The role of educational quality and quantity in the process of economic development[☆]

Amparo Castelló-Climent[a], Ana Hidalgo-Cabrillana[b,*]

[a] Institute of International Economics, Spain
[b] Department of Economic Analysis, Universidad Autónoma de Madrid, Spain

ABSTRACT

We develop a theory of human capital investment to study the effects of school quality on student choices of education, and to understand its effect on economic growth. In a dynamic general equilibrium closed economy, primary education is mandatory but there is an opportunity to continue to secondary education and beyond. High-quality education increases the returns to schooling, and hence the incentives to accumulate human capital. This is caused by two different channels: higher quality makes education accessible to more people (extensive margin), and once individuals decide to participate in higher education, higher-quality increases the investment made per individual (intensive margin). Furthermore, educational quality determines human capital composition and growth. Cross-country data evidence shows that the proposed channels are quantitatively important and that the effect of the quality and quantity of education on growth depends on the stage of development.

© 2011 Elsevier Ltd. All rights reserved.

1. Introduction

This paper seeks to understand what drives schooling decisions regarding higher education (i.e., secondary and tertiary education) and why educational attainment levels differ widely with the level of economic development. Two salient features are worth noting. First, most of the population in poor coutries have only a primary education or none at all. Second, higher education attainments increases with income and differs substantially across countries. Possible explanations for this could be, for example, the typical credit constraints story (e.g., Galor & Zeira, 1993; Mookherjee & Ray, 2003) and the existence of skill-biased technical change (e.g., Galor & Moav, 2000). In this paper, we analyze an alternative explanation that posits cross-country differences in the quality of the educational system.

As preliminary evidence of how important the quality of education may be, we plot enrollment rates in secondary education and a measure of educational quality in each country.[1] The results are striking. Fig. 1 shows a positive correlation between educational quality and enrollment

Quality of Education and Investment rates in Secondary Schooling

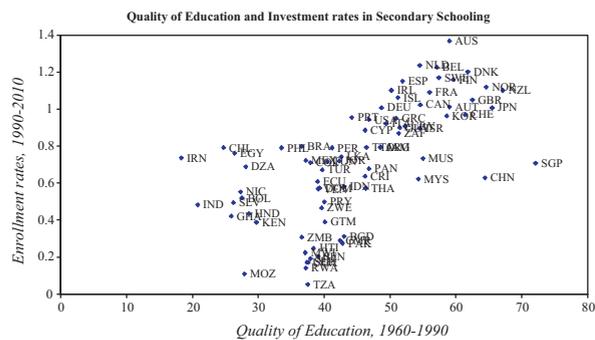*Enrollment rates, 1990-2010*

Quality of Education, 1960-1990

Fig. 1. Quality and quantity of education.

rates in secondary schooling when the quality of education is relatively high—a correlation that disappears when the quality of the educational system is below a threshold level. Moreover, the upper and lower extremes in the figure also show that, on average, the countries with a high-quality educational system are mainly the high-income OECD economies, whereas those with low-quality educational systems are the less-developed countries.[2]

Motivated by these observations, we develop an analytical theory to study how the quality of the educational system influences individuals' decisions to invest in higher education, which in turn affects the distribution of educational attainment and allows for different paths of development. Specifically, the objective of this paper is to shed light on the following questions: Can educational quality account for higher education, which is essentially non-mandatory education? And if so, what are the channels through which educational quality operates? And how can educational quality affect the long-run income level?

To answer these questions, we present a model of schooling decisions where growth results from the accumulation of physical and human capital. We find a simple closed-form solution, which allows us to identify the mechanisms at work and thus provides a theoretical foundation to check the results empirically. Our theory is based on the following assumptions. First, the quality of the educational system is exogenous and, motivated by the evidence of Hanushek and Woessmann (2008), affects the returns on education so that high-quality education provides more human capital per level of schooling. Second, agents are heterogeneous along two dimensions—ability and inherited wealth—but capital markets are perfect. The essential implication of this last assumption is that schooling decisions are made independently of the current

distribution of wealth levels. Although capital markets for education are far from perfect in reality, this assumption allows us to isolate and best illustrate the role played by education quality. Adding imperfections in the capital markets would reinforce our results. Third, every individual is assumed to have the elementary skills that are taught in primary school, since primary schooling is compulsory and publicly provided. People can choose to continue with their education, but this decision requires the investment of private resources. That is, agents decide whether or not to pursue higher education, and if so, how much to spend on it. Accordingly, our focus is on the evolution of higher education, under the assumption that the goal of universal basic literacy has already been met.

Our proposed theoretical model makes several predictions. It identifies two potential channels through which the quality of the educational system affects human capital accumulation. On the one hand, low educational quality decreases the returns from education and discourages access to higher schooling across a broader segment of the population. As a result, low quality could act as a barrier to pursuing higher education. We refer to this effect as the extensive channel. On the other hand, once individuals participate in higher education, high-quality educational systems raise the investments in higher schooling made by each person. We call this the intensive channel. Our empirical evidence, based on cross-country data, suggests that the proposed channels are quantitatively important.

General equilibrium forces also impact schooling choices through changes in prices, reinforcing the effects of quality on educational attainment. As output per capita increases, agents have more incentives to invest in higher education. Higher per capita GDP affects the returns as well as the cost of education, since as wages increase, the marginal returns on education rise, while its opportunity cost—given by the interest rate—falls.

We show that in every period, the economy, as an aggregate, is entirely characterized by the aggregate output per worker, and that how this variable evolves depends on the level of educational quality. Therefore, this parameter determines the level of income in the long run. Indeed, when educational quality is relatively low, only the extensive channel is at work. Individuals would optimally decide to stop after completing primary education and invest only in physical capital, but then aggregate output would be low. This would bring low returns to secondary education, discouraging individuals from going to secondary school, and so on. Conversely, when educational quality is very high, everyone goes on to a secondary education or beyond. Additionally, all people make the optimal investment in higher schooling, so that the economy is at the maximum possible income level in the steady state. Therefore, in our model, higher education is larger in relatively developed economies, and is positively correlated with the quality of the educational system.

Studying the quality of the educational system is important in itself, since education translates into a more productive and efficient labor force. However, while the quantitative aspects of human capital have been studied intensively, less attention has been given to the qualitative aspects of education. An exception is the recent

---

(2000); the enrollment rates in secondary education are taken from Barro and Lee (1994) and UNESCO.

[2] A potential problem with these internationally comparable test scores is that they could measure innate abilities. First, it seems reasonable to assume that average ability of students does not vary across countries. Second, even assuming that high-ability agents in developing countries would enter secondary schooling more often than low-ability agents in the same countries, and that the average ability level of secondary students would decline as secondary education expands, we would then expect a negative correlation between quality and enrollment rates across income levels. This would imply that Fig. 1 is still robust to these assumptions.