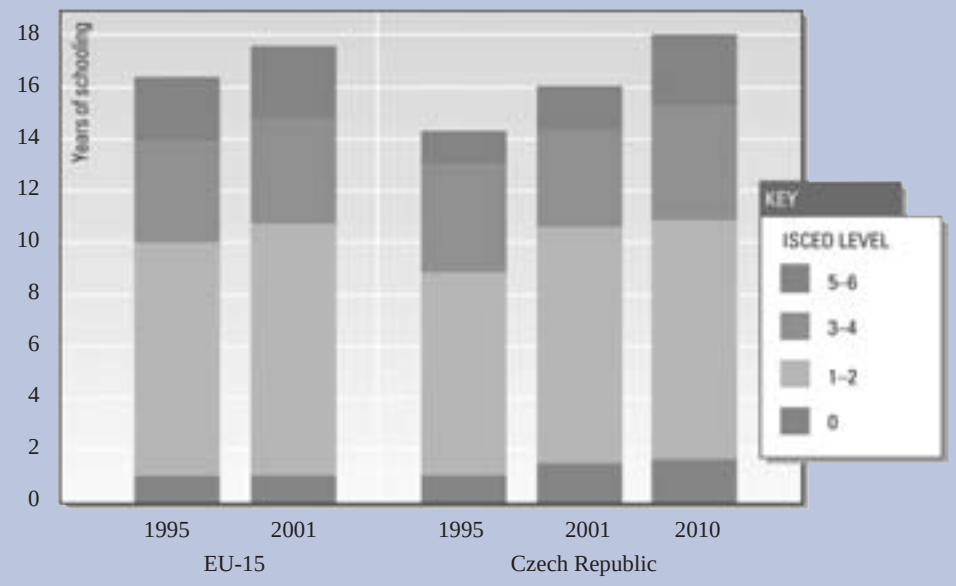
6. School expectancy: the EU and the Czech Republic

In consequence — and also due to education policy measures — the supply of education in the Czech Republic is responding to growing demand; now, the focus is on quality.

School expectancy tells us how many years a person will spend in all stages of schooling. It is one of the most powerful characteristics of an education system since the number of years of schooling determines to a great deal the actual standard of knowledge and skills acquired.

EU countries have considerably increased school expectancy in past decades. In the Czech Republic, on the other hand, the development has been rather complicated. Even reverse trends appeared: in the 1980s the primary level was shortened by a year, and after the political change in the early 1990s participation in pre-school education fell sharply (as indicated in the diagram for 1995). Since then the situation has been steadily improving. Both set-backs have been redressed and important structural and systemic changes have been introduced (as recognition of the right of pupils to choose their educational path, allowing for the establishment of private and denominational schools, formula funding, establishing new types of tertiary institutions outside higher education). The tertiary sector, in particular, has started to expand (in 2004 almost 60 % of the age cohort entered a tertiary institution as compared with 20 % in 1995). This development is even going to accelerate (see the forecast for 2010).

Figure 5: **School expectancy: the EU and the Czech Republic — Expected years of schooling for 5-year-olds**



7. Education and competitiveness

Relevance of education, lifelong learning and their relationship to knowledge economy are salient problems of education policy today, particularly in transition countries.

This diagram is an outcome of a more sophisticated analysis using soft data such as top executive surveys of the relationship between education and economy (world competitiveness yearbook and global competitiveness report). Component analysis extracted two factors — a more traditional one identified as school quality, and a new and more powerful one identified as education–economy link.

The current position of EU-15 members, new members and the USA vis-à-vis them is indicated on the diagram. We are allowed to infer two conclusions. From the traditional point of view of quality per se, the Czech education system is reasonably well placed (the same applies to Hungary as well). On the other hand, the relationship between education and the economy — including the new concept of lifelong learning — is rather weak (as in other transition countries). The main problem for Czech education policy lies no more in increasing quantity, but in achieving a new quality by opening the education system to the requirements of society and the economy and by introducing lifelong learning. It is, however, quite reasonable to assume that once closer links are established, the impact of a quality education system on economy will be strong and may lead to a quantum leap. (*European competitiveness report 2003*, p. 212 — points more or less in the same direction: 'In the long run, based on their stock of human capital, the acceding countries should have a comparative advantage in human capital intensive industries and thus compete mainly with the northern EU-15 members.')

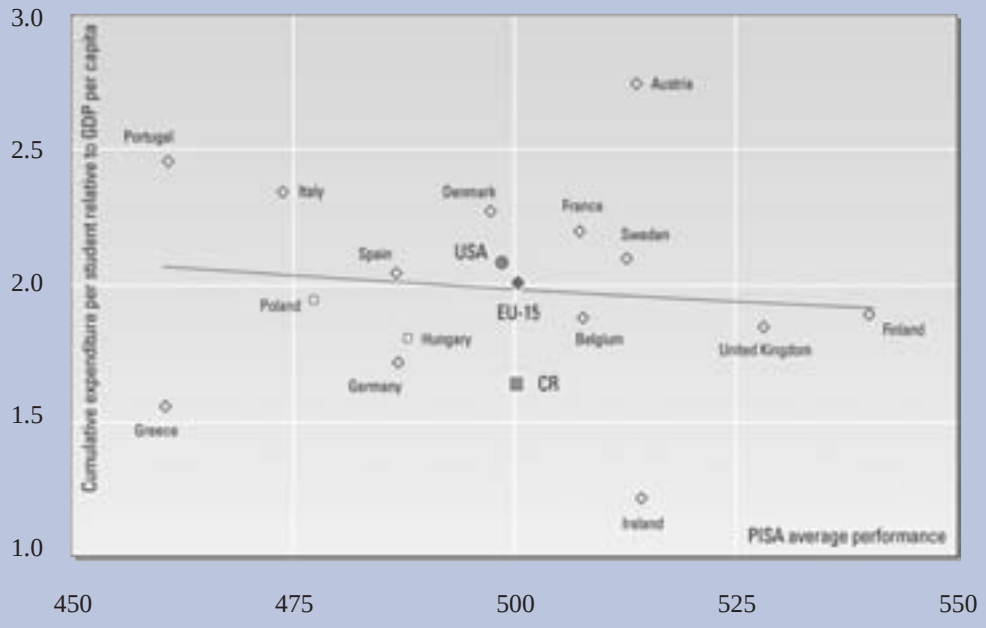
Figure 6: **Education and competitiveness — EU-15, new members and USA, 2003**

8. Student performance and spending per student

European education systems vary a lot in performance, costs and efficiency; the Czech one is reasonably efficient with average outcomes at low cost.

The diagram indicates the relationship between cumulative expenditure per student up to age 15 divided by GDP per capita (thus eliminating the economic level of the country) and PISA average performance across the combined reading, mathematical and scientific literacy scales of 15-year-olds (in 2000). Countries differ enormously in the relative cost per student, in extreme cases it is more than twice as high. The same applies to the efficiency of their education systems, indicated by the distance of the country from the trend line. The Czech education system seems to be reasonably efficient — average performance, low costs.

Figure 7: **PISA, performance and spending per student — EU-15, new members and USA, 2000**



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