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Modelling the macroeconomic impact of future trajectories of educational development in Least Developed Countries

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ABSTRACT

The distribution of educated populations across age groups and the relative shares of population with different levels of attainment appears to be an important factor when it comes to explaining and predicting economic growth patterns both across developing countries and over time. A series of studies unveil the key role that complementing primary education with secondary schooling plays as a determinant of economic development. Here, we model the macroeconomic impact of the playing out of three different education-specific policy/investment scenarios (interacting with population dynamics). The model suggests that the Least Developed Countries would derive great economic benefits from increased investment in education, especially post-primary, as they move towards a post-MDG agenda.

1. Introduction

Investment in human capital – people's education and health, including reproductive health – has been a key cornerstone of development investment strategies, and nowhere more so than in the United Nations [UN]-defined group of Least Developed Countries [LDCs].[1] Current levels of human capital development in LDCs are usually poor, and factors which are likely to affect their immediate future – namely the growing population, low levels of economic growth preventing revenue redistribution, and already meagre levels of expenditure on health and education – make the picture look quite bleak (Basten et al., 2010). The importance of human development, including but not limited to human capital, as a necessary condition for sustainable economic growth has been stressed often in other studies. Ranis et al. (2000) present a systematic framework to apprehend the link between human development and economic growth, assessing the two-way relationship and feedback effects existing between both spheres. Here, we concentrate exclusively on the link between human capital improvements and income growth, since the distribution of educated population across age groups, and the relative shares of population with different levels of attainment appear to be important factors when it comes to explaining and predicting economic growth patterns both across developing countries and over time.[2] In this respect, our analysis is less general than the one pursued by Ranis et al. (2000) and our value added rests on exploiting the availability of new data to improve the quantification of the link between improvements in educational attainment and subsequent income growth.

Lutz et al. (2008) and Crespo Cuaresma and Mishra (2011) show that the dynamics of age-structured educational attainment levels provide superior information for explaining income per capita changes. Lutz et al. (2008) provide evidence that the latest efforts in applying demographic back-projection methods to reconstruct

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[1] According to the UN (2013a), the criteria for inclusion in the list of Least Developed Countries is: (1) a low-income criterion, based on a three-year average estimate of the gross national income (GNI) per capita (under $750 for inclusion, above $900 for graduation); (2) a human resource weakness criterion, involving a composite Human Assets Index (HAI) based on indicators of: (a) nutrition; (b) health; (c) education; and (d) adult literacy; (3) an economic vulnerability criterion, involving a composite Economic Vulnerability Index (EVI) based on indicators of: (a) the instability of agricultural production; (b) the instability of exports of goods and services; (c) the economic importance of non-traditional activities (share of manufacturing and modern services in GDP); (d) merchandise export concentration; and (e) the handicap of economic smallness (as measured through the population in logarithm); and the percentage of population displaced by natural disasters. For a complete list of LDCs, see UN (2011).

[2] It should be noticed that the link between education and poverty reduction goes beyond the indirect effect through (average) income. Palmer et al. (2007) present a broad analysis of the complexities embodied in this relationship for developing economies.

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educational attainment data lead to significant improvements in terms of the possibility of modelling the macroeconomic link between human capital and income. Both of these contributions use specifications which are comparable to those used in this piece of research to quantify the effect of human capital on the income growth process. In particular, they use econometric specifications which account at the same time for the role played by human capital as a standard factor of production and as a determinant of technology improvement. Crucially, these studies unveil the key role that complementing primary education with secondary schooling plays as a determinant of economic development.

Here, we focus especially on the UN-defined group of LDCs (UNCTAD, 2007), and the macroeconomic returns to different future trajectories of educational development. Firstly, we present a literature review of the relationships between educational change and both micro- and macro-economic change. We then set out to quantify the differences in income per capita which would result from the playing out of three different scenarios of education investment, policy and provision. We find that investment in education – and secondary education by implication – has strong positive economic returns in terms of income growth and thus poverty reduction, given the strong link between the two. We conclude by considering the policy relevance of these results, particularly with regard to the on-going discussion over the post-Millennium Development Goals [MDG] agenda and post-primary education.

