Economic development and growth in the world economy

Rui Castro

Université de Montréal, Département de Sciences Économiques and CIREQ, CP 6128, succ. Centre-Ville, Montréal, Québec, Canada H3C 3J7

Abstract

This paper investigates whether technological shocks, constructed to be consistent with the observed cross-country income dispersion, are also capable of accounting for development regularities related to capital accumulation. This question is approached via a quantitative theoretical analysis of an integrated world economy model. An open economy framework constrains country heterogeneity to be consistent with international capital flows. Moreover, it enables the study of distinctively open economy development facts. The model produces time-invariant cross-sectional distributions for development variables, whose properties are quantitatively compared with the Penn World Table data set. The model generates too little dispersion in capital-output ratios and investment rates. However, it is consistent with the relative importance of investment, saving, and international capital flows for economic development.
© 2004 Elsevier Inc. All rights reserved.

E-mail address: rui.castro@umontreal.ca.

1. Introduction

The goal of this paper is to investigate whether cross-country technological differences, which are designed to match the observed cross-country income dispersion, are also capable of accounting for development facts related to physical capital accumulation.

Specifically, this paper is interested in three sets of questions. The first set concerns cross-country dispersion in capital-output ratios: How much of this dispersion can the model account for? What fraction is due to investment-specific technological differences, and what fraction is due to neutral productivity differences? What is the contribution of international borrowing and lending? Secondly, the paper asks whether the model generates differences in investment rates and saving rates, which are as large and persistent as in the data. Finally, a third set of questions looks at the interaction between saving, investment, and cross-country capital flows. Specifically, the paper asks whether, in the model, currently richer countries have saved more, and especially invested more in the past; and whether faster-growing countries tend to save more, and especially invest more. The paper then looks at development miracles and disasters as an illustration of these regularities.

These questions are approached through a quantitative theoretical analysis of a model of an integrated world economy. The framework features a large number of small open economies, each producing a single homogeneous consumption good and a single homogeneous investment good. Financial markets are complete at the national level, but incomplete at the worldwide level. International borrowing and lending is freely allowed through trade in one-period riskless bonds, subject to a borrowing constraint. National economies are ex ante identical, but total factor productivity (TFP) and the productivity specific to the sector producing investment goods are stochastic. Both technology shocks are purely country-specific. In part because these risks are uninsurable in world asset markets, national economies will differ ex post. The focus is on a "long-run" scenario of time-invariant equilibrium cross-sectional distributions for the relevant variables. This scenario fits the approximate stability in world income inequality that is displayed in the Summers–Heston Penn World Table data set.

A calibrated version of this model world economy is solved numerically and its results are compared with the evidence from the Penn World Table data set. To perform this exercise, investment-specific technology levels are identified from data on the relative price of investment goods, and neutral technology levels from data on Solow residuals, appropriately adjusted for the presence of investment-specific technological differences. In this sense, by design, neutral technological differences are consistent with differences in income levels. The model is also calibrated to display a reasonable degree of cross-country capital flows.

The paper finds that technological differences of this type account for very little, from 1/5 to 1/3, of the observed dispersion in capital-output ratios, essentially all of it due to investment-specific productivity differences. This dispersion is nevertheless about 1/3 higher than what it would have been without international borrowing and lending, which reflects the contribution of the open economy framework in accounting for the basic dispersion in capital-output ratios. Since the capital share in the model is calibrated to a small value, 1/3, the model still generates about 90% of the observed dispersion in incomes,