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Education, Financial Markets and Economic Growth

Introduction

"Upon the education of the people of this country the fate of this country depends", British Prime Minister, Benjamin Disraeli, observed over 100 years ago with great prescience. Today, his insightful observation about the crucial importance of education and human capital for social welfare and economic performance of their economies is widely recognised, especially in advanced countries, with their increasingly knowledge-based economies. In Europe, the Lisbon Strategy has placed education high on the policy agenda – together with some key structural reforms in product, labour and capital markets – in order to make Europe a more competitive, knowledge-based and dynamic economy. It is, therefore, highly appropriate and very much appreciated that the OeNB has devoted its 35th Economics Conference to the topic of "Human Capital and Economic Growth". Joining you for this conference is a pleasure and a privilege, and I am delighted to address this distinguished audience.

Education contributes significantly to economic growth and welfare through various channels and in many ways. First, I will review these channels and assess their relative importance on the basis of the available empirical evidence regarding the quantitative significance of the effects of education on a number of key determining factors of growth. In particular, I will examine the role of education in accounting for differences in economic growth across countries and regions, as well as the growth performance of different sectors within our economies. Second, I will address the role of the financial sector in fostering economic growth, concentrating on how the development, efficiency and stability of financial markets can contribute to the dynamism and growth of other sectors and the economy as a whole. I will then explore how education, research and the diffusion of knowledge have supported and facilitated the development of financial markets, and how education can further contribute to fully realising the benefits of financial innovation, thereby supporting our economies' growth performance. Finally, I will draw some conclusions regarding the implications of our analysis for public policy and the effectiveness of monetary policy.

Education and Economic Growth

Through which channels does education foster economic growth? Economists have tried to explain the large cross-country variation in economic growth and, more generally, welfare, in terms of differences in the contribution of factors of production and their overall efficiency. Growth theories – both the extended neoclassical model and the new "endogenous" growth theories – specify the economy's aggregate output as a function of capital, employed labour services, that is hours worked by the economically active population, and a measure of technological progress. Capital is broadly defined to include both physical and human capital. Technological progress is usually described as the process that determines how efficiently all factors of production

are used; that is, it measures total factor productivity. This general theoretical specification implies that the growth rate of per capita aggregate output can be expressed as the sum of real investment (capital deepening), human capital accumulation, the rate of change of labour utilisation and total factor productivity (TFP) growth. The "growth accounting" framework employed in empirical analyses, which need not be based on concrete analytical foundations, uses the same, or a similar, decomposition of output growth in terms of

its basic determinants. This analytical framework provides a useful means for examining and assessing the various channels through which education fosters growth.[1] It should be kept in mind, however, that this framework depends on several simplifying assumptions that may impose limitations on the analysis. It also does not take into account explicitly the potential effects on economic efficiency of "social capital" and human development; that is, the set of institutions and social values that underpin the functioning of markets and can influence the behaviour of economic agents.

Direct Effects of Education on Growth

Education affects economic growth both directly, since it is a key determinant or component of human capital, and indirectly, by influencing the other factors of production and total factor productivity. Human capital is a broad concept which is determined by education – the quantity and quality of schooling – as well as by on-the-job training and learning, cognitive skills and the health status of the labour force (as proxied, for example, by life expectancy).

The direct positive effects of education and, more generally, human capital on growth have been demonstrated by empirical analyses employing both macroeconomic and microeconomic data.[2] Several empirical studies show that countries that are more affluent are also richer in human capital. This is illustrated in chart 1 that shows the relationship between the average number of years of schooling (using data from the most recent update of the Barro-Lee dataset) and the real per capita GDP in the year 2000 (using data from the latest update of the Penn World Tables).

To further illustrate this positive relationship, charts 2 and 3 show that those countries in which the general education level has improved significantly in recent decades have

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[1] See, for example, Mankiw, Romer and Weil (1992) and Caselli (2005).

[2] For general surveys of the contribution of human capital and education to economic growth, see Krueger and Lindahl (2001) and Wasmer et al. (2006). De la Fuente and Ciccone (2002) review the literature with specific reference to Europe.

Chart 1

Income and Education Level – High Income OECD Countries
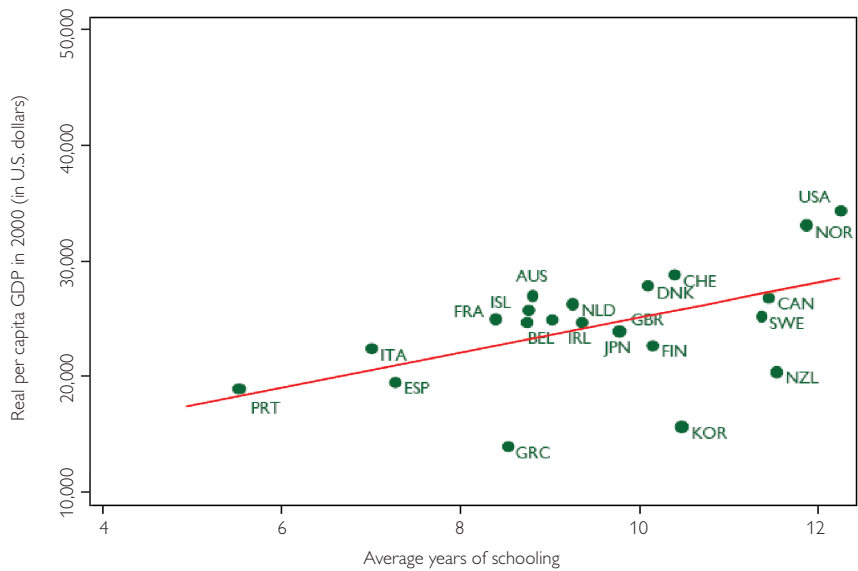
Source: Barro-Lee (2001), Penn World Tables and ECB calculations.

