



Structural Change, Fundamentals, and Growth

A Framework and Case Studies

Edited by
Margaret McMillan
Dani Rodrik
Claudia Sepúlveda

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STRUCTURAL CHANGE, FUNDAMENTALS, AND GROWTH

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Edited by Margaret McMillan, Dani Rodrik, and Claudia Sepúlveda

A Peer-Reviewed Publication

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International Food Policy Research Institute
1201 Eye Street NW, 12th floor
Washington, DC 20005 USA
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Acronyms and Abbreviations

ASD	Africa Sector Database
ASEAN	Association of Southeast Asian Nations
BDP	Botswana Democratic Party
BIDPA	Botswana Institute for Development Policy Analysis
CEPR	Center for Economic and Policy Research
CSO	Central Statistical Office (India, Zambia)
CSO	Central Statistics Office (Botswana)
EEG	Export Expansion Grant
FDI	foreign direct investment
FBS	finance, business, and real estate (as described in Chapter 6)
FIRE	finance, insurance, real estate, and business services (as described in the Overview and Chapters 2, 3, 4, and 5)
FIREBS	finance, insurance, real estate, and business services (as described in Chapter 1)
FISP	Farmer Input Support Program
FRA	Food Reserve Agency
FRN	Federal Republic of Nigeria
FTZ	free trade zone
GDP	gross domestic product
GGDC	Groningen Growth and Development Centre
GHS	General Household Survey

GLSS	Ghana Living Standards Survey
GSO	General Statistics Office of Vietnam
HS	Harmonized System
IDA	Industrial Disputes Act
IEI	Innovation Enterprise Institution
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
IPUMS	Integrated Public Use Microdata Series
ISI	import-substitution industrialization
ISIC	International Standard Industrial Classification
ISS	Import Substitution System
kg/ha	kilogram per hectare
km	kilometer
kWh	kilowatt-hour
LCMS	Living Conditions Monitoring Surveys
LFS	Labor Force Survey
MFDP	Ministry of Finance and Development Planning
MoFNP	Ministry of Finance and National Planning
MIB	Manufacture-in-Bond program
MMD	Movement for Multiparty Democracy
MPC	Minnesota Population Center
MW	megawatt
NAFCON	National Fertilizer Company of Nigeria
NBER	National Bureau of Economic Research
NBS	National Bureau of Statistics
NBTE	National Board of Technical Education
NGO	nongovernmental organization
NLC	National Liberation Council
NSSO	National Sample Survey Organisation
NTB	nontrade barrier
OECD	Organisation for Economic Co-operation and Development

PF	Patriotic Front
PNAD	Pesquisa Nacional por Amostra de Domicílios (Brazilian Household Survey)
PPP	purchasing power parity
PS	Priority Survey
RHS	right-hand side
RoZ	Republic of Zambia
SACU	Southern African Customs Union
SADC	Southern African Development Community
SAP	structural adjustment program
SITC	Standard International Trade Classification
SMME	small, micro, and medium-sized enterprises
SOE	state-owned enterprise
TDCA	Trade, Development and Cooperation Agreement
UNCTAD	United Nations Conference on Trade and Development
UNPF	United Nations Population Fund
VASS	Vietnam Academy of Social Sciences
VEI	Vocational Enterprise Institution
VHLSS	Vietnamese Household Living Standards Survey
WDI	World Development Indicators
WTO	World Trade Organization

Foreword

Structural Change, Fundamentals, and Growth: A Framework and Country Studies is the outcome of a joint project of the International Food Policy Research Institute and the World Bank.

The volume consists of an overview and seven country studies, written by leading scholars from both developed and developing countries. The overview lays out a unifying framework for thinking about economic growth as a combination of two challenges. The "structural change challenge" is focused on moving resources from traditional low-productivity activities into modern, more productive industries. The "fundamentals challenge" faced by policy makers in the developing world is about how best to develop broad capabilities such as human capital and infrastructure. While the two are inextricably linked, they are conceptually different, and making this distinction is one of the contributions of this book. The overview also includes a description of the common methodology used in the country studies, a discussion of data and measurement issues, and a synthesis of the findings.

Of the seven countries studied, only Viet Nam seems to be in the midst of rapid structural change based on an expansion in modern manufacturing. By contrast, India's growth has been driven primarily by increases in within-sector productivity. In Ghana, Nigeria, and Zambia, structural change has helped boost growth in labor productivity largely as a result of an expansion in the services sector. Botswana and Brazil experienced rapid structural change decades ago, but recent growth in these middle-income countries

has come from investments in fundamentals. The book and its findings demonstrate that with all things considered, rapid structural changes are now more difficult to achieve and investments in fundamentals will be key to sustaining growth in low-income countries.

Shenggen Fan
Director General, IFPRI

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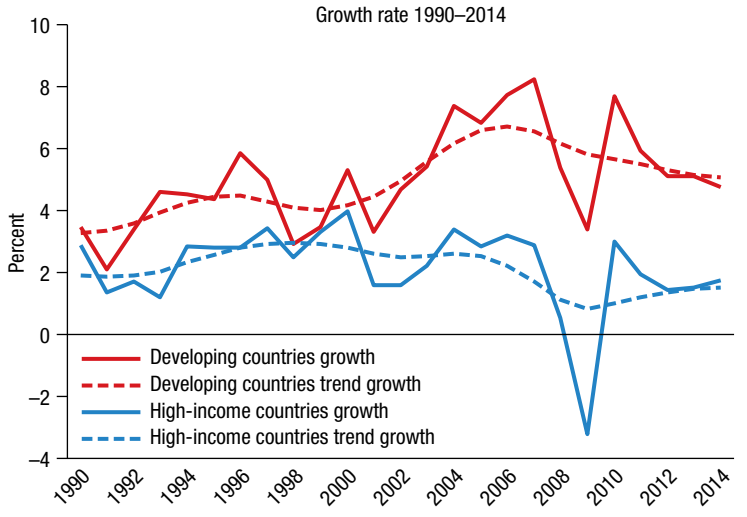
STRUCTURAL CHANGE, FUNDAMENTALS, AND GROWTH

Dani Rodrik, Margaret McMillan, and Claudia Sepúlveda

The first decade of the 21st century was extraordinarily good for developing countries and their mostly poor citizens. Their economies expanded at unprecedented rates, resulting in both a large reduction in extreme poverty and a significant expansion of the middle class. In fact, their growth rates were an average 4 percentage points faster than those of the advanced countries—versus only 1.3 percentage points in the 1990s (Figure O.1a). This growth was led by the efforts of China, India, and a small number of other Asian countries, and assisted by the weaker economic performance of the rich countries. Latin America and Africa resumed growth as well, catching up with—and often surpassing—the growth rates they experienced during the 1950s and 1960s. As a result, the developing countries moved more quickly to close the income gap with the advanced countries (Figure O.1b), a process known as economic convergence. More recently, however, that process has slowed down—reflecting a narrowing of the advanced and developing country growth rate differentials since 2010—making it unlikely that poorer countries will be able to close the development gap with richer countries anytime soon.

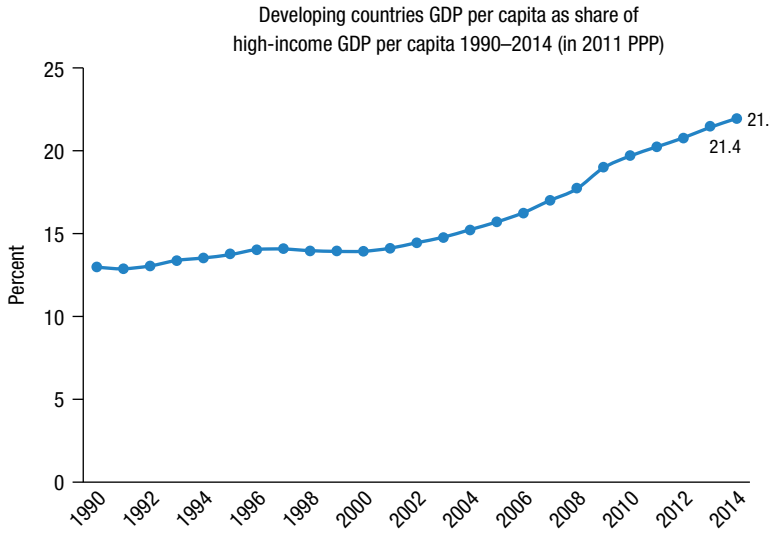
What are the growth prospects for developing countries? Two traditions for examining and explaining growth exist side by side within economics. The first has its roots in development economics and is based on the dual-economy approach (initially formalized by Lewis 1954 and expanded upon by Ranis and Fei 1961). It draws a sharp distinction between the traditional (agriculture) and modern (industry) sectors of the economy, and it assumes that different economic logics are at work within them—and therefore the two sectors cannot be lumped together. Accumulation, innovation, and productivity growth all take place in the modern sector—often in unexplained ways—while the traditional sector remains technologically backward and stagnant. Thus, economywide growth depends largely on the rate at which resources—principally labor—can migrate from the traditional to the modern sector.

FIGURE O.1a With advanced and developing country growth rate differentials narrowing in the 2000s . . .



Source: World Development Indicators database (World Bank, various years).

FIGURE O.1b . . . the income gap has been closing more rapidly than in the 1990s



Source: World Development Indicators database (World Bank, various years).

Note: The gross domestic product (GDP) trend was calculated using a Hodrick-Prescott filter with smoothing parameter equal to 6.25; PPP = purchasing power parity.

The second tradition has its roots in macroeconomics, and derives from the neoclassical growth model of Solow (1956). It eschews such distinctions and presumes different types of economic activity are structurally similar enough to be aggregated into a single representative sector. In neoclassical models, growth depends on the incentives to save, accumulate physical and human capital, and (in subsequent variants that endogenize technological change) innovate by developing new products and processes (Grossman and Helpman 1991; Aghion and Howitt 1992).

These traditions offer complementary perspectives on economic growth. One way to combine their insights is to think of the neoclassical model as essentially focusing on the growth process *within* modern sectors, while the dual-economy model focuses on relationships and flows *among* sectors. As such, each perspective provides a distinct reason why growth in the lagging countries should be not just feasible, but also easy and rapid. In the dual-economy world, growth is just a matter of moving traditional farmers into modern industries in urban areas where productivity is on a positive trajectory. In the neoclassical world, physical and human capital levels in developing countries are low, and thus returns to accumulation should be high. Either way, economic convergence with rich nations should be the norm rather than the exception.

As it turns out, however, those predictions have not been borne out. Nevertheless, their failure informs us about the obstacles that need to be overcome if economic development is to happen. Using these two sets of models to guide us, we can identify two broad development challenges:

- The *"structural transformation" challenge:* How to ensure that resources flow rapidly to the modern economic activities that operate at higher levels of economic productivity.
- The *"fundamentals" challenge:* How to accumulate the skills and broad institutional capabilities needed to generate sustained productivity growth, not just in a few modern industrial sectors but also across the entire range of services and other nontradable activities. There is considerable debate about whether it is primarily the quality of institutions (governance, rules of law, and the business environment) or the level of human capital (education, skills, and training) that drives long-run levels of income (see Acemoglu, Johnson, and Robinson 2001 versus Glaeser et al. 2004). But for our purposes, we can just lump them under the rubric of "fundamentals."

The critical question is the relationship between these two challenges, especially in Africa, which, until recently, has been largely absent from any work on structural change (Box O.1). A major reason for this absence has been largely unreliable or nonexistent economic data for most African countries. A deeper reason is poverty itself. Until recently, few African countries have enjoyed the sustained economic growth needed to trace the patterns of structural transformation achieved in earlier decades elsewhere. However, since the beginning of this century, African countries have grown at an unprecedented pace and in unusual ways, making them especially interesting for such research.

This book speaks directly to our lack of information about structural change and growth in developing countries. It includes four African countries—Botswana, Ghana, Nigeria, and Zambia—all of which have experienced rapid growth in recent years, but for different reasons. They are also interesting because it does not appear that the process of structural change in any of these countries is following the standard patterns that we are familiar with from the historical literature or from widely used models of structural change. These case studies may thus shed light on both the processes that are unfolding at present and some of the barriers that remain. We also include two fast-growing Asian countries that appear to be following different paths: India and Viet Nam. Finally, we include Brazil because of its position as a "postindustrial" developing country.

The authors of these chapters try to answer how much of the growth in labor productivity during given time periods can be attributed to the "within-sector" versus the "structural change" component, paying particular attention to the structural transformation challenge (drawing on the methodology in McMillan and Rodrik 2011). While the starting year for each country differs depending on data availability, all of the studies cover the period 1990–2010. Moreover, the authors painstakingly piece together data to paint a detailed account of structural change for subperiods and sectors.

From these chapters, we learn that the experience with structural change has been quite diverse around the world. In particular:

- Structural change played only a tiny role in the recent growth performance of the middle-income countries of Brazil and Botswana, although it did play an important role in launching them into middle-income status.
- Structural change contributed significantly to growth in Viet Nam and Ghana over the past two decades, although their experiences have been quite different—with Viet Nam undergoing much more industrialization than Ghana, where the formal manufacturing sector is still relatively small.

BOX 0.1 An eclectic spin on the two traditions

From a theoretical perspective, within-sector productivity growth and structural change go hand in hand, but there is disagreement as to where the process of growth originates. For example, Schultz (1953) argued that in a closed-economy setting, advances in agricultural productivity are a precondition for growth. This view featured prominently in several later pieces, including work by Johnston and Mellor (1961), Johnston and Kilby (1975), and Timmer (1988). More recently, the role of agriculture has featured prominently in work by noneconomists, such as Jared Diamond (1997).

In stark contrast to Schultz (1953), Sir Arthur Lewis (1954) argued that the low marginal productivity of farm labor would persist until nonfarm employment expanded enough to absorb rural population growth. Moreover, industrialization could mechanically raise agricultural productivity by reducing the size of the labor force in agriculture without affecting output. Subsequent work also challenged the link between agricultural productivity growth and structural change by using open- rather than closed-economy models (for example, Mokyr 1976; Field 1978; Wright 1979; Matsuyama 1992). Rather than focusing on international trade, a third strand of the literature began to emphasize the "special" properties of industry—such as increasing returns, learning by doing, and coordination failures—and called for a "big push" type of industrial policy (for example, Murphy, Shleifer, and Vishny 1989).

More recent work on structural change has typically focused on documenting the stylized facts of structural change, estimating the contribution of structural change to economywide productivity growth, and developing multisector growth models consistent with the stylized facts of structural change. This work was recently reviewed in an excellent and extensive piece on growth and structural change by Herrendorf, Rogerson, and Valentinyi (2013).

From the perspective of our book, the most important conclusion they reach is probably the fact that economists have a substantial amount of data regarding the process of structural transformation in today's advanced economies, but we know little about this process in today's developing economies. To what extent are they following different paths from today's developed economies? And if so, what factors give rise to these differences? Specifically, Herrendorf, Rogerson, and Valentinyi (2013) call for more quantitative studies on structural transformation in today's poor economies—a topic that our book tries to shed light on. They also emphasize the importance of two issues that they did not examine in their review piece. The first is human capital and its role in determining both within- and across-sector productivity growth. The second is market failures and the role for government—notably, the extent to which externalities, public goods, market power, or other factors associated with inefficient equilibrium outcomes—shape the process of structural change.

Source: Authors.

- Structural change contributed to growth in India, Nigeria, and Zambia, but it is not the kind of structural change that China and Viet Nam enjoyed. Rather, the three countries have seen a less rapid decline in the employment share of low-productivity agriculture, exacerbated by the lack of a boom in labor-intensive manufacturing for export.

In short, the policy requirements of rapid structural change do not seem to align neatly with conventional recommendations of the "fundamentals" type. Despite significant improvements in policy regimes in Africa—macroeconomic stabilization, external opening, democratization—the rate and direction of structural transformation have been disappointing in this region. And in Latin America, although privatization and liberalization may have contributed to within-sector productivity growth, they seem to have done so at the expense of economywide productivity. In countries with significant unexploited potential for structural change, there are large payoffs for taking imaginative shortcuts (such as investment zones or competitive currencies) that target the development of new industries directly. In other cases, policies must remain focused on long-run fundamentals—institutions and human capital.

A Unifying Framework

To place these results in perspective, we begin this overview with an overall unifying framework for thinking about growth (drawing on Rodrik 2013a). We drew above a distinction between the "structural transformation" and "fundamentals" challenges in growth—the first focusing on moving resources into modern industries, and the second on developing broad capabilities. At first sight, these two challenges may seem one and the same, too closely linked to be separable. Much of the development literature operates on the assumption that policy that is good on one front is also good on the other. For example, investing in human capital and improving the legal regime should be good for boosting overall productivity, as well as promoting industrial expansion. Deregulating industrial restrictions and international trade should be good for developing the economy as a whole, as well as fostering entry into new economic activities. What is desirable policy for growth need not differ based on whether we look at growth from the perspective of facilitating structural transformation or building fundamentals.

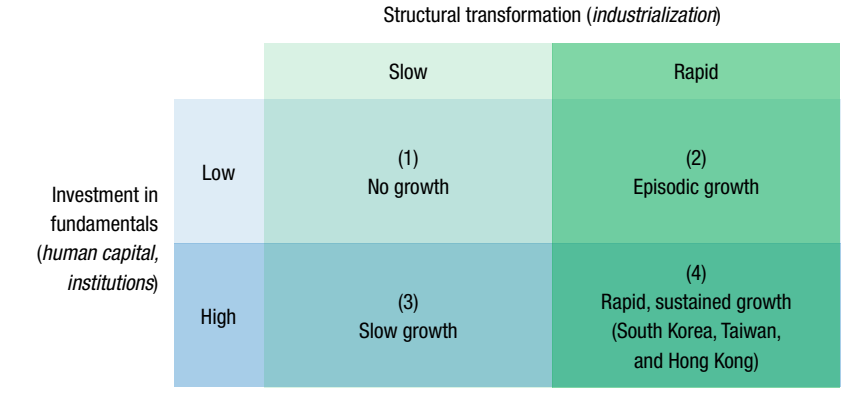
While there is substantial overlap between the two sets of policies, it is also clear that the two challenges have somewhat different strategic implications. In practice, it may be far easier to promote industrialization directly, by subsidizing industry in diverse ways or removing specific obstacles to it, than to

promote it indirectly by making broad investments in human capital and institutions and hoping that these will trickle down to investment incentives in industry. It is possible to have rapid structural transformation (in other words, industrialization) without significant improvements in fundamentals. East Asia is the premier example of this strategy. In China, governance and human capital have lagged significantly behind the country's manufacturing prowess. Viet Nam is a similar case, following on China's footsteps with some lag.

It is also possible to invest significantly in fundamentals without reaping much reward in terms of structural transformation. Since the early 1990s, Latin America has considerably improved its governance and macroeconomic fundamentals, yet structural change in the region has been, if anything, growth reducing. Manufacturing and some other modern sectors have lost employment to lower-productivity services and informal activities (McMillan and Rodrik 2011).

We can visualize these possibilities in Figure O.2, which depicts a typology of growth patterns and outcomes. It shows that structural transformation can fuel rapid growth on its own, but if it is not backed up by fundamentals, growth peters out and remains episodic (quadrant 2). On the other hand, the accumulation of fundamentals, which requires costly, time-consuming, and complementary investments across the entire economy, only produces steady but slow growth if it is not backed up by structural change (quadrant 3). The bottom line is that, ultimately, sustained growth and convergence require both processes (quadrant 4). Even in the best of all worlds, structural transformation will eventually run its course and industrialization will reach its limits.

FIGURE O.2 A typology of growth patterns and outcomes



Source: Authors.

From that point on, growth must depend on the steady accumulation of fundamentals emphasized by neoclassical growth theory. Long-term successes, such as Britain, Germany, and the United States, have all gone through these phases, as have more recent examples, such as Japan, South Korea, and Taiwan. If doubts remain about China's economic future, it is because so much of the country's institutional transformation, particularly with respect to political institutions, still remains ahead of it.

This typology helps clarify one of the puzzling aspects of cross-national data: institutional quality and human capital are both highly correlated with income levels, yet improvements in institutions and human capital are not a reliable predictor of economic growth. It suggests that this empirical finding is not a contradiction. Only countries that steadily enhance their fundamental capabilities eventually become rich. But investment in fundamentals is not the quickest or easiest way of getting there, at least during the early stages of development. Early on, it is rapid industrialization that fuels growth, and this requires policies that may differ considerably from conventional fundamentals. Countries that rely exclusively on building up broad-based capabilities are rewarded with modest growth, and may in fact be diverted from those policies as a result (Rodrik 2013a).

We will use this typology to interpret the experiences of our country examples. None of them can be said to have made it definitively to the nirvana of quadrant (4). Botswana has high fundamentals but limited structural change, while Viet Nam has relatively rapid structural change but relatively low fundamentals. Our other African examples (Ghana, Nigeria, and Zambia) typically have had episodic growth-promoting structural change at best, moving back and forth between quadrants (1) and (2), although Ghana has recently moved into quadrant (3). Brazil has moved from quadrant (2) to quadrant (3), with greatly improved fundamentals but much weaker growth underpinned by slow structural change. India meanwhile has not experienced the kind of structural change that import-substituting countries (such as Brazil in the 1950s–1970s) or the East Asian exporters (such as Viet Nam) have gone through, so its growth prospects remain brittle.

Country Studies: Methodology

In an effort to retain consistency across country studies, all of the country chapters use the same methodology as McMillan and Rodrik (2011). This approach is not intended to resolve questions about causality; rather, it is intended to lay out a set of facts that we hope will help policy makers better

understand their economies and allow future researchers to develop better theories of growth and structural change.

