

BOOK REVIEWS

Robert J. Barro, *Determinants of Economic Growth: A Cross-Country Empirical Study*. Cambridge, MA: The MIT Press, 1997. xii + 145 pp., index, \$22.50.

I expected Robert J. Barro's *Determinants of Economic Growth: A Cross-Country Empirical Study* to be a concise summary of his pioneering work on the factors underlying long-run growth. This book is much more. Besides documenting many of the determinants of growth, Barro provides: (1) an intuitive characterization of the theories underlying empirical investigations of growth, (2) an insightful critique of econometric methodologies used in the growth literature, and (3) an intellectually stimulating analysis of the relationship between democracy and economic progress.

The book begins by discussing a critical implication of the neoclassical growth model, the conditional convergence hypothesis. The conditional convergence hypothesis states that the lower the starting level of real per capita gross domestic product (GDP) is relative to the country's steady-state level of real per capita GDP, the faster the predicted rate of economic growth. Thus, poorer countries will not necessarily grow faster than richer countries. Rather, the model predicts that poorer countries will only grow faster than richer countries if the poorer countries are farther below their steady-state real per capita GDP levels than the richer economies are below *their* steady-state levels. Only recently have economists energetically examined this key prediction.

A burgeoning body of evidence supports the conditional convergence prediction. To control for cross-country differences in steady-state levels of GDP per capita, Barro uses measures of education, health, the legal system, terms of trade changes, government spending as a fraction of GDP, fertility, and political freedom. The estimation is conducted using a panel of about 80 countries, where there are three observations per country (data permitting) for the periods 1965–1975; 1975–1985; and 1985–1990. Barro finds that the speed of convergence is about 2.5% per year. This implies a very slow rate of convergence compared to the predictions of the underlying model. Specifically, these estimates imply that it would take an economy 27 years to get halfway to its steady-state level of GDP per capita. Estimates from very different data sets (the U.S. states, Canadian provinces, Japanese prefectures, and regions of the main Western European countries) produce very similar conclusions.

Alternative estimation procedures, however, produce much faster estimates of

the speed of convergence. Specifically, some researchers highlight the potential biases introduced by omitting country-fixed effects and the endogeneity of the variables used to control for differences in steady-state levels. These concerns have led to the use of dynamic panel estimation techniques that employ data averaged over five-year periods. Then, after differencing the panel to eliminate country-fixed effects and using instrumental variables to mitigate endogeneity concerns, generalized method-of-moments procedures can produce consistent and efficient estimates. This technique yields estimates of the speed of convergence that are two to three times faster than those obtained using the standard procedures.

Professor Barro presents an intuitive critique of these alternative econometric procedures. I believe his clarification of the econometric issues represents a material contribution because dynamic panel techniques are becoming increasingly popular in the growth literature. Barro notes that there is little time-series variation in many of the explanatory variables commonly entered into growth regressions. Yet, the dynamic panel technique emphasizes time-series relationships. Moreover, by focusing on shorter-term growth, the dynamic panel estimation procedure may exaggerate the measurement error bias, which will tend to create exaggerated estimates of the speed of convergence and reduce the significance of other explanatory variables. This is precisely what Professor Barro illustrates with the data.

Turning away from convergence and toward long-run growth, Barro notes the major weakness in the neoclassical growth model. The neoclassical growth model predicts that per capita growth will eventually stop unless technology continuously advances. Since per-capita growth is not stopping and since the model does not explain technological progress, the neoclassical growth model essentially becomes a growth model that does not explain long-run growth. Thus, researchers developed models with steady-state growth either because the returns to investment do not diminish or because of intentional investments in research and development that continuously advance technology.

Empirically, Professor Barro finds that more schooling, better health, lower fertility rates, less government consumption relative to GDP, greater adherence to uncorrupted rule of law, improvements in the terms of trade, and lower inflation all go hand-in-hand with faster rates of economic growth. The book provides an expanded analysis of inflation and growth, which has yielded ambiguous results in many studies. While this book does not deal econometrically with causality, the analyses and figures provide a rich insight into the relationship between growth and a broad array of economic, political, and social factors. Similarly, other researchers have stressed the importance of openness to international trade, the development of financial markets, and other policy indicators. This book, however, investigates a broad range of country characteristics, instead of attempting to isolate those policy indicators which are most closely tied to growth.

This book also delves into a comparatively unexplored area, the interplay between economic and political development. The data suggest a nonlinear relationship between democracy and growth. In countries with low levels of political freedom, a marginal increase in political freedom is associated with an acceleration in growth. However, at high levels of political freedom, a marginal increase in political freedom is associated with a slowing in growth. Barro notes that the data are consistent with the view that (a) in dictatorships, more political rights increase growth because of the reduction in government control, but (b) in countries with substantial political freedoms, a further increase in political rights impedes growth by increasing growth-retarding policies associated with income redistribution. There may, however, be important feedback effects. Barro shows that increases in the standard of living are positively linked with increases in democracy, which confirms views about democracy and wealth that were expressed first by Aristotle.

This book offers a lot in an easily readable form. Whether you are actively engaged in empirical research on growth or whether you are looking for an introduction to the subject, this book is an investment that will generate high returns.

Ross Levine

University of Virginia
Charlottesville, Virginia 22903-3288