also experienced faster economic growth. For example, East Asian "tiger" economies (South Korea, Taiwan, Hong Kong and Malaysia) have not only been the fastest growing economies in the post-Second World War period, but they have also been those countries where the average duration of school education for the population as a whole has increased most. Recent research has tried to improve the quality of cross-country schooling data[3]. These studies, based on improved statistics, find that there is a stronger correlation between improvements in schooling and growth, even when other features of economic development are taken into account (such as physical capital accumulation or time-invariant country characteristics).

Correlation, however, does not necessarily imply causality. After all,

improvement in education and faster growth may be both influenced by other country factors, such as institutional infrastructure, social capital, geography or culture. The correlation between the increase in the average years of schooling and growth (shown in the previous charts) may also be driven by "reverse causality" from growth to education, as individuals invest more in education when the economy's growth performance and prospects are good. It is thus difficult to establish causality by employing cross-country data, because it is almost impossible to control for all the variables that could affect economic performance. Nevertheless, using detailed data on wages for individuals and households, a vast body of literature in the field of labour economics has provided ample evidence that there is a significantly positive and

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[3] See, for example, Doménech and de La Fuente (2006) and Cohen and Soto (2007).

Chart 2

Human Capital Accumulation and Income Growth –
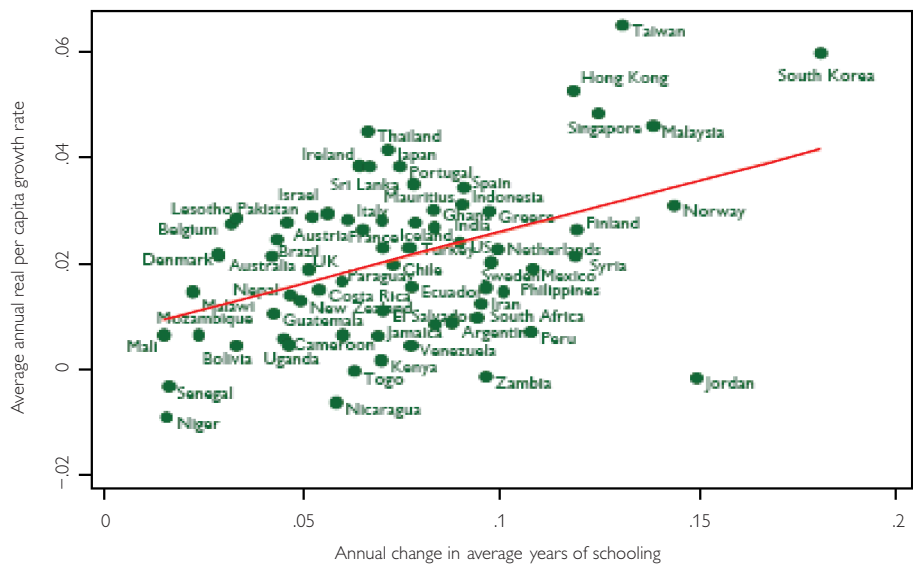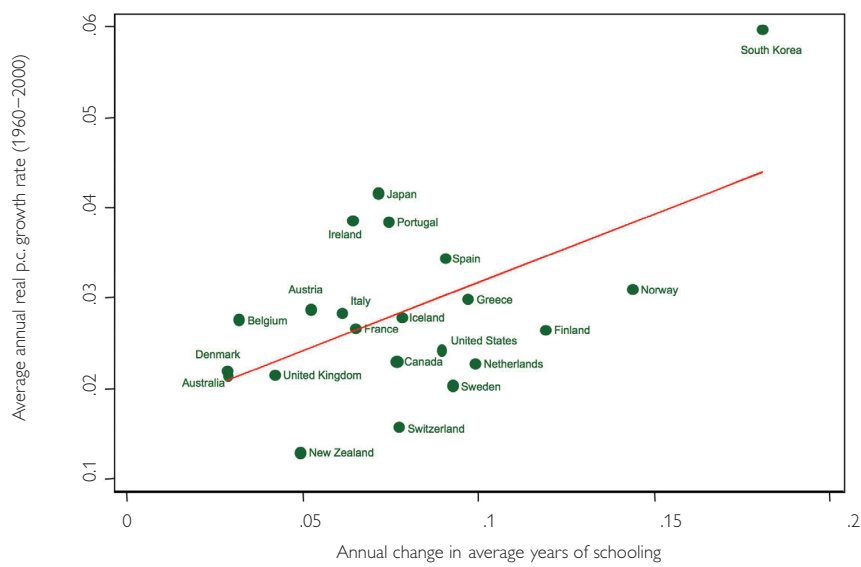
Sample of 65 Countries, 1960−2000

Source: Data from Barro-Lee (2001), Penn World Tables and ECB calculations.