The decomposition used in our paper follows Haltiwanger (1997) and Foster, Haltiwanger, and Krizan (2001), who used this decomposition to explore the contributions of the reallocation of activity across plants and plant productivity growth to overall productivity growth in the US manufacturing sector. Instead, we use this decomposition to establish the contributions of the reallocation of activity across broad sectors of the economy and sectoral productivity growth to economywide productivity growth.

There is no doubt that studying productivity at the sector level necessarily masks the underlying heterogeneity of productivity within sectors. However, focusing solely on heterogeneity within one particular sector ignores the economywide implications of sector-specific changes in productivity. For example, numerous studies have shown that intensified import competition has forced manufacturing industries across the globe to become more efficient by rationalizing their operations. Typically, the least productive firms have exited manufacturing, while the remaining firms have shed "excess labor." It is evident that the top tier of firms has closed the gap with the technology frontier in Latin America and Africa, no less than in East Asia.

However, the question left unanswered by these studies concerns what happens to the workers who are thereby displaced. In economies that do not exhibit large intersectoral productivity gaps or high and persistent unemployment, labor displacement would not have important implications for economywide productivity. In developing economies, on the other hand, the prospect that the displaced workers would end up in even lower-productivity activities (services, informality) cannot be ruled out. That is, indeed, what seems to have typically happened in Latin America. An important advantage of the broad, economywide approach taken in this volume is that the authors are able to capture changes in intersectoral allocative efficiency, as well as improvements in within-industry productivity.

In this framework, total labor productivity is given by:

$$P_t = \sum_{i=1}^{n} \theta_{i,t} p_{i,t} \qquad (1)$$

where P_t is total labor productivity in year t, $\theta_{i,t}$ denotes the proportion of total labor employed in sector i at time t, and $p_{i,t}$ denotes labor productivity in sector i at time t; where $i = 1, ..., 9$. Then, the change in total labor productivity between t and $t-k$ (ΔP_t) can be written as:

$$\Delta P_t = \sum_{i=1}^{n} \theta_{i,t-k} \Delta p_{i,t} + \sum_{i=1}^{n} \Delta \theta_{i,t} p_{i,t-k} + \sum_{i=1}^{n} \Delta \theta_{i,t} \Delta p_{i,t} \qquad (2)$$

Whereas the first term on the right-hand side (RHS) captures *within*-sector productivity changes, the second term on the RHS captures *between*-sector productivity changes, and the third term on the RHS captures *cross*-sector productivity changes. In essence, the *cross* term is a covariance term that captures the effects on overall productivity of simultaneous changes in sectoral employment and productivity. For the purposes of this book, we combine the second and third terms into what we call the "structural change" term. Some authors, such as de Vries, Timmer, and de Vries (2015), estimate these terms separately, calling them the static and dynamic components of structural change. We find this confusing for two reasons. First, structural change by definition is a dynamic concept. And second, the third term alone is difficult to interpret when, for example, reductions in the employment share are accompanied by increases in productivity. This is because the term becomes negative, seemingly acting as a drag on productivity, when in fact it could be viewed as a positive development in such sectors as agriculture.

By combining the second and third terms in equation (2), we arrive at the equation used by McMillan and Rodrik (2011) and by all of the country authors of this book:

$$\Delta P_t = \sum_{i=1}^{n} \theta_{i,t-k} \Delta p_{i,t} + \sum_{i=1}^{n} p_{i,t} \Delta \theta_{i,t} \qquad (3)$$

where P_t and $p_{i,t}$ refer to economywide and sectoral labor productivity levels, respectively, and $\theta_{i,t}$ is the share of employment in sector i at time t. The Δ operator denotes the change in productivity or employment shares between $t - k$ and t. The implication of this decomposition is that economywide labor productivity growth can be achieved in one of two ways.

The first term—the "within-sector" component—captures how much of overall labor productivity growth can be attributed to changes within sectors. It is the weighted sum of productivity growth within individual sectors, where the weights are the employment share of each sector at the beginning of the time period. The second term—the "structural change" component—captures how much of overall labor productivity growth can be attributed to movements of workers across sectors. It is essentially the inner product of productivity levels (at the end of the time period) with the change in employment shares across sectors. When changes in employment shares are positively correlated with productivity levels, this term will be positive, and structural change will increase economywide productivity growth.

This decomposition clarifies how partial analyses of productivity performance within individual sectors (such as manufacturing or agriculture) can be misleading when there are large differences in labor productivities ($p_{i,t}$) across economic activities. In particular, a high rate of productivity growth within an industry can have quite ambiguous implications for overall economic performance if the industry's share of employment shrinks rather than expands. For example, if the displaced labor ends up in activities with lower productivity, economywide growth will suffer and may even turn negative.

Armed with the results of the decomposition, the authors of each of the chapters then use a variety of strategies to gain a deeper understanding of the country-specific factors that played a role in facilitating (or impeding) structural change. For example, in Chapter 1 of this book, Mitra and Ahsan use state-level data on employment shares by industry, tariffs, education, and labor regulations to explore the correlates of structural change across states in India.

Country Studies: Data and Measurement Issues

Here, too, in an effort to maintain consistency, all of the country studies use national accounts data and labor force statistics to compute measures of sectoral employment and value-added for nine broad sectors of the economy. The authors also draw on several complementary datasets to conduct more detailed analyses of the underlying correlates of structural change and within-sector productivity growth. Country-specific data appendixes appear at the end of each of the country chapters. These appendixes document the sources of data, as well as any inconsistencies in the data and how these were handled. Nevertheless, several measurement issues common to all of the studies warrant clarification.

Informality. A big question with national output and employment data in developing countries is how well they account for the informal sector. The coverage of the informal sector in national accounts data varies from country to country (Timmer and de Vries 2009). While all countries make an effort to track the informal sector, obviously the quality of the data can vary greatly. In contrast, employment shares are more likely to include the informal sector, because they are typically obtained from nationally representative household surveys (labor force surveys or population censuses). A failure to account for activity in the informal sector will lead to an underestimate of value-added in activities that are heavily dominated by informality, such as agriculture.

Multiple jobs. In labor force surveys, workers are typically classified by their primary sector of employment. A potential concern with this classification is for individuals classified as "agricultural" but who work a substantial fraction of their hours in nonagricultural activities (Haggblade, Hazell, and Reardon 2007), as this would lead to an underestimate of labor productivity in agriculture. Gollin, Lagakos, and Waugh (2014) use Living Standards Measurement Study data for several developing countries to estimate labor productivity using hours worked; Adeyinka, Salau, and Vollrath do the same in Chapter 6 of this book on Nigeria. They find that the overwhelming majority of individuals classified as working in agriculture do in fact allocate almost all of their time to agriculture. Gollin, Lagakos, and Waugh (2014) also find that a significant portion of individuals in rural households is classified as working in nonagricultural activities.

Accounting for human capital. If human capital differs significantly across sectors, using the number of workers unadjusted for differences in human capital can be misleading. For example, if most of the labor in agriculture is unskilled and most of the labor in services is skilled, simple measures of productivity will understate labor productivity in agriculture and overstate labor productivity in services. One way to account for this is to adjust employment numbers for educational attainment, which is what Gollin, Lagakos, and Waugh (2014) do for their sample of countries (in the poorest countries, human capital is on average 1.4 times higher in the nonagriculture sector than in the agriculture sector). However, even after making this adjustment, they still arrive at the conclusion that average labor productivity in agriculture is significantly lower than average labor productivity in other economic sectors.

Average versus marginal productivity. The country authors of this book compare gaps in sectoral productivities using measures of average labor productivity, as is done in McMillan and Rodrik (2011) and Gollin, Lagakos, and Waugh (2014). It is well known that efficiency in well-functioning markets is characterized by an equalization of productivities at the margin. Under a Cobb-Douglas production function specification, the marginal productivity of labor is the average productivity of labor multiplied by the labor share. Thus, if labor shares differ greatly across sectors, comparing average labor productivities can be misleading. However, the existing evidence suggests that labor shares do not vary widely across sectors, except in a few activities (like public utilities) that typically do not absorb lots of labor (Mundlak, Butzer, and Larson 2012; Gollin, Lagakos, and Waugh 2014).

Quality of African statistics. Recently, concerns about the quality of Africa's national accounts data have been raised by a number of researchers, including

Devarajan (2013) and Jerven and Johnston (2015). Like them, we think that the quality of national accounts data is intimately linked to Africa's growth and prosperity. Over the past decade or so, as growth in gross domestic product (GDP) has picked up in Africa, there has been a renewed focus on the quality of data—even leading to a rebasing of national accounts data for some countries. This is important, because of the rapid growth in small business activity that had previously been unrecorded. As a result, economies that did rebase saw significant gains in GDP per capita. In view of these issues, the authors of this book's African chapters have tried to collect data from a wide range of sources and to account for inconsistencies. For example, in the case of Botswana, the authors consider two scenarios for structural change in recent years, depending on assumptions about the share of the labor force in agriculture.

Failure to distinguish location. Most agriculture takes place in rural areas, and most manufacturing and services take place in urban areas. Given the higher costs of living in urban areas (particularly high cash rents), urban wages must typically exceed rural wages simply because of higher living costs. Thus, comparing nominal urban service and industrial wages with nominal rural farm wage rates inevitably leads to higher urban prices and wages. A more appropriate and purely sectoral comparison would involve comparing farm with rural nonfarm earnings or urban agriculture with urban unskilled manufacturing and service sector wage rates. We would guess that rental costs alone would require a 20 percent higher wage in urban areas, simply to maintain a standard of living comparable with rural areas.

In summary, while all of the measurement issues discussed above are important, we think that there is adequate evidence to support the approach taken by the authors of the country studies in this book. Adjusting average productivities for measurement error may diminish the labor productivity gaps uncovered, but it is highly unlikely that it would overturn any of the results.

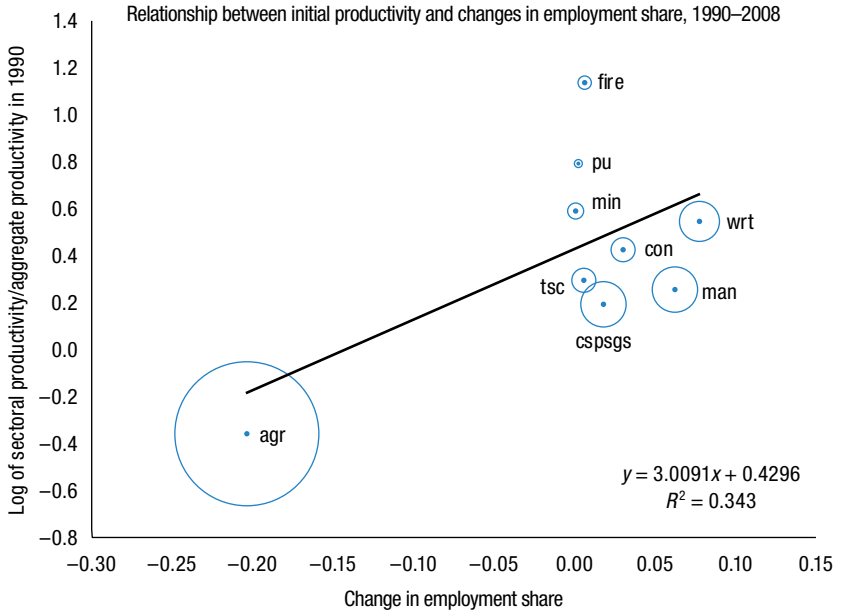
Country Studies: Findings

Significant Structural Changes, Different Outcomes: Viet Nam and Ghana

On the surface, Ghana and Viet Nam appear to have much in common: big pools of labor in agriculture that over time move primarily into services, rather than manufacturing. But a closer look reveals how different their paths have been and, thus, why Viet Nam is further along in its economic convergence.

In the late 1990s, Viet Nam still had 70 percent of its workforce in agriculture, producing a third of the country's GDP. This discrepancy between agriculture's claim on the economy's resources and its contribution to output reflected the large differential in labor productivity across activities. The typical worker in manufacturing produced four times more output than the typical worker in agriculture. The typical worker in services such as construction or wholesale and retail trade produced even a bigger multiple than this. But over the next two decades, workers moved from lower- to higher-productivity activities (Figure O.3). In Chapter 2 of this book, McCaig and Pavcnik tell us that agriculture's employment share declined to 54 percent, while services' share rose from 18 percent to 32 percent, and manufacturing's share rose from 8 percent to 14 percent. During the 2000s, jobs in manufacturing grew at an annual rate greater than 10 percent, with the rate exceeding 15 percent in garments and reaching 30 percent in office and computing machines. The growth was particularly rapid in the

FIGURE O.3 Viet Nam's workers move to higher-productivity sectors



Source: McCaig and Pavcnik, Chapter 2 in this book.

Note: The size of the circle indicates employment in 1990. agr = agriculture; cspsgs = community, social, personal services, and government services; con = construction; fire = finance, insurance, real estate, and business services; man = manufacturing; min = mining and quarrying; pu = public utilities (electricity, gas, and water supply); tsc = transport, storage, and communications; wrt = wholesale and retail trade.

Southeast and Red River Delta, which entered the world economy on the back of export-oriented industrialization.

Viet Nam's structural transformation came alongside two other important shifts that were closely linked: (1) a transition from state-owned firms to private employment; and (2) a transition from family farms and businesses to formal, registered firms (particularly in manufacturing). These shifts contributed directly to productivity growth within sectors, but also enabled reallocation of factors of production across sectors. As a result, GDP per capita tripled in real terms over two decades, and poverty fell sharply, although McCaig and Pavcnik caution that large productivity gaps still exist both among and within sectors. Between 1990 and 2008, the growth in aggregate labor productivity was 5.1 percent per year, with structural change accounting for 38 percent of this increase and within-sector growth accounting for the rest.

In examining a case like Viet Nam's—a clear-cut development success enabled greatly by structural transformation—ex post explanations are easy to come by. The country started with a large pool of "excess" labor in the countryside. The unexploited productivity gains from moving people from the farm to urban employment were huge. Relaxing the grip of state regulations and state-owned enterprises could unleash these hidden sources of productivity. In Viet Nam this meant abolishing collective farms and replacing them with household farms, titling land, liberalizing internal and external trade, and introducing competition and private businesses. Opening the country up to the world economy—through special economic zones and liberalization of investment rules—brought in foreign investment and technology, rendering modern sectors even more competitive. Encouraging exports enabled the expansion of manufacturing enterprises without running into market-size constraints.

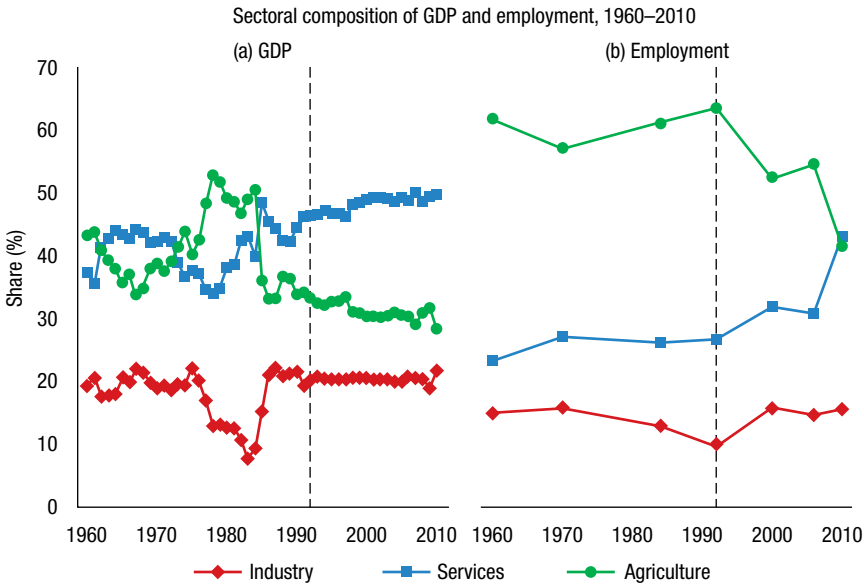
Now consider Ghana, a country that has also done reasonably well in the 1990s and 2000s, certainly by African standards. In Chapter 4 of this book, Osei and Jedwab tell us that following a sharp decline in the 1970s, Ghana's real GDP per capita picked up from the mid-1980s on, with labor productivity registering annual growth of 3 percent between 1992 and 2010. Keep in mind this is only 60 percent of Viet Nam's growth rate over the same period. While structural change appears to have contributed roughly half of the increase over this period—after contributing close to zero before then—a closer look indicates that the impact was highly uneven across subperiods (in fact, it was negative during 2000–2006).

While agricultural employment did decrease—dropping from 60 percent in 1980 to about 40 percent in 2010—the labor that was released was

absorbed mostly by low-productivity services, with limited impact on economywide productivity (Figure O.4). Moreover, the bulk of manufacturing took place in the informal sector, where productivity is more than 20 times lower than in the formal sector. Despite the apparent potential, industrialization has so far played a much more modest role in Ghana than in Viet Nam. But to the extent it has played a role, Osei and Jedwab contend that "it has occurred without a green revolution, industrial revolution, or service revolution of the types seen, for example, in Asia." In our eyes, this assessment is rather troubling, in that a lack of these types of revolutions would inhibit the potential for progress on the structural change front. Keep in mind, as the authors point out, "there are still enormous hurdles on the socioeconomic front, with troubling levels of poverty, unemployment, and underemployment—especially for youths, and income inequality."

Why the difference between the two countries? It is tempting to ascribe Viet Nam's superior performance to its government's liberalization policies

FIGURE O.4 Bypassing industry and into services in Ghana



Source: Osei and Jedwab, Chapter 4 in this book.

Note: Panel (a) plots the sectoral composition of GDP, using three aggregate sectors: agriculture, industry, and services. Panel (b) plots the sectoral composition of employment, using the same three sectors. Employment data are available for the following years: 1960, 1970, 1984, 1992, 2000, 2006, and 2010. The vertical dashed line is for 1992, the year when the nature of structural change was modified in Ghana.

and other efforts to remove obstacles facing private business. For example, in Chapter 2 McCaig and Pavcnik note that Viet Nam was ranked 99th out of 185 countries in 2013 in the World Bank's "Doing Business" indicators, "slightly behind China, ranked 91st, and ahead of such countries as Indonesia and Bangladesh." Yet Ghana ranks 27 countries ahead of Viet Nam, in 64th place. According to the indicators, it was considerably easier to get credit in Ghana than in Viet Nam, paying taxes was less of a hassle, insolvency was much more quickly resolved, and access to electricity was less problematic. In terms of how well investors are protected, there is a whopping 40-point difference between the two countries, in favor of Ghana.

Other cross-national indexes tell a similar story. The Cato Institute's Index of Economic Freedom, which attempts to quantify the extent to which economies are free of government encumbrance, ranks Viet Nam in 96th place, compared with 71st place for Ghana (Gwartney, Lawson, and Hall 2012). (This is for 2010, which is the latest year for which data are available.) A reasonable objection to these comparisons would be that what matters is more the change than the level of an index. Economic progress may be more a function of how much policies have "improved" than where they stand at the end of the relevant period. But here too, it is hard to make the case that Viet Nam looks better than Ghana. Both countries have undertaken significant reforms since the 1980s, opening up their economies to trade, reducing the role of the government, and deregulating. Ghana's summary rating on the Cato Index steadily rose (on a scale from 0 to 10) from 3.05 in 1980, to 5.53 in 1995, to 7.09 in 2010. Unfortunately, Cato does not provide a comparable series for Viet Nam over the full period, so a direct comparison is not possible. But in light of the scale of improvement in Ghana's rating, it is difficult to imagine that Viet Nam could have done much better. (To get a relative sense of these ratings, note that the United States had a rating of 7.70 in 2010.)

None of this is to deny the possibility that Viet Nam's government does indeed provide a more hospitable environment than Ghana for private business, both by nurturing new economic activities and by removing obstacles that existing ones face. The point is that the way such an environment is constructed is subtler than what is captured by standard indexes and conventional types of policy advice. Although economic liberalization and removal of red tape may foster private investment, the comparison with Ghana suggests it would be a mistake to describe Viet Nam's strategy in those terms—or those terms alone. Of course, a similar argument could be made for many other East Asian success stories as well.

Viet Nam's spectacular growth is also likely to be partly driven by a strong commitment to improving the fundamentals. Viet Nam outshines Ghana on all standard measures of education and infrastructure. Its investment rate is 35 percent, while Ghana's is only 25 percent. Industrial policy in Viet Nam appears to be focused on increasing exports in all sectors. At the start of the reforms in the late 1980s, Viet Nam was a net importer of rice, and agricultural exports were paltry. Today, it is the second-largest exporter of rice, and the country has become a major player in the international coffee market. In fact, Viet Nam runs a sizable trade deficit in manufactured goods, which is covered by agricultural and oil exports. Thus, while it is true that productivity growth has been the highest in export-oriented manufacturing, it would be incorrect to attribute all or even most of Viet Nam's success to its success in manufacturing. Rather, the deeper reason for Viet Nam's success in manufacturing is likely to be the same reason for its success in other export- oriented sectors.

Typology placement: Viet Nam seems to have reaped the growth benefits of rapid structural change, even though its institutional indicators are comparatively poor and have not improved as much. In other words, Viet Nam has been in quadrant (2) of Figure O.2 since the early 1990s. Ghana, on the other hand, has seen significant improvements in governance, and yet its comparatively poor record with structural change has kept it in quadrant (3) with lower growth. By the same token, Viet Nam's continued growth and migration into quadrant (4) are by no means ensured, given the weakness of many of its fundamentals.