2. Literature review

At the microeconomic level, educational attainment and earnings have been systematically shown to be strongly related. Myriad empirical studies have presented estimates of the returns to education at the individual level and, despite methodological caveats concerning potential biases related to endogeneity and sample selection issues, conclude that education is one of the most important determinants of differences in wages and earnings across workers. When it comes to the quantification of returns to education at the individual level for LDCs – the 48 countries with the lowest socioeconomic indicators globally – the literature is, however, beset by some conflicting results. The influential results collected by Psacharopoulos (1980, 1985, 1994), for instance, indicated that the rates of return to education in developing countries tend to be higher than in developed economies, and that they are highest for primary education. Although such results have been partly challenged by more recent estimates of returns to schooling in developing countries (see Bennell, 1996a,b), the robust link between schooling and earnings has led to education being a priority within development strategies in recent decades and its importance has been mirrored in the Millennium Development Goals (MDGs) (UN, 2013b).

The results at the individual level might imply an even stronger link at the macroeconomic level, where external effects of education may play a quantitatively important role. Numerous studies have posed a theoretical link between human capital development and economic growth in developing countries. While early neoclassical models of economic growth tended to omit education as an input to production, from the 1960s it increasingly became viewed as one of the variables that could shed light on the unexplained residual in growth accounting exercises. The original Solow model (Solow, 1956), which has become the cornerstone of neoclassical economic growth theory, focuses on the accumulation of physical capital as a driving factor of income per capita growth. The Solow model postulates that changes in physical capital per worker fuel income growth on the way to a (country-specific) balanced growth path, where the growth rate of the economy is exclusively driven by improvements in technology. In this framework, it is the difference in physical investment rates, population growth and physical capital depreciation across economies that explains why some countries are able to increase their income per capita at higher rates than others. Mankiw et al. (1992) generalise the standard Solow model to include human capital as a determinant of income per capita. They show that the neoclassical model augmented with human capital is able to explain the empirical puzzle regarding the fact that income per capita is less responsive to investment rates than implied by the Solow model. The conclusion of a specification of the income growth process such as the one used by Mankiw et al. (1992) is that investment in human capital is able to increase income per capita growth in the transition to the balanced growth path.

Endogenous growth theory models provide explanations as to why human capital investments are important to economic growth (see Barro and Sala-i-Martin, 1995), although cross-country, macroeconomic studies have frequently produced inconsistent and unexpected outcomes (Pritchett, 2001). This is particularly surprising, since microeconomic studies consistently demonstrate a positive relationship between an individual's attained education and his/her labour earnings (for an in-depth review, see Wilson and Briscoe, 2004).

While levels of different measures of human capital do have a degree of explanatory power in growth regressions, the growth rate of human capital stock in fact frequently returns very little explanatory power and sometimes enters regressions negatively rather than positively (Benhabib and Spiegel, 1994; Islam, 1995; Pritchett, 2001). In order to give a rationale to such results, Benhabib and Spiegel, in the spirit of Nelson and Phelps (1966), provide a theoretical framework where human capital plays a role that goes beyond that of a standard input of production. Human capital in this paradigmatic setting is assumed to be a determinant of technological change by having an effect on innovation and technology adoption. On the one hand, countries with a high share of educated individuals have a higher probability of carrying out technological innovations that are able to improve total factor productivity. The highest levels of total factor productivity observed at the global level constitute what growth economists refer to as the "technology frontier". On the other hand, countries which are poorer and thus present lower productivity levels benefit from education through its effect in terms of facilitating the adoption of foreign technologies. In this sense, education increases the speed at which countries converge to their balanced growth equilibrium and its growth effect depends on both the stock of human capital and the level of productivity of the economy (which is interpreted as the distance to the technology frontier or relative backwardness of the country). This implies that the role that human capital investments play in developing countries should be quantitatively more important than in developed countries, since improvements in educational attainment enable a faster convergence in income per capita to their long-run equilibrium.[3]

3. Methods and data

In order to quantify the prospects of LDCs in terms of educational improvement and economic growth in the forthcoming decades, several country-level projections of income per capita were conducted based on different scenarios concerning the

[3] It should be noted that "income convergence" in this context defines the phenomenon of having higher growth rates of income per capita the further a country is from its own equilibrium (see for instance Barro and Sala-i-Martin, 1995). Income convergence to a country-specific long-run equilibrium (conditional convergence), however, does not necessarily imply that income convergence takes place across countries (unconditional convergence).