

*Unified Growth Theory*. By Oded Galor. Princeton, New Jersey: Princeton University Press, 2011. ISBN 978-0-691-13002-6.

In the past few decades, economic growth theory has witnessed a renaissance improving substantially our understanding of determinants and implications of economic growth. The development of endogenous growth theory focused on technological progress and human capital accumulation as two engines of growth on per-capita in addition to physical capital accumulation emphasized by neoclassical growth theory.

Unified growth theory is the most recent valuable addition to modern growth theory. Its development started with Oded Galor's radical scientific conviction: understanding comparative economic development must be based on a growth theory reflecting the same fundamental forces that have governed the remarkable transition of the world economy from an epoch of Malthusian stagnation to a relatively short period of sustained economic growth.

This conviction resulted in a 20 year research effort and accomplishments of Oded Galor, a leading and influential scholar in the field of economic growth. He is the founding editor of the *Journal of Economic Growth*, and has made numerous contributions to economic growth including the background ones for this monograph. Most of these contributions have been published in top-quality economic journals. Undoubtedly, Galor is the best scholar to walk the reader through the structure and implications of this provocative theory.

What is unified growth theory? It is a theory of growth that provides a formal framework which accounts for the entire growth process of human history. The term "unified" refers to those common fundamental growth engines that have propelled the transition from stagnation to sustained growth. The same engines have resulted in differential timing of fertility transitions across regions causing substantial divergence in living standards across the global economy. Unified growth theory provides insights on the interaction between human evolution and the process of economic development.

Chapters 1 and 2 introduce stylized facts that characterize the global process of economic development over human history. This process is divided into three regimes, Malthusian, Post-Malthusian, and Modern Growth. More than 35 figures, charts and tables present evidence, based on secondary sources, describing the main characteristics of each regime. These stylized facts strongly suggest that Malthusian stagnation characterized most of human history. Technological progress was miniscule and led to an expansion in population rather than improving living standards. In the Post-Malthusian regime, the first phase of industrialization emerges resulting in acceleration of technological progress and physical capital accumulation. During this regime, population growth and income per capita rise temporarily. The Modern

Growth regime is characterized by the emergence of human capital formation that complements and accelerated the pace of technological progress. This combination triggers a substantial reduction in fertility and population growth propelling a permanent escape from the Malthusian trap. These two descriptive chapters set up the stage for the formal presentation of the theory.

Chapter 3 develops the first building block of unified growth theory by presenting a simple overlapping-generations model of Malthusian stagnation. Individuals generate utility from consumption and the number of surviving children. Output is produced with a Cobb-Douglas function using land and labor. Technological change is land augmenting. The model generates two empirically relevant predictions: first, technological progress leads to a larger population; and second, differences in land productivity are correlated with differences in population density across countries. Chapter 4 extends the basic framework by assuming that each household generates utility from consumption, the number of children, and human capital per child. Raising children involves time-related opportunity costs. The augmented model generates demand for human capital leading to fertility decline. This new hypothesis is consistent with a range of evidence on demographic transitions.

Chapter 5 presents the main building blocks of unified growth theory. Households in each overlapping generation choose the number and quality of children under a subsistence consumption constraint. Where the latter is binding, higher parental income results in more children with no effect on their quality. The growth rate of land augmenting technological progress depends on average human capital and the level of population. Based on household optimization, an increase in the rate of technological progress boosts the demand for human capital and quality of children, and decreases the equilibrium number of children.

The dynamic system is described by two simple equations governing the evolution of human capital formation and the rate of technological progress. The latter depends on the level of population exhibiting scale effects. Chapter 5 elegantly illustrates the evolution of technology and human capital accumulation using primarily geometric techniques. For a relatively small population level, the subsistence consumption constraint is binding, investment in human capital is zero, the rate of technological progress is slow, and households optimally choose to raise more children. The system reaches Malthusian stable steady-state equilibrium which is conditional on population level. Endogenous positive population growth means that eventually the global economy reaches a relatively moderate population level a Post-Malthusian regime. During this regime, the rate of technological progress increases giving birth to multiple steady-state equilibria. For intermediate population size, investment in human capital remains zero and the rate of technological progress is moderate. Finally, for sufficiently large population size, the economy reaches the Modern Growth regime with positive investment in human

capital, rapid technological progress, positive income per capita growth, and moderate population growth.

Chapters 6, 7 and 8 study the implications of unified growth theory and human evolution in regard to comparative economic development. Chapter 6 advances the hypothesis that cultural, geography-based, and institutional factors determined the differential timing of transition from stagnation to growth across countries and generated disparities in living standards. Chapter 7 states and defends the radical hypothesis that subsistence consumption affected the process of natural selection by providing a survival advantage to individuals with predisposition for higher quality children. As a result, forces of natural selection accelerated the transition from Malthusian stagnation to Modern Growth regime. Chapter 8 offers concluding remarks.

This is a well-written and thought-provoking book that describes the main elements and implications of unified growth theory. In my opinion, the radical idea, that the transition from stagnation to growth in living standards can be explained by a unified analytical framework, is plausible and merits additional scientific attention. I have, however, a few quibbles with the book. In particular, I am skeptical about the quality of historical evidence used to support the theory's assumptions and implications. Most evidence has been extracted from secondary sources, is presented in graphs and charts, and is suggestive rather than conclusive. The assumption that the rate of technological progress depends on the size of population governs the transition from one conditional steady-state equilibrium to the next. Yet, this assumption introduces the scale-effects property which is inconsistent with time series and cross-country evidence, at least during the modern growth regime. Replacing the dependence of the knowledge function on the level of population with dependence on technological complexity or cumulative knowledge, along the lines of semi-endogenous growth theory, might resolve this issue.

The book provides a purely positive (as opposed to a normative) perspective to human history. What are the welfare and policy implications of the theory? Is a family with less but high-quality children happier than a family with more low-quality children? The answer to this question remains unclear in the context of unified growth theory because the theory is built on a framework where households choose the quantity and quality of children in the presence of several externalities stemming from assumptions such as overlapping generations and scale-dependent technological progress. Where natural selection determines partially the level of economic development is there scope for welfare-improving public policy? Finally, one can readily conjecture that unified growth theory embeds an unconditional steady-state equilibrium in which world population is large and constant, i.e., there is no population growth, and scale-free technological progress is fueled exclusively by investment in human capital

formation. Is this utopian steady-state, with perpetual growth in living standards, stable and attainable? The answers to these fascinating and provocative questions constitute fruitful avenues for future research.

The book is intended primarily for an academic audience. Economists in the fields of economic growth, comparative economic development, macroeconomics, international trade, population economics, and economic history will enjoy reading one more intellectual accomplishment of growth theory. Graduate students in aforementioned fields could discover several useful techniques and ideas leading to publishable papers and dissertation topics. The book could also serve as supplementary textbook for graduate level courses in economic growth and comparative development. I highly recommend it.

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