European Expert Network on Economics of Education (EENEE)

Skills for Employability, Economic Growth and Innovation: Monitoring the Relevance of Education and Training Systems

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6

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Skills for Employability, Economic Growth and Innovation:

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Analytical Report for the European Commission prepared by the European Expert Network on Economics of Education (EENEE)[1]

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Opinions expressed in this report are those of the authors alone and do not represent the point of view of the European Commission.

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List of Figures:

List of Tables:

Appendices:

1. Introduction

Knowledge and education are first priorities in the Commission's 'EU 2020' Strategy (European Commission 2009a, p. 4). Europe's unemployment problem is almost exclusively concentrated among the low skilled and its relative standing in the world educational standards and attainment rates has decreased. Ways are sought to not just supply more educational opportunities, but to create demand for those skills as well. A country can have the smartest work force in the world, but if most of those workers are unemployed or choose not to work, the benefits for society, as well as the individuals in question, will be limited. (Hofheinz 2009).

As part of the Lisbon Council's reflection on the Lisbon Agenda Post-2010, Paul Hofheinz, president of the Lisbon Council, argues that the new EU 2020 agenda should move more ambitiously to offer education and educational opportunities to all. He calls on EU heads of state and government to stop delegating skills and education policy to cabinet ministers and to take charge of this key policy area themselves. Improving education levels, reducing early school drop out rates and increasing the share of the population with tertiary education was also one of the headline targets the European Council agreed on in March 2010 (European Council 2010).

The concept of employability discussed in this report has already been a component of the Presidency Conclusions of the European Council in March 2000 where the Lisbon agenda was originally launched (see European Council 2000). In this context, the improvement of employability has been considered as part of an active employment policy and should be monitored by aiming for higher employment rates in member states.

In the meantime, several other documents have adopted this term, among them the work programme of Education & Training 2010 (see European Council 2004). By this, employability has found its way into the education and training sector and has been regarded as a goal that could be affected by specific education and training policies.

On the basis of the 2010 work programme an updated strategic framework for European cooperation in education and training has been issued to provide support for Member States' education and training systems up to the year 2020. The already existing indicators and benchmarks that should monitor progress and contribute to evidence-based policy have largely been adopted, but the Council Conclusions of May 2009 (see European Council 2009) now explicitly ask for providing a European benchmark on employability.

The goal of this report is the contribution to the development of indicators on employability in the updated strategic framework for European cooperation in education and training until 2020. Moreover, the following analysis could serve as useful input to the "New Skills for New Jobs" initiative of the Commission which tries to assess the crucial skill needs until 2020. As a network of education economists we focus on different micro- and macroeconomic factors of employability that can be affected by Education & Training (E&T) systems. In the second Section we provide our idea of a concept of employability which serves as a basis for the whole analysis within this report. Based on this concept we begin in Section three by studying the general role of educational quality and quantity in affecting employability. In Section four we examine several sub-dimensions of employability, first from a microeconomic perspective. This analysis of the individual transition from education/training to work – if possible analyzed by different levels of education and field of study – aims to identify the crucial factors leading to successful employability in terms of our interpretation of this concept. We integrate different patterns in EU Member States and include both the transition to work of the youth, but also the individuals who are already part of the labour force. In Section five we change to the macro view and analyze the association between employability and economic growth, channelled by the stock of cognitive skills. Section six gives a short overview on external institutional determinants affecting employability. Based on our evidence, in Section seven we recommend specific, feasible indicators and benchmarks that could be used to monitor the crucial factors of employability until 2020, complemented by information on data that could be used for the monitoring process in Section eight. Section nine concludes.

2. An Economic Concept of Employability

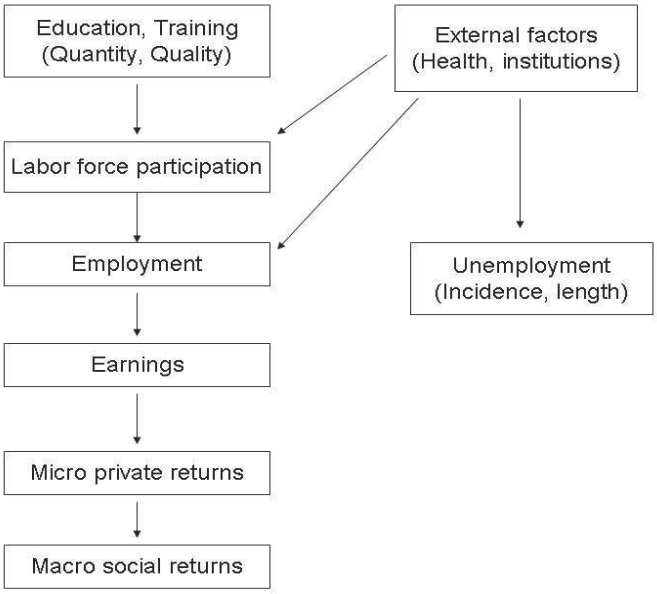
Giving advice on possible indicators and benchmarks on employability requires a definition of this very broad concept. Looking at the Commission Staff Working Document on the Progress towards the Lisbon Objectives in Education and Training from 2008 (see European Commission 2008), employability can be affected by both labour market institutions and also skill and knowledge enhanced by E&T policies. The concept is limited to a "person's capability of gaining employment" (see European Commission 2008, p. 148). This is perhaps the most obvious definition considering the literal sense of the word employability and gives a first impression of the idea of this concept.

Thus, seeking employment or not is a labour supply decision that depends on education or training received, but also on several other factors at the level of the individual (e.g., health state) or the society at large (e.g., labour market institutions facilitating or hindering employment) that could discourage a person entering the labour market for reasons unrelated to education or training received.
Yet, employment can be examined in a much more detailed way integrating aspects like the time needed to get into employment, the skill match when being in work or even contractual differences of the current job. Furthermore, the concept can be subdivided by looking at different groups, for example focusing on young people and their transition from school to work or on people already being part of the workforce who have to be employable under permanently changing labour market conditions. The observed time scope is a further component to be considered: Do we want the people to be employable in the short term or are we pursuing a more sustainable long term view on this concept?

While the criteria mentioned above already present a more nuanced view on the fact of being employed, our network prefers an even broader approach of employability. Estimating returns to education on wages and earnings has always been a key topic in the economics of education and goes to the core of the human capital theory (see for example Psacharopoulos 1994). In the context of the development of indicators on employability this means that the fact of being employed (with all its specific details described above) is only a sub-concept which has – from a pure economic point of view – only a limited meaning in itself. The importance of being employed for many aspects like individual life satisfaction and social cohesion is essential, but it leaves unanswered the question whether the employed workforce has a productive function in the economy measured by individual wages and earnings returns or – from a macro perspective - by economic growth and returns to the society at large. Thus, this aspect should also be addressed when analyzing the determinants of employability.

Figure 1 breaks down the concept of employability into some key analytical dimensions that are amenable to statistical representation and hence can lead to benchmarks. Although this Figure can not completely reflect the whole complexity and interactivity of the concept (for example the Figure contains no time dimension showing that education and training can be attained throughout the life span), it provides a schematic representation of the main forces at work

Figure 1: Analytical dimensions of Employability



3. Human Capital, Education Quantity and Quality

In this Section we study different concepts of measuring human capital which is a key determinant of all employability sub-dimensions discussed later on. The analysis explicitly concentrates on the two sub-concepts of educational quantity and quality

Successful employability – which begins with general participation in the labour force – depends to a great extent on the human capital an individual has developed. There are also several other external dimensions like health or institutions (see also Figure 1) but as we focus on factors of employability coming out of the E&T system, we will discuss the special role of general human capital measures.

Some decades ago it was recognized that human capital is a crucial factor to explain differences in economic development between countries. In the aftermath, several attempts have been made to find the adequate measures for this broad concept. First, different indicators of formal schooling have been included. either as a stock, e.g. the educational attainment of the population or as a flow adding to the stock, e.g. primary or secondary school enrolment rates or the number of graduates (see for example Romer 1990, Barro 1991 or Levine and Renelt 1992). Appendix A.1. and A.2. show a cross-country comparison on different quantity measures of education already indicating considerable differences between

European countries in both educational attainment (appendix A.1.) and enrolment rates (appendix A.2.). However, studies got aware of the shortcomings of this approach as it completely neglected quality issues of schooling. In the next step, school resources like teacher-student ratios have been included as a measure of school quality, but these factors did not seem to account for quality differences (Barro 1991). Instead of using input measures of schooling, researchers concentrated on output performance as measured by cognitive test scores. In many recent studies it becomes clear that cognitive skills by far outperform quantitative measures of schooling in their explanation of economic growth: The inclusion of results from international achievement tests in international growth regressions reveals the effect of years of schooling or educational attainment as less important or even insignificant (see for example Hanushek and Kimko 2000, Coulombe and Tromblay 2006, Woessmann 2002 and 2003 or Hanushek and Woessmann 2008 for an overview).

The most recent compelling evidence on this stems from an analysis of Hanushek and Woessmann (2009) who show a positive relationship between long-run economic growth (as measured by the average annual growth rate of a country between 1960 and 2000) and a country's on-average performance in several international achievements tests. Using several econometric methods, they can even show that this association is causal (see also Section 5). Table 1 gives an overview on country differences in one of the most popular indicators of cognitive skills, i.e. the results of different European countries in the Programme of International Student Assessment (PISA). EU countries exhibit a wide variation in secondary school quality, as measured by achievement in science, reading and mathematics, e.g. Greece scoring 473 in science vs. 563 in Finland.

Table 1: Achievement in science, PISA score

Country	Finland	Netherlands	Germany	UK	Cz. Rep.	Austria	Belgium	Ireland
Score	563	525	516	515	513	511	510	508

Country	Hungary	Sweden	Poland	France	Spain	Norway	Italy	Greece
Score	504	503	498	495	488	487	475	473

Source: Education at a Glance (2009), p. 89

These first insights already corroborate very different patterns in the stock and the flow of human capital in different European countries. The causal influence of cognitive skills on

economic growth, channelled by several sub-dimensions of employability will be explicitly discussed in the macro Section 5.

4. Micro Evidence on different Sub-Dimensions of Employability

In this Section we extend the general analysis from above looking at different sub-dimensions of employability. Having received a given quantity/quality of education (which can be measured by what we discussed in Section 3), several individual outcomes of employability will be affected by this. We begin with an analysis of labour force participation and its determinants, followed by unemployment incidence and duration, job mismatches, earnings/returns and equity. If possible we show evidence of these sub-dimensions by different factors that go beyond educational levels. Apart from showing key-data on selected countries, we also provide evidence from LFS data on all European countries in Tables A.3. and A.4. of the appendix.

Moreover, the statistics presented below are bivariate, i.e. they relate education/training to the various components of employability. This approach is chosen due to the ultimate task of developing benchmarks applicable to a variety of countries. But given that countries differ in many respects other than education and training, such limitation should be taken into account when adopting benchmarks.

4.1. Labour Force Participation

Labour force participation is one indicator of employability. Table 2 gives an overview on average labour force participation on EU 19 average by different levels of education. Labour force participation is defined as the number of 25-64 year-olds in employment as a percentage of the population aged 25 to 64.