Chart 3

Human Capital Accumulation and Income Growth –

High Income OECD Countries, 1960−2000

Source: Data from Barro-Lee (2001), Penn World Tables and ECB calculations.

robust causal relationship between the years of formal schooling (at the primary, secondary and tertiary level) and wages. This evidence suggests that the private, or "Mincerian",[4] returns on education are within a range of 6.5% to 9%, that is, an additional year of formal schooling is associated with an increase in wages of 7.5% on average over the working life. The richness of micro data also enables us to address the key issue of causality. Labour economists have employed sophisticated econometric techniques and innovative methodological approaches (such as studies of twins who followed different education and life paths) to establish causality between education and private returns.[5] Moreover, the social return on education – that is the benefit of increases in the human capital of the population for the economy and society as a whole – will, in all likelihood, be further increased as a result of human capital externalities. Such externalities arise, for example, through knowledge spillovers from more educated workers to less educated ones.[6]

Education, however, is only one component of the broader concept of human capital, which also involves on-the-job training and learning, as well as cognitive skills. Moreover, the quality of education is at least as important as the number of years of formal schooling.[7] These factors are economically significant. For example, the returns on training could be as high as 5%, which is a rate comparable with the range of estimates for the private returns on the years of formal schooling of between 6.5% and 9%. There is plenty of evidence that points to the importance of the quality of education. This is usually measured by pupil-teacher ratios, public spending on education, the educational level of teachers, as well as students' performance in internationally standardised tests. Measures of the quality of the labour force (at the macro level), based on internationally comparable test scores, explain a significantly larger proportion of the cross-country variation in growth rates than the more simple measure of average number of years of schooling which is usually employed.[8] Micro studies using data on individuals' wages also demonstrate the importance of labour quality. Interestingly, a number of international studies also suggest that the quality of schooling is far more important than the quantity

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[4] The "Mincerian equation", developed by the Polish-American economist Jacob Mincer, specifies a relationship between an individual's education and experience and his or her wages. See Mincer (1974).

[5] For en extensive review of the micro evidence, see Card (1999).

[6] The importance of human capital externalities in the process of development has been stressed by Lucas (1998) and Azariadis and Drazen (1990), among others. Empirical studies in the United States have, however, failed to detect human capital externalities at the U.S. state and city level (e.g. Acemoglu and Angrist, 2001; Ciccone and Perri, 2006). Moretti (2004) does provide some evidence of sizable (and statistically significant) externalities at the U.S. plant level.

[7] Human capital also includes health. However, accounting for health, while of major importance in emerging and developing countries, is likely to be of less importance for the industrial countries.

[8] See, for example, Hanushek and Kimko, (2000); Bosworth and Collins, (2003).

of schooling in explaining the impact of eduction on growth. Put simply, spending time at school is not enough; it is what you learn, how you learn it, and from whom that counts.

The crucial importance of labour quality for Europe's economic performance is also corroborated by recent research at the ECB (Schwerdt and Turunen, 2007), which suggests that improvements in labour quality have made a substantial positive contribution to labour productivity growth in the euro area. Due mainly to a notable increase in college education, the average annual growth rate of labour quality in the euro area is estimated at about 0.5% in the twenty-year period 1984–2005. The relative contribution to productivity of the improvement in labour quality has also increased over time, accounting for up to a quarter of euro area labour productivity growth since 2000.

What is behind the observed – and highly welcome – steady improvement in the quality of employed labour in the euro area? First, the greater number of more educated people in the workforce has led to, an increased share of the total hours worked by more educated workers in the total hours worked.[9] Second, both the business cycle and structural changes in the labour market have positively influenced the human-capital composition of the euro area workforce. By contrast, in the late 1990s, labour quality growth had moderated, mainly reflecting entry into the labour market of low-skilled workers. You may recall the debates about the "jobless recovery" and the labour market policy pursued in the late 1990s, which aimed, in particular, at increasing the employment intensity of growth.

Indirect Effects of Education on Growth

Education influences economic growth not only directly, through its effects on human capital – as explained thus far – but also indirectly, through its effects on a number of other growth determinants, notably: labour force participation, overall labour utilisation, total factor productivity, the skill-bias of technological progress and the complementarity – or substitutability – of physical capital and skills. I will briefly discuss each of these in turn. First, education enhances growth by raising labour utilisation (and, specifically, the number of hours worked per worker). The higher the education level, the higher the participation in the labour force. In other words, if people are more educated, they are more likely to seek or hold a job. Let me provide you with some evidence for the euro area that supports this proposition (see table 1): In 2006, total labour force participation ranged from 70.1% for persons with below secondary education, to 84.3% for persons with above secondary education and 90.6% for persons with tertiary education. In addition, a higher level of education is usually connected with a higher percentage of the labour force being employed. In 2006, the employment rate in the euro area was 83.5% for

