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Book Review

[Book Review of] Ochoa, Orlando A. : Growth, trade and endogenous technology : a study of OECD manufacturing : Houndsmill, MacMillan, 1996

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CGE models should not be considered as prognoses, but rather as quantifiable conjectures.

Unfortunately, the conference volume has no articles identifying and advocating future needs for reform of the present WTO system. While some opinions as to future reform agendas are hidden in some of the articles, no author has strung these together and given an overall assessment of what is left to be done. An exception is the final article by *Kym Anderson* who addresses the intrusion of environmental and labour standards into trade policy – a subject, it must be hoped, that will not manage to find its way onto future reform agendas. Here, the reader is compensated for the lack of normative thinking about the future by an excellent case against environmental and labour standards as part of a new GATT.

On the whole, the volume is a very good and detailed overview of the UR results and the potential impacts on world trade. Its descriptive as well as its analytical content go beyond assessing changes in developing countries trade positions after finalization of the UR and implementation of the new WTO system. Such broader focus on world trade is necessary. The interdependency of the trade system means that the adjustment processes in developing countries not only depend on the implementation of the UR agreements and further trade liberalization in some of these countries, but will also be influenced by adjustment processes taking place in developed countries. It is apt to point out that more attention should have been given to discussing the cases for and against special and differential treatment of developing countries. The preservation of this principle which forms part of the UR (compromise) package continues the GATT tradition of different speeds of trade liberalization and the tradition of development strategies that have turned out to be ineffective.

The interested reader should be aware that my review has ordered the papers into subgroups which will not be found in the book itself. In my view, this would have greatly enhanced the book; instead the reader is presented by a rather unstructured numbering of fifteen papers – possibly an outcome of following the conference timetable. The result is that the articles tend to overlap, especially where results of the UR are concerned. Yet, readers who get through these reiterations will be compensated by detailed insights into the world trade prospects under the new WTO and into methodological approaches for building applicable world trade models.

Dieter Bender

Ochoa, Orlando A., *Growth, Trade and Endogenous Technology: A Study of OECD Manufacturing.* Houndsmill, Basingstoke, London, New York 1996. MacMillan Press. XIII, 198 pp.

This remarkable monograph presents a carefully crafted and comprehensive empirical exploration of Paul Romer's famous model of endogenous technological change. The study is based on a disaggregated data set for manufacturing industries in eleven OECD countries during the period from 1970 to 1987. Its finding that output growth is determined by sectoral research effort, the potential for technological catch-up and a country's technology policy, as well as growth in capital and employment, supports Romer's central hypotheses about the growth effects of knowledge production and diffusion: increases in the relevant stock of human capital are the ultimate source of long-run growth; productivity grows as a consequence of endogenous technological change, which in turn is driven by new capital inputs and knowledge externalities; and government policy can have a positive impact on that process.

Ochoa's book begins with a review of the main strands of new growth theory, emphasizing the genesis and intellectual contribution of the Romer model. Building on this review, five subsequent chapters report Ochoa's empirical work. The first of these derives the empirical predictions and an econometric specification of Romer's model used throughout the book; it also discusses methodological issues in cross-country growth analysis and data characteristics.

The second empirical chapter examines the contribution of capital to output growth across manufacturing sectors as implied by the basic neoclassical model. But Ochoa finds that higher growth performance is not just linked to higher investment, but also to new capital inputs, identifiable sources of endogenous technological change and technological catch-up.

The third empirical chapter examines trade and other cross-country, cross-industry differences as sources of endogenous technology. As implied by Romer's model, Ochoa rejects the notion of exogenous technology and generalized diminishing returns. Instead, he finds that growth at the industry level is largely explained by the interaction between growth in physical capital and the human capital employed in the business research sector as well as by international productivity convergence.

The fourth empirical chapter examines human capital and research activities as sources of comparative advantage, taking a long-run approach. Ochoa finds further support for Romer's basic model of endogenous technological change, but cannot confirm the postulated direction of causality from trade to growth. He emphasizes the difficulty of separating any measure of trade performance from measures of endogenous technology, which he suspects as a fundamental source of long-term comparative advantage. The accumulation of technical human capital is identified as one of the nation-specific factors behind country-wide productivity gains.

The fifth empirical chapter attempts an assessment of the impact of national technology policies, infrastructure investments and macroeconomic policy on output growth in manufacturing. Only for technology policy, proxied by the number of research scientists and engineers employed in government and higher education, does Ochoa find a positive impact on growth in OECD manufacturing industries.

Although it is a pity that this extensive study had been completed before Jones (1995) astutely criticized Romer's model for its counterfactual scale effects, Ochoa has written a useful book. He avoids the methodological pitfalls that bedevil the convergence literature and argues persuasively that the detailed study of manufacturing industries is more informative about the sources of growth than cross-country regressions at the aggregate level. However, the path-dependent nature of his research voyage, which has involved repeated respecification and sequential testing of basically one and the same regression equation, may be judged as a drawback. Although his approach is firmly based on theory, the most exacting criticisms would rightly be concerned about data mining. In spite of this, Ochoa's study is to be commended for offering a unique blend of theory, data and estimation, as well as thoughtful, non-technical interpretations. This book should be of interest to growth economists and policymakers alike.

References

Jones, C. J. (1995). R&D-Based Models of Economic Growth. *Journal of Political Economy* 103(4):759–784.

Romer, P. M. (1990). Endogenous Technological Change. *Journal of Political Economy* 98(5) suppl.:S71–S102.

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