Table 2: Labour force participation rate by level of education, EU-19 average (%)

Educational level	Males	Females
Primary or below	58.4	35.9
Lower secondary	70.8	49.0
Upper secondary	82.6	65.4
Post-sec, non-tertiary	84.7	71.6
Tertiary 1st degree	86.3	80.1
Tertiary MA, PhD	89.4	81.9

Source: Education at a Glance 2009, p. 129

The numbers show a clear pattern: there is a neat positive correlation between the level of one's education and labour force participation for both males and females. The highest labour force participation is found for the group of individuals having a Tertiary degree. Table 3 provides an insight into the length of the transition from school-to-work The Table shows the country-average in the time span from leaving initial education/apprenticeship to the age of entry into the first job for young people aged 15-29.

Table 3: Length of school to work transition (in months)

Country	Length of transition
Hungary	47
Greece	40
Finland	36
Italy	36
Portugal	36
Czech Republic	35
Spain	35
Poland	32
Slovak Republic	32
Sweden	25
Denmark	23
Belgium	22
France	22
United Kingdom	22
Netherlands	17
Ireland	16
Austria	14
Luxembourg	14
Germany	10

Source: Education at a Glance 2008, p. 72

It is perhaps suggestive that countries with very well designed apprenticeship systems as a part of initial Vocational Education and Training (i.e. VET programmes which form a considerable part of upper secondary education) like Austria and Germany perform especially well in this indicator. This coincides with the finding that **within** initial VET systems those with a focus on workplace training - compared to more school-based programmes - are probably more promising in terms of transition patterns: Employers can learn about the performance of trainees and apprentices and exclusively observe their characteristics. This information advantage can be exploited to employ the best of them after the programme. For trainees and apprentices this can smooth the transition from school-to-work in terms of lower

search costs and a shorter time-to-first job (see Acemoglu and Pischke 1998, Autor 2001, Field et al. 2009 or Leuven 2005).

In a comparison **between** initial VET programmes and other educational pathways Table 2 shows insightful results: Graduating from tertiary education relates to a higher labour force participation compared to finishing any other upper secondary degree (which includes initial VET education from apprenticeships and other programs) Within tertiary education more academic tracks (ISCED Level 5A and 6) also lead, on EU-average, to higher labour force participation than more vocational tracks (ISCED Level 5B). As already mentioned, the Tables show bivariate correlations. Other confounding factors could still exist and selection into the programmes could drive these results.
However, initial VET has also to be considered in comparison to other educational pathways, particularly to the decision to drop out of school. In this case – which is especially relevant for low achievers – VET provides a possibility to improve employability (see Ryan 2001). A recent study from Latin America shows large employment effects of a short training programme for young disadvantaged adults aged 18-25 (see Attanasio et al. 2009). Although not from Europe, this experimental evidence shows that VET can still help to remediate skill lacks at adolescence for young people from low socioeconomic backgrounds who otherwise would not finish any educational degree.

Regarding training in the workplace (sometimes called continuous VET) there is not much convincing evidence on its effect on labour force participation. Bassanini (2006) shows positive effects on (perceived) job security for employees participating in training in a cross-European study with data from the European Community Household Panel (ECHP). These suggestive results indicate that later remediation of skill lacks is probably not completely in vain, even if early interventions are preferable.

4.2. Unemployment (incidence and duration)

A further sub-indicator of employability is unemployment. Table 4 shows the Number of 25-64 year old who are unemployed as a percentage of the labour force aged 25-64. There is – consistent with what we have shown from labour force participation - a clear negative relationship between the incidence of unemployment and the level of one's education.

Table 4: Unemployment rate by level of education (%)
(EU-27 average)

Educational level	Males	Females
Pre-primary, primary and lower secondary education - levels 0-2 (ISCED 1997)	9	10,8
Upper secondary and post-secondary non-tertiary education - levels 3-4 (ISCED 1997)	5	6,3
Tertiary education - levels 5-6 (ISCED 1997)	3	3,9

Source: Eurostat 2008,

Table 5 shows the OECD average of the proportion of unemployed aged 25-34 years who are long term unemployed (with spells over 6 months). The correlation between unemployment and educational level remains consistent: the more educated are less likely to experience unemployment lasting over six months. Tables A.3. and A.4. show employment rates for people aged 15-24 for the European Union as a whole and almost all member states. Obviously, employment rates for those having only ISCED Levels 3-4 (upper secondary and post-secondary non-tertiary education, Table A.3.) are substantially lower compared to individuals with ISCED Level 5-6 (tertiary education, Table A.4.).

Table 5: Proportion of Long term unemployed (OECD average)

Educational level	Long term unemployed (%)
Below secondary	39
Upper secondary	26
Tertiary	22

Source: Education at a Glance 2009, p. 355

Regarding the relationship between initial and continuous VET programmes versus other educational pathways the results for unemployment coincide with what we have found for labour force participation

4.3. Job Mismatch

Job mismatch is often the result of incomplete information about the abilities of school leavers and the characteristics of jobs offered by employers and also an indicator of employability. We provide an overview on job mismatches by field of study in different European countries. Particularly high incidences of job mismatch for graduates from humanities (with half or more of school leavers working in a job outside their field of

education) are found in nearly every country for which data exist (see Table 6). Relatively lower incidences of job mismatch were observed for engineering graduates, although the proportion of school leavers with a non-matching job was still high in Italy (43%), Greece and Belgium (37% each).

Of course we should bear in mind that an indicator might be normative. For example, the fact that graduates in humanities find a job in another area is not a problem in itself, if employers are hiring and rewarding the skills of humanities' graduates. The problem is when employers do not use the skills produced by education and training.

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Table 6: Job mismatch by field of study (%)

Country	Humanities	Engineering
Denmark	86	26
Netherlands	82	23
Italy	78	43
Greece	73	37
Belgium	67	37
Finland	67	23
Spain	65	26
Sweden	65	24
Austria	64	24
France	62	28
Hungary	58	27
Slovenia	50	23

Source: Eurostat, LFS ad hoc module, 2000

Regarding whole educational institutions and their effect on job/skill mismatch, there is a suggestive picture drawn by Brunello (2008). He plots an indicator of skill mismatch against the degree of stratification in European E&T systems, one group of member states with high stratified systems (Germany, Austria, Belgium, Netherlands), one with a low degree of stratification (including the UK, Sweden, Denmark and Finland) and an intermediate group consisting of the rest of the EU countries. The degree of stratification indicates to what extent E&T systems only provide broader curricula serving for the development of general skills or also emphasize teaching particular skills in specific (vocational) tracks. This variation between E&T systems could be one determinant of the incidence of job/skill mismatches: On the one hand, general skills make people more flexible to technical and organizational developments in labour markets and could facilitate skill matches during periods of ongoing

changes. On the other hand, E&T Systems that focus on teaching special knowledge and skills could facilitate short-term employability and the school-to-work transition.

He finds a weak positive correlation between the incidence of skill mismatches and more general E&T systems (see appendix A.5.). This could be an indication that more stratified systems provide a better match between skill demand and supply as they provide the "right skills" required in labour markets and perhaps improve the transition from school-to-work. Whether this is a causal relationship remains unclear: The correlation is low and the measure for the skill mismatch is quite sketchy. Moreover, variation in training incidence between more stratified and non-stratified systems could compensate for differences in skill matches (see Brunello 2008 and Bassanini et al. 2005). However, the relationship between educational institutions and job/skill mismatches should be further studied to get clearer insights in this correlation.

4.4. Earnings and Returns

As already indicated, our understanding of employability includes more than the pure job opportunities and includes the earning and returns of the employment. Table 7 provides an overview on relative earnings by educational level on OECD average. The numbers indicate that relative earnings increase by educational degree.

Table 7: Relative earnings by level of education (OECD average)
(note: Index base, upper secondary education = 100)

Educational level	Males	Females
Below Upper Secondary	79	75
Upper Secondary	100	100
Post-sec, non-tertiary	108	105
Tertiary 1st degree	123	128
Tertiary MA+	164	162

Source: Education at a Glance 2009, p. 145

Section 3 already indicated that educational quality in terms of cognitive skills is more important than educational levels in explaining earnings. This result from Table 6 does not contrast with the previous findings. It rather shows that there is probably a high correlation between skills and educational levels.

When the extra earnings associated with a higher level of education are related to the costs of obtaining that education (including the student's foregone earnings), a private rate of return to

investment in education is obtained. Table 8 presents comparable OECD estimates of the private returns for an individual obtaining higher education at age 40 in a number of countries. In most countries such returns are well above those of Bank deposits.

Table 8: Private returns to investment in higher education (%)

Country	Cz. Rep,	Portugal	Poland	Hungary	UK	Belgium	Ireland	Switzerland
Private	26.5	22.7	20.7	16.8	14.4	12.7	11.0	10.3
Country	Finland	Spain	Norway	France	Germany	Sweden	Denmark	**Average**
Private	10.0	8.2	8.1	7.9	6.4	4.7	4.3	**12.3**

Source: Education at a Glance 2008, p. 198

Furthermore we try to give some more in-depth insights in the returns to education by looking at different programme types and field of studies. For these very detailed analyses it is difficult to get an overall European picture as there is a lot of missing data. Much information has to be collected from different sources and, thus, it is difficult to provide a conclusive interpretation. The respective Tables *private returns to investment in tertiary education by degree type,* private *returns by university faculty***,** *and returns to higher education by subject* can be found in the appendix A.6. – A.8.

Regarding to VET there is only little evidence on this sub-dimension of employability. Estimates of the returns to training are less abundant than estimates of the returns to education due to several reasons. First, "training" is much more diverse than education. For example, it can refer to a pre-vocational curriculum in the secondary school system, an apprenticeship parallel to or after school leaving, attending a vocational school, a short-cycle non-university degree, or any other experience in adult education. A second reason is that estimating the returns to training is more subject to selectivity bias relative to estimating the returns to general education. This is because in all countries, either by official examinations selection or self-selection (students from low-income families), less able students attend vocational education courses. Third, vocational education exhibits much more length and quality variation than general education.

Within initial VET a comparison between more workplace-based (like apprentices) and more school-based programmes shows no clear results with regard to earnings and returns (see Ryan 2001, p.78). A comparison between initial VET and other educational pathways corroborates the result for the previous sub-dimensions discussed above: More

academic/general education yields higher relative earnings compared to VET programmes on upper secondary or tertiary levels (see Table 7).

Malamud and Pop-Eleches (2008) use a regression discontinuity design to study whether individuals with general education had more success in Romania's transitory labor market than their counterparts who received vocational training. They address the problem of selection bias by analyzing a unique educational reform in Romania which shifted a large proportion of students from vocational training to general education. Hence, they are able to identify an unbiased estimate for the effect of the policy on labor market outcomes and derive the effect of a year of vocational versus general education. They find evidence that men who were affected by the policy were less likely to work as manual workers and craftsmen than their counterparts who were born too early to be affected by the policy. However, apart from the effects on occupational choice, they find no significant difference in labor market participation or earnings between cohorts that were affected and unaffected by the policy, even during the later stages of the transition period.