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[9] *See Schwerdt and Turunen (2007) for evidence of an increased share of the total hours worked by more educated workers and, in particular, of a sizeable increase in the share of hours worked by those with tertiary education.*

Table 1

Euro Area Labour Force Participation

in thousands of persons in the age group 25 to 59

Education	1996 Total	1996 Females	2006 Total	2006 Females	Difference 1996–2006 Total	Difference 1996–2006 Females
Below secondary						
Total employment	34,197	13,235	32,561	12,810		
Unemployed	5,348	2,619	3,751	1,911		
Inactive	20,445	16,538	15,478	11,737		
participation ratio in %	65.9	48.9	70.1	55.6	4.2	6.7
Above secondary						
Total employment	43,407	18,084	52,171	23,288		
Unemployed	4,220	2,247	4,158	2,109		
Inactive	10,339	7,583	10,485	7,497		
Participation ratio in %	82.2	72.8	84.3	77.2	2.1	4.4
Tertiary						
Total employment	21,581	8,893	31,681	14,933		
Unemployed	2,619	1,532	1,911	1,592		
Inactive	2,463	1,730	3,492	2,492		
Participation ratio in %	90.8	85.8	90.6	86,.9	−0.2	1.1

Source: Eurostat, Labour Force Survey; data for 2006 extends up to 2006 Q3.

persons with tertiary education and only 57.2% for persons with below secondary education.

A most significant and far-reaching contribution of human capital to the European economy and other advanced economies stems from its positive effect on total factor productivity (TFP). Empirical studies suggest that countries that are richly endowed with human capital tend to use existing technologies better, and firms and entrepreneurs in these countries also innovate much more. Building on an early contribution by Richard Nelson and Edmund Phelps (1966), the new "endogenous" growth theories have stressed the role of human capital in sustaining long-term growth, because it enables economies rich in human capital to catch up with the technological frontier and innovate.[10] In line with these theories – which have also emphasised the importance of research and development (R&D) and entrepreneurial activity – cross-country empirical studies show that human capital accelerates progress towards the technological frontier (e.g. Benhabib and Spiegel, 1994). There are valuable lessons for the advanced EU Member States, because the contribution of human capital is especially important for economies that are closer to the technological frontier and which thus depend more on innovation than imitation.[11]

The role of human capital, and education in particular, in fostering innovation and a rapid adoption of technological advances has been crucial over the past decades, when technology has been "biased" towards highly-skilled labour. There is now a consensus that in the 1980s and 1990s (and even in the 1970s), technologi-
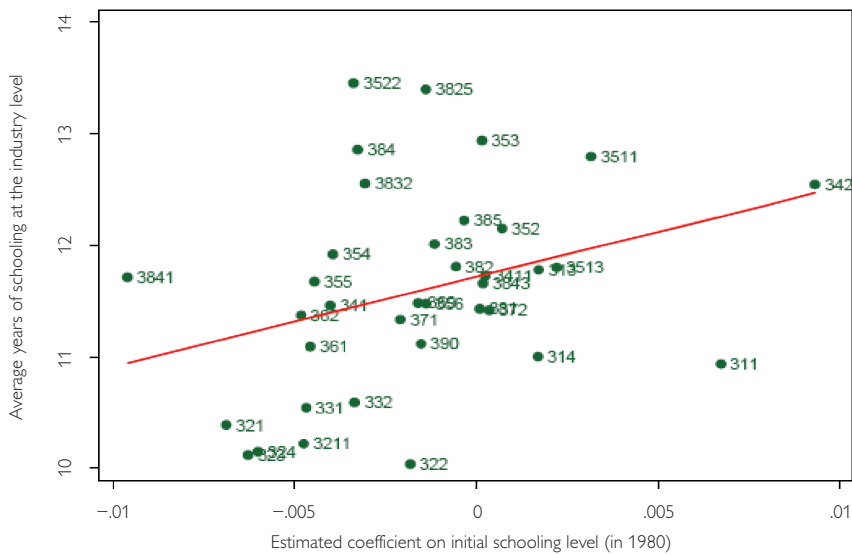
[10] See, for example, Romer (1990), Grosman and Helpmann (1991), and Aghion and Howitt (1992).

[11] For a formalisation of this intuition, see Acemoglu, Aghion, and Zilibotti (2006).

Chart 4

Education and the Skill-bias of Technological Change–I

Source: Ciccone and Papaioannou (2005) and UNIDO.
Note: See table 2 for explanation of ISIC code.

cal progress favoured educated and highly-trained workers.[12] For example, the private return on education in Europe and the United States rose from about 6.5% to 7.5% in the early 1970s to 10% in the early 1990s. This increase was almost exclusively driven by college graduates and highly-trained workers, who were the beneficiaries of the higher skill-bias of recent technological innovation. If we analyse this rather general result in greater depth, and assess the effect of education in facilitating technology adoption and the skill content of recent technological innovation, we find that countries with abundant human capital managed to better utilise technological innovations in skill-intensive sectors in the 1980s

and 1990s (Ciccone and Papaioannou, 2005). Moreover, it was precisely the industries with high human capital intensity that experienced higher total productivity growth globally. Chart 4 illustrates this point. It shows the relationship between the cross-country marginal return on human capital at the industry level and the industry skill-intensity. There is a positive relationship between the effect of schooling on industry growth and the skill-bias of an industry. These findings confirm our expectations that education is far more important for the growth of R&D intensive sectors, such as drugs and pharmaceuticals, and computer and office equipment than for footwear and textiles.

