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Economic Growth and Development

A Dynamic Dual Economy Approach

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Overview

1

Among the most enduring questions in economics are those related to growth and development. Since 1776, when Adam Smith published *An Inquiry into the Nature and Causes of the Wealth of Nations*, economists have been assessing the factors determining a nation's standard of living and rate of economic progress. More than two centuries of research have improved our understanding of the roles of investments in physical and human capital, advancing technologies, openness, and sound institutions in transforming relatively poor economies into economic powerhouses. This book is an introduction to some of the newer features of growth theory that were developed after 1950. We show how the theory can be blended with historical data and case studies to think about the sources of economic prosperity.

Our coverage is selective and the book is no means a broad survey. We concentrate on transitional growth from a two-sector perspective. Most economists believe that this is the right approach for studying early growth. However, we also believe that the importance of transitional growth in explaining the complete growth experience of countries over very long periods of time has been underestimated. One of the primary objectives of the book is to make a case for transitional growth and its implications. For these reasons, we do not cover *endogenous growth theory*, which is an attempt to explain long-run technological change. For those who have an interest in endogenous growth theory, Aghion and Howitt (2008) is an excellent text for advanced undergraduates and beginning graduate students that discusses the topic in detail.

We begin with a single, relatively simple, theoretical framework that extends the Solow model to include endogenous theories of saving, fertility, human capital, and policy formation. The analysis is then expanded to include two sectors of production. We study the structural transformation of developing economies as they shift from traditional production in largely rural areas to modern production in largely urban areas during the early take-off period of modern growth. The two-sector growth model is used to explain the commonly observed differences in saving, worker productivity, and fertility across rural and urban sectors. We examine the effects of policies that reallocate resources across these sectors, such as taxation, migration restrictions, international trade, and the urban bias in the provision

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of public services. How policies affect the pace of the structural transformation is a critical feature of development as it plays an important causal role in determining an economy's aggregate growth rate.

The extensions to the standard one-sector growth model mentioned above add significant complexity to the analysis. We maintain tractability by using specific functional forms that make the main points more transparent. The use of specific functional forms also allows us to calibrate the models and assess the quantitative importance of various sources and mechanisms of growth. We believe this approach makes the book suitable for advanced undergraduates, beginning graduate students, and policy makers specializing in the macroeconomic analysis of development. The mathematics used in most of the text requires only undergraduate calculus and an exposure to optimization theory that can be found in intermediate microeconomics or an undergraduate mathematics-for-economist course. The more technical material is contained in starred sections and in the appendices at the end of chapters. End-of-chapters *Questions* are provided that help further focus the main points for less advanced students, and *Problems* are provided for more advanced students who want to work on model-building skills.

1.1 Why a Two-Sector Approach

Given the predominance of one-sector models in growth theory, it is natural to ask whether a two-sector model is needed. As mentioned, many economists believe accounting for two sectors is essential, especially for understanding the early stages of development. Lewis (1954) noted that developing economies exhibit a *dualism*, where two economies with fundamentally different structures operate within a single country. One economy operates in a *traditional* sector using elementary production technologies that rely heavily on raw labor, natural resources, and land. The other economy operates in a *modern* sector using advanced technologies that rely heavily on skilled labor and physical capital. The precise interpretation of the two sectors is left open and depends on the particular application of the framework.

In some applications, the traditional sector is thought of as rural in location and the goods produced are assumed to be agricultural. The modern sector is urban in location and produces manufacturing goods. In other applications, the same goods are produced in each sector but using different production technologies and inputs. For example, agricultural products can be produced using traditional or modern methods. As the economy evolves, the traditional ways of producing disappear, but not the products themselves.

The existence and effectiveness of markets also may differ across the two sectors as the markets for labor and capital in the modern sector will generally be more developed than the markets for labor and land in the traditional sector. Under this interpretation, the decline in the traditional sector represents the spread of markets for labor and land (as land is enhanced and developed, essentially becoming part of the reproducible capital stock).

In most developing countries, these different interpretations of the two-sector framework strongly overlap. The traditional sector is predominately rural and agricultural and is operated without much reliance on formal markets for labor and land. In the early stages of growth, the traditional sector is very large, and this is where the dual economy approach has the greatest potential to improve our understanding of development.

When the two sectors are given an explicit geographic interpretation, the households living and producing in the two locations may differ in their behavior because of differences in their economic environments and their initial conditions. Household behavior that may differ across sectors includes saving, work effort, human capital investment, and fertility—all of which relate to aggregate economic growth in important ways.