Fersterer and Winter-Ebmer (2003, Table 2) report that in Austria the wage effect of secondary academic schools over compulsory education (43%) in 1997 was higher than the effect of vocational schools (31%) or apprenticeships (15%). They also find that holding an apprenticeship degree, rather than having an additional year of schooling does not change the returns to education (p. 75, footnote).

Based on a special sample of failed firms in Austria Fersterer, Pischke and Winter-Ebmer (2008, Table 4) find returns to the length of apprenticeship ranging from 2.3 to 5.2%. They conclude that apprenticeship training does not seem to be superior to other forms of school-based education (p. 751). Lechner (2000) evaluates public sector vocational training programs in East Germany and does not identify any positive effects on earnings.

Returns to workplace training (as part of continuing VET) are not as abundant as those for formal education. Cross – country comparisons of private returns to training are difficult. Some comparative perspective can be gained for European countries using the European Community Household Panel, as supplemented by the EU-SILC survey - a dataset explicitly conceived for international comparisons, and focusing on the effects of training incidence.

The impact of training incidence on log hourly earnings range between 3.7 and 21.6 percent, and is higher in the countries with lower incidence, especially Greece and Portugal. Training incidence is defined as a stock variable ranging between 0 and 4. Thus the impact measures the

return to receiving at least one training course in one year of the sample. The estimated returns are generally low and many are statistically different from zero (see appendix A.9.).

Again, bivariate comparisons have to be considered with caution because of selection issues. If, for example, more able students choose the higher-quality workplace-based programs in initial VET or more motivated employees select themselves into training the resulting positive effects of this forms of VET would be overestimated.

As shown in the detailed LFS Annex Tables A.3. and A.4 covering all EU countries, there is no obvious typology regarding education and training development on the one hand, and simple employability indicators on the other. Or, the data are all over the place. This is a finding in itself, i.e. that very different education and training systems are compatible with same employability outcomes. However, a contrast between Romania and other European systems has shown that some of the blame for Romania's disappointing economic performance during the transition period rests with the inflexibility of vocational training (OECD 2000). Under an emerging democratic and competitive market system, the state enterprises have had to adapt to changing demand and new competition. This adaptation has been hindered by a workforce trained in narrow specializations with little ability to adjust to changing skill demand.

Moreover, there is a contrast between the American and European systems of education. Whereas the United States emphasizes formal general education in secondary schools, much of Europe relies on vocational training and apprenticeships to prepare its workforce for the labor market. Goldin (2001, p. 277) notes the essential trade-off between these different approaches: Formal, school based education enabled American youths to change occupations over their lifetimes and to respond rapidly to technological change. Apprenticeships and highly specific training were more cost effective for individuals who expected to spend their lives in the same place and in the same industry and occupation.

5. Macro evidence

Section 3 already mentioned different methods of measuring human capital and indicated the importance of quality-related measures of education, e.g. by using cognitive skills. In this Section we deepen this first insight by showing the importance of cognitive skills for economic growth. Given this robust causal relationship we also discuss several determinants of cognitive skills arising from systemic differences in E&T systems.

5.1. Cognitive Skills, Employability and Economic Growth

In a very recent study Hanushek and Woessmann (2009) combine the country-specific results from several international student achievement tests like PISA or TIMSS from 1964 until 2003 to get one measure of cognitive skills for each country. The causal relationship between this measure and the on-average annual growth rate between 1960 and 2000 of these countries reveals the high relevance of this type of skills throughout several decades and the leading role of quality measures compared to quantitative ones: Key competences in mathematics, science and literacy seem to be timeless predictors of economic growth. The three graphs in appendix A.10. provide a good illustration of that: The first graph shows a positive association between attended years of schooling and economic growth of countries if quality measures are omitted. If the cognitive skill measure is added, there is a positive relationship between economic growth and this factor (see second graph), but the positive association between years of schooling and economic growth almost vanishes (see third graph). From a policy standpoint it's crucial to find out that the association between cognitive skills and economic growth is causal and, thus, not simply driven by other confounding factors. By this policymakers know that improved cognitive achievement directly leads to a higher long-run growth rate and affects the economy as a whole (see Hanushek and Woessmann 2010, p. 18).

How is this linked to the concept of employability? This is due to the channel by which cognitive skills affect economic growth: They have an influence on employability through their role as a proxy for labour-force quality (see for example Hanushek and Kimko 2000). As we identified earnings as one crucial sub-indicator of employability, the literature on the effects of cognitive skills on individual earnings provides a first insight: Most of the studies analyzing the link between cognitive skills and earnings stem from the US and they find a significant positive effect of higher cognitive achievement on later earnings (see for example Murnane et al. 1995, Altonji and Pierret 2001, Hanushek 2002 or Lazear 2003). The few studies from other countries find similar effects (see for example McIntosh and Vignoles 2001 for Great Britain or Green and Graig 2003 for Canada).

The literature focusing on the link between cognitive skills and school continuation/school completion also largely finds positive effects: Students who do better in school – as measured by cognitive achievement – have a higher probability of continuing schooling (see for example Manski and Wise 1983) or high school completion and college continuation (Rivkin 1995). As all these outcome variables are, in turn, supposed to be important factors of

employability (see the whole Section 4), these studies corroborate the role of cognitive skills within this context.

Only few studies directly analyze the effects of cognitive skills on other employability measures like time to first job, skill mismatches or unemployment incidence and duration. Chiswick et al. (2002) show with Australian data a significant positive effect of cognitive skills on labour force participation and lower unemployment rates. Some further evidence stems from the International Adult Literacy Survey that evaluates cognitive skills of the working-age population for several countries in 1994 and 1998. Individuals being part of the labour force have higher cognitive skills than those who are not. The risk of getting unemployed is also by far higher for persons with lower cognitive achievement (see OECD 2002, pp. 62 ff.). These results are also corroborated by the Adult Literacy and Life Skills Study (ALL) which bases on the IALS (see OECD 2005, pp. 105 ff.).

Although it is difficult to exclude all possible confounding factors like the reverse effect of labour market outcomes on cognitive skills[2] or other unobserved determinants correlated with both cognitive skills and labour market outcomes, the robust association between cognitive skills and several measures for employability suggests a causal association.

Given the importance of cognitive skills for employability and the strong causal effect on economic growth resulting from this, a recommendation of indicators and benchmarks on employability requires an assessment of the promising factors within E&T systems that improve cognitive achievement and thereby employability.

5.2. Determinants of Cognitive Skills

The majority of the literature has a sceptical view towards the relevance of school inputs for the development of cognitive skills. After controlling for non-schooling factors that affect both schooling inputs and cognitive skills (like family background, neighbourhood or peers), an extension of resources does mostly not show significant effects: Several studies demonstrate that educational funding in a country is not positively correlated with better cognitive skills (see for example Hanushek 1986, 2002 and 2003, Gundlach et al. 2001, Woessmann 2002, or Leuven et al. 2007), the effects of a reduction of class sizes/increasing the teaching staff are, if anything, very modest and do not justify further educational investments in this field (see Woessmann 2003 or West and Woessmann 2006 for European

[2] This is only a problem when cognitive skills are measured during adulthood like in the IALS or ALL

evidence). Also the use of specific inputs like computers is not promising in yielding higher cognitive skills (see for example Fuchs and Woessmann 2004).

In contrast to these results, there is evidence that certain systemic variables can positively affect cognitive skills of students because they provide incentive schemes - for schools, teachers and students themselves - that enhance achievement. In this context, several components of educational systems can be listed: School autonomy is conducive to a higher stock of cognitive skills. Schools should have more scope to decide on factors like resources, teaching practices or teacher salaries. In combination with an accountability system that guarantees external examination of school quality (for example central external exams), schools will be most successful (see for example Woessmann 2003, 2005, 2006, Hanushek and Raymond 2004, Jacob 2005). A further factor is the provision of school choice: Creating a functioning coexistence between private and public schools – ideally both state-funded - increases competition in the educational system and thereby enhances student achievement as measured by cognitive skills (see for example Hoxby 2003 or West and Woessmann 2010).

PISA allows for an assessment of the correlation between institutional frameworks of the E&T system and cognitive skills. Comparing the average cognitive skills of countries that belong to the worst 10 % concerning the institutional measures (autonomy, accountability and choice) with those being among the best 10 %, show how meaningful effects can be (see appendix A.11.): Going from 5 % staff autonomy in Czech schools to 80 % in Swiss schools accounts for 22 PISA points more (see third bar of the figure). For school choice measures, effects are even higher.

5.3. Related Skill Dimensions

In nearly all studies mentioned in Section 5.1, measures of cognitive skills stem from standardized achievement tests assessing competencies in mathematics, science and/or literacy. The most well-known of these tests that allow for international comparisons are PISA, TIMSS and PIRLS which test children during their time in school[3].

Yet, during periods of rapid technological and organizational changes in workplaces, additional or even other (cognitive) skills could be promising for employability.

[3] In PIRLS in fourth grade, in TIMSS in fourth and eighth grade, in PISA at the age of 15.

Literature shows that the influence of human capital on economic growth is largely channelled by its continuing contribution to R&D and innovation (see for example Romer 1990). Providing Skills that can enhance innovative and entrepreneurial thinking are therefore supposed to be highly demanded in labour markets and improve employability. Several studies mention concrete skills like risk behaviour (see Kihlstrom and Laffont 1979 or Astebro 2003) or networking capacity (Mosey and Wright 2007) to be correlated with innovative behaviour and entrepreneurial engagement.

Furthermore, studies analyzing the effect of technological and organizational change emphasize the importance of being able to handle so called 'non-routine' skills for employability (see Autor 2003 or Spitz-Oener 2006). This literature identifies problem-solving or communication skills as important competencies (see Autor et al. 2003 or Spitz-Oener 2006).

These findings question whether additional indicators and data are required for the monitoring process that go beyond what is measured by the international achievement tests.

Although there is no conclusive answer to what extent these skills coincide with measures of performance in mathematics, science and literacy, there seem to be suggestive correlations between them: The competencies measured in the international achievement tests (especially those in mathematics and science) will also be good predictors for providing innovative and entrepreneurial knowledge (see for example Hanushek and Kimko 2000 for a discussion on that). Dohmen et al (2009) show for example that risk behaviour is highly correlated to tests measuring cognitive ability. In general, the conceptual difference between what is often defined as noncognitive skills (for example risk aversion or communication) and cognitive skills (mathematics, science and literacy) seems to fade away: Cunha and Heckman (2007) emphasize the mutual dependency of these skills and even replace these definitions by only using the term ability. Interestingly, there is also some evidence that entrepreneurial skills are fostered by the same systemic determinants than the "traditional" cognitive skills measured by international achievement tests: Sobel and King (2007) show for the U.S. that the rate of youth entrepreneurship is higher if regions offer school choice programs like educational vouchers. The competitive environment is supposed to create an atmosphere of innovation and risk-taking in these areas (see also Section 5.2 for the general argument).