[12] See, among others, Acemoglu (1998, 2002); Caselli and Coleman (2006); Berman, Bound and Machin (1998).

Table 2

Industry Measures of Human Capital Intensity (Dependence)

| ISIC Code	Industry Name	HCINT
3522	Drugs	13.45
3825	Office, computing	13.40
353	Petroleum refineries	12.94
384	Transportation equipment	12.86
3511	Basic chemicals excluding fertilizers	12.79
3832	Radio	12.55
342	Printing and publishing	12.54
351	Industrial chemicals	12.42
385	Professional goods	12.22
352	Chemicals	12.15
383	Electric machinery	12.01
354	Petroleum and coal products	11.92
382	Machinery	11.81
3513	Synthetic resins	11.80
313	Beverages	11.78
3411	Pulp, paper	11.72
3841	Ship building and repairing	11.71
355	Rubber products	11.67
3843	Motor vehicle	11.65
369	Non-metal products	11.48
356	Plastic products	11.48
341	Paper and products	11.46
381	Metal products	11.43
372	Non-ferrous metals	11.42
362	Glass	11.37
371	Iron and steel	11.33
390	Other industries	11.11
361	Pottery	11.09
314	Tobacco	11.00
311	Food products	10.93
332	Furniture	10.59
331	Wood products	10.54
321	Textile	10.38
3211	Spinning	10.21
324	Footwear	10.14
323	Leather	10.12
322	Apparel	10.04

Note: The table reports the average years of schooling of employees for 36 industrial sectors in manufacturing, calculated using U.S. data, on the basis of the International Standard Industrial Classification (ISIC). The series is taken from Ciccone and Papaioannou (2005).

Chart 5 exhibits a similar relationship, but uses educational quality as a proxy for human capital. The results are even more striking, indicating that educated societies were more successful in adopting the R&D intensive technologies of the 1980s and 1990s.[13]

[13] The skill content of the recent technological revolution has also been a key force for raising inequality. If this pattern continues, then it is fundamentally important for Europe to further invest in human capital: in order to sustain growth and help reduce social inequality.

Chart 5

Education and the Skill-bias of Technological Change−II
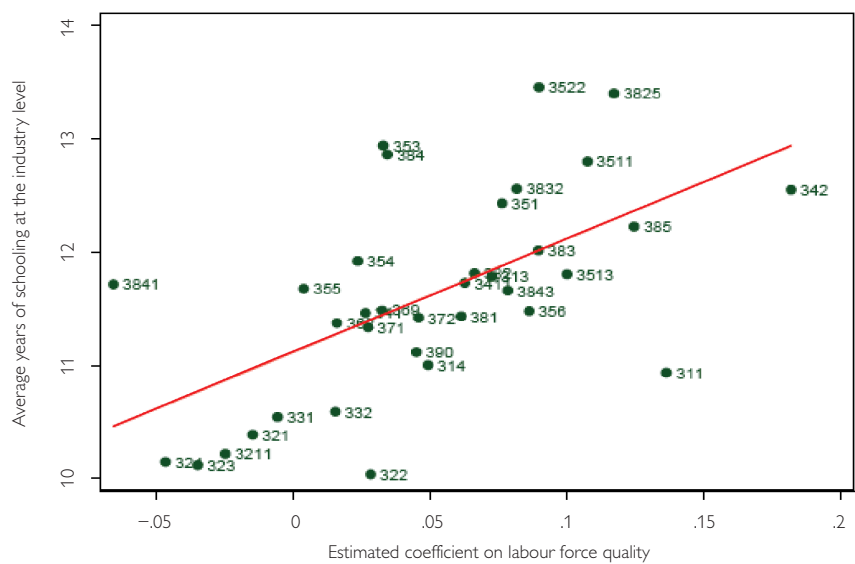
Source: Ciccone and Papaioannou (2005) and UNIDO.

Finally, human capital may foster growth due to so-called capital-skill complementarities. While capital complements both skilled and unskilled labour, it tends to be more relevant for tasks and sectors that use skilled labour more intensively. Recent empirical studies support this hypothesis. Research using very detailed data for the United States shows that capital invested in information and communication technologies (ICT) strongly complements skilled workers in performing complex tasks, while it substitutes low-skilled workers in manual tasks. Similarly, studies on the adoption of computers in the United States over the past three decades clearly show that computerisation is associated with reduced labour input of routine manual tasks and in- creased labour input of non-routine tasks.[14] This finding also highlights how important it is for Europe to invest in both human and physical capital, since their positive effects on growth will most likely be mutually reinforcing, and thus greater.

