Unified Growth Theory

Oded Galor

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藏书章

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Unified Growth Theory

Dedicated to the members of two generations of my family who have profoundly affected my life—my sons Alon, Yuval, and Omri, and my parents Sarah and Joseph

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Preface

Striving toward unification and simplification of the premises of the theory as a whole.

—Albert Einstein

This book is devoted to Unified Growth Theory—an intellectual endeavor conceived and developed by the author over the course of 20 years of research. The theory explores the fundamental forces that have generated the remarkable transition of the world economy from an epoch of stagnation to an era of sustained economic growth and triggered the emergence of the vast disparity in the standards of living across the globe.

The research agenda has been stimulated by the author's conviction that the understanding of comparative economic development would be hindered unless growth theory would reflect the principal growth engines over the entire process of development and would capture the central role played by historical and prehistorical factors in the prevailing disparity across countries and regions. Moreover, it was instigated by the recognition that the hurdles faced by less developed economies in reaching an era of sustained growth would remain obscure unless the forces that facilitated this transition among the currently developed economies would be thoroughly explored.

Chapter 1 introduces the empirical and theoretical motivations of the quest for a unified theory of economic growth. It examines the fundamental inconsistencies of non-unified growth theory with the process of development as a whole, underlines the importance of the establishment of a unified theory of economic growth, and describes the central hypotheses of Unified Growth Theory and their implications for comparative economic development.

Chapter 2 provides an overview of the three fundamental regimes that have characterized the process of development over the course of human history: the Malthusian Epoch, the Post-Malthusian Regime, and the Modern Growth Regime. It explores the forces that have generated the transition from stagnation to growth and have contribued to the emergence of the vast inequality across countries.

Chapter 3 develops the foundations of the influential Malthusian theory and examines its predictions regarding the evolution of population and income per capita in the pre-industrial era of human history. The analysis explores the hypothesis that although the growth of income per capita was minuscule during

the Malthusian Epoch, the dynamism in population and technology over this period was instrumental for the emergence of economies from the Malthusian Epoch.

Chapter 4 examines the triggers for the onset of the demographic transition that has swept the world since the end of the nineteenth century and has been identified as one of the prime forces in the movement from stagnation to an era of sustained economic growth. The chapter explores various mechanisms that have been proposed as possible triggers for the demographic transition, assessing their empirical plausibility and significance in understanding the transition from stagnation to growth.

Chapter 5 develops the foundations of Unified Growth Theory. It underlines the significance as well as the intellectual challenge associated with the establishment of a unified theory of economic growth that captures each of the central phases in the process of development while orchestrating an endogenous transition across these distinct regimes. The chapter highlights the fundamental building blocks of Unified Growth Theory and their role in generating a dynamical system that accounts for (a) the epoch of Malthusian stagnation that has characterized most of human history; (b) the escape from the Malthusian trap and the associated spike in the growth rates of income per capita and population; (c) the emergence of human capital formation in the process of development; (d) the onset of the demographic transition; and (e) the emergence of the contemporary era of sustained economic growth.

Chapter 6 derives the implications of Unified Growth Theory for comparative economic development across the globe. It explores the role of cultural, institutional, and geographical factors in the differential pace of transition from stagnation to growth and the emergence of the contemporary disparity across countries. Furthermore, it establishes the persistent effect that deep-rooted factors (e.g., biogeographical endowments and migratory distance from the cradle of humanity in East Africa) have had on the course of comparative economic development from the dawn of human civilization to the modern era, and it examines the implications of Unified Growth Theory for understanding the origins of multiple growth regimes and convergence clubs.

Chapter 7 explores the dynamic interaction between human evolution and the process of economic development. It advances the hypothesis that during the Malthusian Epoch, when the subsistence consumption constraint affected the vast majority of the population, the forces of natural selection complemented the growth process and played a significant role in the transition of the world economy from stagnation to growth.

Finally, Chapter 8 offers some concluding remarks about the achievements of Unified Growth Theory thus far and the looming challenges in the exploration of the role of historical and prehistorical factors in contemporary economic development, as well as in the analysis of the interaction between human evolution and the process of development.

The philosophical foundations of this research agenda have been outlined by the author in his interview by Brian Snowdon (2008), "Towards a Unified Theory of Economic Growth." The theory was the subject of the author's Kuznets Lecture titled "Unified Growth Theory and Comparative Economic Development" (Yale University, 2009), Klein Lecture titled "Comparative Economic Development: Insights from Unified Growth Theory" (Osaka, 2008), opening lecture of the Israeli Economic Association Annual Meeting titled "From Stagnation to Growth" (Ma'ale Hahmisha, Israel, 2003), a keynote lecture at the DEGIT Annual Meeting (Vienna, 2001), and the keynote lecture of the Annual T2M Conferences (Paris, 2000). In addition, the theory was the focus of the author's lecture series for the Danish Doctoral Program (Copenhagen, 2008), the Minerva Summer Workshop in Economic Growth (Jerusalem, 2008), the International Monetary Fund Training Program (2006 and 2008), the Center for Economic Policy Research Summer Workshop in Economic History (Florence, 2007), and the Dutch Joint Doctoral Program (Groningen, 2000).