Apart from that there is evidence that even **within** VET systems – which are normally characterized by the provision of narrow technical, occupation-specific skills - a broader mix

is essential: Several studies show that requirements also change for blue-collar workers: Future craftsmen have to be able to deal with clients, to balance the cash and to get along with their employees. Thus, traditional cognitive skills like mathematics and reading (see Kézdi 2006) but also entrepreneurial and problem-solving competencies (see Autor et al. 2003, Munich 2004 or Lasonen 2005 with Finish evidence) are important.
It is obvious that these crucial skills have also to be assessed by indicators and benchmarks. To what extent this can be done by already existing statistic or new ones, will be discussed in Section 8.

6. External Factors of Employability

Employability is certainly influenced by several factors that *prima fasciae* do not relate to education. Most of them stem from institutional feature of labour markets. One example is the so called "tax wedge", i.e. the gap between the cost of labor to the employer and the employee's take-home pay. The difference between take-home pay and the cost to the employer accounts mainly for social security contributions.

Minimum wages and the strictness of employment laws are a double-edge knife, in the sense that while they are intended to protect labor, in fact they may discourage labor demand, especially for young people. Using cross-country/time-series data from 21 OECD countries over the period 1982-2003 Bassanini and Duval (2006) found that in the "average" OECD country, high and long-lasting unemployment benefits, high tax wedges and stringent anti-competitive product market regulation increase aggregate unemployment. As we focused on determinants of employability that stem from E&T systems, we will not further deepen this analysis. Yet, appendices A.12.–A.15. provide some insightful cross-country evidence on crucial institutional differences within Europe that can affect different employability sub-dimensions.

It should be noticed in the tables on institutional differences (A.12.-A.15.) that the United States has much less labor protection than European countries. And, it also has a lower unemployment rate relative to Europe. Quintini and Manfredi (2009, Table 2) report that it takes 16.9 months on average to find a job after leaving school in Europe, relative to 5.6 months in the United States.

7. Indicators and Benchmarks to monitor Employability

The recommendation of indicators and benchmarks on employability is one central goal of this report. After the assessment of different sub-dimensions of this concept at the micro-level in Section 4 we analyzed the role of cognitive skills and their determinants as key factors of employability and economic growth.

Both parts serve as a basis to recommend specific detailed indicators and benchmarks to monitor employability within European countries.

There already exists a lot of work regarding indicators and benchmarks for monitoring the progress of education and training systems. A February 2007 Communication from the Commission identified 20 such indicators. The May 2007 Education Council adopted 16 of them for monitoring performance (Table 9).

Table 9: EU core indicators for monitoring education and training systems

1. Participation in pre-school education	9. Professional development of teachers and trainers
2. Special needs education	10. Upper secondary completion rates of young people
3. Early school leavers	11. Higher education graduates
4. Literacy in reading, mathematics and science	12. Cross-national mobility of students in higher education
5. Language skills	13. Participation of adults in lifelong learning
6. ICT skills	14. Adult skills
7. Civic skills	15. Educational attainment of the population
8. Learning to learn skills	16. Investment in education and training

Before proposing indicators for monitoring the employability dimension of education and training systems, some analytical remarks can be helpful. Indicators could be classified along the following dimensions:

- **Input vs. output indicators**. Investment in education and training is an input indicator, while adult skills are an output indicator. The difference between the two types of indicators is important because the input indicator is a means towards achieving an objective and not a sufficient condition. For example, resources devoted to education might not necessarily translate to outcomes (Hanushek and Woessmann, 2008 and Section 5.2). This is the reason in this report we abstract from education finance indicators.

- **Stock vs. flow indicators**. The educational attainment of the population is a stock indicator, whereas enrolment in pre-school is a flow indicator. The difference

between these two types of indicators is important because a stock takes decades to be built, whereas a flow indicator might be subject to immediate policy intervention.

- **Early age vs. adult indicators**. Participation in preschool education is an early age indicator, whereas participation of adults in lifelong learning is a late age indicator. Monitoring and acting on early age indicators might be more conducive to promoting employability in the sense that whatever intervention is enacted to affect early age will produce benefits over a longer time period, relative to enacting policies to affect adults. The emphasis on early age is based on the results of recent research by Professor Heckman and his colleagues (Cunha and Heckman 2007).

- **Quantity vs. quality indicators**. The number of graduates of a particular educational level is a quantity indicator. But what if scores of graduates are produced at a quality that deters employers from hiring them?

- **Internal vs. external** to the school/training system indicators. All indicators listed in Table 8 are internal to the education system. But as documented above, institutional factors such as the business environment or the decentralization of school administration are parallel factors that may promote or stall educational development and hence employability.

Moreover, one cannot have too many indicators. Beyond the fact that there is always some overlap between them, (e.g., the number of higher education graduates and the educational attainment of the population or between skills in language, science and mathematics and other key competencies), the monitoring exercise might be diluted and difficult to focus on the most critical contributors or inhibitors of employability.

Table 10 contains a list of ten employability indicators proposed by EENEE. The emphasis is on early age, output, flow and quality indicators. The first indicator does not appear prima facie to relate to education and training. However, EENEE considers it fundamental regarding the employment prospects of graduates of the education and training system because a country's institutions and competitiveness govern the way knowledge is produced and used.

Table 10: New key employability indicators

1. Business environment, such as country competitiveness, strictness of employment protection and time/cost of establishing new business
2. Preschool coverage (number of children in preschool divided by the number of children in the population aged 3-4 for example), especially for low income families/migrants' children
3. Number of hours in the curriculum devoted to vocational subjects, relative to number of hours devoted to general/academic subjects
4. Measures for the degree of autonomy, accountability and choice in European school systems
5. Secondary school achievement in language, science and mathematics as measured in international achievement tests like PISA or TIMMS
6. Achievement in other crucial competencies (risk behaviour, communication skills and the like) at different stages
7. University ranking by faculty, e.g. based on the number of publications, citations, patents
8. Time to first job by education/training level/type
9. Incidence of unemployment of those under age 25 by education/training level/ type
10. Returns to education/training based on relative earnings/costs of young cohorts

Once a set of key indicators is adopted, the question is what benchmarks to set in order to monitor progress. In 2009 new benchmarks were updated to 2020 as follows (European Commission 2009b):

- at least 15 % of adults should participate in lifelong learning
- the share of low-achieving 15-years olds in reading, mathematics and science should be less than 15 %.
- the share of 30-34 year olds with tertiary educational attainment should be at least 40 %.
- the share of early leavers from education and training should be less than 10 %.
- at least 95 % of children between 4 years old and the age for starting compulsory primary education should participate in early childhood education.

One characteristic of the above benchmarks is that they are all numerical, in fact to a round number. These benchmarks were based on a linear extrapolation of the progress observed in the past. It is not clear how these numbers were adopted, probably by reference to the value of an indicator in the best performing countries. Another characteristic is that they refer to a mix of absolute and relative measures.

An example of an **absolute** measure is the percentage of young people who have completed secondary education. An example of a **relative** measure is the decrease of at least 5 percentage points of low-achieving pupils in reading literacy.
The distinction between absolute and relative benchmarks is important because, assuming that a country is low on an absolute measure relative to the rest, what would be the point of imposing on this country an absolute indicator that would never be reached in the next decades? In such case it might make more sense to use a relative indicator, e.g. an increase in the enrolment ratio by 5 percentage points in the next 5 years.

Most of similar EU benchmarks adopted earlier (European Commission 2006) were not reached by 2010. Does this mean that countries under the benchmarks have been doing badly regarding their education and training systems? Not necessarily so if one took into account progress at the margin towards to benchmark. To put it in other words, a country starting from a low position on a given absolute indicator, might really be making good progress towards that indicator if the benchmark were formulated in relative progress terms.

For a first assessment, it can make sense to use the simple absolute benchmarks presented above as they serve as a political tool on European Level.
Nonetheless, the absolute numerical benchmarks for monitoring the employability indicators, listed in Table 9, have their limits. In addition, the following criterion could be adopted:

- **Within-country change of a given indicator over the value of the indicator in the previous year, monitored annually.**

In other words, the yardstick is not set by what other countries are doing, but how well, or not so well, a country is doing in improving an indicator relative to its own starting position.
Of course country listings of how other countries are doing on a given indicator could be used as a red flag regarding underperformers and to call attention in the policy debate, but not for setting targets to specific member states that might never be reached.
In what follows we will provide an overview on different statistics, their drawbacks and limitations that can help to assess the indicators we have recommended.

8. Statistics – Availability and Shortcomings

At first sight, there exists a lot of statistics on the needed indicators. The richest collection might be found in the New Cronos, "Monitoring progress in the "Education and Training 2010" process" (under "Population and social conditions-->Education and training-->Education-->Thematic indicators). There are many printed reports covering various sub-themes of the human capital statistics, e.g., Eurostat's "Key data on Education in Europe", "Lifelong learning in Europe", "Spending on tertiary education in Europe", "Final report of the Task Force on Adult Education Survey" or Eurydice's "Key Data on Education in Europe 2009" (see Eurydice 2009). OECD's "Education as a Glance" also contains many selected relevant indicators.

However, the existing statistics have several limitations (Psacharopoulos 2006). Take for example the most critical variable on the link between education and employment - earnings by level and type of education and training: The income variable is spread out in many overlapping and time-discontinuous surveys. The European Community Household Panel (ECHP) seems to contain the most critical income variables, but it was discontinued in 2001. It was replaced by the Statistics on Income and Living Conditions (EU-SILC), which is a key potential data source for long term monitoring of the transition between E&T and employment.

The general Labour Force Survey (LFS) and its special modules raise a wealth of information. However, one of the most critical indicators – the transition of young people from school to the labour market, is slow to generate results.

Information on participation in education and the public cost of education is raised by means of a Unesco/OECD/Eurostat questionnaire, and a supplementary Eurostat education questionnaire. But answers to these questionnaires are voluntary, and the comprehensiveness of the questionnaires cause many missing entries in the final tables, as well as a three-year gap between the time reference of the statistic and its availability in the database.

Regarding out-of-school training, the Continuing Vocational Training Survey (CVTS) is discontinuous (e.g., available for reference years 1993, 1999, 2005), and misses workers in firms with less than 10 employees.

Statistics on Cognitive Skills:

Information on student cognitive achievement is based on the International Association for the Evaluation of Educational Achievement (which carries out TIMSS and PIRLS) and OECD's Program for International Student Assessment (PISA). These measures are very helpful to monitor cognitive skills although the have some limitations:

- As they are not available on a yearly basis they are probably more adequate to monitor long-term developments of employability.

- There is almost no link of the data from international achievement tests with information about educational achievement or labour market outcomes of the participants. The evidence on the association between cognitive skills and future outcomes discussed in Section 5.1 mainly stems from data where students assessing achievement tests on school, regional or national level were followed until end of school or even into the labour market. There are only few studies in which labour market relevant information exists on students that participated in internationally comparable achievement tests. Only one EU country (Denmark) links PISA performance (in reading) to final educational attainment or labour market outcomes. A very recent study from Switzerland (Bertschy et al. 2009) can observe Swiss PISA 2000 participants in vocational training after secondary school.