Limited Structural Change, Enormous Potential: India, Nigeria, and Zambia

India, Nigeria, and Zambia provide an interesting contrast. On paper, these countries have the makings of industrial success stories, with their large endowments of relatively unskilled labor still in rural areas and their enormous domestic markets. Yet all three have underperformed remarkably on this dimension, and it is clear that all of them would benefit greatly from greater attention to the fundamentals.

Over the past 50 years, as we learn from Ahsan and Mitra in Chapter 1, agriculture's share of employment in India has fallen by roughly 20 percentage points—from about 70 percent in 1960, to 60 percent in 2004, to 50 percent in 2011—with the sector now contributing about 15 percent of GDP, sharply

down from around 40 percent in 1960. However, manufacturing's labor share has barely changed over this time period, from 10 percent in 1960 to 12 percent today, with the GDP share unchanged at 13 percent. To put these numbers in perspective, Viet Nam was able to achieve more than double this rate of industrialization in less than half the time. For India, the biggest labor movement has been into services (up from 18 percent in 1960 to 28 percent in 2011), with the GDP share rising to nearly 60 percent (up sharply from just below 40 percent in 1960).

Structural change did make a positive contribution to growth in India after the 1990s, especially during the first decade after the 1991 reforms. But the biggest part of that came from the expansion of finance, insurance, and other business services, with manufacturing actually shrinking and making a negative contribution during 2000–2004 (Figure O.5a). Information technology and business process outsourcing services, on which India's recent growth has relied, are no doubt high-productivity activities with convergence dynamics that may be even stronger than in manufacturing. But they are also highly skill-intensive sectors, unable to absorb the vast majority of the Indian workforce that remains poorly educated. As a consequence, India's underlying growth trend is suppressed by the necessarily slow accumulation of fundamental capabilities—education, infrastructure, and governance—in the economy as a whole.

Moreover, Ahsan and Mitra report that while manufacturing was the leading contributor to within-sector productivity growth in 2000–2004 (Figure O.5b), it fell in terms of its employment share during these years (even though its labor productivity was higher than the economywide average). Thus, they stress the need for overhauling restrictive labor regulations, "especially because the future potential of agriculture and services in generating overall growth is limited (beyond a point) at India's stage in the development process."

At the state level, the authors find that two of the fastest-growing states between 1998 and 2004 followed strikingly different growth paths. For Gujarat, all of the growth came from within-sector change; in fact, structural change was slightly negative, unlike the rest of the states, which enjoyed some positive structural change (Figure O.6). In contrast, in Maharashtra, the within-sector and structural change components were about the same. The only state that experienced negative within-sector change was Assam.

The story in Nigeria is not that different. In Chapter 5, Adeyinka, Salau, and Vollrath show that between 1996 and 2009 (not including petroleum), the share of employment in agriculture fell only slightly, from 66 percent

FIGURE O.5a Finance, insurance, real estate, and business services is contributing most to India's structural change . . .

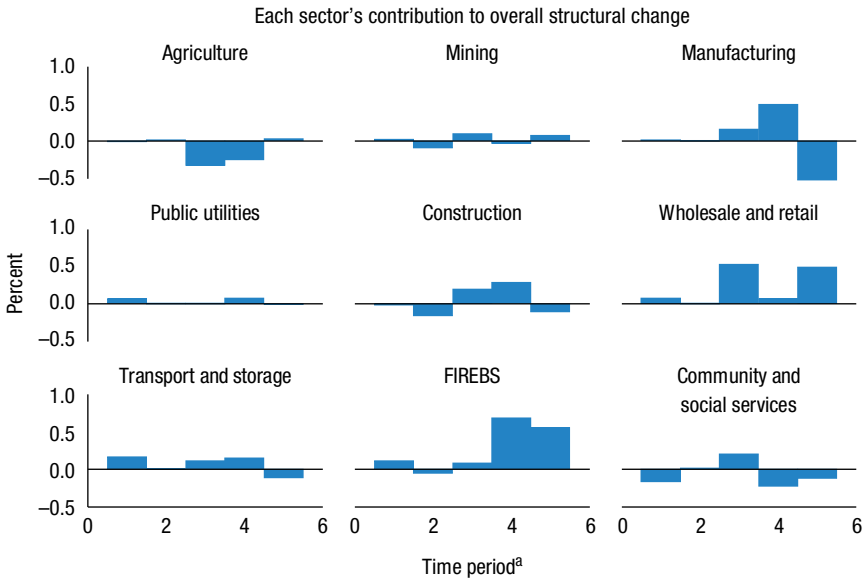
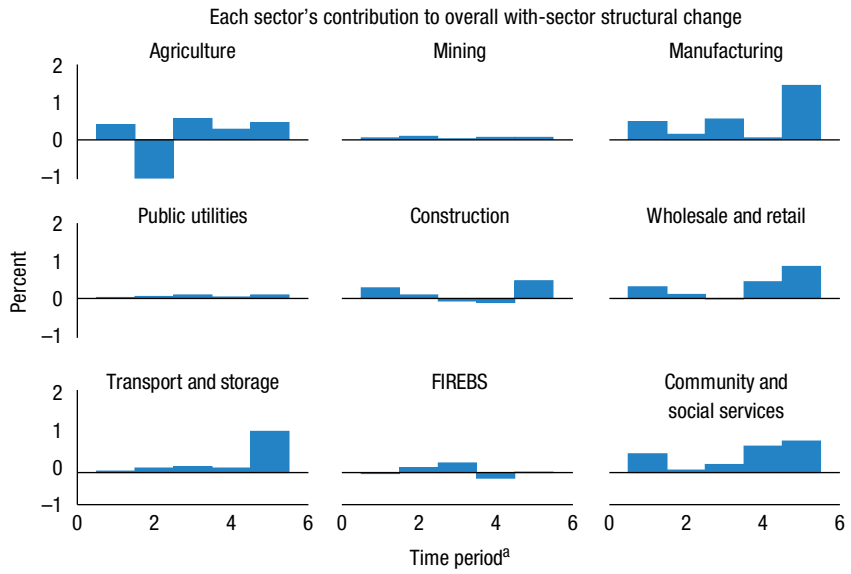


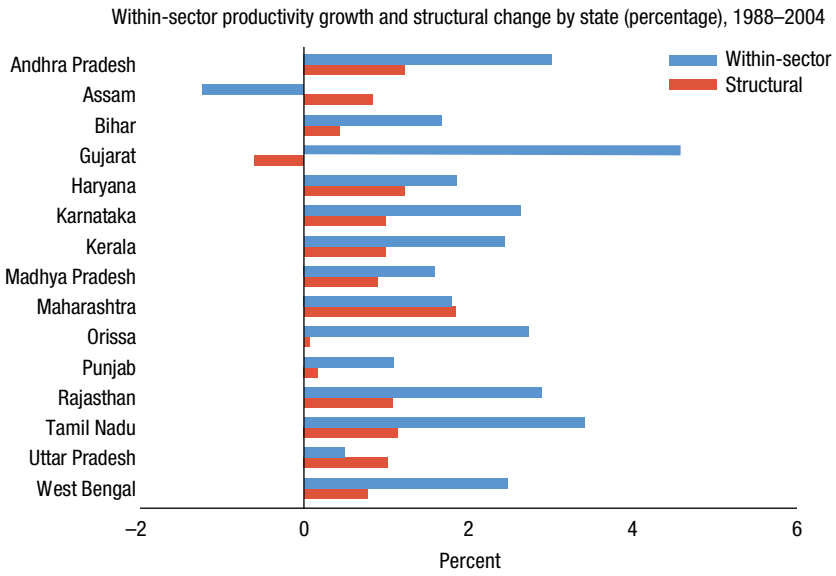
FIGURE O.5b . . . and since 2000, manufacturing is helping its "within-sector" change



Source: Ahsan and Mitra, Chapter 1 in this book.

Note: [a]Period values are: 1 = 1960–1969; 2 = 1970–1979; 3 = 1980–1989; 4 = 1990–1999; 5 = 2000–2004.
FIREBS = finance, insurance, real estate, and business services.

FIGURE O.6 Gujarat and Maharashtra follow significantly different growth paths



Source: Ahsan and Mitra, Chapter 1 in this book.

to a little more than 60 percent (still the dominant sector at 40 percent of GDP), while the share of employment in manufacturing increased by a meager 2.2 percentage points to 4.1 percent (accounting for only about 10 percent of GDP). Over this same period, average annual productivity growth was 4.5 percent for the nonpetroleum economy, but the lion's share of this growth (3.5 percent) was accounted for by within-sector productivity improvements. If petroleum (oil and gas)—which employs less than 1 percent of the labor force but accounts for 20–30 percent of GDP—is included, productivity rose less but structural change played a bigger role (Table O.1). The authors suggest that productivity gains could have been as much as 54 percent greater had structural change been greater. They see the key levers for this to occur as (1) stimulating agricultural production, (2) liberalizing trade policies, (3) upgrading infrastructure, and (4) improving human capital.

A worrying feature of the Nigerian economy is that productivity growth in manufacturing between 1996 and 2009 was actually negative relative to agriculture. The reasons for this are unclear. One explanation may be that people entering the manufacturing workforce are in the informal sector, as in Ghana and several other African countries. Another explanation

Table O.1 Structural change starts to take on a bigger role for Nigeria in the mid-2000s

Components of labor productivity change, 1996–2009				
	Time periods			
Growth decomposition	1996–1999	1999–2005	2005–2009	1996–2009
Panel A: Excluding oil and gas				
% annual productivity growth	0.8	4.8	7.0	4.5
of which:				
% within-sector productivity	–2.0	9.4	2.6	3.5
% structural change	2.8	-4.6	4.4	1.0
Panel B: Including oil and gas				
% annual productivity growth	–0.8	4.4	4.1	2.9
of which:				
% within-sector productivity	–7.1	6.2	–1.6	0.7
% structural change	6.3	–1.8	5.7	2.2

Source: Adeyinka, Salau, and Vollrath, Chapter 5 in this book.

may have to do with Nigeria's low levels of fundamentals (such as infrastructure and human capital). However, to explain negative productivity growth, these conditions would have had to deteriorate. In addition, large productivity gains were made in wholesale and retail trade, transportation and communications, agriculture, and general services. This is puzzling, because it is not obvious why fundamentals would matter more for manufacturing than for other sectors. That said, Nigeria's record on this front is inexcusable. In 2010, only half of Nigeria's population was literate, life expectancy was 51 years, only 15 percent of the roads were paved, electric power consumption was only 135 kilowatt-hours per capita, and investment stood at only 17 percent of GDP.

As for Zambia—a country that reclaimed its "middle-income" status in the 2000s thanks to rapid growth—the story is one of extremely uneven structural change. In Chapter 6, Resnick and Thurlow find that structural change was an overall drag on economic growth in Zambia between 1991 and 2010, as labor productivity grew by only 0.31 percent. But if that period is divided into two subperiods, a more nuanced picture emerges. Between 1991 and 2001, there was a mass exodus out of urban areas as copper mines and other parastatals shut down during a phase of privatization, with the share of employment in agriculture (the sector with the lowest productivity) actually increasing (Table O.2).

Table O.2 Agriculture is driving Zambia's job growth but not GDP

Drivers of GDP and formal employment growth, 1991–2010						
	GDP (millions of 2002 US$)			Employment (1,000s people)		
	Initial	Change over period (%)		Initial	Change over period (%)	
Sectors	1991	1991–2002	2002–2010	1991	1991–2002	2002–2010
Value (US$ millions or 1,000s people)	8,410	1,023	6,108	2,519	1,001	865
Contribution (%)	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture	15.2	30.5	8.1	65.4	87.6	51.4
Mining	20.1	–84.4	13.6	1.9	0.2	1.0
Manufacturing	10.7	21.3	6.8	4.3	1.4	1.3
Utilities	3.3	2.6	1.6	0.9	–1.2	0.7
Construction	8.4	-8.0	21.9	1.9	–0.3	4.2
Trade	17.3	49.3	9.8	10.3	4.8	19.6
Hotels, catering	1.2	14.0	2.5	0.5	1.9	1.3
Transport, communications	6.1	12.1	16.5	2.9	–1.5	3.7
Finance, business services	9.8	48.8	9.0	1.8	0.6	6.1
Government	7.1	11.4	8.9	5.6	6.7	6.7
Other services	0.7	2.3	1.4	4.5	–0.2	4.1

Source: Resnick and Thurlow, Chapter 6 in this book.

But starting in 2002, the share of employment in agriculture began to fall, with services absorbing most of the workers who left the farm. Although the services sector is dominated by small-scale informal activity, its activities are still more productive than subsistence agriculture. Mining staged an impressive recovery, but only accounted for 1 percent of the new jobs created. And manufacturing not only failed to rally, but actually continued its decline. In the end, structural change and within-sector growth each accounted for around half of the 3.56 percent increase in labor productivity between 2002 and 2010. However, Resnick and Thurlow emphasize that the renewed growth and positive structural change have not translated into social transformation—a reality that has been reflected "in the country's shifting political landscape," and one that they contend can be seen playing out elsewhere in Africa, even in countries without large-scale mineral resources.

With more than half of the population engaged in low-productivity agriculture, structural change could play a significant role in Zambia's growth going forward. But it may well be that to realize this potential, Zambia must first invest more in its fundamentals. Gross fixed capital formation as a share

of GDP was only 22 percent in 2010, and physical and human infrastructures are still comparatively low.

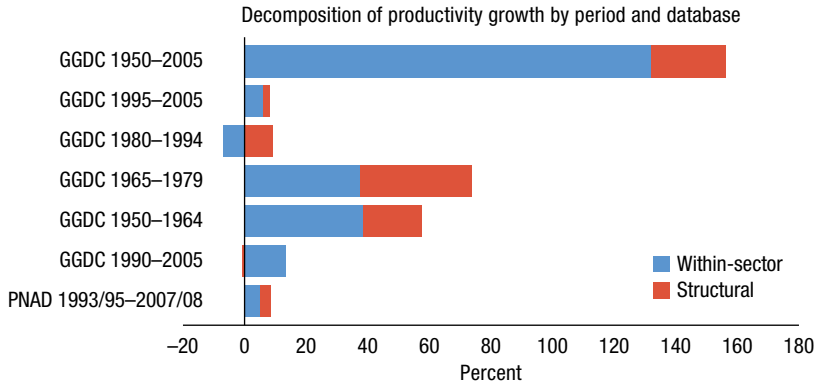
> **Typology placement:** India, Nigeria, and Zambia have not had the full benefit of quadrant (2), and India in particular has hovered not too far from quadrant (1). For all of them, investing in the fundamentals is now critical.

No Structural Change in Recent Years: Botswana and Brazil

Unlike the rest of the countries featured in this book, Botswana and Brazil have been middle-income countries for some time. Structural change played a significant role in catapulting these countries into middle-income status, but its role has been more muted in the past two decades. Their stories, though, are quite different.

In Brazil, structural change was rapid from the 1950s through the 1970s (especially in the 1950s and early 1960s), accounting for 40 percent of total labor productivity growth during this period (Figure O.7). As agricultural employment shrank, manufacturing jobs expanded slightly, and modern service activities—the most productive sector—absorbed the bulk of the labor. By the late 1970s, industries as a whole accounted for close to 40 percent of total labor productivity growth. This period of high-growth, rapid structural change was one

FIGURE O.7 Within-sector changes in Brazil swamping structural changes



Source: Firpo and Pieri, Chapter 7 in this book.

Note: The bars correspond to growth rates for the whole period indicated. For example, for the period 1950–2005, using Groningen (GGDC) data, labor productivity resulting from the within-sector and structural change effects grew by 132 percent and 24 percent, respectively. GGDC = Groningen Growth Development Centre; PNAD = Pesquisa Nacional por Amostra de Domicílios.

in which policies of import substitution predominated. (It goes without saying that such policies are anomalous from the perspective of the World Bank's Doing Business database and Cato Institute's Economic Freedom indicators [World Bank, various years; Gwartney, Lawson, and Hall 2012]).

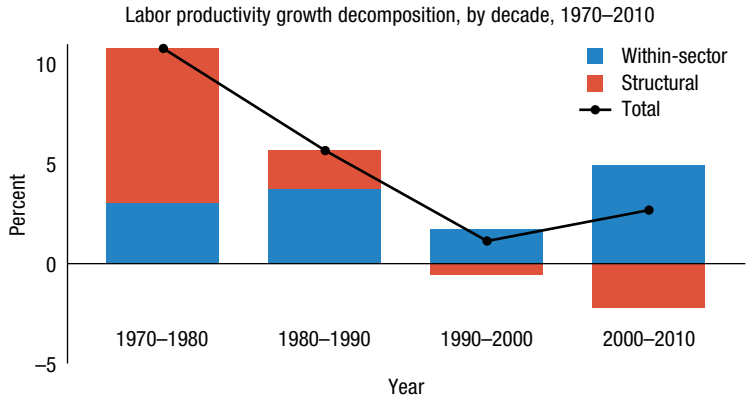
But in Chapter 7, Firpo and Pieri argue that by the late 1970s, the country had run out of room for continuous and long-term structural change, at least along broad intersectoral lines, and had to rely on within-sector enhancements—like investing in human capital and new technologies (in agriculture especially) and improving institutions. In fact, they assert that efforts aimed at reversing this natural trend (by enlarging manufacturing and contracting agriculture) failed "and the early years of the 1980s of slow growth can serve as evidence of those efforts."

So what path remains open for Brazil today? The authors argue that the Brazilian experience suggests a return to the old policies is likely to fail. They believe horizontal, across-the-board policies are more likely to spur productivity within sectors than selective policies that give priority to some sectors over others. Given where Brazil stands in term of its stage of development, it is reasonable to expect that future growth will have to rely predominantly on investment in fundamentals (institutions and human capital), and that broad patterns of structural change will play a comparatively small role. In particular, it will be difficult for Brazil to reindustrialize. But there are still strategic opportunities that could be exploited by a nimble government. If used well, the country's deep-water oil reserves should boost not only oil exports but also a range of associated services and industries at home.

As for Botswana, its story is similar to Brazil's, in that the share of employment in agriculture fell dramatically between 1970 and 1990. But unlike Brazil, the decline in agriculture's share of employment was almost entirely matched by an increase in the share of the labor force in services. Moreover, numerous government efforts to industrialize never succeeded (perhaps not surprising for a small landlocked country). The authors of Chapter 3—McCaig, McMillan, Verduzco-Gallo, and Jefferis—point to two distinct periods in Botswana's economic evolution. Between 1970 and 1989, they find that labor productivity grew at an average of 8 percent per year, with structural change playing a major role in this spectacular growth, especially in the 1970s (Figure O.8). But in the decades that followed, labor productivity slowed to 1.9 percent per year, driven entirely by within-sector productivity growth—with structural change an actual drag on growth in the 2000s.

Historically, diamonds played a significant role in fueling Botswana's economic growth, although this has changed in recent years. Between 1968 and 2010, economic activity shifted out of agriculture, first to mining and later to

FIGURE O.8 From a big role for structural change in Botswana to a drag on growth



Source: McCaig et al., Chapter 3 in this book.

Note: Graph shows decomposition of average annual labor productivity growth (value-added in 2005 output per worker) during each decade.

services. In 2010, diamonds made up only 17.7 percent of value-added and a mere 1.5 percent of total employment. In contrast, the share of services in value-added reached 64.4 percent, while the share of services in employment reached 50.6 percent. Although the share of employment in agriculture remains high at 38.6 percent, its share in value-added has dropped from 27.4 percent to 2.7 percent—an indication of agriculture's abysmal performance in Botswana.

An interesting feature of both Brazil's and Botswana's economies is that trade liberalization in the early 1990s did not have a major impact on the structure of either economy, although it did give a sharp boost to within-sector productivity. This limited impact on the structural front is especially surprising in Brazil, where manufacturing has been central to the economy. Also unlike Brazil, Botswana does not have the same potential in agriculture, as most of the land inhabited by farmers is semi-arid and prone to drought. For both of these countries, growth is more likely to come from improvements in fundamentals that facilitate within-sector productivity growth.

Typology placement: The expectation was that Brazil would move from quadrant (1) to quadrant (4); but the country instead ended up in quadrant (3), with much-improved fundamentals, but also sharply reduced growth. Botswana is similarly stuck in quadrant (3), with slow growth and relatively strong fundamentals, although unlike Brazil, it has never industrialized.

The Verdict on Structural Change versus Within-Sector Productivity Growth

So what do these findings on individual countries add up to in terms of broad trends in structural change? We believe this book provides a worthwhile insight in that, although we are only examining seven country studies, these countries together represent about 22 percent of developing country GDP and 30 percent of developing country population. Moreover, within their respective regions, some of these countries matter greatly—like Nigeria (19 percent of Africa south of the Sahara's GDP and 19 percent of the region's population), India (82 percent of South Asia's GDP and 75 percent of the region's population), and Brazil (35 percent of Latin America and the Caribbean's GDP and 34 percent of the region's population).

Overall, our country sample shows that the past two decades have seen extraordinary growth and rapid catch-up convergence in developing countries—underpinned by increases in labor productivity—although the patterns of within-sector versus structural change increases vary widely (Table O.3). Nonetheless, a few themes emerge at the regional level.

Africa. Labor productivity rose in all four countries during the 2000s, with the second half of the period characterized by a resurgence of structural change as a driver of productivity growth in Nigeria and Zambia, and to a lesser extent in Ghana. Botswana, the only upper-middle-income country in the African sample, resembles a Latin America country in the sense that most of the productivity stems from within-sector growth rather than from structural change. These results are consistent with McMillan and Harttgen (2014), who show that structural change was growth enhancing in Africa post-2000.