The research that led to this book has greatly benefited from the author's collaborations with Quamrul Ashraf, Stelios Michalopoulos, Omer Moav, Andrew Mountford, Dietrich Vollrath, and David Weil, and from extensive discussions with Carl-Johan Dalgaard, Peter Howitt, Ross Levine, and Yona Rubinstein. In addition, this research has profited from the interaction with doctoral students who attended the author's courses at Brown University, Providence, Rhode Island; the Hebrew University of Jerusalem; and the Massachusetts Institute of Technology, Cambridge, Massachusetts, and researchers who attended dozens of the author's lectures on segments of this book around the globe. In particular, the author is grateful to Charles Horioka and the members of the Institute of Social and Economic Research at Osaka University for fruitful discussions in the course of the Klein Lecture, and to Tim Guinnane, Mark Rosenzweig, Paul Schultz, and other members of the Growth Center at Yale University, New Haven, Connecticut, for stimulating discussions in the course of the Kuznets Lecture.

In addition, the final version of the manuscript benefited from numerous suggestions by William Fallon, Martin Fiszbein, Martin Guzman, Casper Hansen, Cory Harris, Mariko Klasing, Lars Lønstrup, Ryan Miller, Kuni Natsuki, Ehud Schwammenthal, Sarah Stein, and Harvey Stephenson and invaluable comments by anonymous reviewers, Boris Gershman, and Gareth Olds. Finally, support of the National Science Foundation through grants SBR-9709941, SES-0004304, and SES-0921573 and the Israel Science Foundation through grants 0341240, 848/00, and 795/03 for various segments of this research is gratefully acknowledged.

Providence, Rhode Island, January 2011

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CHAPTER 1

Introduction

A complete, consistent, unified theory . . . would be the ultimate triumph of human reason.

—Stephen W. Hawking

The transition from an epoch of stagnation to an era of sustained economic growth has marked the onset of one of the most remarkable transformations in the course of human history. While living standards in the world economy stagnated during the millennia preceding the Industrial Revolution, income per capita has undergone an unprecedented tenfold increase over the past two centuries, profoundly altering the level and distribution of education, health, and wealth across the globe.

The rise in the standard of living has not been universally shared among societies. Variation in the timing of the take-off from stagnation to growth has led to a vast worldwide divergence in income per capita. Inequality, which had been modest until the nineteenth century, has widened considerably, and the ratio of income per capita between the richest and the poorest regions of the world has been magnified from a moderate 3:1 ratio in 1820 to a staggering 18:1 ratio in 2000 (Figure 1.1).

An equally striking development has emerged in the world distribution of population. The decline in population growth in Europe and North America toward the end of the nineteenth century and the long delay in the onset of a corresponding demographic transition in less developed regions, well into the second half of the twentieth century, have generated significant bifurcation in the global distribution of population. The share of world population that resides in the prosperous region of Europe has declined by nearly one-half over the past century, whereas the fraction of the human population that lives in the impoverished regions of Africa and Latin America has doubled.

Throughout most of human existence, the process of development was marked by Malthusian stagnation: resources generated by technological progress and land expansion were channeled primarily toward an increase in the size of the population, providing only a glacial contribution to the level of income per capita in the long run. While cross-country variations in technology and land productivity were reflected in differing population densities, their effect on variation in living standards was merely transitory.

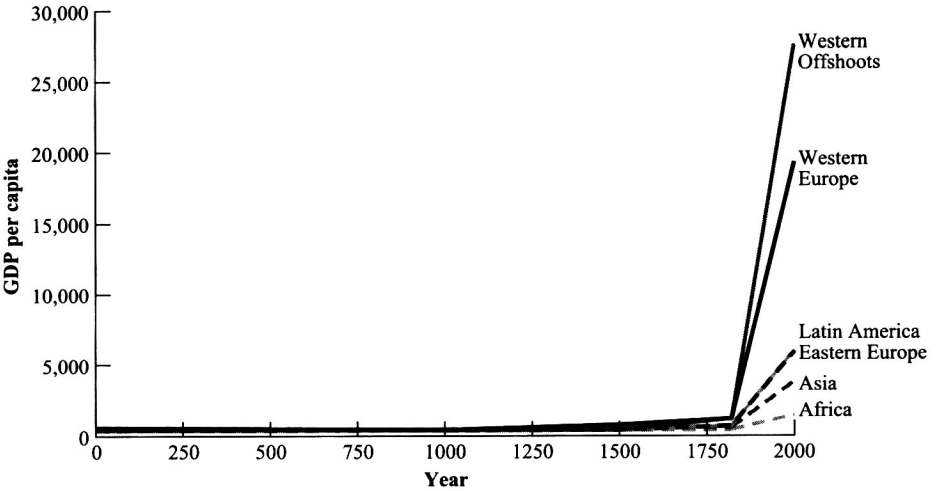

FIGURE 1.1. Evolution of regional income per capita over the past two thousand years.
Data source: Maddison (2001).
Note: The Western Offshoots are Australia, Canada, New Zealand, and the United States.

In contrast, over the past two centuries, various regions of the world have departed from the Malthusian trap and have witnessed a considerable increase in growth rates of income per capita. The decline in population growth over the course of the demographic transition has liberated productivity gains from the counterbalancing effect of population growth and enabled technological progress and human capital formation to pave the way for the emergence of an era of sustained economic growth.

The transition from an epoch of Malthusian stagnation to an era of sustained economic growth and the corresponding divergence in income per capita across the globe have been the center of intensive research during the past decade. The inconsistency of the predominant theories of economic growth with some of the most fundamental characteristics of the growth process and their limited ability to shed light on the origins of the vast global disparity in living standards have led to the development of a unified theory of economic growth that captures the growth process in its entirety.

Unified Growth Theory explores the fundamental factors that have contributed to the remarkable transition from stagnation to growth and examines their significance for the understanding of the contemporary growth process of developed and less developed economies. First, it unveils the factors that have generated the Malthusian trap. What accounts for the epoch of stagnation that

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