- There is no direct assessment of other important skill dimensions that contribute to employability. This could improve the evidence on the interaction between the "classic" cognitive skills like reading, mathematics and science and other competencies (see Section 5.2).

Statistics on adult literacy are spread out between the OECD's discontinued International Adult Education Survey (IALS), the Adult Literacy and Life Skills Survey (ALL) conducted in 2003 and the Program for International Assessment of Adult Competencies (PIAAC) scheduled to be launched in 2010. Although not yet existing, the latter is promising for several reasons. Instead of focusing on students, this study assesses the skills of the adult population and integrates measures for highly demanded competencies like communication ability in addition to math, science and literacy skills (see Section 5.2). PIAAC can give insights in the

development of cognitive skills in periods after entering the labour market (for example during training) and monitor cognitive skills of the unemployed or mismatched workforce. Thus, this study will help to get indicators of cognitive skills on the people already part of the workforce and expand the traditional perspective of employability which focuses on school-to-work transitions.

Statistics on the Institutional Framework:

It is difficult to find useful, continuous information on the institutional framework within which education takes place and yields results. Some useful data on that can be drawn from several sources:

- The more recent PISA studies deliver – apart from test sores - a lot of school-level information on autonomy, accountability and choice in the countries that participate in this study. In terms of autonomy principals give information on whether the respective school can formulate the budget, select teachers for hire or establish teachers' salaries. School choice variables include information on whether the school is publicly or privately operated and how much of the school's funding comes from governmental sources (see Luedemann et al. 2007).

- Eurydice developed a lot of systemic indicators for autonomy, choice and accountability providing a comparison between the 31 countries that participate in the Lifelong Learning programme (2007-2013). It is of course challenging to provide indicators on these systemic variables that can capture the whole variety of educational systems in Europe. Eurydice's measures that classify the European E&T systems by building four or five categories of autonomy, accountability and choice might not fully reflect differences between member states. However, they can in any case provide a rough European overview on key indicators of autonomy, accountability and choice in European E&T systems if they will be assessed also in future.

In general, there are too many "missing" entries in statistical tables, perhaps a result of the comprehensiveness of some of the questionnaires, or the fact that reporting is voluntary. The most critical outcome indicator, the returns to investment in education, is reported only for a

few countries in OECD's *Education at a Glance*. And the methodology on which these rates are computed is not very clear. One conclusion that stems from the above review is that the existing human capital databases are perhaps good for providing historical information on some of the critical variables. However, their coverage and timing leave much to be desired for using them to monitor employability indicators. There is clear need for consolidation, simplification and timeliness.

The following improvements could be considered:

- **School as the starting point.** For example, information on employment and earnings by level and type of education could preferably come from a tracer study of graduates, rather than a household or, much worse, enterprise, survey.

- **Continuity of the same instrument.** Income and labour market information, such as employment status, should come from longitudinal/panel data. Results regarding the employability of recent graduates might be more useful in determining policies than long term manpower forecasts.

- **Additional skill dimensions.** Integrating sociometric elements in international achievement test like measures of risk behaviour or other social competencies would be a reasonable tool to expand the monitoring process on additional labour market relevant outcomes and copes best with the evidence on a considerable correlation between most skill dimensions.

- **Questionnaire streamlining.** Questionnaires could be simpler, asking only for information on variables that will be actually used for policy. (Psacharopoulos 1980, 1995).

- **Timely database availability**. Questionnaire filling should be done on line, e.g. by entering information on a laptop at the household door, or directly into the database at the Ministry level.

- **Reduce legal procedures**. Agreement on the variables and questionnaires should be speeded up.

- **Make compulsory.** Answering the streamlined questionnaires should be made compulsory to countries, as it is now information regarding budget statistics. Eurostat/Unesco filled questionnaires show that many questions are left unanswered by the countries, mainly due to their comprehensives. Fewer targeted questions have a greater chance of being answered.

In order to cover all educational stages, we should, ideally, have panel data that start as early as possible in the life cycle and follow individuals during their working career. EENEE strongly feels that such idea should be promoted.

Tracer studies:

Eurostat's present Labour Force Survey *ad hoc* modules are infrequent and slow to generate results for policy. Also, they do not start from a base of schools. Household Survey Panels do not start from schools. They are not substitutes to the US National Longitudinal Survey of Youth that start from a school base. A tracer study of new graduates by education/training level/type is the tool *par excellence* for monitoring employability (Psacharopoulos and Hinchliffe 1983). These studies start collecting statistics on student background before the student graduates. Then the student is followed up for one or more years.

Tracer study results are more sensitive in determining what new skills are needed, than longer term manpower forecasts. This is because they mirror the labor market situation today, rather than trying to anticipate what it would be 10 years from now.
Moreover, a tracer study is superior to an employer survey because the latter is biased – it includes those who are already employed and excludes the unemployed or non-labour-market participants that are key to this debate. Also, a tracer study generates objective data based on facts. Asking employers generates subjective data.

In Table 11 we provide an overview on how to implement the indicators we recommended in Table 10. For short term studies the respective datasets are mostly at hand and indicated in Table 11. Long term assessments, however, often require special data and modules that still have to be collected. This need is also listed in Table 11.

Table 11: Indicators data bases

Indicator class	Data base	
	Short term	**Long term**
1. Business environment	OECD, World Bank, World Economic Forum	
2. Preschool coverage	Unesco, Eurostat	Special module in household surveys
3. Curriculum emphasis	OECD	Special school survey
4. School autonomy	OECD, PISA	Special Ministries of Education survey
5. School achievement	PISA, TIMSS, PIRLS	PISA extended to 12 and 18 years old, PIAAC
6. Crucial competencies	Non existent	Special surveys by competence
7. University ranking	Shanghai index	Peer assessment
8. Time to first job	Eurostat	Tracer studies
9. Unemployment incidence	Eurostat	Tracer studies
10. Returns to education	Eurostat	Tracer studies

9. Conclusions

The goal of this report was to identify the pivotal determinants and factors of employability related to education and training systems. Such analysis should on the one hand feed into the "New Skills for New Jobs" initiative of the European Commission and contribute to the identification of crucial future skill needs in European labour markets. On the other hand, this is report is a basis for a new set of indicators and benchmarks that aims to monitor the most important sub-dimensions of employability.

After an economic assessment of the concept of employability, general measures of educational quantity and quality were the starting point of our analysis of employability factors: Here, we could already identify considerable performance differences between European countries in the amount of years of schooling and the cognitive skill stock. The bivariate analysis of different sub-dimensions of employability and their determinants revealed educational attainment as one promising factor of success. This result also delivered suggestive insights in the effectiveness of general/academic educational pathways compared to different initial VET programmes on upper secondary or tertiary level. Analyses of employability by field of study or curriculum remain difficult and conclusive, reliable recommendations are still beyond our expertise

The macro Section studied the importance of cognitive skills for employability, economic growth and innovation. This analysis showed that it is rather the right skill mix provided by higher educational attainment which is crucial for employability and for growth. Studying different skill dimensions, we revealed both traditional cognitive skills but also other key competencies as important for employability.

These results lead to a provision of indicators and benchmarks on employability: In our proposition we largely focus on quality indicators rather than quantitative ones and recommended an early monitoring of all employability relevant outcomes. Furthermore, we abstain from advising indicators based on input measures like educational financing and prefer a better assessment of institutional features that are conducive to different determinants of employability. Moreover, we do not want to provide specific numbers and benchmarks to be achieved. Due to very different conditions in member states, benchmarks should be defined on country-level and aim at a relative improvement in the respective indicators.

Although some indicators can already be measured by existing data, much has to be done to improve established data sources and to create new ones that provide further insights in important dimensions. It is hoped that this analysis provides both a consolidated overview on employability determinants of E&T systems and a helpful assessment of useful indicators and benchmarks. By this, further steps towards the achievement of the strategic objectives for the period 2010-2020 can be made.

References

Acemoglu, Daron, Jörn-Steffen Pischke (1998). Why do Firms Train? Theory and Evidence. *Quarterly Journal of Economics* 113 (1): 79-118.

Altonji, Joseph G., Charles R. Pierret (2001). Employer Learning and Statistical Discrimination. *Quarterly Journal of Economics*, 116 (1): 313–50.

Astebro, Thomas (2003). The Returns to Independent Invention: Evidence of Unrealistic Optimism, Risk Seeking or Skewness Loving?, *Economic Journal*, 113, 226-239.

Attanasio, Oracio P., Adriana D. Kugler, Costas Meghir (2009). Subsidizing Vocational Training for Disadvantaged Youth in Developing Countries: Evidence from a Randomized Trial. IZA Discussion Paper No. 4251.

.

Autor, David (2001). Wiring the Labor Market. *Journal of Economic Perspectives* 15 (1): 25-40.

Autor, David H., Frank Levy, Richard J. Murnane (2003). The Skill Content of Recent Technological Change: An Empirical Exploration. *Quarterly Journal of Economics* 118 (4): 1280 – 1333.

Barro, Robert J. (1991). Economic growth in a cross Section of countries. *Quarterly Journal of Economics* 106 (2): 407-443.

Bassanini, Andrea (2006). Training, Wages and Employment Security. *Applied Economics Letters* 13 (8): 523-527.

Bassanini, Andrea, Alison Booth, Giorgio Brunello, Maria de Paola, Edwin Leuven (2005). Workplace Training in Europe. IZA Discussion Paper No. 1640.

Bassanini, Andrea, Romain Duval (2006). Employment Patterns in OECD Countries: Reassessing the Role of Policies and Institutions. OECD, Social, Employment and Migration Working Papers 35.

Bassanini, Andrea, Stefano Scarpetta (2001). The driving forces of economic growth: Panel data evidence from OECD Countries. *OECD Economic Studies* 33: 9-56.

Baumol, William (2004). Education for Innovation: Entrepreneurial Breakthroughs vs. Corporate Incremental Improvements. NBER Working Paper No. 10578

Bertschy, Kathrin, M. Alejandra Cattaneo, Stefan C. Wolter (2009). PISA and the Transition into the Labour Market. *LABOUR: Review of Labour Economics and Industrial Relations* 23: 111-137.

Brunello, Giorgio (2007). The Effects of Training on Employment, Wages and Productivity: a European Perspective. Thematic Review Seminar *Measuring, improving and promoting effects of lifelong learning*, The European Commission DG Employment.

Brunello, Giorgio (2008). General versus specific skills in EU labour markets. Answer to an ad-hoc question of the DG Education and Culture. Unpublished manuscript.

Chiswick, Barry R., Yew Liang Lee, Paul W. Miller (2002). Schooling, Literacy, Numeracy and Labor Market Success: IZA Discussion Paper No. 450.

Coulombe, Serge, Jean-François Tremblay (2006). Literacy and Growth. *Topics in Macroeconomics* 6 (2), article 4.

Cunha, Flavio, James J. Heckman (2007). The Technology of Skill Formation. *American Economic Review* 97 (2): 31-47.

Dohmen, Thomas, Armin Falk, David Huffman and Uwe Sunde (2009): Are Risk Aversion and Impatience Related to Cognitive Ability? Forthcoming in *American Economic Review*.