Asia. In this region, India and Viet Nam represent stark contrasts in terms of what has driven labor productivity increases. In Viet Nam, structural change has been a strong driver throughout the period. However, in India, most of the productivity growth has come from within-sector productivity. In fact, the contribution of structural change decreased in the 2000s from the 1990s, down from 1.3 percent to 0.3 percent—a definite worrying sign for a country that still has a large portion of the population working in the agriculture sector.

Latin America. Brazil exemplifies an upper-middle-income country that has already undergone a deep structural transformation, moving a large share of workers from agriculture to manufacturing by the end of the 20th century. Over the past two decades, however, the country has strongly relied on within-sector productivity change—in fact, gains in structural change are minimal.

Table O.3 African and other countries seeing structural change in the 21st century

	Labor productivity growth (percent)		
Country	Total	Within	Structural
Botswana			
1990–2000	1.1	1.7	–0.6
2000–2010	2.7	4.9	–2.2
Ghana			
1992–2000	1.0	–0.9	2.0
2000–2006	4.5	6.0	–1.5
2006–2010	2.7	0.0	2.6
Nigeria			
1996–1999	–0.8	–7.1	6.3
1999–2005	4.4	6.2	–1.8
2005–2009	4.1	–1.6	5.7
Nigeria, excluding oil and gas			
1996–1999	0.8	–2.0	2.8
1999–2005	4.8	9.4	–4.6
2005–2009	7.0	2.6	4.4
Zambia			
1991–2002	–2.0	0.0	–2.0
2002–2010	3.6	1.8	1.8
India			
1990–1999	2.9	1.7	1.3
2000–2004	6.5	6.2	0.3
Viet Nam			
1990–2008	5.1	1.9	3.1
1990–2000	5.2	1.0	4.2
2000–2008	4.9	2.7	2.2
Brazil			
1995–2005	0.8	0.6	0.2
1990–2005	0.8	0.8	–0.0
1993/1995–2007/2008	0.5	0.3	0.2

Source: *Botswana*—Value-added and employment data are from the Groningen Growth and Development Centre Africa Sector Base; *Ghana*—Economic Survey of Ghana 1961–1982; population and housing censuses 1960, 1970, 1984, 2000, and 2010; Ghana Living Standard Survey 1991–1992 and 2005–2006; Singal and Nartey (1971); Androe (1981); Ewusi (1986); GSS (2010); and World Bank (2010); *Nigeria*—Output data are from the Nigerian Bureau of Statistics. Employment data are from the Nigeria General Household Survey (GHS) [1996–2011]; Zambia—Data are from the Central Statistics Office [1993, 2004, 2011, and 2012.]; *India*—Value-added and employment data are from the Groningen Growth and Development; *Viet Nam*—Employment, gross domestic product (in constant 1994 prices), and labor productivity (also in constant 1994 prices) data are from the General Statistics Office of Viet Nam; *Brazil*—For the period 1950–2005, value-added and employment data are from the Groningen Growth and Development Centre. For the period 1993/1995–2007/2008, data are from Pesquisa Nacional por Amostra de Domicílios.

Note: *Botswana*—Data are disaggregated at 10 sectors, as in McMillan and Rodrik (2011); *Ghana*—Data are disaggregated at 9 and 14 sectors; *Nigeria*—Data are disaggregated at 9 sectors; *Zambia*—Data are disaggregated at 9, 10, or 3 sectors; *India*—Data are disaggregated at 10 or 9 sectors. *Viet Nam*—Data are disaggregated into 19 economic sectors; *Brazil*—Data are disaggregated at 10 sectors, as in McMillan and Rodrik (2011).

The "Double Whammy" of Manufacturing

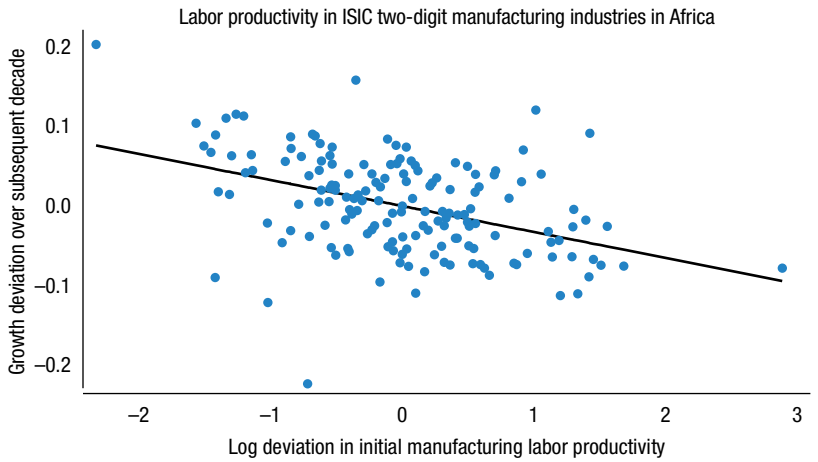
Like India, African countries seem to be bypassing the industrialization stage that was so important to Brazil's and Viet Nam's rapid growth. In fact, the share of employment in African manufacturing is still only roughly half the share in Asian manufacturing (McMillan 2013). Instead, to the extent that structural change is taking place, it is primarily fueled by an expansion in services. To understand the ramifications of this pattern, it is important to understand the role that manufacturing has played in the past.

A manufacturing-based growth strategy has two distinct advantages. First, a great deal of manufacturing is labor intensive, so it can absorb large amounts of relatively unskilled workers from other sectors at a substantial productivity premium. It is comparatively easy to turn a rice farmer into a garment factory worker, without significant investment in human capital and with manageable investment in physical capital. And the industrialization process can go on for quite some time—several decades—during which income and productivity levels converge with those of rich countries.

Second, manufacturing—specifically, formal manufacturing—exhibits a remarkable property known as "unconditional convergence." That is, it takes place regardless of the quality of domestic policies or institutions and other aspects of economic context, such as geography and infrastructure (Rodrik 2013b). For developing countries, where lagging manufacturing sectors are the norm, labor productivity tends to catch up with the productivity of developed countries, where technologies are the most advanced as if on an automatic escalator, at a rate of 2–3 percent per year. The greater the distance from the productivity frontier, the faster the rate of productivity growth. Of course, the better the environment, the more rapid the convergence—that is, conditional convergence is even more rapid (Rodrik 2013b).

Unconditional convergence can be visualized in Figure O.9, which maps the relationship between initial labor productivity in manufacturing industries for 21 countries in Africa south of the Sahara (including Ghana) and their growth rates in the subsequent decade. The negative slope of the scatter plot captures the essence of unconditional convergence. The trend is as unmistakable in Africa as it is elsewhere. Perhaps this outcome is not surprising, given that these industries produce tradable goods and can be rapidly integrated into global production networks, facilitating technology transfer and absorption. Even when they produce just for the home market, these industries operate under a competitive threat from efficient suppliers from abroad, requiring them to upgrade their operations and remain efficient.

FIGURE O.9 Unconditional convergence is alive and well in Africa



Source: Author's calculations, based on Rodrik (2013b).

Note: Data cover the 21 countries south of the Sahara (including Ghana) with the requisite data. Each observation represents an International Standard Industrial Classification (ISIC) two-digit manufacturing industry in an African country, for the latest 10-year period for which data are available. Period, industry, and period × industry dummies are included as controls, so that values on the axes are purged of these "fixed effects," but there are no country-level controls.

Prospects for Economic Convergence

Against this backdrop, where should developing countries be focusing their energies to jumpstart economic convergence? The possible paths include reviving industrialization, focusing on natural resources and nontraditional agricultural products, and raising productivity in services.

Revive Industrialization?

The classic path of rapid catch-up through industrialization played out well in East Asia, as well as in Latin America and certain other countries, such as Turkey, during their earlier, import-substituting phase. But there are a variety of reasons to think this path will figure much less prominently in the future:

- Many African countries are starting out with a much better endowment of natural resources and are not as well positioned for specialization in manufacturing.
- The success of East Asian economies—China and its successors, such as Viet Nam and Cambodia—poses significant competitive challenges to newcomers in manufacturing, especially in light of globalization and the reduced barriers to trade virtually everywhere.

- New trade rules—local content requirements, subsidies, import restrictions—limit to a much greater extent than previously the room for industrial policies, which Asian countries have deployed with some success.
- The economic difficulties of the advanced countries make them more resistant to significant surges of manufactured imports from low-cost sources.
- Technological changes in manufacturing itself have made the sector much more capital and skill intensive than in the past, reducing both the advantage of poor economies in manufacturing and the scope for labor absorption into the sector.
- The prospect of climate change and the greater awareness of the associated risks call for green technologies that are more environmentally friendly but also are more costly for developing nations.

Nevertheless, one can deploy counterarguments. First, diversification into manufacturing can sometimes be facilitated by the presence of natural resources; Ethiopia, for example, can deploy its high-quality livestock to turn itself into an exporter of designer shoes. Second, Chinese manufacturers are now looking for low-cost suppliers themselves, not the least in Africa. Third, even if the world economy stagnates, there are sizable domestic (Nigeria) and regional markets in Africa. There are glimmers of hope in all of these directions in the data—but they remain glimmers for the time being.

It is also true, as Baldwin (2011) has emphasized, that the spread of global supply chains—what he calls "globalization's second unbundling"—has facilitated the spread of industry from the advanced countries to the periphery. New entrants do not have to build entire supply chains (from intermediate inputs to final products) at home; they can simply join existing global supply chains by producing a narrow range of components. Even so, industrialization remains limited and fleeting, even when a country can succeed in plugging into global supply chains.

Taken together, these trends imply that even the most successful countries of the future are likely to fall far short of the industrialization levels that have been the norm in economic history. The available data indicate that deindustrialization is now beginning to happen at lower levels of income. Manufacturing's share of employment peaked at above 30 percent in the United Kingdom and Germany, and at around 25 percent in Japan and South Korea. But in China, manufacturing employment rose to slightly less than 15 percent in the mid-1990s before it started to fall gradually. Viet Nam, Cambodia, and other smaller countries will likely not surpass such levels. The apparent failure of African

countries to industrialize to date and the deindustrialization of Latin America have to be seen against such a global context. The industrialization-led growth model may have run its course. The question is, what will take its place?

Focus on Natural Resources and Nontraditional Agriculture?

Natural resource booms can fuel growth, but resource sectors that exhibit high labor productivity—such as oil and diamonds—tend to be capital intensive and absorb few workers. Continued growth in a resource-based economy is dependent on rapid and sustained productivity increases in the resource sector, new discoveries, or a steady rise in world market prices. And even if one or more of these fortuitous circumstances materialize, the pattern of growth tends to become skewed. Growth benefits the state or a rentier class, spawns inequality and distributive politics, and proves generally detrimental to institutional development. Resource-based growth tends to produce spurts of growth, followed by stagnation or decline. Take the case of Ghana, where manufacturing expanded little while investtment and growth were concentrated in the resource sector—a trend that was exacerbated after the discovery of oil in 2008. Aside from oil, Ghana's main exports are gold, cocoa beans, timber products, and other natural resources. Viet Nam, meanwhile, is a major exporter of textiles and garments. In 2012, manufacturing's share of merchandise exports stood at 65 percent in Viet Nam, but only 9 percent in Ghana (having actually come down from a peak of 25 percent in 2009).

As for nontraditional agricultural products—horticulture, aquaculture, floriculture, and so on—they could well act as an intermediate stepping stone out of traditional farm products, but here, too, the record with labor absorption is not encouraging. We do not have any examples of countries that have successfully developed through diversification in agriculture. Typically, agricultural transformation represents the early stage of a growth takeoff. If not followed by rapid industrialization, growth peters out. Moreover, given the inexorable trends in urbanization, the bulk of the new jobs has to be created in urban rather than rural areas. So it is hard to think of an agriculture-led path as anything other than a bridge to a more sustainable urban-based strategy.

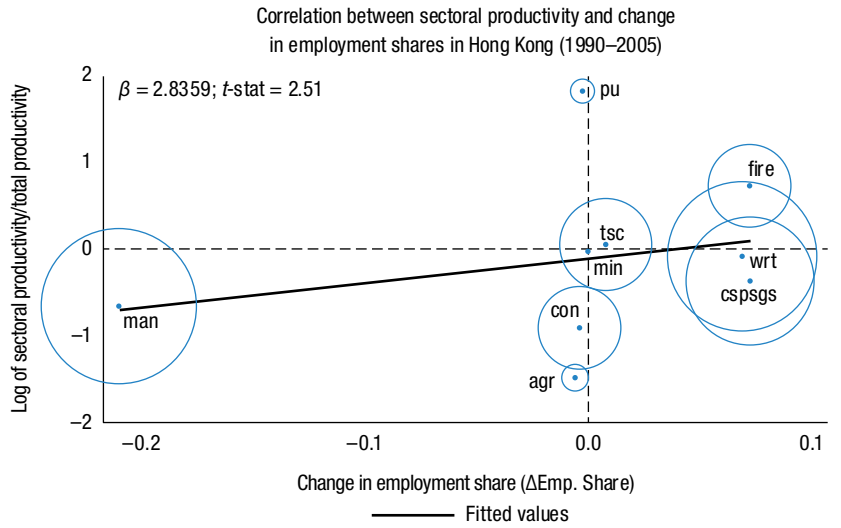
Raise Productivity in Services?

Tradable services can substitute to some extent for manufacturing, but the evidence to date on that has not been encouraging either. The reality is that an expansion of services is not necessarily a bad thing for structural

transformation and growth, as long as the economy has been able to build up human capital and accumulate fundamental capabilities that transform those services into high-productivity activities (like finance and business services). However, this typically happens rather late in the development process, after industrialization runs its course, and high-productivity (tradable) segments of services cannot absorb as much labor. As for labor-intensive tradable services (like tourism), they have typically spawned few links to the rest of the economy and have not produced much diversification.

One prominent exception is the success of Hong Kong. Its structural transformation picture looks just like that in Viet Nam, except that the roles of agriculture and manufacturing are reversed (Figure O.10). In Hong Kong, it is manufacturing that has rapidly shrunk since 1990, releasing more than 20 percent of the economy's labor force to other sectors. The displaced labor found employment in services (wholesale and retail trade, finance, insurance and business services, and so on), but at even higher levels of productivity. So deindustrialization was growth promoting. The difference with other countries is that Hong Kong first achieved significant levels of industrialization

FIGURE O.10 A move from manufacturing to services in Hong Kong



Source: Author's calculations with data from Timmer and de Vries (2009); McMillan and Rodrik (2011).

Note: Size of circles represents employment share in 1990; β denotes coefficient of independent variable in regression equation: $\ln(p/P = \alpha + \beta\Delta\text{Emp. Share}$; agr = agriculture; cspsgs = community, social, personal services, and government services; fire = finance, insurance, real estate, and business services; con = construction; man = manufacturing; min = mining and quarrying; pu = public utilities (electricity, gas, and water); tsc = transport, storage, and communications; wrt = wholesale and retail trade.

before deindustrializing—and then used the intervening period to strengthen its human capital base and other fundamental capabilities.

In principle, then, structural transformation can play a potent positive role both during the early stages of development when there is "excess supply of labor" in agriculture and informal economic activities, and during later stages when capabilities have accumulated and modern services have caught up with and surpassed industrial activities. But neither outcome is ensured. Structural change is frequently slow, and often goes in the wrong direction. And the correspondence between market liberalization and structural change is weak, at best.

Tempering Expectations

All of this suggests that we should not be surprised if broad patterns of intersectoral structural change play a more muted role in the future. Development will have to happen the hard way for the most part, through the steady accumulation of skills and human capital and improvements in governance and institutions. In terms of the central growth-decomposition equation used in McMillan and Rodrik (2011) and the chapters that follow, growth will come mainly from the within-sector components of productivity change, rather than from structural change (Box O.2).

A corollary is that rapid growth of the type experienced in South Korea, Taiwan, China, Viet Nam, and other East Asian cases will be out of reach for most developing countries. It has proved significantly more complicated and time consuming to upgrade a country's health system, tertiary education, or judiciary—to name just a few examples of nontradable sectors—to first-world standards than to ride the wave of global competitiveness in a narrow, but expanding, range of standardized manufacturing industries. Automatic escalators may be rare in nonmanufacturing parts of the economy.

One reason is that improving human capital and institutions entails a wide range of reforms and investments that are highly context specific and complementary to each other. Context specificity implies that off-the-shelf imported blueprints are not useful. Local experimentation and expertise are needed to get systems to cohere and work well. Complementarity means investments on a broad front are required for any of them to pay off. Together, these imply an S-shaped relationship between fundamentals and growth—investments in human capital and institutions produce at best moderate growth until they (and income) accumulate and reach a certain threshold (Rodrik 2013a). The downside of this mode of growth is that it can easily produce reform fatigue.

BOX 0.2 Putting the focus on the "fundamentals"

In all of our country studies, a frequent refrain is the need to improve "within-sector" productivity. Here, we try to illustrate the range of policies needed with current examples from our sample countries. These policies can be grouped into four key areas.

Political economy. In *Zambia,* where structural change has not translated into economic transformation, a major problem has been a lack of macroeconomic stability and persistent policy volatility—like currency swings and periodic trade bans on maize exports and wheat imports, which deter investment in agriculture and other sectors. In *Botswana,* some of the constraints are as much political economy as technical ones. Building up the industrial sector involves issues of political capture, and making more land available for business touches on issues of land markets and even immigration.

Labor regulations. In *India,* labor regulations appear to be a major impediment to employment growth in manufacturing. But in a democratic country such as India, changing these laws may take a long time—which is worrisome, given that the future potential of agriculture and services in generating overall growth is limited (beyond a point) at India's stage in the development process.

Institutions and education. In *Viet Nam,* which continues to feature large productivity gaps within and across sectors, it is vital to remove distortions (like improving access to land and capital) to help workers transition out of agriculture and to further enhance agricultural productivity. In *Brazil,* policies that raise overall labor productivity—like improving educational quality—are likely to have a deeper impact on growth than those that are strictly concerned with deepening an unfinished structural change.

Infrastructure. In *Nigeria,* the employment share in low-productivity agriculture is still quite high, indicating a potential for rapid structural change. But the country's levels of human capital and infrastructure are still abysmal, making a rapid exodus out of agriculture unlikely in the near future. In *Ghana,* which needs to diversify away from natural resource exports, a key focus is making the manufacturing sector more competitive. High nonlabor costs could be reduced by investing in roads, the power supply, and the regulatory framework. Although the business environment has improved greatly over the past 20 years, a lot remains to be done for Ghana to be as competitive as Mauritius or South Africa.

Source: Authors.

Growth payoffs will appear as disappointing, despite substantial efforts at reform.

The bottom line is that the balance of forces going forward appears less favorable to rapid structural change than has been the case during the past six decades. We may well need to moderate the optimism that the recent experience of high growth across the developing world has spawned.

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Chapter 1

CAN THE WHOLE ACTUALLY BE GREATER THAN THE SUM OF ITS PARTS? LESSONS FROM INDIA'S GROWING ECONOMY AND ITS EVOLVING STRUCTURE

Reshad N. Ahsan and Devashish Mitra

India's economy today is much larger than what it was half a century ago, with most of that growth occurring since the early 1990s—an indication that it has flourished in the postglobalization phase. Since 1991, GDP growth has averaged 6 percent, with the rate hitting close to 9 percent in recent years (before the recent slowdown in the last couple of years to roughly 5 percent). While some modest "business-friendly" reforms in the 1980s resulted in higher growth rates relative to the earlier years (Rodrik and Subramanian 2005), the big economic reforms were announced in 1991.

What is behind India's rapid growth in the past two decades? At the sectoral level, we see that, unlike emerging economies like China and South Korea, the big push in India has come from an expanding services sector, rather than an expanding (labor-intensive) manufacturing sector. Keep in mind that in the early 1960s, India and South Korea had similar growth rates. When India became independent in 1947, more than half of its GDP came from agriculture—a share that has dropped considerably over time to less than 15 percent today.

However, today around half of India's labor force is still in agriculture, although down from 70 percent in 1960 (Figure 1.1a). This means that while agriculture's output share has decreased significantly, its employment share has declined only modestly—a clear sign that agriculture's relative productivity has fallen. Yet workers leaving agriculture have largely sidestepped manufacturing, whose share of GDP remains quite low, at about 13 percent, and whose share of total employment is even lower, at about 12 percent. This contrasts sharply with China and South Korea, where about a third of GDP comes from manufacturing. Instead, India's services sector constitutes nearly 60 percent of its GDP (Figure 1.1b), although the employment share is lower, at around 28 percent.

For India, the obstacles to developing a vibrant manufacturing sector have been many, such as poor infrastructure, land constraints, and restrictive labor

FIGURE 1.1a Agriculture accounts for about half of India's workers . . .

