Skills development and competitiveness in Africa

Outline

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I would like to discuss the model I am planning to estimate, the best way to handle missing data (averaging or imputing the data) and the estimation methods.

I. Introduction

The global competitiveness index shows that most African countries are lagging behind the rest of the world with as many as 13 out the 20 bottom countries being from Africa and only four African countries ranked above the median (Global Competitiveness Report 2011-2012). This suggests that despite the high economic growth rates, 5.2% on average between 2003 and 2011 (African Economic Outlook, 2012), recorded in Africa in recent years there is a long way to go in terms of sustainability of these high rates of growth. The outcome of interest when looking at sustainability of economic growth is competitiveness.

There can be many reasons why competitiveness of African countries is low. The World Economic Forum identified 12 pillars of economic competitiveness: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labor market efficiency, financial market development, technological readiness, market size, business sophistication and innovation. That is 12 likely reasons why African countries lags behind the rest of the world as far as competitiveness is concerned. Among these pillars I chose to focus on the pillar which related to skills development, namely higher education and training.

One of the reasons for focusing on skills development is that in recent years many African countries have designed development plans to outline how they expect to achieve economic transformation and most countries have identified skills development as a central pillar.

However, these plans do not provide details as to how skills will be developed and used to drive economic growth and transformation. The other reason for making skills development the focus of this study is that there is little empirical evidence of the contribution of skills to economic competitiveness in developing countries and virtually none focusing on Africa. Therefore, the purpose of this paper is to examine the impact of skills development on economic competitiveness in Africa and the implications of for economic transformation.

II. Literature review

The theoretical literature on skills development and competitiveness has been summarized in Lall (1999), Quiggin (1999), Wignajara (2005), and Onsomu et al (2010). The main postulate is that education quality determines the level of skills a country's workforce will have which in turn has an impact on the ability to develop new technologies and/or to adopt and adapt existing ones. The ability of a country to master the use of technology will determine the sustainability of its economic growth, in other words, its competitiveness. Skills development and mastering of technologies also have implications in terms of employment as they facilitate labor market clearing.

Here, I focus on two relevant past empirical studies on skills and competitiveness. Lall (1999) run a cross sectional analysis of the impact of Foreign Direct Investment (FDI) and skills on competitiveness for 72 countries. Competitiveness was measured as the share of high technology plus medium technology exports in manufactured exports and as per capita value of high plus medium technology exports. Using data for the year 1995 he found that skills, FDI inflows and Research and Development (R&D) positively contribute to economic competitiveness but he was cautious to highlight the shortcomings of his regressions, namely the approximate nature of the variables and the unsophisticated nature of the econometric methods. Indeed the main shortcomings of Lall's study are the use of cross sectional data and the failure to control for fixed effects and time effects.

Onsomu et. al. (2010) ran a similar regression as Lall in terms of variables included in the regression but they were able to control for country-specific effects and time effects. However, they used the share of high technology exports in total manufactured exports as dependent variable rather than share of high technology plus medium technology exports in total manufactured exports as suggested by Lall. This is really important especially for African countries as the definition of high technology exports in World Development Indicators (WDI) is as follows: "High-technology exports are products with high R&D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery." Looking

at production data from UNIDO one can notice that the high technology amount is zero for virtually all African countries. This means that African countries are not likely to export high technology products if they are not producing them. The reason why high technology exports amount in not zero in African countries is that those countries re-exports high technology products they may have acquired and used in the past. Therefore, using only high technology exports (as % of manufactured exports) as outcome may be misleading. In light of that shortcoming of the WDI variable for high technology exports, I will use as dependent variable the share of high technology plus medium technology exports on manufactured exports. Another shortcoming of this paper is that the authors could not control for business organizations and firm efficiency as recommended by Lall. Given data limits, I will run regressions where I attempt to control for firm efficiency using a two-year panel dataset.