Education, Financial Development and Economic Performance

The financial sector, where the complementarity between human capital and physical capital can be expected to be particularly strong, has undergone rapid transformation over the past few decades, especially since the 1990s, partly as a result of the large-scale adoption of ad- vanced information and communica- tion technologies. This sector has

[14] For the effect of computer adoption on wages and skill upgrading in the United States, see Autor, Katz and Krueger (1998).

played a central role in fostering economic growth in both advanced and emerging market economies. This role has been supported and facilitated by education in a broad sense – involving both teaching and research in the fields of finance and the new technologies – and by the effective use of the acquired knowledge in practice. For these reasons, I would like to focus now on the relationship between financial sector development and economic growth, and the contribution of education to the development, efficient functioning and stability of financial markets.

Through which mechanisms does the financial sector foster economic growth? Broadly speaking, the financial system can affect economic growth by influencing the investment and saving decisions of economic agents and by fostering innovation and productivity. A well-functioning financial system should *(i)* improve the available information on investment opportunities and reduce informational asymmetries; *(ii)* facilitate the diversification and management of risk; *(iii)* contribute to better corporate governance; *(iv)* mobilise and pool savings; and *(v)* foster the exchange of goods and services. The key functions of the financial intermediation process, particularly information availability and transformation, risk diversification and management, and corporate governance, clearly indicate the central role of education, knowledge and technological advances in the development and efficient functioning of financial markets. The

better a financial system performs these functions – that is, the more developed and efficient it is – the greater its contribution to economic growth.

The empirical evidence supporting the proposition that financial development and integration promote economic growth is substantial.[15] Numerous studies have shown that countries with more liquid capital markets and developed banking systems grow on average faster, and that financial sector reforms and financial liberalisation policies positively affect investment and GDP growth. For example, evidence from emerging and developing countries shows that financial liberalisation policies are followed by a 0.5%–1% increase in investment and a significant fall in the cost of capital (by 100 basis points on average). More generally, the evidence from cross-country and country-specific studies (in both advanced and emerging market economies) shows that deregulation, privatisation and financial development result in an acceleration of growth and a sustained increase in total factor productivity (e.g. Bekaert, Harvey, and Lundblad, 2005). Financial development is especially beneficial for industries which for technological reasons depend predominantly on external finance (Rajan and Zingales, 1998; Guiso, Jappeli, Padula, and Pagano, 2005).

Another important channel through which a well-developed financial system fosters innovation and sustained growth is by facilitating the

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[15] *Levine (2005) provides a thorough review of the literature. Papaioannou (2008) surveys studies that mostly focus on advanced economies.*

Chart 6

Financial Development and Capital Reallocation – Sample of 65 Countries
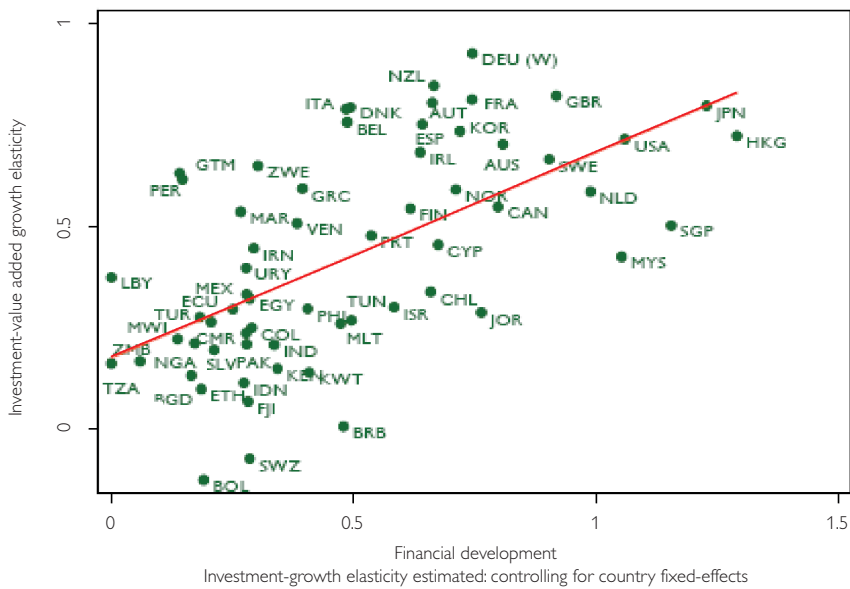
Source: Ciccone and Papaioannou (2007); UNIDO data and methodology based on Wurgler (2000).

rapid re-allocation of capital from declining industries to fast-growing sectors, and, in this way, raising aggregate productivity in the economy.[16] Recent studies have confirmed this proposition, which was first put forward one hundred years ago by a great Austrian, Joseph Schumpeter. He was among the first to emphasise the catalytic role of well-developed financial intermediaries in the process of "creative destruction". The efficient functioning of this Schumpeterian capital reallocation mechanism is especially relevant in advanced economies, such as the euro area, where the promotion of entrepreneurship and increased openness to competi-

tion are key to raising productivity and growth.[17] Recent empirical research at the ECB demonstrates that the larger and more developed the financial markets, the greater the efficiency with which capital is reallocated across sectors. Charts 6 and 7 show the relationship between a measure of capital efficiency and an indicator of financial development for a sample of 65 countries and for the OECD sample of high-income countries. The higher a country scores on the vertical axis, the faster its industries respond to investment opportunities; the horizontal axis denotes the size of the financial market: the upward slope of the line clearly

[16] See, among others, Fisman and Love (2007), Wurgler (2000), Ciccone and Papaioannou (2006).