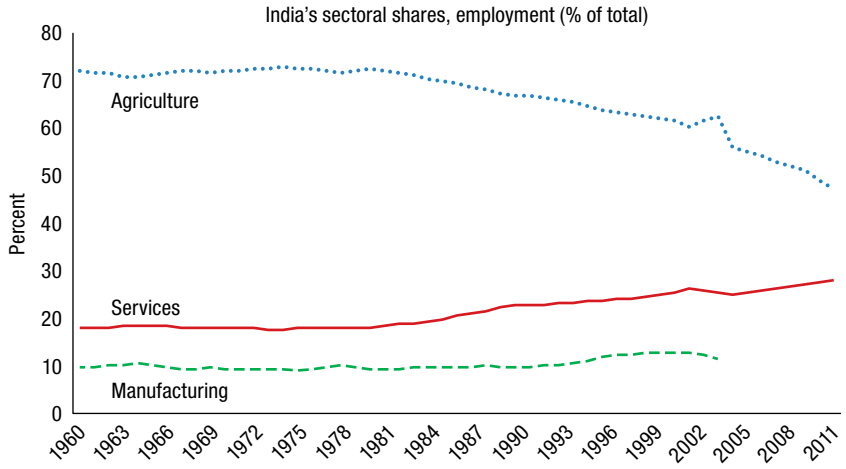
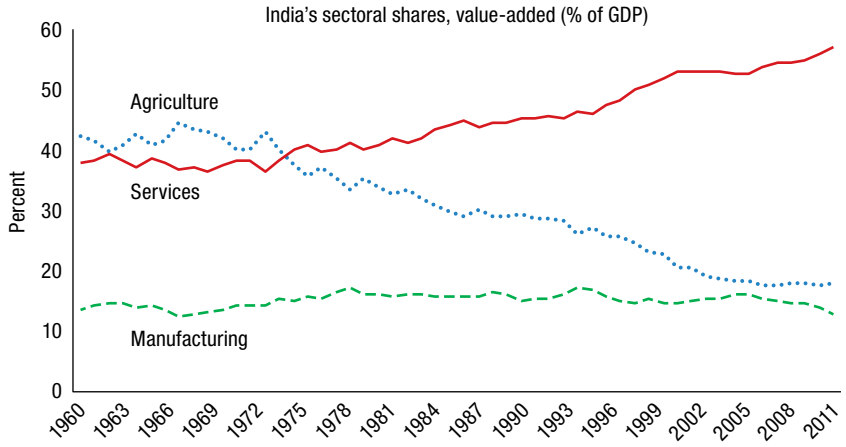


FIGURE 1.1b . . . but the growth in gross domestic product is coming from services



Source: Groningen Growth and Development Centre database, extended from 2004 to 2012, using the World Bank's World Development Indicators database (along with interpolations).

Note: The manufacturing employment share is only available for the period 1960–2004.

regulations. For example, numerous labor regulations in India make for a rigid labor market by making hiring and firing workers and reassigning them from one task to another difficult, if not impossible. In contrast, the restrictive labor laws do not apply to India's services sector. Also, the relatively higher value-added services depend more on the global rather than the local infrastructure.

The global infrastructure we are referring to is basically the Internet and the various modern means of telecommunications, whose connectivity in India has been rather good over the last couple of decades. However, at India's stage of development, there is a limit to which the services sector can be the prime contributor.

It needs to be pointed out, however, that India has managed its globalization phase much better than most Latin American countries and African countries south of the Sahara. An important recent study by McMillan and Rodrik (2011), which looks at 38 developing and developed countries from 1990 to 2005, finds that changes in the sectoral composition of the economy were "growth enhancing" in India and Thailand, but were "growth reducing" in Argentina, Brazil, Nigeria, and Zambia. They also argue that globalization by itself cannot deliver this growth. Rather, what matter are the availability of factors, such as the type of factor endowments a country possesses, the kind of specialization globalization leads to, and, above all, how globalization is managed. They contend that sectors that are exposed to foreign competition through globalization need to receive government support, as they have in most of Asia—unlike in Latin America, where not only import-competing sectors failed to receive government support in the form of subsidies, but also trade barriers were eliminated rapidly. Making matters worse, exchange rates were overvalued in Latin America (unlike in Asia), thereby encouraging imports and discouraging exports. Also, McMillan and Rodrik (2011) underscore the importance of labor-market flexibility.

India is now one of the BRIC countries, along with Brazil, Russia, and China. Together, these large emerging economies account for about 40 percent of the world population and more than 25 percent of the world GDP. Yet the differences among them are huge. In 2010, India's per capita GDP (in purchasing power parity terms) was $3,477, which is less than a quarter of Russia's per capita income, about 40 percent of Brazil's, and about half of China's—a stark change from 1991 when India and China had similar per capita GDP levels (Figure 1.2a).[1] Moreover, India's per capita income is less than one-seventh of that of South Korea (they had similar levels until the mid-1960s) and one-tenth of that of the United States. And its GDP level is less than half of China's (they had similar levels until the late 1970s) (Figure 1.2b).

As India weighs how to increase growth in a sustainable, inclusive manner, the key will be raising the economy's average labor productivity (that is, its output per worker). The possible sources of growth are (1) greater productivity

1 We present purchasing power parity adjusted GDP and GDP per capita numbers in Figures 1.2a and 1.2b to facilitate meaningful intercountry comparisons of real incomes.

FIGURE 1.2a China leads India in GDP per capita . . .

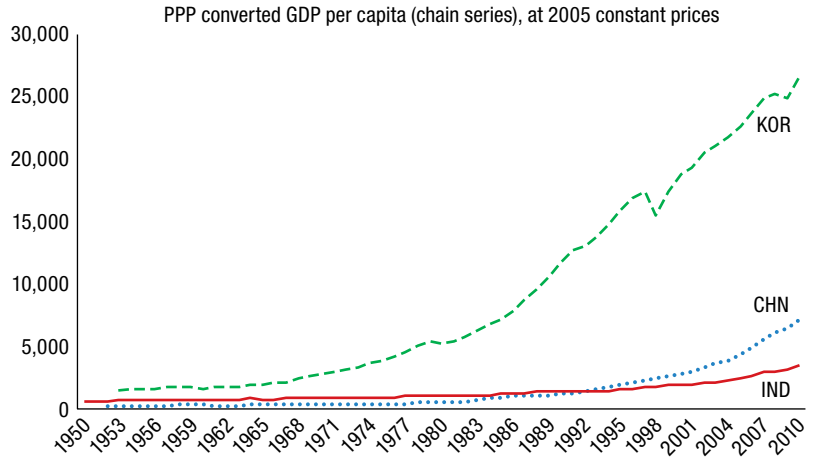
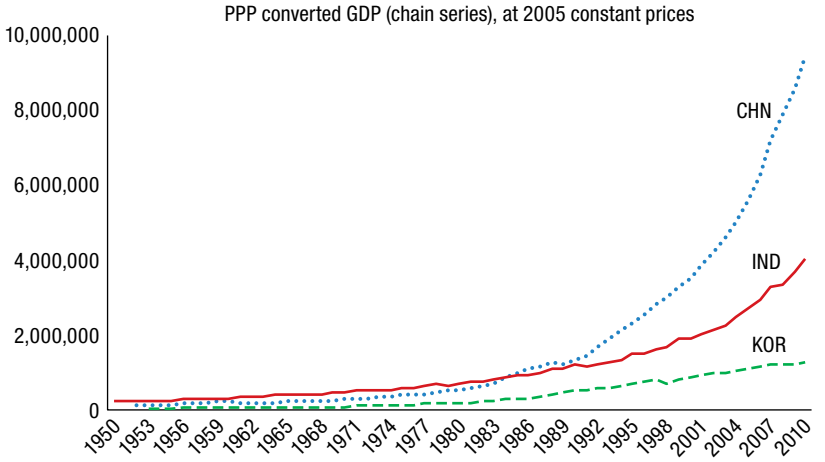


FIGURE 1.2b . . . and is on a much faster growth trajectory



Source: Penn World Tables 7.1, Heston, Summers, and Aten (2012).
Note: CHN = China; GDP = gross domestic product; IND = India; KOR = South Korea; PPP = purchasing power parity.

within individual sectors (typically triggered by technological improvements), and (2) greater productivity arising from the movement of resources toward high-productivity sectors—known as "structural change." According to Kuznets (1971), modern economic growth is characterized by rapid innovation and rapid structural change. It can take the form of changes in the output

and employment composition of an economy in terms of broad sectors, such as agriculture, manufacturing, mining, and services. Or it can take the form of changes in the shares of the rural and urban components of the economy, such as urbanization. But keep in mind that the contribution of structural change can be positive or negative, leading to the whole being greater or less than the sum of its parts.

How does India fit into this picture of growth-enhancing (that is, "desirable") structural change in Asia? In this chapter, we try to answer this question, starting with a brief synopsis of how the Indian economy has evolved since independence in 1947. We then study the relative contributions of within-sector growth and structural change to overall labor productivity growth in the past five decades at the economywide and state levels, using the McMillan and Rodrik (2011) decomposition approach. We document how this decomposition varies across both time and sectors. We also see how various industry characteristics—including industry-level labor force characteristics, state-level characteristics, and institutions—are correlated with the ability of an industry in a state to attract workers. Next we illustrate the differing paths of two high-performing states—Gujarat and Maharashtra. Then we analyze whether India's structural change has been growth enhancing, before concluding with thoughts on possible paths for India going forward.

Encouragingly, we find that, overall, structural change has contributed positively to India's growth, since workers have moved from sectors with low value-added per worker to those with relatively high value-added per worker. Indeed, the contribution of structural change to productivity growth has been mainly positive, with negative (growth-reducing) structural change concentrated mainly in the 1970s. In the postreform period (1991–2004), structural change has contributed slightly less than a fourth of the overall productivity growth rate of slightly more than 4.0 percent. In the 2000s, structural change was a small fraction of the overall productivity growth rate of 6.5 percent.

In addition, sectors in the right policy and institutional environments have benefited. High-productivity sectors located in states where workers have been exposed to foreign competition (through their employment composition being skewed toward the relatively less protected sectors) have seen labor flows in their direction. Education (especially in rural areas) and urbanization have also aided these flows, and must continue to do so in the years and decades ahead. Also vital will be tackling rigid (and even some arcane) labor regulations that serve as impediments to the creation of a vibrant manufacturing sector that can boost overall growth and generate jobs for India's still rapidly growing population.

Evolution of the Indian Economy

After independence from British rule in 1947, India did not start out with a closed economy (Panagariya 2008). In fact, during the first postindependence phase (1951–1965), beginning with the launch of its first five-year plan in 1951–1952, trade and foreign investment policies were quite open and liberal.[2] While the industrial policy regime was somewhat restrictive and an important role was given to the public sector, the policy regime did not act as a major barrier to private initiative. The purpose of the public sector was to complement the private sector. India's first prime minister, Jawaharlal Nehru, emphasized the growth of industry, in particular heavy industry, and some have argued that he did this at the cost of agriculture. In any event, in this 14-year phase, growth rose from 1.0 percent to 4.1 percent per year.

In the second phase (1965–1981), there was a sharp fall in the GDP per capita growth rate, brought about by a combination of wars, droughts, and inward-looking policies. Foreign aid declined, economic policies emphasized equity (sometimes at the cost of efficiency), and progress with poverty alleviation was unsatisfactory. For all practical purposes, until the early 1980s, India pursued a strategy of import substitution. Complicating matters, India's labor laws made it difficult, if not impossible, to lay off workers in response to changes in demand or even on grounds of incompetence. In turn, firms were reluctant to hire for fear of being stuck with those workers in bad economic times.

These two phases can be seen as a period when the focus was on self-sufficiency, as would be expected of a country recently freed from foreign rule (Kochhar et al. 2006). This argument points to a series of government five-year plans that aimed at promoting rapid industrialization, especially the creation of domestic heavy capital-producing industries (1947–1980), with trade restrictions following as a result. These plans also promoted a "mixed economy" in which the public sector and a controlled private sector would coexist, with some industries (especially the large-scale, capital-intensive ones like steel and machine tools)—the "commanding heights"—reserved for the public sector. Note that the emphasis was not on labor-intensive industries, as would have been expected in a populous developing country. Moreover, the manufacturing sector was subject to several regulatory constraints, such as investment licensing, import licensing, foreign exchange controls, controls on credit allocation, and price controls. To encourage labor-intensive manufacturing in the private sector, small-scale firms enjoyed significant government benefits, and

2 We follow here the division into the different time phases (along with some of the description) presented in Panagariya (2008).

some goods (usually those produced by labor-intensive methods) were reserved for production by these firms. However, by preventing the existence of large-scale firms in most labor-intensive industries and thereby also preventing the reaping of economies of scale, this policy turned out to be counterproductive and detrimental to employment generation (and overall output expansion in labor-intensive manufacturing activities).

In the third phase (1981–1988), there were some industrial policy reforms, including a partial relaxation of constraints on capacity expansion, changing the product mix by firms and creating product lines. Also, some piecemeal incentives were provided to exports—in fact, there was some liberalization in almost every dimension of economic policy—and the growth rate reverted to that experienced in the first phase. Overall, the reforms could be described as "business friendly" (Kochhar et al. 2006; Rodrik and Subramanian 2005).

But it was the next phase, notably in 1991, when the major trade reforms were launched—a response to the balance-of-payments crisis, which was exacerbated by the dramatic rise in oil prices originating from the Gulf War. At the time, the International Monetary Fund (IMF) helped the Indian government with financial assistance, but attached the conditionality that India embark on major economic reforms, which were to be implemented almost immediately. The reforms took the form of rationalization of rules, the gradual removal of price and quantity restrictions on import and export barriers, and a movement toward the full convertibility of the Indian rupee for foreign exchange transactions. There were also significant devaluations of the Indian rupee in 1991 and 1992. At the same time, foreign direct investment (FDI) stopped being highly restricted—up to a 51 percent foreign equity stake was allowed in many industries—facilitating a steep acceleration in FDI flows (Sivadasan 2009). However, it was difficult to reap the full benefits of these trade and FDI reforms in light of the rigid labor regulations that created impediments to resource reallocation, underscoring the need for labor reforms (Box 1.1).

What is the economic verdict for the period 1980–2000? Kochhar et al. (2006) found that manufacturing growth (in output and especially employment) was below that of other countries, controlling for the level of development and overall economic growth, while services' growth in output was much more rapid—constituting a much bigger proportion of value-added—although there was not a commensurate growth in employment. There was a movement toward more skill-intensive manufacturing industries and services, especially in the faster-growing states. But it is important to note that India's performance in labor-intensive manufacturing was not satisfactory for its level of development.

BOX 1.1 Are India's labor regulations a problem?

For India, a high priority is making the labor market more flexible. But to do so, policy makers will have to tackle long-standing labor regulations based on a wealth of complex labor laws. To understand India's regulatory framework for labor issues, it is important to note two important features of India's labor regulations. First, under the Indian constitution, both the central (federal) government as well as state governments are empowered to legislate on labor-related issues, with the latter having the authority to amend central labor laws and the responsibility to enforce all labor regulations. Second, there is considerable disagreement regarding the impact of labor market regulations on the various aspects of economic performance.

Much of the controversy surrounds Chapter VB of the Industrial Disputes Act (IDA), which requires employers with more than 100 workers to seek prior government approval before workers may be dismissed. Given that governments have often been unwilling to grant permission to retrench (Datta-Chaudhuri 1996), critics argue that this labor rule creates a strong disincentive to hire (additional) workers and generates a bias in favor of capital-intensive techniques of production. But some analysts counter that most of India's labor regulations have been either ignored (Nagaraj 2002) or circumvented through the increased use of temporary or contract labor (Dutta 2003; Ramaswamy 2003). However, it is hard to imagine that temporary or contract (casual) workers will always be as productive and will have as much incentive to learn on the job as permanent workers.

A seemingly obvious and natural way to determine whether Chapter VB of the IDA has been binding in practice has been to check whether there has been clustering or bunching of firms around the 100-worker mark. Most studies have not found such a clustering. However, we believe, for several reasons, that we should not infer from this lack of clustering that labor regulations in India are not binding or that they lack any bite. First, technologies could be discrete or lumpy (and not continuous), in that production techniques could be available in discrete steps (for example, very small, small, medium, large, very large). A firm that chooses a small-scale production technique in response to Chapter VB may well find it optimal to employ significantly fewer than 100 workers. Also, there could be fixed costs of moving into larger scales of production, which could restrict a firm well before it reaches the 100-worker threshold. In addition, there is the issue of enforcement (Hasan and Jandoc 2013).

Finally, we believe that there is one important feature of firm-level employment in India that makes it obvious that the labor laws are binding. Close to the 100 regular workers mark, there is a sudden spike in the use of "workers

hired through contractors" (temporary workers). This is important, as Chapter VB of the IDA has its threshold at 100 regular workers (not all workers). Specifically, ongoing work with Annual Survey of Industry data for 2005 reveals for labor-intensive industries the average share of temporary workers (more specifically, "workers hired through a contractor" divided by the sum of "workers hired through a contractor" and "directly hired workers") at firms with 90–99 regular workers ("directly hired workers") to be double the share for firms with 80–89 and 100–109 regular workers. The prevalence of contract workers also shows a similar spike. These patterns are repeated for all manufacturing industries as a whole (though the spikes are not as sharp).[1]

[1] Personal communication with the Asian Development Bank's Rana Hasan, who is carrying out this research.

Source: Authors.

Role of Structural Change in India

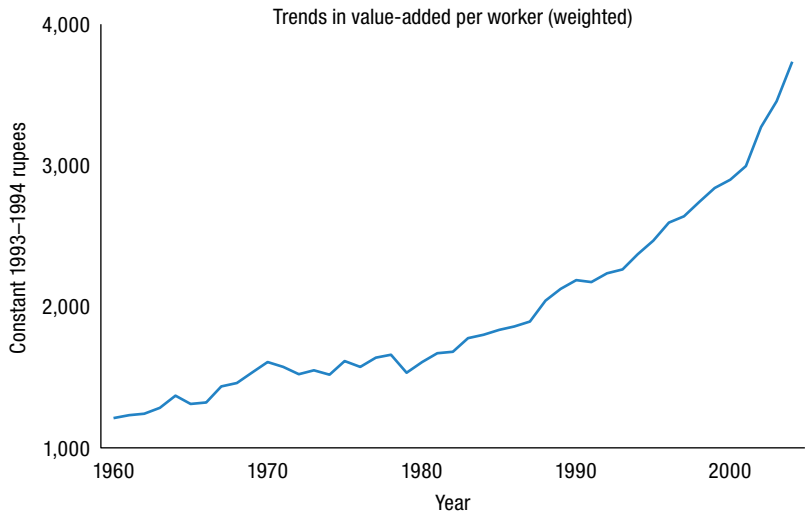
How big of a role has structural change played in India's growth? To understand the role structural change could play, suppose there is no within-sector productivity growth, but let workers move between sectors. As long as labor productivity is different across sectors, this movement will lead to some changes in average labor productivity in the economy. In particular, if workers move from low-productivity sectors into relatively high-productivity sectors, we will see positive productivity growth in the economy as a whole (through structural change). However, if misguided and restrictive policies or various types of frictions prevent labor from flowing from low- to high-productivity sectors, we will not see structural change that makes a positive contribution to labor productivity growth. While the contribution of within-sector growth to overall productivity growth in an economy is measured by the weighted sum of productivity growth rates in the various parts of the economy called sectors (with employment shares of the sectors as weights), the contribution of structural change comes about through the movement of workers across sectors with differing labor productivities.

We begin with a look at real value-added per worker—which measures labor productivity—using the National Income and Employment data from the Groningen Growth and Development Centre database for the period 1960–2004 (also used by McMillan and Rodrik 2011). This dataset provides value-added at constant prices (in 1993–1994 Indian rupees) for 10 broad sectors in India for the period 1950–2005 and employment data for those sectors

for the period 1960–2004. Because of data limitations, we follow McMillan and Rodrik (2011) and convert the 10-sector database to a 9-sector database by combining the government services sector with the community and social services sector. Dividing real value-added by employment, we are able to construct a 9-sector real labor productivity series for the period 1960–2004.

We find that real value-added per worker has been steadily rising in India over the 1960–2004 period, barring some minor dips in the mid-1960s and late 1970s (Figure 1.3). But while in the first 30 years labor productivity increased by around 70 percent, it roughly doubled in the final 14 years (1990–2004), with the longest-lasting high-growth phase. The sharp difference between performances in the two periods (1960–1990 and 1990–2004) can be attributed to the difference in their economic policy regimes—initially restrictive and distortionary, then more open. The acceleration since 1990 parallels that of Malaysia, South Korea, and Taiwan, but it is far behind that of China (Table 1.1). Between 1990 and 2005, India's value-added per worker grew at 4.23 percent per year—a distant second to China, whose value-added per worker grew at 8.78 percent per year. For this reason, by 2005, China's value-added per worker was $9,518.31 (in 2005 purchasing power parity (PPP) US dollars), which was well ahead of

FIGURE 1.3 Labor productivity has risen sharply since 1960



Source: Constructed from the National Income and Employment data from the Groningen Growth and Development Centre database.

Note: The weights are each sector's share of total employment.

TABLE 1.1 China's labor productivity has grown much faster than India's International comparison of value-added per worker, 1990 and 2005

Country	Value-added per worker in 1990 (constant 2000 PPP US dollars)	Value-added per worker in 2005 (constant 2000 PPP US dollars)	Annual growth rate of value-added per worker (%)
China	2,692.58	9,518.31	8.78
India	4,135.26	7,700.01	4.23
Indonesia	7,437.95	11,222.20	2.78
Malaysia	17,951.44	32,712.26	4.08
Philippines	8,810.10	10,145.76	0.95
South Korea	18,908.86	33,552.34	3.90
Taiwan	25,647.95	46,128.77	3.99
Thailand	8,818.66	13,841.79	3.05

Source: Constructed from the National Income and Employment data from the Groningen Growth and Development Centre database.