For example, Lewis thought that a dual approach was necessary to explain how saving rates and capital accumulation increased over the course of development. He conjectured that the income of capital owners in the modern sector would rise relative to incomes of workers and land owners as "surplus" labor from the traditional sector is pulled into the modern sector with little upward pressure on wages. Lewis believed that the relative expansion of capital income was important for growth because capital owners were viewed as saving a larger fraction of their income than land owners and workers. Thus, growth was accelerated by an increase in the economy's saving rate as the modern sector expanded and the traditional sector contracted.

Carter et al. (2003) argue saving rates expand with development for a different reason, but one that is also related to the presence of a dual economy. Residual income from inherited farms finances the consumption of the elderly and reduces the need for retirement saving during working years. As the economy goes through the structural transformation away from traditional family farming, the reliance on income from inherited family farms declines and the retirement saving out of earnings rises.

The difference in saving rates across the two sectors is only one possible feature of dual economies that affects aggregate growth. There is now a substantial body of evidence suggesting that there are large gaps in worker productivity across sectors in the early stages of development (Gollin et al. 2002, 2004, 2014). These productivity gaps suggest that labor may be inefficiently allocated and that TFP and aggregate economic growth increase as labor migrates from the low-productivity traditional sector to the high-productivity modern sector.

It is commonly observed that fertility is much higher in the traditional sector than in the modern sector (e.g., Greenwood and Seshadri 2002). This fact suggests that the movement of households from the traditional sector to the modern sector lowers the economy's fertility rate. A reduction in the economy's fertility creates another link between the transformation of the dual economy and economic growth. Reductions in population growth allow for greater accumulation in physical capital *per worker*, for a given saving rate.

Years of schooling for children of households in the modern sector are typically higher than those in the traditional sector (Cordoba and Ripoll 2006; Vollrath 2009). There is some suggestion that the "quality" of schooling is also different across the two sectors, as students in the rural schools of developing countries are less well equipped and have fewer days of attendance over the course of a school year (e.g., Banerjee and Duflo 2011, Chap. 4). Thus, growth of the modern sector may increase human capital, yet another important cause of economic growth. Recent theories connect the rise in schooling and the decline in fertility associated with development (Galor 2005, 2011). Some of the theories relate both behaviors to the dual structure of economies (Greenwood and Seshadri 2002; Doepke 2004; Cordoba and Ripoll 2006; Mourmouras and Rangazas 2009a).

A country's fiscal policy is also affected by its dual structure. Countries with larger traditional sectors have a more difficult time collecting taxes and providing essential public infrastructure to private producers (Mourmouras and Rangazas 2009b). Similar to private capital accumulation, the structural transformation of an economy away from the traditional sector and toward the modern sector may accelerate the growth in productive public capital per worker. There are also many political economy issues associated with how policies are affected by the relative influence of landowners who dominate the traditional sector versus capitalists who dominate the modern sector (e.g., Galor et al. 2009) or rural versus urban households, who may receive different levels of attention from government officials (e.g., Mourmouras and Rangazas 2013).

A final connection between the dual economy and aggregate economic growth focuses on the role of cities in the urban sector (Henderson 2010). There are theories and evidence supporting the idea that producing in larger cities can raise worker productivity through knowledge and information spillovers. These externalities are believed to be positively associated with the population density of the city, at least up to the point where various negative effects of crowding begin to dominate. The premise is that the more people who work in a concentrated area, the greater the flow of ideas and the better the match between employers and employees. Raising the stock of knowledge, and matching skills and tasks more effectively, raises worker productivity in the city. Thus, the concentration of workers in larger cities may increase economic growth apart from the other mechanisms described above.

1.2 Early Theory

The recent literature on two-sector models and the structural transformation relates back to the earlier work on dual economies, although there are substantial differences between the older and more modern approaches. Lewis (1954) and Ranis and Fei (1961) pioneered the analytical treatment of dual economies and the structural transformation. Important assumptions in their analysis included the following: (i) an exogenous institutional wage in the agricultural sector, (ii) the institutional

wage is paid out of the average product of labor (which includes land rents) and (iii) a "surplus" of labor in the agricultural sector with the marginal product of labor in agriculture lower than the marginal product of labor in industry (which equals the institutional wage and average product of labor in agriculture). There are no wage gaps in their models, as the institutional wage also determines the wage paid to labor in industry. In the early stages of development, with most of the labor in traditional agriculture, the marginal product of labor in agriculture was thought to be, not just low, but actually zero. This was Lewis's extreme interpretation of "surplus" labor.