Education at a Glance (2008). OECD Indicators.

Education at a Glance (2009). OECD Indicators.

European Commission (2006). "Detailed Analysis of progress towards the Lisbon Objectives in education and training: Analysis of Benchmarks and indicators," (Annex). European Commission.

European Commission (2008). Progress towards the Lisbon Objectives in education and training – Indicators and benchmarks. Commission Staff Working Document. http://ec.europa.eu/education/lifelong-learning-policy/doc1522_en.htm.

European Commission (2009a). Consultation on the future 'EU 2020' strategy. Commission Working Document COM 647/3.

European Commission (2009b). Progress towards the Lisbon objectives in education and training. Commission Staff Working Paper 1616.

European Council (2000). Presidency Conclusions, Lisbon European Council 23 and 24 March 2000. http://www.europarl.europa.eu/summits/lis1_en.htm#top

European Council (2004). Education and Training 2010. The Success of the Lisbon Strategy hinges on urgent Reforms. Joint interim report of the Council and the Commission on the implementation of the detailed work programme on the follow-up of the objectives of education and training systems in Europe. http://ec.europa.eu/education/policies/2010/doc/jir_council_final.pdf.

European Council (2009). Notices From European Union Institutions And Bodies. Council conclusions of 12 May 2009 on a strategic framework for European cooperation in education and training ('ET 2020'). Official Journal of the European Union 28 May 2009.

European Council (2010). Conclusions, European Council 25 and 26 March 2010. http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/113591.pdf

Eurostat (2008). Unemployment rates by sex, age groups and highest level of education attained (%)
http://epp.eurostat.ec.europa.eu/portal/page/portal/employment_unemployment_lfs/data/database

Eurostat (2009). Statistical Yearbook.

Eurydice (2009). Key Data on Education in Europe 2009. European Commission.

Fersterer, Josef, Jörn-Steffen Pischke, Rudolf Winter-Ebmer (2008). Returns to Apprenticeship Training in Austria: Evidence from Failed Firms. *Scandinavian Journal of Economics* 110 (4): 733–753.

Fersterer, Josef, Rudolf Winter-Ebmer (2003). Are Austrian returns to education falling over time? *Labour Economics* 10: 73–89.

Field, Simon, Kathrin Hoeckel, Viktória Kis, Małgorzata Kuczera (2009). Learning for Jobs. OECD Policy Review of Vocational Education and Training. http://www.oecd.org/document/42/0,3343,en_2649_39263238_40344106_1_1_1_1,00.html

Fuchs, Thomas, Ludger Woessmann (2004). Computers and Student Learning: Bivariate and Multivariate Evidence on the Availability and Use of Computers at Home and at School. *Brussels Economic Review* 47 (3/4): 359-385.

Goldin, Claudia (2001). The Human-Capital Century and American Leadership: Virtues of the Past. *Journal of Economic History* 61 (2): 263-292.

Green, David A., W. Craig Riddell (2003). Literacy and Earnings: An Investigation of the Interaction of Cognitive and Unobserved Skills in Earnings Generation. *Labour Economics* 10 (2): 165–84.

Gundlach, Erich, Ludger Woessmann, Jens Gmelin (2001). The Decline of Schooling Productivity in OECD Countries. *Economic Journal* 111 (471): C135-C147.

Hanushek, Eric A. (1986). The Economics of Schooling: Production and Efficiency in Public Schools. *Journal of Economic Literature* 24 (3): 1141-1177.

Hanushek, Eric A. (2002). Publicly Provided Education. In: Alan J. Auerbach, Martin Feldstein, Handbook of Public Economics, Volume 4. Amsterdam, London and New York: Elsevier Science, North-Holland.

Hanushek, Eric A. (2003). The Failure of Input-Based Schooling Policies. *Economic Journal* 113 (485): F64-F98.

Hanushek, Eric A., Dennis D. Kimko (2000). Schooling, labor force quality, and the growth of nations. *American Economic Review* 90 (5): 1184-1208.

Hanushek, Eric A., Margret E. Raymond (2004). The Effect of School Accountability Systems on the Level and Distribution of Student Achievement *Journal of the European Economic Association* 2 (2-3): 406-415.

Hanushek, Eric A., Ludger Woessmann (2008). The Role of Cognitive Skills in Economic Development. *Journal of Economic Literature* 46 (3): 607-668.

Hanushek, Eric A., Ludger Woessmann (2009). Do better schools lead to more growth? NBER, Cambridge, MA, WP 14633, National Bureau of Economic Research.

Hanushek, Eric A., Ludger Wößmann (2010). The High Cost of Low Educational Performance: The Long-Run Economic Impact of Improving PISA Outcomes, Organisation for Economic Co-operation and Development (OECD), Paris. Online available: www.oecd.org/dataoecd/11/28/44417824.pdf.

Hofheinz, Paul (2009). EU 2020: "Why skills are key for Europe's future". The Lisbon Council. http://www.lisboncouncil.net/news-a-events/147-skillseuropesfuture.html

Hoxby, Caroline M. (2003). School Choice and School Competition: Evidence from the United States. Swedish Economic Policy Review 10 (3): 9-65.

Jacob, Brian A. (2005). Accountability, Incentives and Behavior: The Impact of High-stakes Testing in the Chicago Public Schools. *Journal of Public Economics* 89 (5-6): 761-796.

Kihlstrom, Richard E., Jean-Jaques Laffont (1979), A General Equilibrium Entrepreneurial Theory of Firm Formation based on Risk Aversion. *Journal of Political Economy* 87 (4): 719-748.

Kézdi, Gábor (2006). Not Only Transition: The Reasons For Declining Returns To Vocational Education, CERGE-EI.

Lasonen, Johanna (2005). Workplace as Learning Environments: Assessments by Young People after Transition from School to Work, *www.bwpat.de/7eu* .

Lazear, Edward P. (2003). Teacher Incentives. *Swedish Economic Policy Review* 10 (3): 179–214.

Lechner, Michael (2000). An Evaluation of Public Sector Sponsored Continuous Vocational Training Programs in East Germany. *Journal of Human Resources* 35 (2): 347-375.

Leuven, Edwin (2005). The Economics of Private Sector Training: A Survey of the Literature. *Journal of Economic Surveys* 19 (1): 91-111.

Leuven, Edwin, Mikael Lindahl, Hessel Oosterbeek, Dinand Webbink (2007). The effect of extra funding for disadvantaged students on achievement. *Review of Economics and Statistics* 89 (4): 721-736.

Levine, Ross, David Renelt (1992). A Sensitivity Analysis of Cross-Country Growth Regressions. *American Economic Review* 82 (4): 942–63.

Luedemann, Elke, Gabriela Schütz, Ludger Woessmann, Martin R. West (2007). School Accountability, Autonomy, Choice and the Level of Student Achievement: International Evidence from PISA 2003. OECD Education Working Paper No. 13.

Malamud, Ofer, Cristian Pop-Eleches (2008). General education vs. vocational training: Evidence from a transition economy. NBER Working Paper 14155.

Manski, Charles F., David A. Wise (1983). College Choice in America. Cambridge and London: Harvard University Press.

Martin, John P. (1998). Education and Economic Performance in the OECD Countries: An Elusive Relationship. *Journal of the Statistical and Social Inquiry Society of Ireland* 27 (5): 99-128.

McIntosh, Steven, Anna Vignoles (2001). Measuring and Assessing the Impact of Basic Skills on Labour Market Outcomes. *Oxford Economic Papers* 53 (3): 453–81.

Mitrakos, Theodore, Panos Tsakloglou, Ioannis Cholezas (2008). Earnings determinants in Greece. Athens: Economics University (in Greek).

Mosey, Simon, Mike Wright (2007). From Human Capital to Social Capital: A Longitudinal Study of Technology-Based Academic Entrepreneurs. *Entrepreneurship Theory and Practice* 31: 909-935.

Munich, Daniel (2004). Estimating the Impact of School Quality, Selection, and Supply on Student's Achievements: Evidence from the Czech Nation-wide Testing of Youth, CERGE-EI CEPR.

Nonneman, Walter, Isabelle Cortens (1997). A note of the rate of return to investment in education in Belgium. *Applied Economics Letters* 4 (3): 167-171.

OECD (2000). Reviews of National Policies for Education: Romania. Paris: OECD.

OECD (2002). Literacy in the Information Age. Final Report on the International Adult Literacy Survey. http://www.oecd.org/dataoecd/24/21/39437980.pdf.

OECD (2004). Employment Outlook.

OECD (2005). Learning a Living. First Results of the Adult Literacy and Life Skills Survey. http://www.oecd.org/dataoecd/44/7/34867438.pdf.

O'Leary, Nigel C., Peter J. Sloane (2005). The Return to a University Education in Great Britain. *National Institute Economic Review* 193 (1): 75-89.

Polanec, Sašo, Ales Ahcan (2007). Evolution of returns to tertiary education during transition: Evidence for Slovenia. Paper presented at the Conference on Efficiency and Equity of Higher Education, Portoroz, Slovenia November 2007.

Psacharopoulos, George (1980). Questionnaire Surveys in Educational Planning. *Comparative Education* 16 (2) 159-69.

Psacharopoulos, George (1994). Returns to Investment in Education: A Global Update. *World Development* 22 (9): 1325–1343.

Psacharopoulos, George (1995). Tracking the Performance of Education Programs: Evaluation Indicators. *New Directions for Program Evaluation* 67: 93-104.

Psacharopoulos, George, Keith Hinchliffe (1983). Tracer Study Guidelines. Washington, DC: The World Bank, Education Department, 1983.

Psacharopoulos, George, Harry A. Patrinos (2004). Returns to investment in education: A further update. *Education Economics* 12 (2): 111-134.

Psacharopoulos, George (2006). The Value of Investment in Education: Theory, Evidence and Policy. *Journal of Education Finance* 32 (2): 113-136.

Quintini, Glenda, Thomas Manfredi (2009). Going Separate Ways? School-to-Work Transitions in the United States and Europe. OECD Social, Employment and Migration Working Papers No. 90, OECD.

Quintini Glenda, Sébastien Martin (2006). Starting Well or Losing their way? The Position of Youth in the Labour Market in OECD countries: DELSA Working Paper No. 39, OECD, Paris.

Rivkin, Steven G. (1995). Black/White Differences in Schooling and Employment. *Journal of Human Resources* 30 (4): 826–52.

Romer, Paul (1990). Endogenous technological change. *Journal of Political Economy* 99 (5): 71-102.

Ryan, Paul (2001). The School-to-Work Transition: A Cross-National Perspective. *Journal of Economic Literature* 39 (1): 34-92.

Sobel, Russel S., Kerry A. King (2008): Does school choice increase the rate of youth entrepreneurship. *Economics of Education Review* 27: 429-438.

Spitz-Oener, Alexandra (2006). Technical Change, Job Tasks and Rising Educational Demands. *Journal of Labor Economics* 24 (2): 235-270.

The World Bank. Doing Business. http://www.doingbusiness.org/CustomQuery/.