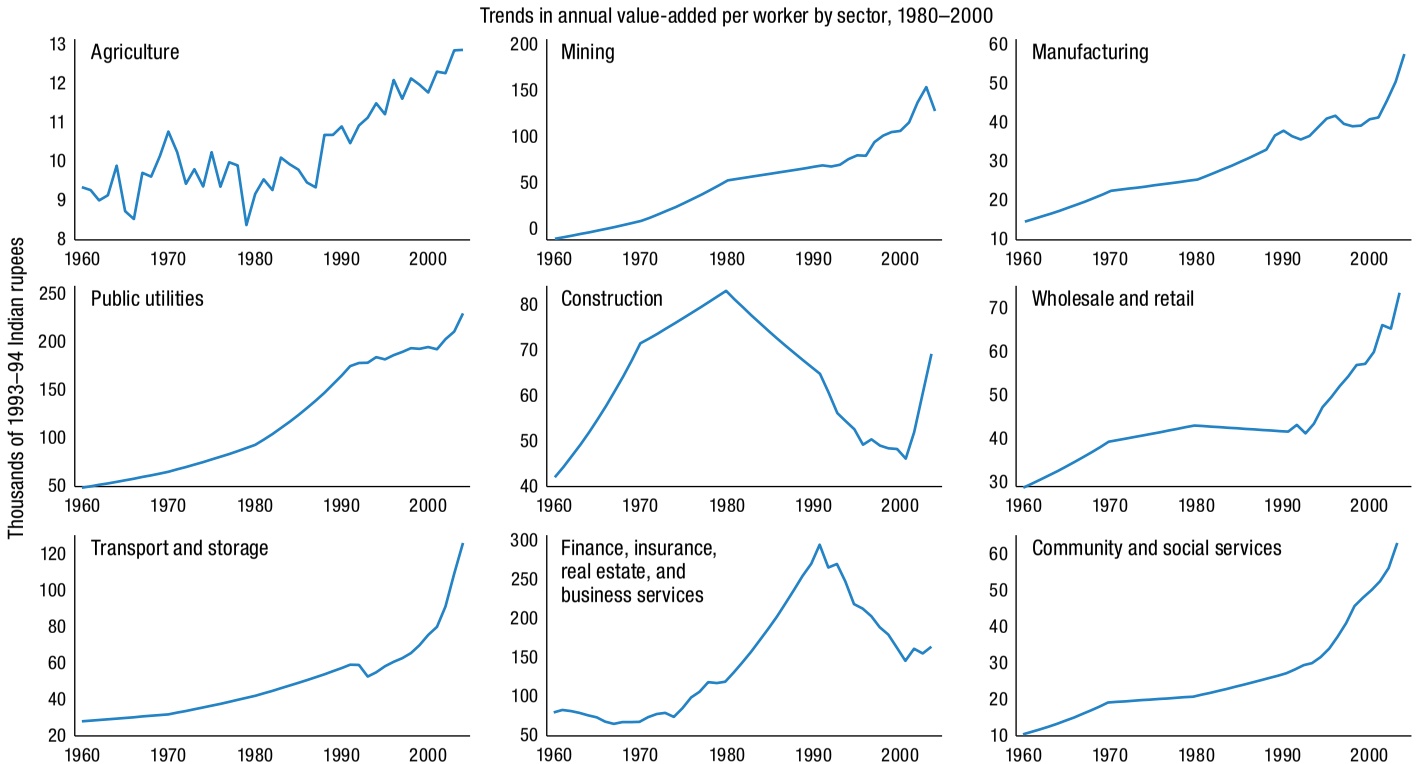
Note: PPP = purchasing power parity.

India's at $7,700.00—although in 1990, India's value-added per worker was 50 percent higher than China's.

Digging a little deeper, we look at the trends in productivity in India's nine key sectors and find that not everyone sees an increasing secular trend over the time period (Figure 1.4). Those sectors whose productivity did grow include (1) mining (except for the last two years and a minor dip in the mid-1990s); (2) public utilities; (3) wholesale and retail (especially in the last decade, which is not surprising, given the spread of department stores and supermarkets, along with their distribution networks); (4) transport and storage; and (5) community and social services.[3] Construction followed an up-and-down path, rising rapidly in the first 20 years, followed by a rapid decline in the next 22 years, although the last two years show a rapid uptick. This pattern in construction is not surprising, given that it coincided with the start of a real estate boom, plus the establishment of call centers and the arrival of various multinationals. Manufacturing saw fairly big fluctuations in the 1990s, but grew quite rapidly in the early 2000s. Agriculture was highly volatile until the late 1980s, probably because of the uncertainty in rainfall, coupled with inadequate irrigation facilities. But since the late 1980s agriculture has settled down, giving way to a rising secular trend (perhaps thanks to better irrigation facilities and higher-quality inputs).

3 Following McMillan and Rodrik (2011), we combined "community, social, and personal services" and "government services" into a single sector. We refer to this combined sector as "community and social services."

FIGURE 1.4 Some sectors are doing a lot better than others



Source: Constructed from the National Income and Employment data from the Groningen Growth and Development Centre database.

The story on finance, insurance, real estate, and business services (FIREBS) is somewhat confusing, given that different datasets show different outcomes for the final 14 years—which matters, especially for such a vibrant sector. What does not seem controversial is that value-added per worker kept growing until the early 1990s. However, after then, according to the Groningen Growth and Development Centre data, value-added has been falling steeply, leading to a halving of the 1990 productivity level by 2005. But this outcome is not confirmed by our sectoral data at the state level (discussed later) for the 15 major states for which consistent data are available. Most of the states (10 out of 15) saw a fair amount of increase in FIREBS productivity between 1993 and 1999, although there was some decline in many of the states between 2000 and 2004. But only in one state (Orissa) do we see a much lower FIREBS labor productivity in 2004 relative to 1993. In all other states, the 2004 productivity is higher, roughly the same as, or slightly lower than in 1993. Thus, our state-level data for FIREBS show much more plausible trends than the Groningen Centre data for the same sector. In any event, whichever data we use, what is important is that labor productivity in FIREBS is much higher than in other sectors, and it is overall an expanding sector in terms of employment.

As for the trends in the sectoral composition of employment from 1960 to 2004, we see a drop in the share of agriculture in national employment, from 71.48 percent to 61.51 percent (Table 1.2). Over the same period,

TABLE 1.2 Agriculture's share has fallen

Sector composition (percentage of total employment), 1960–2004					
	Decade				
Sector	1960–1969	1970–1979	1980–1989	1990–1999	2000–2004
Agriculture	71.48	72.26	70.05	64.81	61.51
Mining	0.55	0.44	0.47	0.59	0.55
Manufacturing	9.80	9.44	9.64	11.09	12.42
Public utilities	0.21	0.29	0.29	0.34	0.40
Construction	1.48	1.21	1.37	2.44	3.32
Wholesale and retail	4.88	4.99	6.05	7.56	8.27
Transport and storage	2.06	2.43	2.58	3.01	3.32
Finance, insurance, real estate, and business services	0.32	0.43	0.40	0.78	1.68
Community and social services	9.21	8.50	9.15	9.38	8.53

Source: Constructed from the National Income and Employment data from the Groningen Growth and Development Centre database.

manufacturing's share rose from 9.80 percent to 12.42 percent, wholesale and retail's share increased from 1.48 percent to 3.32 percent, transportation and storage's share rose from 2.0 percent to 3.3 percent, and FIREBS's share inched up from 0.3 percent to 1.7 percent. Even though this looks like a small change, FIREBS, as we will see later, makes a substantial contribution to structural change, because worker productivity in FIREBS is much higher than the national average.

Turning to relative labor productivity in the various sectors, we see a more dramatic switch in which sectors are leading growth (Table 1.3). While agricultural labor productivity in the 1960s was 30 percent lower than the economywide labor productivity, it fell to 62 percent below overall labor productivity in the 2000s. Over the same period, manufacturing's productivity rose from 32 percent to 45 percent; wholesale and retail's productivity in relative terms stayed high, moving down a bit from two and a half times the economy's average to twice the economywide average; and transport and storage's relative productivity inched up from 2.28 percent to 2.92 percent. However, construction's relative productivity dropped from 4.0 percent to 1.68 percent, and FIREBS rose significantly from 5.62 percent in the 1960s to 9.80 percent in the 1990s. For the 2000–2004 period, the Groningen data show an implausible drop of FIREBS relative productivity to 4.87 percent.

TABLE 1.3 Finance, insurance, real estate, and business services leads the way in productivity

	Relative labor productivity, 1960–2004				
	Decade				
Sector	1960–1969	1970–1979	1980–1989	1990–1999	2000–2004
Agriculture	0.70	0.62	0.54	0.47	0.38
Mining	3.56	4.42	5.16	4.50	4.47
Manufacturing	1.32	1.51	1.64	1.60	1.45
Public utilities	4.17	4.88	6.62	7.45	6.30
Construction	4.00	4.86	4.17	2.29	1.68
Wholesale and retail	2.46	2.58	2.33	1.91	1.96
Transport and storage	2.28	2.34	2.68	2.47	2.92
Finance, insurance, real estate, and business services	5.62	5.71	9.88	9.84	4.87*
Community and social services	1.06	1.28	1.29	1.34	1.64

Source: Constructed from the National Income and Employment data from the Groningen Growth and Development Centre database.

Note: Relative labor productivity is defined as a sector's value-added per worker in any given year divided by the economywide value-added per worker in that same year. *For the 2000–2004 period, the Groningen data show an implausible figure for FIREBS relative productivity of 4.87. Aggregation using our state-level productivity data shows the figure at roughly 7.50.

Our aggregated state-level productivity data tell a more positive story, with the sector's relative productivity for this period at about 7.50 percent.

To measure how much of the labor productivity growth over the period 1960–2004 was the result of structural change, we follow the decomposition methodology used by McMillan and Rodrik (2011). (See the Overview in this book for details on the methodology.)[4]

We should note here that there is little research on structural change in India, apart from the work by McMillan and Rodrik (2011), who examine India as part of their comparative analysis of structural change in various regions. They show that India has been successful in moving labor from low-productivity sectors to relatively high-productivity sectors, thereby resulting in a positive contribution made by structural change to overall labor productivity growth. Another related contribution is a paper by Hasan, Lamba, and Sen Gupta (2013) that looks at how the two components of state-level labor productivity growth are associated with poverty reduction across states in India. They find that structural change and within-sector growth are equally important in poverty reduction. The focus of the work by Hnatkovksa and Lahiri (2013) and by Verma (2010, 2012a, 2012b) is different from, but complementary to, our own work. Verma analyzes the recent structural transformation of India's national output toward services and concludes that it was driven by higher total factor productivity growth in services than in other sectors, which was the result of "market-based liberalization policies." Hnatkovksa and Lahiri's (2013) study highlights the importance of technological progress along with urbanization in dealing with the rural–urban divide—with a special role for rural education.

What did McMillan and Rodrik (2011) find for India as a whole? They estimate 4.23 percent annual growth in overall labor productivity between 1990 and 2005, of which the "within-sector" component was 3.24 percent and the "structural change" component was 0.99 percent. We follow the same procedure to calculate within-sector and structural change components over various subperiods between 1960 and 2004 to trace the story over a longer

4 Algebraically, the decomposition is:

$$\Delta P_t = \sum_{i=1}^{N} \theta_{i,t-k} \Delta p_{i,t} + \sum_{i=1}^{N} p_{i,t} \Delta \theta_{i,t}$$

where ΔP_t is the change in aggregate labor productivity between period $t-k$ and t. The first term is the "within-sector" component, which is a weighted average of the change in labor productivity in each of the N sectors, with the weight for sector i being the labor share of that sector in period $t-k$, measured by $\theta_{i,t-k}$. The second term is the "structural change" component, which is a weighted average of the change in labor shares in the N sectors, with the weights captured by the labor productivity of the sector in period t.

period and to illustrate how the shares of these components changed over time (Table 1.4).

We find that while 2000–2004 saw by far the largest growth in labor productivity—6.5 percent per year—most of this growth was accounted for by within-sector growth (6.24 percent). The biggest contribution of structural change was in the 1990s (1.26 percent out of a total of 2.93 percent growth per year), followed by the 1980s (1.06 percent out of a total of 3.14 percent per year). The only period that seems to have experienced truly undesirable structural change in the form of a negative contribution to growth was the 1970s—a period that also saw negative within-sector growth. This period can be regarded as the peak of the "License-Permit Raj," during which firms had no flexibility in their input and output decisions in their response to shocks to the system. In addition, the public sector was given an important role in every sphere of economic activity. In the 1960s, the contribution of structural change, even though positive, was small (0.26 percent).

During these subperiods, the trends in within-sector change are much more volatile than those of structural change (Figure 1.5a), especially in the 1980s (Figure 1.5b). The reason may be that labor mobility is costly and changing employment from one sector to another is a longer-term decision, whether made by employers or employees, while technological change is an uncertain process. It is important to note that both components lie in the positive region much more often than in the negative region, with negative contributions of both components concentrated in the 1970s—a time of distortionary and restrictive economic policies.

TABLE 1.4 Structural change, albeit still low, contributed the most during the 1990s

Within-sector and structural change components of productivity by various periods (%), 1960–2004			
Period	Annual growth	Within-sector	Structural change
1960–1969	2.671	2.411	0.261
1970–1979	–0.515	–0.266	–0.250
1980–1989	3.141	2.077	1.064
1990–1999	2.930	1.669	1.262
2000–2004*	6.535	6.242	0.293

Source: Constructed from National Income and Employment data collected by the Groningen Growth and Development Centre database.

Note: See footnote 4 in this chapter for how within-sector and structural change components are constructed. *As a result of issues with the Groningen data on finance, insurance, real estate, and business services for this period, as explained later in this book, the true figure for structural change should be considerably higher (more than 0.5), but still a small fraction of the overall growth.

FIGURE 1.5a "Within-sector" productivity growth tends to be much more volatile than structural change . . .

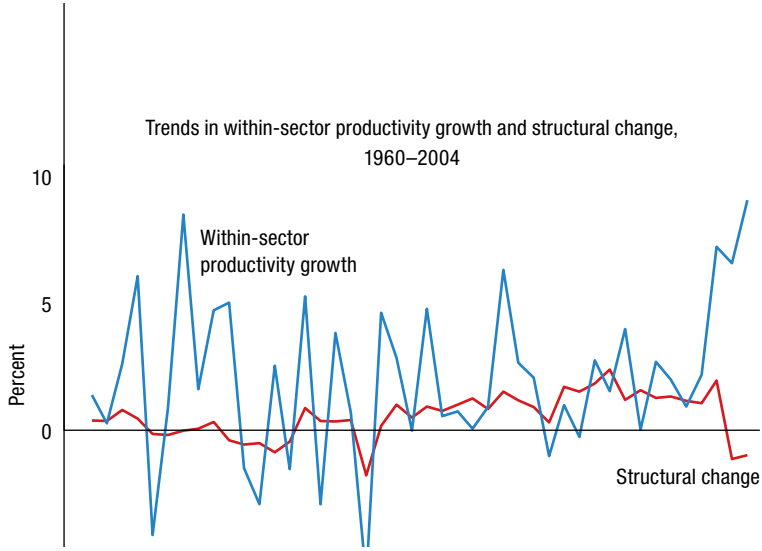
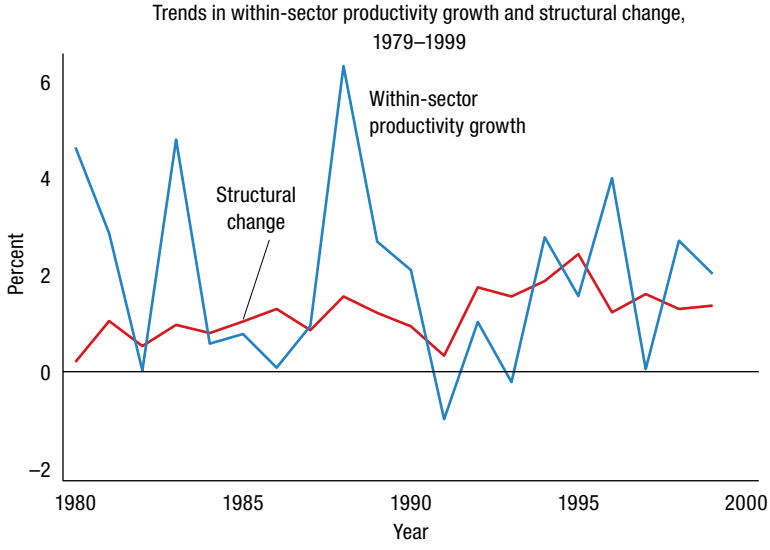


FIGURE 1.5b . . . with "within sector's" greatest volatility in the 1980s



Source: Constructed from National Income and Employment data collected by the Groningen Growth and Development Centre database.

At the sectoral level, we find that in the postliberalization period (1990–2004), FIREBS made the biggest contribution to structural change—between 0.5 and 1.0 percent, as Figure 1.6a shows—although the range may have been 0.75–1.0 percent using our back-of-the envelope correction.[5,6] During the period 2000–2004, manufacturing made a negative contribution (roughly minus 0.5 percent), with its employment share declining, even though its labor productivity was higher than the economywide average.[7] Substantial contributions to within-sector productivity growth have been made in the postliberalization period by manufacturing (up to 2.0 percent in 2000–2004), wholesale and retail (up to 1.0 percent in 2000–2004), transport and storage (up to roughly 1.2 percent in 2000–2004), and community and social services (roughly 1.0 percent throughout 1990–2004) (Figure 1. 6b).

The Stories of Gujarat and Maharashtra

We next turn to what was going on at the state level to discern whether the more productive sectors and states have experienced larger increases in employment. Our results for all the 15 major states (except Assam) show a positive growth in labor productivity between 1987 and 2004 (Figure 1.7). The average within-sector growth was positive for all states (except Assam), while the contribution of structural change was positive everywhere, except for Gujarat, where it was slightly negative. Ironically, Gujarat was one of the fastest-growing states in India during this period, but it appears that this growth was driven strictly by within-sector growth. Gujarat's within-sector

5 This is the change in the share of employment in FIREBS times labor productivity in FIREBS (as a fraction of overall change in national output), in turn multiplied by the overall growth rate of national output per worker.

6 The back-of-the-envelope calculation is very rough. If we assume that FIREBS average productivity was roughly unchanged for the period 1993–2004 (as roughly seen from the aggregation of the state-level data from the Central Statistics Office (CSO) and National Sample Survey Organisation (NSSO)), then actual productivity in 2004 is about 50 percent.

7 Note that the contribution to structural change is being measured by looking at the productivity level in each industry, rather than looking at the productivity level in an industry relative to the average productivity in the economy. In other words, what we are looking at is the contribution of individuals moving into a sector relative to those individuals remaining unemployed (making zero output or income), rather than relative to those individuals earning the economy's average income. Therefore, according to our measure, any expanding sector makes a positive contribution to structural change. With the alternative measure of contribution to structural change mentioned above, even a sector that is expanding its employment share can make a negative contribution to structural change if its productivity is less than the economywide labor productivity. We believe these are alternative measures of contribution to structural change, and that both these measures are useful in their own ways.

FIGURE 1.6a Finance, insurance, real estate, and business services is contributing most to structural change …

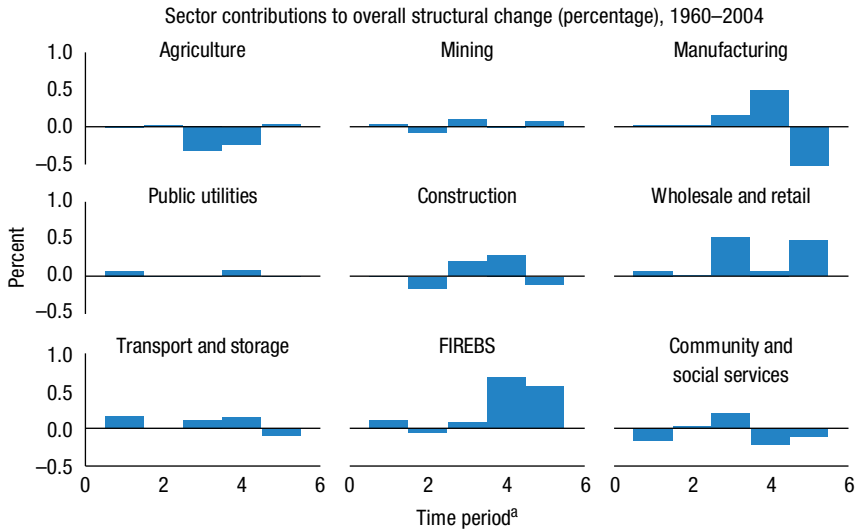
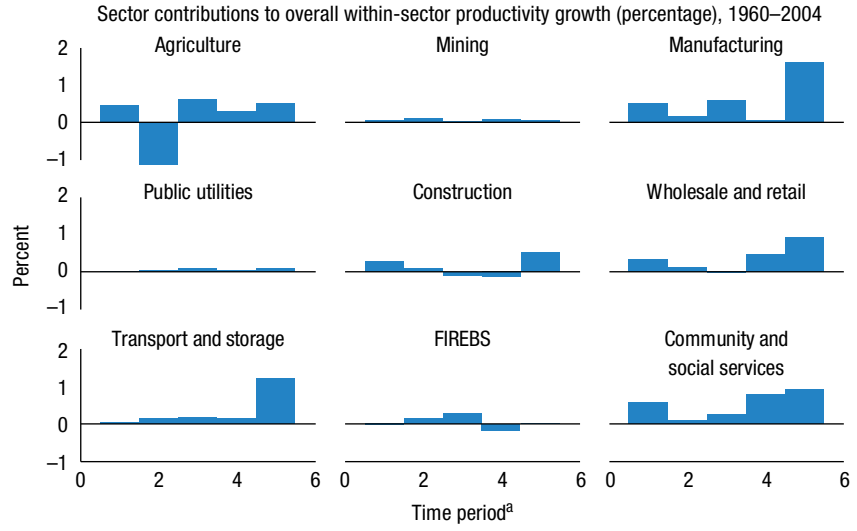


FIGURE 1.6b . . . and since 2000, manufacturing is significantly helping "within-sector" change



Source: Constructed from National Income and Employment data collected by the Groningen Growth and Development Centre database.