[17] See Papademos (2006, 2007); Strahan (2003) for a review and assessment of the U.S. evidence; Bertrand, Schoar, and Thesmar (2007) for the aftermath of French financial reforms in the mid-1980s; and Guiso, Sapienza and Zingales (2004) for the Italian experience.

Chart 7

Financial Development and Capital Reallocation − High-Income Countries

Investment-growth elasticity estimated: controlling for country fixed-effects
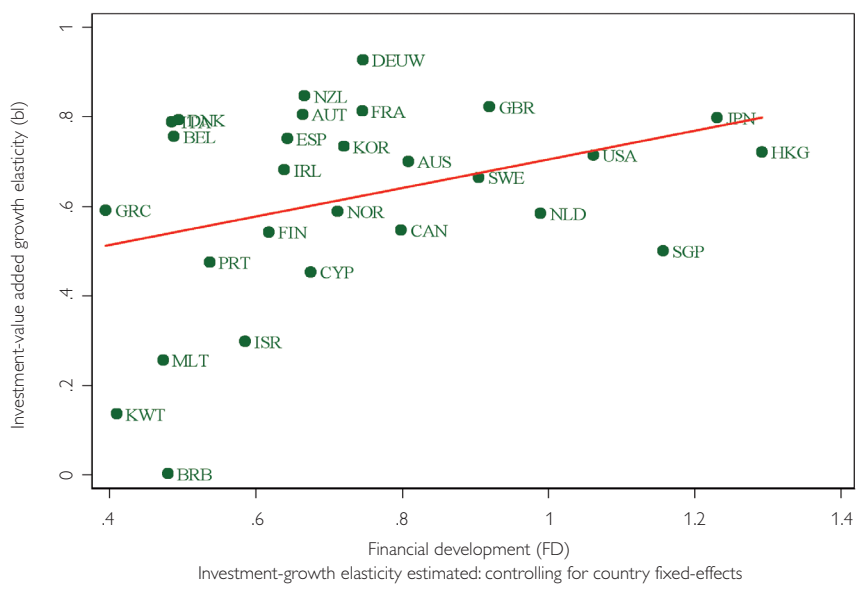
Source: Ciccone and Papaioannou (2007); UNIDO data and methodology based on Wurgler (2000).

indicates that capital is reallocated more efficiently in financially advanced countries.[18]

Financial development is thus manifestly beneficial for growth, but what is the role of education and research in this process? It would be useful to investigate further the relationship between education and technological advances, on the one hand, and financial development and economic growth, on the other. Conceptually, such a link appears plausible, if not perfectly clear. Progress in the theory of finance and management, employing mathematical and statistical techniques, combined with the exponential growth in computing power and the diffusion of informa-

tion and communication technologies – which made the application of theoretical advances technically feasible – have supported the creation of new, innovative, sometimes complex, financial instruments and the development of alternative investment vehicles. Market participants – financial institutions and investors – further elaborated this knowledge, which had been developed initially in universities, and applied it in practice, fruitfully interacting with centres of higher education. In addition, the education pertaining to the organisation, management and governance of firms also contributed to financial development and enhanced productive efficiency. The increasing breadth and sophisti-

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[18] *These figures draw on Ciccone and Papaioannou (2007) and Hartmann, Heider, Lo Duca, and Papaioannou (2008) and are based on a methodology proposed by Wurgler (2000). Data taken from UNIDO (2005 Edition). A certain caution needs to be applied in interpreting these figures, as both the capital efficiency measure and the indicators of financial development can only be proxies for the theoretical concept of the efficiency of capital allocation and financial intermediation. That said, the key finding of a clear positive relationship remains valid.*

cation of financial markets, in turn, have been conducive to economic growth, for the reasons I have outlined above. Intuition and anecdotal evidence suggest that these are reasonable propositions. It would be useful to examine the available evidence in a systematic manner and try to quantify and estimate the contribution of education and research to the development and efficiency of the financial system and the resulting direct and indirect effects on total productivity growth. It would also be valuable to examine how education and the diffusion of knowledge on risk measurement, assessment and management can help to better safeguard financial stability, by enhancing the resilience of the financial system to shocks and the potential materialisation of risks associated with the intermediation process.

Needless to say, the role of education in fostering financial development, efficiency and stability is a very broad theme. However, I would like to point out another important issue concerning the link between education and financial development which has recently attracted attention and led to some interesting findings. This pertains to the fact that it is not only the education and sophistication of bankers, brokers, analysts, asset managers, or risk management specialists that determine the extent to which the full benefits of financial development and risk diversification can be reaped; it is also the financial educa-

tion and literacy of all savers and investors.[19] On that front, I am afraid, the news is not good: the evidence indicates that even in advanced countries, financial illiteracy is widespread. For example, a recent study in the United States (Lussardi and Mitchell, 2006) found that on average only 50% of those close to retirement (aged 50+) could correctly answer two simple questions regarding interest compounding and inflation, and the scores were worse when questions were raised about risk diversification. Evidence from other industrial countries is similarly alarming. Of course, these averages conceal differences: more affluent people with higher education, especially those with college education, tend to be more financially literate than people from lower-income groups. However, this fact offers no solace.