Wilson, Robert A. (1983). Rates of return: Some further results. *Scottish Journal of Political Economy* 30 (2): 114-127.

West, Martin R., Ludger Woessmann (2006). Class-Size Effects in School Systems Around the World: Evidence from Between-Grade Variation in TIMMS. CESifo Working Paper 2332.

West, Martin R., Ludger Woessmann (2010). Every Catholic Child in a Catholic School: Historical Resistance to State Schooling, Contemporary Private Competition, and Student Achievement across Countries. *Economic Journal,* forthcoming.

Woessmann, Ludger (2002). Schooling and the Quality of Human Capital. Kiel Studies 319, Berlin: Springer.

Woessmann, Ludger (2003). Schooling Resources, Educational Institutions, and Student Performance: The International Evidence. *Oxford Bulletin of Economics and Statistics* 65 (2): 117-170.

Woessmann, Ludger (2005). The Effect Heterogeneity of Central Exams: Evidence from TIMSS, TIMSS-Repeat and PISA. *Education Economics* 13 (2): 143-169.

A.1. Table: Educational attainment of the population (%)

Country	Lower secondary -	Upper secondary	Tertiary
Finland	20	44	37
Germany	16	53	34
Norway	21	41	34
Belgium	32	34	33
Denmark	23	45	33
Ireland	32	25	32
Sweden	16	47	32
UK	14	55	32
Iceland	31	32	30
Netherlands	27	39	29
Spain	49	22	28
France	31	42	27
Luxembourg	27	43	27
Greece	37	32	22
Poland	14	61	19
Austria	18	54	17
Hungary	20	61	17
Czech Rep.	9	76	14
Italy	47	38	14
Portugal	72	13	14
Slovak Rep.	13	73	14
EU-19	**29**	**46**	**24**

Source: Based on Education at a Glance 2009, p. 37

A.2. Table: Enrolment ratios by level of education (%)

Country	Primary	Lower secondary	Upper secondary and post-sec non-tertiary	Tertiary
Greece	31.6	16.6	19.8	32.0
Slovenia	23.2	19.3	29.1	28.5
Latvia	16.7	31.8	23.8	27.8
Lithuania	19.2	39.2	16.2	25.4
Poland	30	18.6	26.6	24.8
Finland	29.9	16.4	29	24.8
Estonia	28.6	21.3	25.6	24.5
Spain	35.2	26.3	14.8	23.8
Hungary	21.3	24.5	31.8	22.5
Romania	24.5	25.1	28.6	21.8
Italy	29.7	19.1	29.8	21.4
Bulgaria	22.9	25.2	31.5	20.4
Sweden	33	20.1	26.7	20.2
Denmark	36.4	20.6	22.9	20.0
Portugal	40.4	21.1	18.8	19.7
United Kingdom	35.5	17.9	28.2	18.3
Slovakia	21.6	31.7	28.5	18.2
Czech Republic	25.3	26.1	30.5	18.0
Ireland	44.6	17.1	20.4	18.0
France	32.9	26.7	22.4	17.9
Netherlands	38.5	23.7	20.3	17.5
Austria	24.2	26.8	31.8	17.2
Belgium	30.4	18	35.2	16.4
Germany	23.1	36.7	23.7	15.9
Cyprus	40.9	22.3	22.7	14.1
Malta	37.9	35.6	15	11.4
Luxembourg	46	23.7	26.8	3.5
EU-27	**30.4**	**24.4**	**25.1**	**20.0**

Source: Eurostat Statistical Yearbook, 2009, p. 182

A.3. Table: Employment Rates for individuals aged 15-24 with ISCED Level 3-4 (%)

Country/Region	2009 Q01	2009 Q02	2009 Q03
European Union (27 countries)	46.9	47.3	46.7
European Union (25 countries)	47.9	48.4	47.8
European Union (15 countries)	49.4	50.2	49.9
Euro area (15 countries)	46.3	47.4	46.9
Belgium	29.7	33.3	32.6
Bulgaria	45.7	43.8	40.6
Czech Republic	47.8	47.0	44.1
Denmark	73.4 (u)	74.6 (u)	72.7 (u)
Germany (including ex-GDR from 1991)	63.2	62.6	63.2
Estonia	46.0	45.8	42.7
Ireland	49.8	49.4	48.4
Greece	26.1	27.2	27.2
Spain	31.8	30.6	31.5
France	40.4	43.4	42.0
Italy	32.5	33.5	31.8
Cyprus	51.8	49.9	40.2
Latvia	48.7	44.6	40.1
Lithuania	34.6	33.4	29.0
Luxembourg (Grand-Duché)	30.6	42.0	46.4
Hungary	28.1	29.8	29.6
Malta	53.8	48.6	54.1
Netherlands	77.5	78.2	77.7
Austria	69.9	70.9	71.7
Poland	43.9	42.2	41.5
Portugal	31.5	32.4	32.0
Romania	31.0	31.2	30.8
Slovenia	43.8	48.8	51.1
Slovakia	40.5	39.8	39.1
Finland	57.3	63.8	61.1
Sweden	59.4	64.1	63.9
United Kingdom	57.5	56.8	57.8
Croatia	37.9	40.1	38.5
Former Yugoslav Republic of Macedonia, the	:	:	:
Turkey	28.8	30.8	33.2
Iceland	66.2	69.4	72.9
Norway	65.3	69.7	66.5
Switzerland	:	:	:

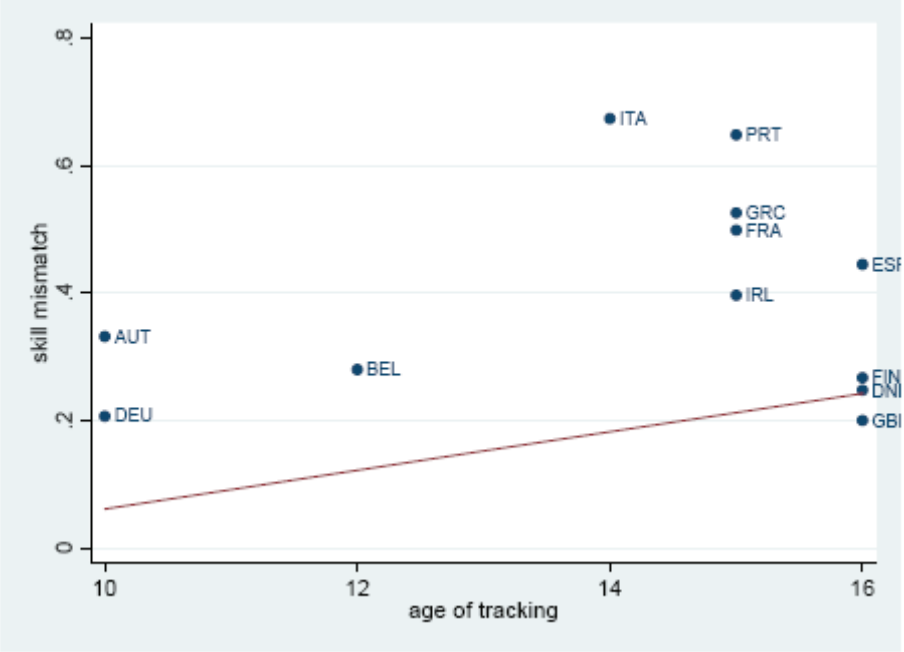
Source: Labour Force Survey (LFS) of the European Union, Eurostat

A.4. Table: Employment Rates for individuals aged 15-24 with ISCED Level 5-6 (%)

Country/Region	2009 Q01	2009 Q02	2009 Q03
European Union (27 countries)	61.5	60.7	55.8
European Union (25 countries)	61.3	60.6	55.8
European Union (15 countries)	61.0	60.5	56.5
Euro area (15 countries)	56.1	55.7	51.5
Belgium	59.4	59.6	45.7
Bulgaria	78.8	75.6	78.0
Czech Republic	41.6	36.9	36.6
Denmark	81.4 (u)	82.4 (u)	78.4 (u)
Germany (including ex-GDR from 1991)	80.0	80.0	76.7
Estonia	79.5 (u)	66.1 (u)	60.8 (u)
Ireland	70.5	68.1	65.2
Greece	60.5	58.4	54.1
Spain	52.2	49.6	46.1
France	52.9	54.5	49.6
Italy	25.3	25.2	26.0
Cyprus	75.5	69.4	59.3
Latvia	75.1	69.6	56.6
Lithuania	76.7	71.7	63.5
Luxembourg (Grand-Duché)	51.1 (u)	77.7	35.1 (u)
Hungary	63.1	64.7	57.8
Malta	71 (u)	68.6	80.5
Netherlands	82.5	79.7	78.1
Austria	71.4	66.6	58.7
Poland	64.7	63.8	51.7
Portugal	53.8	57.3	43.5
Romania	63.4	61.2	50.1
Slovenia	72.6 (u)	78.9 (u)	68.7 (u)
Slovakia	55.4	46.9	35.3
Finland	79.1	83.2	80.2
Sweden	50.6	59.3	64.3
United Kingdom	75.2	73.1	69.0
Croatia	50.7 (u)	58.7 (u)	68.4 (u)
Former Yugoslav Republic of Macedonia, the	:	:	:
Turkey	54.0	54.1	45.0
Iceland	:	:	:
Norway	79.6	70.2	74.4
Switzerland	:	:	:

Source: Labour Force Survey (LFS) of the European Union, Eurostat

A.5. Graph: Skill mismatches and school stratification



Source: Brunello, Reply to ad-hoc question 4/2008

A.6. Table: Private returns to investment in tertiary education by degree type (%)

Country	Non-university	First university degree	Master's	Doctorate
Austria	8.0	7.3		
Belgium	7.1	9.0		
Denmark	5.2	10.1		
Finland	11.4	14.6		
France	18.9	13.4		
Germany	12.7	9.6		
Greece	5.9	7.0	9.9	7.6
Ireland	10.0	15.7		
Norway	8.6	12.5		
Slovenia	15.0	11.8	13.9	12.1
Sweden	5.4	6.8		12.0
UK	9.3	15.9		
Average	**10.4**	**11.4**	**10.5**	**9.9**

Source: Belgium from Nonneman and Cortens (1997), Table 3, Greece from Mitrakos et al. (2008), Slovenia from Polanec and Ahean (2007), Table 8, all other countries from Martin (1998), Table 7

A.7. Table: Private returns by university faculty (%)

Faculty	Greece	Slovenia	UK
Agriculture	4.4	10.5	
Medical Related	7.7	18.0	17.4
Sciences	8.0	12.3	12.5
Maths and Computing			21.1
Engineering	6.4	11.0	15.8
Architecture			12.8
Social Sciences	5.4	13.0	12.5
Business and economics	6.5		13.9
Arts		11.1	4.1
Education	9.4	9.7	19.4

Source: Greece from Mitrakos et al. (2008), Table 5, Slovenia from Polanec and Ahean (2007), Table 8, UK from O'Leary and Sloane (2005), Table 6

There is very limited evidence on the returns to different higher education faculties. The pattern shown in Table 17 is very mixed. However, the lowest returns refer to agriculture and the highest to education and medicine.