Note: [a]Period values are (1 = 1960–1969; 2 = 1970–1979; 3 = 1980–1989; 4 = 1990–1999; 5 = 2000–2004). FIREBS = finance, insurance, real estate, and business services.

average annual growth rate of labor productivity of 4.58 percent was the highest in India, while the contribution of structural change was the lowest, at −0.60 percent. The best performer in terms of structural change was Maharashtra. While its annual growth rate of labor productivity was 3.65 percent, structural change contributed 1.85 percent, with the remainder coming from within-sector growth.[8,9]

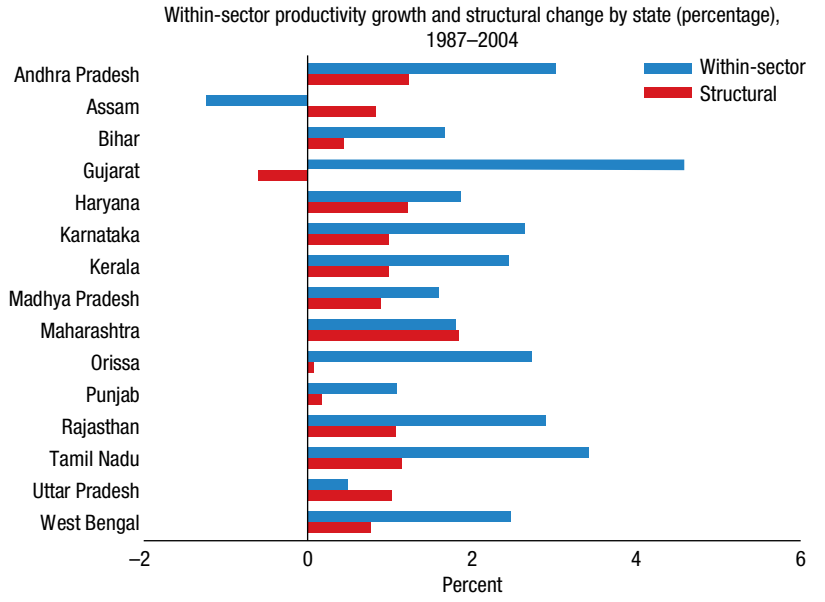
Why was there such a sharp contrast between Gujarat and Maharashtra in terms of their growth patterns? A closer look at what happened at the sectoral level is quite revealing. We see that in almost every sector—apart from FIREBS and mining (which had a negative productivity growth rate in Gujarat and accounts for only around 1 percent of the labor force in each of these two states)—Gujarat shows higher value-added per worker growth than Maharashtra (Table 1.5). In construction, Gujarat's growth rate in value-added per worker was 14.12 percent, while Maharashtra's was only 1.40 percent—although Gujarat saw a rapidly declining employment share (about 14.10 percentage points), while Maharashtra saw a slight increase. In agriculture, Gujarat's growth rate was more than five times that in Maharashtra (1.66 percent versus 0.31 percent), and if the expanding employment in this sector is also factored in, clearly the size of this sector was growing quickly. Even so, for both states agriculture still has the lowest value-added per worker—although its employment share expanded by 10 percentage points in Gujarat, while it contracted by 6.40 percentage points in Maharashtra.

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8 Our estimates differ from those of Hasan, Lamba, and Sen Gupta (2013), who also use Central Statistical Office (CSO) and National Sample Survey Organisation (NSSO) data to construct state-level structural change. However, their estimation differs in the following ways: (1) they use an additional round of NSSO data (2009–2010), and (2) they define an NSSO worker's sector using the worker's principal industry of employment, whereas we use an NSSO worker's current weekly industry of employment. Nonetheless, the results in Hasan, Lamba, and Sen Gupta (2013) support our finding that growth arising from structural change has been more positive (and constitutes a much bigger proportion of overall growth) in Maharashtra relative to Gujarat.

9 It is very important to note here that in the 1960s and 1970s, Punjab performed spectacularly in the agriculture sector. Of all Indian states, it was the most successful in terms of agricultural productivity growth—propelled mainly by the "Green Revolution," which involved the use of high-yielding varieties of seeds and modern agricultural production techniques. The contribution of agricultural productivity growth to overall growth falls in the category "within-sector growth." While a case study of Punjab's agricultural growth and Green Revolution should be an important component of any serious analysis of the Indian growth experience during the last half century, our main focus in this chapter is on the last quarter century and the relative importance of structural change and within-sector growth. Given that the overall productivity levels in manufacturing and services remain much higher than in agriculture, direct growth-enhancing structural change will come through a movement of employment out of agriculture (even though agriculture can have an indirect effect in this regard by providing inputs to the other sectors). For the above reasons and because of space constraints, we decided not to present a case study of Punjab's agricultural performance in this chapter.

FIGURE 1.7 Gujarat and Maharashtra follow different growth paths



Source: Constructed from India's National Accounts Statistics data from the Central Statistical Office, along with employment survey data from the National Sample Survey Organisation.

One explanation for Gujarat's superior performance in most sectors is the state's fast pace of infrastructure development (with investments in ports, roads, rail, power, and so on), reflecting incentives designed to attract private capital and governance geared toward facilitating private investment (for example, by rapidly clearing projects and flexibility in land use) (Sood 2012). Even agriculture has been "corporatized" with a switch to cash crops (like cotton, vegetables, groundnuts, and fruits), where profits are high and growing. As explained in Sen and Mallik (2012), farmers are able to directly sell their output to wholesalers, thereby leading to greater profitability, and noncultivable land (including wasteland) has been brought under cultivation, leading to a rapid decline in landlessness. In addition, high-yielding, genetically engineered varieties of crops have been spread throughout the state, with active technical education provided to farmers in the cultivation of these varieties. A few new agricultural universities have also been established. And rapid expansion of irrigation facilities (including incentives for micro-irrigation to tap the state's groundwater potential) has led to less dependence on the vagaries of monsoons.

The main factor responsible for Gujarat's poor performance relative to Maharashtra's in the structural change component appears to be the fairly

TABLE 1.5 Gujarat has a higher labor productivity growth rate in every sector than Maharashtra

	Gujarat				Maharashtra			
Sector	Value-added per worker (thousands of constant 2004–2005 rupees)	Value-added per worker growth rate (percent)	Share of state employment (percent)	Change in share of state employment (percentage points)	Value-added per worker (thousands of constant 2004–2005 rupees)	Value-added per worker growth rate (percent)	Share of state employment (percent)	Change in share of state employment (percentage points)
Agriculture	27.25	1.66	58	9.8	20.75	0.31	54	–6.4
Mining	469.87	–1.94	1	0.2	179.34	0.83	1	0.2
Manufacturing	159.60	3.73	17	3.0	180.51	2.34	12	0.5
Public utilities	1,069.90	4.51	0	0	656.39	4.46	0	–0.1
Construction	167.93	14.12	4	–14.1	131.01	1.40	5	0.7
Wholesale and retail	171.43	3.00	9	1.8	164.86	2.34	11	3.0
Transport and storage	160.51	4.32	4	0.9	171.81	3.32	5	1.3
Finance, insurance, real estate, and business services	925.60	1.14	1	0.6	892.81	1.69	3	1.9
Community and social services	64.19	3.87	6	–2.1	67.51	4.44	9	–1.1

Source: Constructed from India's National Accounts Statistics data from the Central Statistical Office, along with employment survey data from the National Sample Survey Organisation.

Note: Value-added per worker is for 2004. Value-added per worker growth is the compound annual growth rate in value-added per worker over the period 1987–2004. The share of state employment is for the year 2004. Change in share of state employment is the change between 1987 and 2004.

rapid expansion of the employment share of the relatively low-productivity agriculture sector and the rapid contraction of the employment share of the high-productivity construction sector. However, the reasons for the employment expansion in agriculture were probably no different from those responsible for agricultural productivity growth in Gujarat. After all, most of the construction activities were publicly funded in the 1980s, and they were primarily aimed at protecting agricultural workers from the uncertainties of monsoons—typically for drought relief (Lalitha and Orza 2002). Workers were also sometimes employed for building irrigation facilities. Given that Gujarat's agriculture was later made virtually independent of the vagaries of monsoons, employment in publicly funded construction projects was probably not needed as much. In addition, the high and fast-growing productivity of Gujarat's construction sector probably meant that less labor was needed to meet demand.[10]

By far, the most productive sector for both states was FIREBS, where the value-added per worker was 35–45 times that in agriculture and around 6 times that in manufacturing. However, while Gujarat saw only a 0.6 percentage point increase in employment share, Maharashtra saw almost a 2.0 percentage point increase—a difference that can lead to a big difference in how much structural change contributes to growth because of the extremely high labor productivity of FIREBS relative to the economy's average. In this context, it is important to reiterate that for Maharashtra, FIREBS has been a big contributor to structural change. Not only has the change in its employment share of FIREBS been more than three times that in Gujarat, its actual employment share level in this sector (3 percent) is also three times that of Gujarat's (1 percent). This is not unexpected, as Mumbai, Maharashtra's capital city, is India's financial capital, with the country's premier stock exchange. Also, the capacity of FIREBS to absorb labor is limited in Gujarat relative to Maharashtra by the much lower levels of education—especially in terms of outcomes (reading, writing, and math), the proportion of the population with eight years of education or higher, and the standard literacy rate measure (Drèze and Sen 2013; Ghosh 2012).

Is the agriculture–construction story of Gujarat and Maharashtra evident in other states? Our results show that in agriculture, all states—except

10 It is important to note that what appears as structural change or alternatively "within-sector growth" depends on the degree of aggregation or disaggregation of the analysis. For instance, if we could treat food grain production and cash crops as two separate sectors, it is quite possible that some of the within-sector growth contribution of Gujarat's agriculture would get converted to structural change.

Gujarat—have seen a decline in the share of employment (Table 1.6). In construction, all states—except for Gujarat (major decline) and Rajasthan (minor decline)—have seen an increase in their employment share. But this increase may have more to do with the role of the public construction sector (to tackle the seasonality of agricultural employment, which is also subject to the vagaries of monsoons) than anything else in employment generation.

Forces for "Desirable" Structural Change

The final step in our examination of India's growth patterns is using econometric analysis to determine whether—and to what extent—structural change was "growth enhancing" (or what we call "desirable") and which factors played the biggest roles. Our work picks up on that of McMillan and Rodrik (2011), who used their nine-sector data at the national level to examine patterns in a number of countries. They find that structural change was growth enhancing in India and Thailand, but it was "growth reducing" in Argentina, Brazil, Nigeria, and Zambia.

TABLE 1.6 Agriculture is down everywhere, except Gujarat

Changes in agriculture and construction employment between 1987 and 2004				
	Agriculture		Construction	
Sector	Share of state employment in 1987 (percent)	Change in share of state employment 1987–2004 (percentage points)	Share of state employment in 1987 (percent)	Change in share of state employment 1987–2004 (percentage points)
Andhra Pradesh	63.5	–6.4	3.6	1.6
Assam	71.4	–3.6	1.6	1.4
Bihar	73.1	–5.4	2.5	3.1
Gujarat	47.7	9.8	17.8	–14.1
Haryana	57.5	–4.6	4.0	3.2
Karnataka	64.7	–1.9	2.9	1.1
Kerala	44.4	–10.1	5.5	5.7
Madhya Pradesh	73.0	–4.2	3.5	1.9
Maharashtra	60.8	–6.4	4.5	0.7
Orissa	66.2	–5.5	4.6	1.8
Punjab	52.2	–0.4	3.8	4.2
Rajasthan	63.6	–3.1	11.6	–1.3
Tamil Nadu	48.2	–2.4	4.2	2.4
Uttar Pradesh	69.1	–8.4	3.1	2.5
West Bengal	50.1	–4.7	2.9	2.1

Source: Constructed from India's National Accounts Statistics data from the Central Statistical Office, along with employment survey data from the National Sample Survey Organisation.

They also argue that globalization by itself cannot deliver the "desirable" kind of structural change. Rather, what matters is the availability of such factors as the type of factor endowments a country possesses, the kind of specialization globalization leads to, and, above all, how globalization is managed. They contend that sectors that are exposed to foreign competition through globalization need to obtain government support, as they have in most of Asia—unlike in Latin America, where not only import-competing sectors failed to receive government support in the form of subsidies, but also trade barriers were eliminated rapidly. Making matters worse, exchange rates were overvalued in Latin America (unlike in Asia), thereby encouraging imports and discouraging exports. Plus, they underscore the importance of labor-market flexibility.

We begin by asking about the nature of the relationship between productivity and employment share—an indicator of whether structural change is growth enhancing or growth reducing—in India's sectors between 1987 and 2004. In particular, we examine whether the more productive sectors and states have experienced larger increases in employment. We do so by estimating the following econometric specification:

$$\Delta\theta_{jst} = \alpha_2 + \beta_1 X_{jst-1} + \varphi_{st} + \varphi_j + \varepsilon_{jst} \qquad (2)$$

where $\Delta\theta_{jst}$ is the one-period difference in sector j's share of state employment in state s and year t. X_{jst} is a vector of one-year lagged variables that vary by sector, state, and year. The key variable included in X_{jst} is one-year lagged value-added per worker in natural logarithm. If $\beta_1 > 0$ when X_{jst} is one-year lagged labor productivity, it follows that the more productive sectors are experiencing higher increases in employment. This is evidence of positive structural change. Other variables that are sequentially included in X_{jst} are one-year lagged values of the fraction of casual workers, the fraction of workers with a primary education, and the fraction of rural workers.[11] φ_{st} and φ_j are state-by-year and sector fixed effects, respectively. Finally, ε_{jst} is a classical error term.

We find that the change in employment share of a sector in overall state-level employment is positively related to the value-added per worker in that sector (column 1, Table 1A.1). A 1 percent increase in the value-added per worker leads to an increase in the change in the share of the sector in state-level employment of about a 0.02 percentage point between two consecutive National Statistical Survey rounds (roughly six years).

So what is behind this desirable structural change? Using our state-by-industry-level data, we next look at the underlying factors that enable this

11 Note that these alternate state characteristics are used in place of labor productivity.

positive outcome. We find that a 1.0 percentage point decline in the fraction of casual workers leads to a 0.04 percentage point increase in the change in employment share of a sector—in other words, sectors with a smaller share of casual workers have been expanding in their relative employment size (column 2, Table 1A.1). We also find a weak (statistically insignificant) relationship between this employment share increase and both the fraction of workers with primary education and above, and the rural share of a sector's employment (columns 3 and 4, Table 1A.1).

As for the trend over time, we find that desirable structural change is stronger in the postliberalization period than in the preliberalization period (columns 5 and 6, Table 1A.1)—which is consistent with the McMillan and Rodrik (2011) story that globalization has been managed better in India than in most of Latin America, and good management of globalization can deliver good results. We also see that education and urbanization matter in the postliberalization phase (columns 7 and 8, Table 1A.1). Indeed, employment increased more (or decreased less) in sectors with a bigger share of educated workers (those with primary education and above). And the employment share rose more in sectors with a smaller proportion of rural employees in their total employment.

A Bigger Role for "Labor Pull" Than for "Labor Push"

What about the roles of agricultural and modern-sector productivity—that is, whether the impetus is "labor push" or "labor pull" (Matsuyama 2008)? The assumption that demand for agricultural goods is less responsive to income than demand for modern goods means that growth in agricultural labor productivity will push labor out of agriculture and toward the modern sector (which represents all nonagriculture sectors). This is called "labor push." "Labor pull" occurs when growth in labor productivity in the modern sector pulls labor out of agriculture. In analyzing whether trade liberalization complements or works against the above role of agricultural and modern-sector productivity, much will depend on how this liberalization affects agricultural and nonagricultural prices.

We investigate the importance of the above factors by estimating the following econometric specification:

$$\Delta\theta_{jst} = \alpha_3 + \beta_2 \ln (VAPW)_{jst-1} + \beta_3 \ln (VAPW)_{jst-1} \times Z_{st-1} + \varphi_{st} + \varphi_j + \varepsilon_{jst} \quad (3)$$

where $(VAPW)_{jst-1}$ denotes one-period lagged value-added per worker (which is a measure of labor productivity) at the level of industry (sector) by state. Z_{st-1} is a vector of state-level variables that are also lagged by one

period. It includes the one-period lagged labor productivity of the agriculture sector in state *s*, the one-period lagged labor productivity of the modern sector in state *s*, the one-period lagged relative labor productivity of the modern sector (modern sector productivity / agriculture sector productivity) in state *s*, or the one-period lagged state tariffs. Note that these measures vary only by state and time and not by sector. As a result, we have omitted the level effects of Z_{st-1} from equation (3) because of its collinearity with the state and year interaction fixed effects.

Our results suggest that agricultural productivity did not have a statistically discernible effect on structural change (column 1, Table 1A.2). But there is strong evidence (column 2, Table 1A.2) for the positive role of modern-sector productivity in fostering desirable structural change (that is, increasing employment shares in favor of the relatively productive sectors). We also see a positive role of the relative labor productivity of the modern sector (versus the agriculture sector) in stimulating structural change, once again in favor of high-productivity sectors (column 3, Table 1A.2). In other words, these results suggest that labor pull factors were a much more important determinant of positive structural change in India than labor push factors. However, the postliberalization period tells a story slightly different from the previous subperiod, in that now there is a strong positive role for not only absolute modern-sector productivity and relative modern-sector productivity but also agricultural productivity (columns 4–6, Table 1A.2). It is important to note that while both coefficients are statistically insignificant in column 1, and also some coefficient estimates are insignificant in the other columns of Table 1A.2, in each of those other columns there is at least one important coefficient estimate (of the level and/or interaction terms(s)) that is statistically significant.

Trade Liberalization, Flexible Labor Markets, and Education Help, Too

Another key factor to evaluate is trade liberalization, by using state-level employment-weighted tariffs as an inverse measure of the state's labor force exposure to foreign competition (with time-invariant state-level industry employment weights—that is, of the year 1993—applied upon the national industry tariff vector varying from one year to another). We find that in states where the labor force is relatively more exposed to foreign competition, more productive sectors experience a relatively larger increase in employment share (column 1, Table 1A.3). We also have some fairly strong evidence that labor market flexibility increases the positive structural

change effect of trade liberalization (column 3, Table 1A.3), which is consistent with McMillan and Rodrik (2011). Also, at higher values of the share of workers with primary education, we have a more positive relation between the changes in the shares of employment and labor productivity (column 4, Table 1A.3). The impact of the share of the educated workers itself changes from negative to positive as the value-added per worker increases. As for the role of higher road density, our results show a possible, but weak, improvement (column 5, Table 1A.3). All together, these results suggest that trade restrictions, restrictive labor regulations, the lack of basic education, and possibly low road density can act as impediments to positive structural change.

What if we focus on just the manufacturing sector? Here, too, we find that the change in the employment share of the manufacturing sector increases with value-added per worker in that sector (column 1, Table 1A.4), which indicates that structural change is of the desirable kind. We also again find that trade liberalization enhances this positive relationship between employment share change and labor productivity, especially in states with relatively flexible labor markets (column 4, Table 1A.4). In states where the labor force is more exposed to foreign competition, we see that labor regulations that make for a more flexible labor market strengthen the positive relationship between labor productivity and the change in the employment share of the manufacturing sector (column 6, Table 1A.4).

But Informality Is Not a Big Factor

As for the level of casualization (also known as informality) of the work force, we see a slight increase during the period 1987–2004 from almost 41 percent to 42–43 percent, with manufacturing having roughly the same degree of informality as the overall economy (Table 1.7). However, there is quite a wide variation across sectors. Agriculture and construction have a much higher degree of informality (91–94 percent) than FIREBS and public utilities (below 10 percent). Is this variation correlated with certain industry characteristics? We do see a negative, albeit weak, correlation between the change in the proportion of casual workers and labor productivity (column 1, Table 1A.5)—that is, the greater increase in informality is taking place in the relatively lower-productivity sectors. But this negative impact is stronger (larger) in the preliberalization period than during the postliberalization period (column 2, Table 1A.5), possibly reflecting the fact that globalization requires firms to be much more agile and respond to shocks quickly by hiring or firing workers, which is easier to do with informal workers than with formal workers under

TABLE 1.7 Informality is up slightly

Casualization of the labor force by year and by sector	
Year and sector	Percentage casual worker
Panel A: By year	
1987	40.6
1993	42.3
1999	43.2
2004	42.9
Panel B: By sector	
Agriculture	91.7
Mining	63.9
Manufacturing	42.4
Public utilities	8.6
Construction	94.0
Wholesale and retail	27.6
Transport and storage	30.3
Finance, insurance, real estate, and business services	6.9
Community and social services	15.6

Source: Constructed from India's employment survey data from the National Sample Survey Organisation.

Note: Percentage casual worker refers to the percentage of wage workers in each state and sector who are not regular employees. All household employees were excluded when constructing this measure.

the Indian labor laws. Our results also suggest that labor market flexibility does not affect the relationship between labor productivity and changes in the share of casual workers (columns 3 and 4, Table 1A.5).

The bottom line is that the sectors where employment expansion is not taking place (because of their relatively lower productivity) seem to be the sectors where informality is growing, relatively speaking, while the expanding sectors (which are the relatively high value-added sectors) are seeing either a decline in informality or a relatively small increase in informality. Thus, this evidence indicates that the structural change in informality is probably not a cause for concern. The macro numbers, on the other hand, show an increase in informality. It is quite possible that other variables not included in our regressions are driving the aggregate numbers.

Ways to Drive "Desirable" Structural Change

Encouragingly, we find that structural change has been of the desirable kind in India. In other words, the contribution of structural change to productivity growth has been mainly positive, with negative (growth-reducing)

structural change concentrated mainly in the 1970s. In the postreform period (1991–2004), structural change has contributed slightly less than a fourth of the overall productivity growth rate of slightly more than 4.0 percent. In the 2000s, structural change was a small fraction of the overall productivity growth rate of 6.5 percent.