The empirical relevance of surplus labor, even in the poorest developing countries, was challenged early on by Schultz (1964). He used the natural experiment of an influenza epidemic in India as a test of the idea. The epidemic caused a sharp decline in the agricultural labor supply and total agricultural output fell accordingly—a clear contradiction to the surplus labor assumption. The surplus labor assumption certainly is not relevant to labor scarce countries, such as the USA in the nineteenth century, because migrant workers from other sectors of the economy were typically hired during harvest times.

The assumption of an exogenous institutional wage that determines wages across the economy is also problematic. As mentioned above, not only are there large productivity gaps across sectors, but there are large annual wage gaps as well. Explaining the presence of these large wage gaps has become the main focus of the recent literature on dual economies.

The earlier dual theories were naturally not unified in the sense that models are today. They ignored human capital altogether. The theories did recognize the importance of population growth and physical capital formation for the economic transformation, but these variables were treated exogenously. Schultz (1964) was the first to stress the importance of human capital in causing the movement away from traditional agriculture. Eaton (1987) and Drazen and Eckstein (1988) modeled the interaction between a dual structure and physical capital formation. Galor and Weil (1996, 2000) insisted that fertility and population growth must be given a central role in theories of long-run development. This book incorporates all these features from the recent literature into a dual economy approach.

To see how a unified approach to modeling the dual economy is able to generate connections between key features of development, consider the treatment of implicit claims on land. In the older theories, there were implicit claims on land rents that allowed "wages" to exceed the marginal product of labor in the traditional sector, resulting in an inefficient allocation of labor. The older theories were static models, with no markets for land, and the total output was simply assumed to be split across the workers.

In the newer theories, inefficiencies in the allocation of labor are also linked to land rents. The current generation of landowners desires to bequeath land to the next generation if they are willing and able to maintain the tradition of family farming (a preference that is more likely to be operative when land markets are incomplete). Workers in the traditional sector accept lower wages (which do equal their marginal product) in the traditional sector because if they move off the farm

they lose their claims to land in the future, i.e., they will not inherit the land from their parents or tribal elders. Thus, expectation of future rents from an intergenerational transfer of land creates both wage and productivity gaps across sectors. Moreover, the expectation of future land rents also lowers saving and raises fertility. The observed sector differences in wages, productivity, saving, and fertility are all explained in the same way.

1.3 Outline

We hope this book encourages readers to think about the connections mentioned above and to explore new connections between the structural transformation and economic growth. Chapter 2 presents a standard one-sector model of physical capital accumulation where saving is motivated by the need to finance retirement consumption, based on the seminal work of Diamond (1965). The model is then extended to include intergenerational transfers that take the form of both physical assets and investment in children's human capital. Calibration exercises show that one can explain very little growth in US history unless human capital is included. This result receives further support when we move to a two-sector setting. Chapter 3 extends the one-sector model to include endogenous human capital, fertility, and policy formation. In this chapter, large income differences across countries are explained by a combination of a poverty trap that keeps human capital low and fertility high, and anti-growth fiscal policies. We discuss the limitations of outside aid in addressing both these sources of poverty.

Chapter 4 provides an introduction to a two-sector model with complete markets across the economy. We use the model to examine the origins of modern growth, asset bubbles, how the structural transformation affects physical capital accumulation, the impact of opening the economy to the trade of goods on economic growth and welfare, and how health considerations help explain the relatively constancy of caloric intake and the decline in household budget shares spent on food over the course of development.

Chapters 5, 6, and 7 introduce market imperfections and cultural attitudes that create the dualism observed in many developing countries. The dual structure leads to differences in household behavior and to policy conflicts. Chapter 5 focuses on gaps in worker productivity and fertility. Chapter 6 focuses on how differences in saving behavior and the internal migration of workers affect physical capital accumulation per worker in the modern sector. Chapter 7 combines the material in Chaps. 5 and 6 to provide a complete dynamic analysis of a dual economy. The model is used to simulate transitional growth over two centuries. The simulated growth and predictions about other features of development are compared to real-world data.

Chapter 8 introduces fiscal policy in a two-sector setting to examine the connection between government provision of goods and services and urbanization. We find that it can be efficient for fiscal policy to be "biased" toward the modern sector,

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