The implications of financial illiteracy are far from negligible. Proper retirement planning, the ability to exploit diversification opportunities and the propensity to invest in high-return and high-risk assets are more widespread among financially literate households (Lussardi and Mitchell, 2006, 2007; and Calvert, Campbell and Sodini, 2005). Enhancing financial literacy is essential, especially in economies with ageing populations and the expected progressive shift away from public pension provision, based on pay-as-you-go schemes, to privately funded schemes where people have to assume responsibility for

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[19] *The OECD (2005) defines financial education as "The process by which financial consumers/investors improve their understanding of financial products and concepts and, through information, instruction, and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being." The importance of financial literacy for household finance is also stressed by Campbell (2006) in his Presidential Address to the American Finance Association.*

their own retirement savings. Aristotle's wisdom that "education is the best provision for old age", understood also in this specific sense, still holds today; and should provide guidance for public policy. Programmes to enhance people's ability to understand some basic financial and economic concepts (such as interest compounding, percentages, the difference between nominal and real returns, etc.) have demonstrated their usefulness, especially for less-educated participants. The best way, however, to enhance financial literacy so as to fully realise the benefits of financial development is to further invest in education, for there is clear evidence of a strong relationship between the level of schooling and financial literacy.

Policy Implications

Overall, there is ample and robust evidence that education plays a key role in enhancing economic performance, especially in those sectors where productivity and labour utilisation are relatively low. Therefore, improving education – in quantitative and qualitative terms – has to be at the heart of policy measures aimed at raising the growth potential of the euro area in a sustainable manner. The Lisbon Agenda aims precisely at this. Given the lower productivity growth in the financial sector compared with the productivity gains achieved in other sectors in the euro area, but also relative to those recorded in the United States, policies that can accelerate the integration and development of European financial markets are essential. They will help to raise the European economy's growth potential, enhance its capac-

ity to adapt to changing global conditions and structures, and strengthen its resilience to shocks. In particular, further financial integration and development in the euro area would allow for a more balanced systemic response of its economy to asymmetric shocks – which is, of course, of particular relevance for the smooth functioning of Economic and Monetary Union. The improved risk-sharing opportunities offered by an integrated financial market should also help to further synchronise business cycles across the euro area and reduce

the volatility of output and employment. Last, but by no means least, more integrated and efficient financial markets will also enhance the smooth and effective transmission of the single monetary policy impulses across the euro area. This brings me to my final point: the links between education and monetary policy.

What are the potential implications of a rise in the level of education for the conduct of monetary policy in the euro area? Improvements in education and labour quality affect the transmission of monetary policy in two principal ways. First, by fostering higher productivity growth and labour utilisation, a higher level of education raises potential growth and thus the "speed limit" of the economy, meaning that the economy can

attain a faster rate of sustainable growth that is compatible with price stability. The second channel through which education affects the transmission of monetary policy relates to the efficient functioning of national labour markets and the role of labour mobility as an adjustment mechanism, which is especially relevant in a monetary union. Increased labour force participation and mobility of high-skilled workers will improve job-matching efficiency in the euro area, especially when there are certain skill shortages. To the extent that more educated workers display greater mobility across firms, sectors and borders compared with workers with fewer qualifications, a higher level of education can contribute to containing the size of economic fluctuations and mitigating the effects of shocks, because labour markets can adjust faster and in a manner that reduces output and employment volatility.

Concluding Remarks

In recent quarters, economic activity in the euro area has been expanding at a solid pace and conditions are in place for the ongoing expansion to continue at sustained rates. The improved growth performance of the euro area economy reflects the positive influence of the policies pursued and the reforms that have been implemented over the past few years. It is essential to preserve the favourable conditions that are fostering sustained growth and to step up the efforts that can enhance the dynamism and growth potential of the euro area economy.

Monetary policy has made a decisive contribution to fostering sustainable growth by having established an environment of price stability and by ensuring that medium to longer-term inflation expectations remain solidly anchored at levels consistent with price stability. This is what our policy will continue to do. The ECB's Governing Council remains strongly vigilant and ready to act in an effective, firm and timely manner to ensure that price stability is preserved over the medium and longer term.

At the same time, the euro area's potential for higher sustained growth and its capacity to effectively absorb economic shocks can be further enhanced by the implementation of appropriate structural reforms that increase productivity and employment growth and improve market efficiency and flexibility. In my presentation, I have examined and assessed the links between education and the growth performance of our economies. There is ample and robust evidence that more and better education can foster productivity growth and raise labour utilisation. Moreover, I have emphasised the important role which the development of financial markets can play in fostering innovation, entrepreneurship and productivity growth and I have argued that education has contributed and can further contribute to the development and stability of the financial system. What counts now is to use these insights and implement the necessary policy measures to enhance the quantity and quality of education in Europe. After all, as Anton Chechov reminds us, "knowledge is of no value unless you put it into practice." ✎

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