A common shortcoming of both studies is that there were not able to control for education quality. However, it is important to control for education quality as it has been shown by Hanushek and Woessmann that education quality is a more important predictor of economic growth and that "… a year of schooling does not produce the same cognitive skills everywhere." Therefore, I will use returns to schooling data from Schoellman (2011) to control for education quality in my regressions. Schoellman (2011) used the Public Use Micro Survey data from the 2000 US census to measure returns to schooling for foreign-born US immigrants and showed that sizeable differences in returns to schooling exist, depending on the type of country (developed or developing) migrants are from. He conducted robustness checks to ensure the observed differences in returns to schooling are due to education quality differences rather than selection or skill transferability. The main conclusion of Schoellman's paper is that differences in education quality are equally important as differences in education quantity in explaining differences in output per worker across countries. This result forms the basis of the second hypothesis of my paper, namely education quality matters for competitiveness. Similarly to previous studies, my first hypothesis is that skills development matter for competitiveness. Unfortunately, the data is available for the year 2000 only which means I am can only estimate a cross section or make the assumption that the education quality has not changed over the period of interest.

If this is empirically verified in my study then African countries can gradually increase their competitiveness by first using their cheap labor to compete; then train their youth in technical and vocational skills target at developing specific industries and in the long run upgrade their skill

profile to move up the value chain. This paper goes beyond previous studies in three ways. I use a longer panel data 1999-2011, so can control for time and country effects, I control for business organizations and firm efficiency and for education quality.

III. Data and methods

a) Data

The data for this study comes from several sources. The exports data on medium and high technology exports are from the United Nations COMTRADE database. The population, GDP and FDI data are from the World Bank's World Development Indicators database. The skill indices are computed using data from the World Bank's Education Statistics database. The education quality data are from Schoellman (2011) paper on education quality and development accounting where he computed and used returns to schooling of foreign-educated immigrants in the US to measure the quality of education of their country of birth.

Because the Schoellman data covers 131 countries[1] only our sample will be restricted to those countries so as to be able to compare the results with and without controlling for education quality. Data used to compute the technical enrolment and engineering enrolment indices is available from 1999 only; therefore the sample is restricted to the period 1999-2011.

There are missing data in the sample. Most missing values are from developing countries which are known to have weaker statistical systems than their developed counterparts. Thus, I assume that the data is missing at random and use multiple imputation methods to fill in the missing values. The final sample is a balanced sample of 127 countries and 13 time periods.

The dependent variables in this study are the share of high plus medium technology exports in manufactured exports and the per capita value of high plus medium technology exports. Both are used as competitiveness measures since the former indicates whether a country can compete with industrialized economies while the latter gauges capacity to export per inhabitant.

The skill indices used as regressors here are the Harbison-Myers Index (HMI) and the Technical Enrolment Index (TEI). Engineering enrolment index was also computed is highly correlated with TEI thus I decided to use TEI which has a smaller number of missing values. The HMI is computed as the sum of secondary enrolment and tertiary enrolment times five both as a

[1] In fact some of those countries are entities such as autonomous regions of countries or are former countries such as Azores, Taiwan, Czechoslovakia, and Yugoslavia. Merging this data which exports and education data causes the four entities to drop out which leaves us a sample of 127 independent countries.

percentage of age group. The TEI is the tertiary enrolment (times 1000) plus tertiary enrolment in technical subjects (time 5000), both as a percentage of population (Lall, 1999). The others regressors are net FDI inflows, R&D expenditures, Gross Domestic Product (GDP) and the US immigrants' returns to schooling.

b) Methods

This section draws on the work of Lall (1999) and Onsomu and others (2010), the model estimated is as follows.

$$y_{it} = \alpha_i + \gamma_t + \beta \boldsymbol{X}_{it} + \varepsilon_{it}$$

where y_{it} is share of medium plus high technology exports in manufactured exports, α_i is country-specific effect, γ_t is time-specific effect, $\boldsymbol{X}_{it}$is the vector of explanatory variables, and ε_{it} is the error term. Fixed effects methods will be used to estimate the model on pooled data for developing countries and for a sub-sample of African counties for comparison purposes.

IV. Results

V. Conclusion