A.8. Table: Returns to higher education by subject (%)

Subject/ Country	Private	Social
Agriculture		
Greece	3.1	2.7
Norway		2.2
Social Sciences		
UK		13.0
Arts		
Norway		4.3
UK	26.0	7.0
France	2.9	
Economics		
Belgium		9.5
Denmark		9.0
Greece	5.4	4.4
Norway		8.9
Sweden		9.0
Engineering		
Denmark		8.0
France	17.5	
UK	9.0	5.5
Greece	12.2	8.2
Norway		8.7
Sweden		7.5
Law		
Belgium		6.0
Denmark		10.0
France	16.7	
Greece	13.8	12.0
Norway		10.6
Sweden		9.5
Medicine		
Belgium		11.5
Denmark		5.0
France	12.6	
Norway		3.1
Sweden		13.0
Sciences		
Belgium		8.0
France	12.3	
Greece	2.1	1.8
UK	10.0	6.5
Norway		6.2

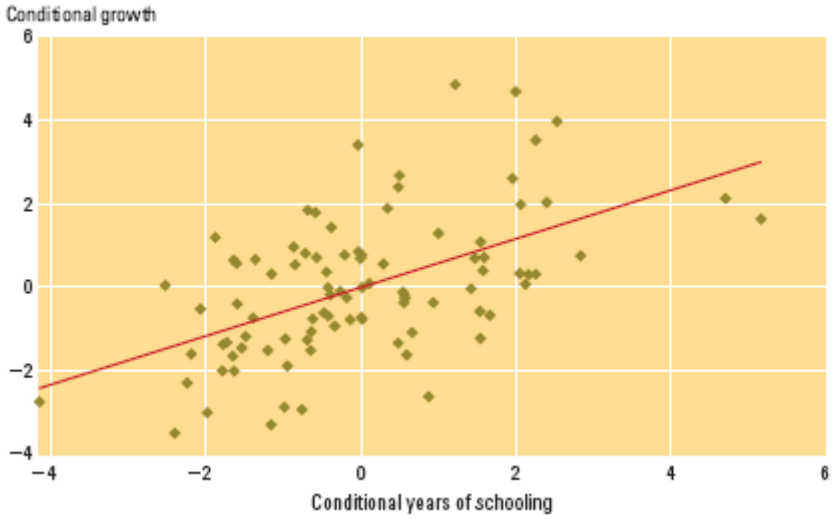
Source: Based on Psacharopoulos and Patrinos (2004,) UK engineering from Wilson (1983). Note: Law includes law and economics, medicine includes health sciences, engineering includes architecture.

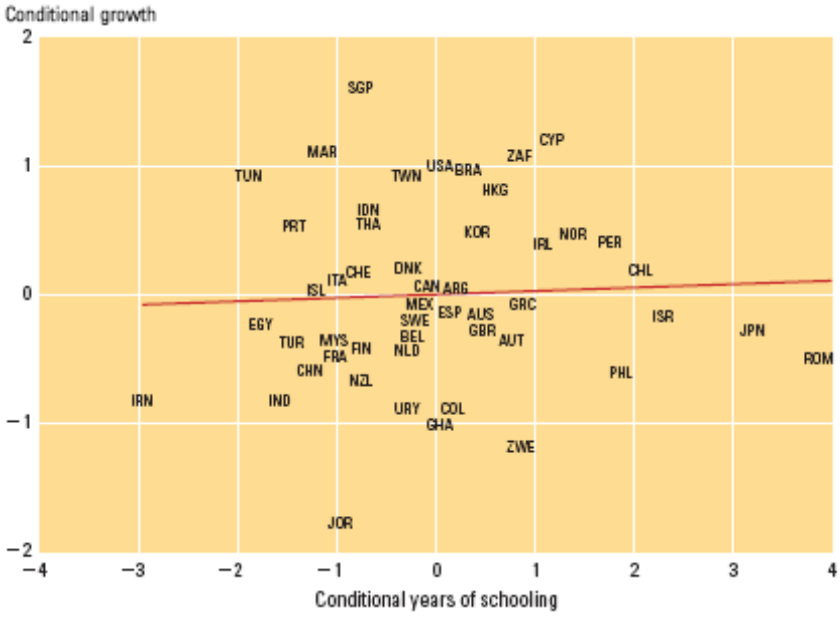
A.9. Table: Training impact on earnings (%)

Country	Returns
Denmark	2.0***
Netherlands	-.3.0
Belgium	.2.6*
France	0.0
UK	1.9*
Ireland	0.5
Italy	3.8.***
Greece	6.0*
Spain	1.7
Portugal	10.5***
Austria	0.4
Finland	3.8.**

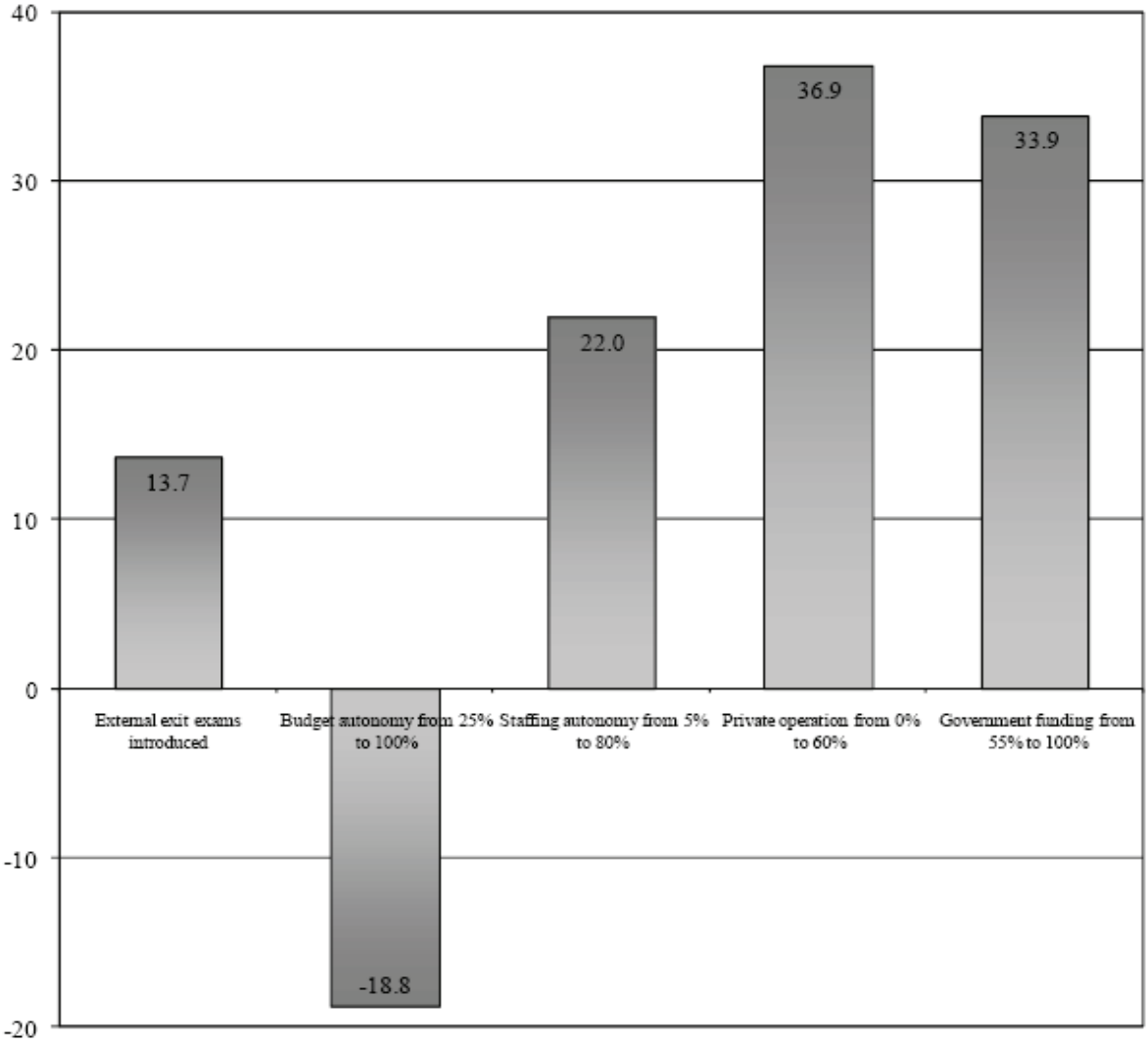
Source: Brunello (2007), Table 2, fixed effects.
Note: Asterisks indicate statistical significance.

A.10. Graphs: Relationship Years of Schooling, Cognitive Skills and Economic Growth





A.11. Figure: Estimated achievement difference between countries with different institutions



Source: Luedemann et al. (2007), p. 21

A.12. Table: Strictness of employment protection

Country	Strictness index
Portugal	4.2
Slovak Republic	3.5
Czech Republic	3.3
Netherlands	3.1
Sweden	2.9
Germany	2.7
Spain	2.6
France	2.5
Austria	2.4
Greece	2.4
Norway	2.3
Finland	2.2
Poland	2.2
Hungary	1.9
Italy	1.8
Belgium	1.7
Ireland	1.6
Denmark	1.5
Switzerland	1.2
United Kingdom	1.1
United States	0.2

Source: OECD Employment Outlook, 2004

A.13. Table: Days needed to start a business

Country	Days needed
Bulgaria	49
Spain	47
Croatia	40
Poland	31
Austria	28
Lithuania	26
Luxembourg	26
Greece	19
Slovenia	19
Germany	18
Latvia	16
Slovak Republic	16
Czech Republic	15
Sweden	15
Finland	14
Ireland	13
United Kingdom	13
Italy	10
Netherlands	10
Romania	10
Norway	10
Estonia	7
France	7
Denmark	6
Portugal	6
United States	6
Hungary	5
Belgium	4

Source: The World Bank, *Doing Business,* http://www.doingbusiness.org/CustomQuery/.

A.14. Table: Tax wedge on average earner, 2007 (%)

Country	Tax wedge
Belgium	55.5
Hungary	54.4
Germany	52.2
France	49.2
Austria	48.5
Italy	45.9
Sweden	45.4
Netherlands	44.0
Finland	43.7
Czech Republic	42.9
Poland	42.8
Greece	42.3
Denmark	41.3
Spain	38.9
Slovak Republic	38.5
Luxembourg	37.5
Portugal	37.4
United Kingdom	34.1
United States	30.0
Ireland	22.3
EU-19 average	**43.0**

Source: Quintini and Manfredi (2009), Table 1

A.15. Table: Minimum wages

Country	Ratio of minimum to median wage
France	0.66
Luxembourg	0.56
Netherlands	0.50
Greece	0.49
United Kingdom	0.47
Belgium	0.46
Hungary	0.45
Portugal	0.42
Slovak Republic	0.42
Canada	0.41
Poland	0.40
Czech Republic	0.38
Ireland	0.38
Spain	0.30
United States	0.30

Source: Quintini and Martin (2006), Table 5

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9	Reinhilde Veugelers	A Policy Agenda for Improving Access to Higher Education in the EU
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