

EDUCATION: MORE CRUCIAL THAN EVER

## Education and economic growth

In 1900, Spain and Finland were very similar: they were underdeveloped, largely agricultural countries with a low level of literacy (scarcely 40% of the population) and a similar income per capita. 50 years on, Finland's income per capita doubled Spain's, all Finns were literate and secondary education had started to spread to all social classes in the country. Meanwhile, in Spain, illiteracy was still widespread and secondary education a rarity. Almost 70 years later, and in spite of Spain's huge economic development and improvements in terms of education, Finland's income per capita is still higher than Spain's. And so is its level of education. Therefore, were Finland's educational improvements the key to its success? This must certainly be partly the case.

Education directly affects economic growth insofar as it is essential to improve human capital. Let's take this step by step. An economy's production capacity depends on different factors. These include physical capital, technology and the number of workers, as well as their quality. This quality is largely determined by what is called human capital (the stock of knowledge, skills and habits). An increase in workers' educational level improves their human capital, increasing the productivity of these workers and the economy's output.

Numerous studies in the field of labour economics have attempted to measure this relationship between a worker's education and its productivity, called the private return to education. And the findings have been incredibly positive. The precursor to all such studies is the equation developed by Jacob Mincer in 1974, known as the Mincer Equation. This relates workers' earnings (seen as a way of measuring their productivity) with their years of schooling and work experience.<sup>1</sup> It goes without saying that equating a worker's education with their years of schooling is highly flawed since it assumes that, for instance, one additional year of primary education has the same effect on a worker's productivity as an additional year of university education. Neither does it take into account possible differences in the quality of the education received, particularly relevant for analyses carried out with data from different countries. Some studies therefore distinguish between primary, secondary and tertiary education and add quality controls such as the results from tests carried out internationally.

Another problem, more substantial and therefore more difficult to resolve, is whether such studies actually measure the effect of education on productivity or rather the result of talent. For instance, if more talented people are the ones who receive more education, then the estimated effect of education on productivity would largely reflect this greater talent and not the higher level of education. In order to avoid this problem (in technical terms, an omitted-variable bias), some articles have attempted to use natural experiments. One of the most curious used identical twins with different lengths of schooling. Such twins are genetically identical and tend to have the same family environment, so their skills and habits should be very similar. Such studies have found that one additional year of schooling results in an increase in earnings, and therefore productivity, of between 6% and 10%.<sup>2</sup>

In addition to education's direct effect on a worker's productivity, numerous economists also point to important education externalities for growth, larger than private returns. Paul Romer, for instance, suggests that societies with a large number of highly skilled workers generate more ideas and consequently grow more. In a recent work, Aghion et al present a theoretical model and some empirical evidence that shows more advanced economies benefit from workers with a university education since this promotes technological innovation, augmenting the productivity of both physical capital and the workforce as a whole. On the other hand, developing economies benefit from workers with a primary and secondary education as this helps them imitate the technologies developed in richer countries, thereby also increasing the productivity of their physical capital and workforce.<sup>3</sup>

Given their huge importance, the existence of such externalities, or social returns, and their quantification are undoubtedly important when designing educational policies in order to avoid underinvestment in education. Individuals tend to decide the

1. See Mincer, Jacob (1974), «Schooling, Experience, and Earnings», NBER Book. On the other hand, although wage income largely reflects a worker's productivity, there are other elements that can affect it, such as legislation, the role of trade unions, etc.

2. See Card, D. (1999), «The causal effect of education on earnings», Handbook of Labor Economics 3: 1801-1863, for a summary of the empirical literature. In this summary, David Card also comments on the use of the geographical proximity variable for individuals to university as a good proxy of the talent-free educational level of individuals.

3. See Romer, P. M. (1990), «Human Capital and Growth: Theory and Evidence», Carnegie-Rochester Conference Series on Public Policy, Vol. 32. And Aghion, P. et al. (2009), «The Causal Impact of Education on Economic Growth: Evidence from U.S.», Brookings Paper.

level of educational training they wish to attain based on the private returns they expect to receive and do not take social returns into account. A significant social return would therefore justify policies to encourage greater investment in education.

But studies focusing on quantifying the effects of education on economic growth and which therefore attempt to reflect both private returns and externalities also face several complications. Like studies focusing on private returns, they need to accurately measure the education variable, distinguishing between different educational levels and controlling via quality. They must also deal with a problem of inverse causality: is it the case that countries which invest the most in education grow the most and achieve the highest levels of income? Or, alternatively, do countries with higher levels of income tend to invest more in education? Both relationships are bound to exist but, in this case, we need to know the extent of the former since it will determine what kind of educational policies need to be implemented.

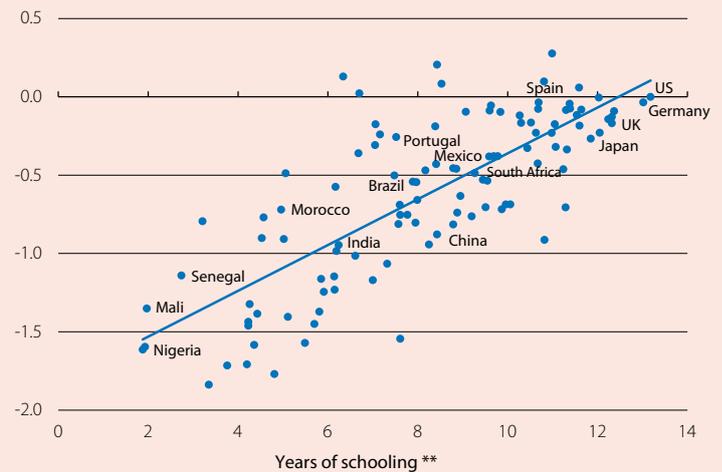
In order to identify this relationship, some studies make use of what are called instrumental variables. In other words, they look for countries or regions whose educational level has changed for some reason, independently of their growth rates. A mission which, in many cases, is almost impossible. Changes in mandatory education policies or appointments of politicians on legislative committees responsible for educational investment in US states are some of the events that have been considered. However, in such cases the findings of the different empirical studies are not conclusive: some show clearly greater social returns than private while others find that both types of return are similar.<sup>4</sup>

Lastly, other kinds of externalities also result from education. Most importantly, the fostering of democracy. Citizens with a higher educational level tend to associate more and take a more active part in civil society in terms of collective decision-making. Such movements are markedly democratic in nature. A higher educational level therefore tends to encourage the defence and reinforcement of democratic systems.<sup>5</sup>

But beyond the relevance of education in economic growth and in fostering democracy, in the words of the United Nations: «education is a fundamental human right and essential for the exercise of all other human rights».

### Growth and education: relationship between productivity and training

GDP per worker (difference compared with US) \*



Notes: \* Log of GDP per worker in a certain country minus the log per worker in the US (2010).  
\*\* Average years of schooling for total population (2010).

Source: CaixaBank Research, based on data from the World Bank and Barro-Lee (2016).

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4. Acemoglu, D. and Joshua, A. (2000), «How Large Are Human-Capital Externalities? Evidence from Compulsory-Schooling Laws», NBER macroeconomics annual 15: 9-59, show a small social return. And Moretti, E. (2004), «Estimating the social return to higher education: evidence from longitudinal and repeated cross-sectional data», Journal of Econometrics 121, 1: 175-212, a clearly higher social return.

5. See Glaeser, E. L., Ponzetto, G. and Shleifer, A. (2007), «Why Does Democracy Need Education?», Journal of Economic Growth 12.2: 77-99.