At the sectoral level, while FIREBS was the leading contributor to structural change in the postreform period, manufacturing was the leading contributor to within-sector growth in the 2000s. Yet despite its high rate of productivity growth, manufacturing's role has not grown in terms of either output or employment. We argue that labor regulations are a big impediment in this regard and that labor-market reforms are needed, especially because the future potential of agriculture and services in generating overall growth is limited (beyond a point) at India's stage in the development process.

On average, more productive sectors have gained in employment shares relative to the less productive sectors, at both the national and the state levels. This structural change has been aided by trade liberalization (especially in states that have labor regulations that make for a relatively flexible labor market) and by the greater exposure of the labor force to foreign competition (an inverse measure of which is the employment-weighted tariff). Thus, we see the importance of less distortionary policies in leading to a more efficient allocation of resources. We also see the value of the right kind of domestic policies and institutions in reaping the gains from globalization. And we find that investing in infrastructure—such as improving the road density and investing in social services like education—can help generate desirable structural change. In other words, the state can play a critical role in ensuring that positive structural change occurs.

We also see that there is some—albeit somewhat weak—evidence that the greater increase in informality is taking place in the relatively low-productivity and slow-growing sectors (during our entire sample period). This evidence suggests that the structural change in informality is probably not a cause for concern. On the other hand, the macro numbers show an increase in informality. It is quite possible that some other variables not included in our statistical analysis are driving the aggregate numbers. However, it is important to note that the negative relationship mentioned above between a sector's labor productivity and the change in its informality has been weaker (smaller in size) in the postliberalization phase, probably driven by the need to hire casual workers to rapidly respond to shocks in the presence of global competition.

The solution to this problem, we feel, is the reform of labor laws to make labor markets more flexible.

Very complementary to our work is the work by Hasan, Lamba, and Sen Gupta (2013), who show that growth-enhancing structural change has played an important role in poverty reduction in India. They have argued that this kind of structural change can be brought about by policies that make the business environment more competitive, make labor markets more flexible, and eliminate financial market imperfections. In turn, these policies become an important part of the toolkit to fight poverty.

The recent work by Hnatkovska and Lahiri (2013) has shown the importance of technological progress and urbanization in dealing with the rural–urban divide. In that context, education—especially rural education—has an important role to play. Our work also shows that both urbanization and investment in education may have a role to play in determining the type of structural change that takes place—that is, whether it has a positive or negative impact on the growth of overall labor productivity (and, therefore, of per capita income).

Thus, while urbanization can help draw some of the underemployed rural labor force from agriculture to higher-productivity manufacturing, for this to actually happen the rural labor force has to have the requisite education to make that transition. That is one of the main reasons why rural education has such an important role to play, making education and urbanization complementary forces for desirable structural change.

Appendix 1A: Data for Our Disaggregated Analysis of Labor Reallocation

We combine National Accounts Statistics data from the Central Statistical Office (CSO) with employment survey data from the National Sample Survey Organisation (NSSO). The CSO dataset provides us with real value-added data for nine broad sectors separately for the 15 major Indian states. The sectors are agriculture, forestry, and fishing; mining and quarrying; manufacturing; public utilities; construction; wholesale and retail trade; transport, storage, and communications; FIREBS; and government services and community, social, and personal services. The included states are Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal. Note that these are not all the Indian states, but are the

15 major states (out of a total of 28 states and seven union territories). Thus, the total value-added by summing up the value-added from these states will be somewhat lower than for the overall country value-added from the Groningen Growth and Development Centre dataset (when both sets of data are converted into common base year prices). While the value-added in the Groningen data is in 1993–1994 Indian rupees, these state-level data are in 2004–2005 Indian rupees.

Next, the NSSO dataset provides us with employment data for the same nine broad sectors and 15 major Indian states. We use these data, in conjunction with the above state-level sectoral value-added data, to construct a value-added per worker series for the years 1987, 1993, 1999, and 2004. These are the years in which the NSSO conducted its surveys. Additionally, we use this series to construct our measures of agricultural and modern-sector labor productivity. The NSSO data also allow us to create sectoral employment shares (in state employment), structural change at the state level, and within- state growth in labor productivity. In addition, we can use the NSSO data to create the sector- and state-level measures of the fraction of casual workers, the fraction of workers with a primary education, and the fraction of rural workers.[12]

For our labor laws measure, we use a partitioning of states that has recently been constructed and used by Gupta, Hasan, and Kumar (2009). This partitioning updates the classification constructed by Besley and Burgess (2004) with information from Bhattacharjea (2006) and OECD (2007), while focusing attention on characterizing state-level differences in Chapter VB of the Industrial Disputes Act (IDA) (which relates specifically to the requirement for firms to seek government permission for layoffs, retrenchments, and closures), and considering both the content of legislative amendments as well as judicial interpretations. Bhattacharjea (2006) also independently assesses legislative amendments, as opposed to the standard approach of relying on the assessments of Besley and Burgess (2004). The Organisation for Economic Co-operation and Development (OECD) study uses a very different approach and relies on a survey of key informants to identify the areas in which states have made specific changes to the implementation and administration of labor laws (including not only the IDA but other regulations as well). The OECD study aggregates the responses on

12 Note that the NSSO provides information on whether each worker surveyed operates in a rural or urban location, in addition to providing information on sector, state, casual/regular status, education level, and so forth. Thus, for example, the fraction of rural workers in a sector within a state would be the number of workers labeled as rural within a sector-state unit divided by the total number of workers in that sector-state unit.

each individual item across the various regulatory and administrative areas into an index that measures the reduction in transaction costs vis-à-vis labor issues brought about by procedural changes. Gupta, Hasan, and Kumar (2009) use the three studies to partition states into those with flexible, neutral, or inflexible labor regulations.

Our state-level trade protection measure used in our state-level analysis is from Hasan et al. (2012), who follow Topalova (2010) and Hasan, Mitra, and Ural (2007). They construct weighted state-specific measures of country-level ISIC two-digit industry trade protection. In particular, they weight two-digit industry-level tariff rates within the agriculture, mining, and manufacturing sectors by state- and industry-specific employment shares in 1993. Similar employment-weighted protection measures have been used in quite a few recent studies. Two such examples are Topalova (2010) and Edmonds, Pavcnik, and Topalova (2010). The idea here is that there is an interaction between the industry-level tariff vector and the employment vector in the determination of various outcomes. This measure of state-level protection has been theoretically justified by Kovak (2013) using a multiregion, multi-industry trade model with sector-specific factors and labor that is mobile across sectors, with all factors being totally immobile across regions. It is important to note in this context that the employment vector (that interacts with the time-varying tariff vector) is time invariant and is chosen for a particular base year. Since we will use the within-state variation to identify the effect of our state-level protection variable, it will be the time-varying tariff vector and not the time-invariant employment vector that will play the key role in our statistical analysis. However, the impact of the tariff vector will vary by the type of the employment vector. In other words, changes in state-level outcomes will be affected by changes in national industry-level tariffs in interaction with 1993 state-level industrial composition. Last, our road density measure is from Cain, Hasan, and Mitra (2012).

TABLE 1A.1 Determinants of desirable structural change

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	Δ (employment share)							
Ln (value-added per worker)	2.090*** (0.489)				–0.180 (0.601)			
Fraction casual		–4.480** (1.749)				–0.850 (1.842)		
Fraction with primary education			–1.200 (2.333)				–5.840** (2.789)	
Fraction rural				–1.900 (1.760)				3.830 (2.470)
Ln (value-added per worker) × liberalization					2.700*** (0.476)			
Fraction casual × liberalization						–3.910*** (1.099)		
Fraction with primary education × liberalization							7.600*** (1.954)	
Fraction rural × liberalization								–6.670*** (1.559)
Constant	–7.780*** (1.464)	2.800 (1.719)	0.180 (1.050)	1.920 (2.099)	1.330 (1.882)	2.840* (1.691)	1.280 (0.842)	–3.010 (2.372)
Observations	405	403	404	404	405	403	404	404
R-squared	0.528	0.501	0.493	0.494	0.596	0.534	0.529	0.547

Source: Authors' econometric estimations using data described in Appendix 1A.

Note: The dependent variable is the change in each sector's share in its state employment. The liberalization variable takes the value of 1 for all rounds of data beginning in 1993 and is 0 otherwise. All independent variables, except liberalization, are lagged by one period. All regressions include state and year interaction fixed effects and industry fixed effects. All regressions are also weighted by each sector's share of national employment. Robust standard errors in parentheses are clustered at the sector-state level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE 1A.2 Labor pull versus labor push

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Δ (employment share)					
Ln (value-added per worker)	0.490 (1.089)	–7.070** (2.970)	0.350 (1.037)	1.690* (1.010)	–0.380 (2.069)	2.000** (0.923)
Ln (value-added per worker) × ln (agriculture sector labor productivity)	0.340 (0.280)			–0.250 (0.277)		
Ln (value-added per worker) × ln (modern sector labor productivity)		1.890*** (0.629)			0.030 (0.394)	
Ln (value-added per worker) × (relative modern labor productivity)			0.920* (0.469)			–1.530*** (0.462)
Ln (value-added per worker) × liberalization				–1.150* (0.586)		
Ln (value-added per worker) × agriculture sector productivity × liberalization				0.360*** (0.136)		
Modern sector productivity × liberalization					–2.890*** (0.598)	
Ln (value-added per worker) × modern sector productivity × liberalization					0.560*** (0.096)	
Relative modern productivity × liberalization						–7.750*** (1.833)
Ln (value-added per worker) × relative modern productivity × liberalization						1.830*** (0.395)
Constant	–8.840*** (2.493)	–8.720*** (2.401)	–9.330*** (2.443)	–6.640** (2.877)	1.480 (2.244)	–0.860 (2.198)
Observations	360	405	405	360	405	405
R-squared	0.265	0.550	0.534	0.296	0.594	0.588

Source: Authors' econometric estimations using data described in Appendix 1A.

Note: The dependent variable is the change in each sector's share in its state employment. The liberalization variable takes the value of 1 for all rounds of data beginning in 1993 and is 0 otherwise. Modern sectors include all nonagriculture sectors. Ln (value-added per worker) is lagged by one period. All regressions include state and year interaction fixed effects and industry fixed effects. All regressions are also weighted by each sector's share of national employment. Robust standard errors in parentheses are clustered at the sector-state level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE 1A.3 The role of trade liberalization, flexible labor markets, and education

	(1)	(2)	(3)	(4)	(5)
Dependent variable	Δ (employment share)				
Ln (value-added per worker)	4.360***	2.150***	4.350***	0.760	1.640
	(0.551)	(0.498)	(0.504)	(0.819)	(1.146)
Ln (value-added per worker) × state tariffs	–5.080***		–4.890***		
	(0.719)		(0.660)		
Ln (value-added per worker) × labor laws		0.190	1.000**		
		(0.169)	(0.422)		
Ln (value-added per worker) × state tariffs × labor laws			–1.500**		
			(0.724)		
Ln (value-added per worker) × fraction with primary education				3.470***	
				(1.284)	
Fraction with primary education				–20.580***	
				(6.486)	
Ln (value-added per worker) × road density					0.080
					(0.190)
Constant	–14.760***	–6.650***	–17.160***	–0.400	–5.920***
	(1.927)	(1.708)	(2.149)	(2.705)	(1.568)
Observations	405	405	405	404	405
R-squared	0.638	0.529	0.646	0.549	0.528

Source: Authors' econometric estimations using data described in Appendix 1A.

Note: The dependent variable is the change in each sector's share in its state employment. The labor laws variable takes the value of 1 for states that have flexible labor laws and is 0 otherwise. Ln (value-added per worker) is lagged by one period. All regressions include state and year interaction fixed effects and industry fixed effects. All regressions are also weighted by each sector's share of national employment. Robust standard errors in parentheses are clustered at the sector-state level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE 1A.4 The role of trade liberalization, flexible labor markets, and education in manufacturing

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Δ (employment share)					
Ln (value-added per worker)	6.880***	6.500***	6.700***	5.640***	7.160***	7.810***
	(1.426)	(1.783)	(1.442)	(1.600)	(1.632)	(1.528)
Ln (value-added per worker) × liberalization		0.350		1.060		
		(0.959)		(0.881)		
Ln (value-added per worker) × labor laws			0.970			–2.130
			(1.047)			(1.727)
Ln (value-added per worker) × liberalization × labor laws				0.310***		
				(0.106)		
Ln (value-added per worker) × state tariffs					–0.650	–1.240
					(1.514)	(1.428)
State tariffs					3.520	5.010
					(6.771)	(6.306)
Ln (value-added per worker) × state tariffs × labor laws						–0.830**
						(0.356)
Constant	–29.460***	–26.700***	–29.520***	–23.260***	–30.860***	–31.470***
	(6.437)	(7.140)	(6.453)	(6.407)	(7.235)	(6.670)
Observations	45	45	45	45	45	45
R-squared	0.643	0.645	0.654	0.734	0.647	0.726

Source: Authors' econometric estimations using data described in Appendix 1A.

Note: The dependent variable is the change in the share of manufacturing employment in each state's overall employment. The liberalization variable takes the value of 1 for all rounds of data beginning in 1993 and is 0 otherwise. The labor laws variable takes the value of 1 for states that have flexible labor laws and is 0 otherwise. Ln (value-added per worker) is lagged by one period. All regressions include state and year fixed effects. All regressions are also weighted by each sector's average share of national employment over the sample period. Robust standard errors in parentheses are clustered at the sector-state level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE 1A.5 Informality and structural change

	(1)	(2)	(3)	(4)
Dependent variable	Δ (casual employment share)			
Ln (value-added per worker)	–1.810 (1.249)	–3.380** (1.361)	–1.960 (1.244)	–3.720*** (1.343)
Ln (value-added per worker) × liberalization		1.870** (0.942)		2.050** (0.850)
Ln (value-added per worker) × labor laws			–0.480 (0.311)	0.550 (0.784)
Ln (value-added per worker) × liberalization × labor laws				–1.320 (1.023)
Constant	6.260 (4.240)	5.410 (4.211)	8.310* (4.673)	8.610* (4.838)
Observations	402	402	402	402
R-squared	0.320	0.326	0.321	0.329

Source: Authors' econometric estimations using data described in Appendix 1A.

Note: The dependent variable is the change in each sector's ratio of casual workers to all wage workers. The liberalization variable takes the value of 1 for all rounds of data beginning in 1993 and is 0 otherwise. The labor laws variable takes the value of 1 for states that have flexible labor laws and is 0 otherwise. Ln (value-added per worker) is lagged by one period. The interaction between the liberalization and labor laws indicator is omitted because of its collinearity with the state and year interaction fixed effects. All regressions include state and year interaction fixed effects and industry fixed effects. These regressions are also weighted by each sector's share of national employment. The standard errors are clustered at the sector-state level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

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Chapter 2

MOVING OUT OF AGRICULTURE: STRUCTURAL CHANGE IN VIET NAM

Brian McCaig and Nina Pavcnik

During the past 20 years, Viet Nam underwent an economic transformation, featuring high rates of economic growth—real GDP increased at an average annual growth rate of 7 percent from 1986 to 2008 and GDP per capita in PPP terms tripled—and a sharp drop in poverty rates.[1] These changes catapulted Viet Nam out of the poorest quintile of countries (ahead of Cambodia and Bangladesh, but behind Laos and Kenya) in 1986, when its GDP per capita in PPP (2005 international dollars) was around only $800. At that point, the highly agrarian nature of Viet Nam's economy placed it in the top quintile of countries with the largest share of agriculture in GDP and among the top 10 percent of countries with the highest share of workers in agriculture throughout the 1990s.

Viet Nam's economic expansion was accompanied by a drastic shift in the composition of GDP, as economic activities moved away from agriculture toward services and manufacturing (Figure 2.1a).

- Agriculture's share of GDP decreased continuously from 34 percent in 1986 to 17 percent in 2009.
- Manufacturing's share initially fell from 17 percent in 1986 to 14 percent in 1990—as many state-owned enterprises (SOEs), which dominated manufacturing at the time, closed (Dodsworth et al. 1996)—but then climbed steadily to 25 percent in 2009, surpassing agriculture's share in 2003.
- The service sector accounted for the largest share of GDP, with its contribution increasing from 46 to 54 percent over the 1986–2008 period.
- Mining and quarrying never accounted for more than 6 percent of GDP.

1 The information on real GDP, real GDP per capita in PPP terms, and poverty is from the General Statistics Office of Vietnam; the Penn World Tables 7.1 (Heston, Summers, and Aten 2012); and the World Development Indicators (WDI) database (World Bank, various years), respectively.

At the same time, Viet Nam experienced a large expansion of its labor force, as employment increased at an average annual rate of 2.4 percent, accompanied by a drastic change in the structure of employment across economic sectors (Figure 2.1b). In 1990, more than 70 percent of workers were in agriculture, with the remaining workers employed in services (18 percent), manufacturing (8 percent), and mining (1 percent). But by 2008, the employment share of agriculture had shrunk drastically to 54 percent, with workers reallocating toward services and manufacturing. The employment share of services grew to 32 percent and that of manufacturing grew to 14 percent, although mining and quarrying never accounted for more than 1 percent of overall employment.

The movement of Viet Nam's workforce away from agriculture to manufacturing and services is consistent with a long tradition in development economics in which poor countries need to undergo a process of structural change, where labor reallocates from traditional, low-productivity sectors of the economy toward modern, high-productivity sectors to achieve high levels of aggregate productivity (Lewis 1954; Fei and Ranis 1964; Chenery 1979). More recently, McMillan and Rodrik (2011) document significant gaps in labor productivity among agriculture, manufacturing, mining, and services in a large set of developing countries, and substantial differences in the contribution of structural change to the aggregate economic performance of these economies during the past four decades. Reallocation of labor across sectors enhanced aggregate labor productivity in Asian economies, while decreasing it in Latin American and African economies within the McMillan and Rodrik (2011) sample.

What contributed to Viet Nam's economic transformation? This is an important question, given that the transformation was swifter than in many other developing countries and consequently contributed more to rising labor productivity and growth (see other countries covered in this book and McMillan and Rodrik 2011). In this chapter, we explore the role of structural change in Viet Nam's economic development in the 1990s and 2000s, starting with quantifying the contribution of structural change to growth in overall labor productivity.[2] We then describe a set of reforms—known as *Doi Moi*, or "renovation"—that were launched in 1986 to gradually transform the economy from central planning to a regulated market economy.

2 Ideally, we would examine the role of structural change over a period of time encompassing several decades. There are no publicly available data on employment and GDP by sector prior to 1990, even at a high level of aggregation. Viet Nam is also not included in the Groningen Growth and Development Centre database used by McMillan and Rodrik (2011).

FIGURE 2.1a Big move out of agriculture in terms of GDP . . .

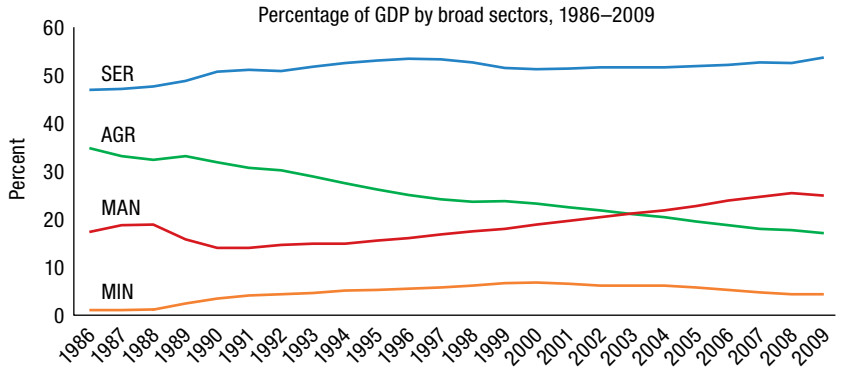
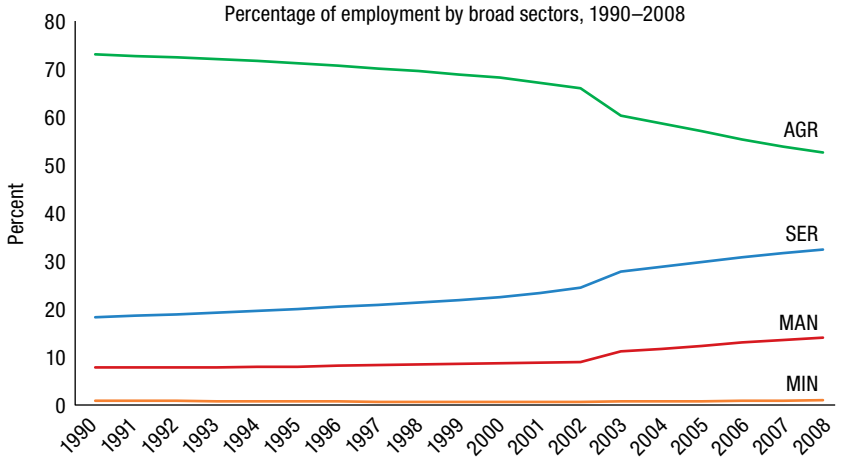


FIGURE 2.1b . . . and in terms of employment share



Source: Authors' own calculations based on data from the General Statistics Office of Viet Nam.

Note: AGR = agriculture; GDP = gross domestic product; MAN = manufacturing; MIN = mining; SER = services. The employment shares match well with Vietnamese census estimates from 1989, 1999, and 2009.

Next, we review the role of key reforms in agriculture, the enterprise sector, and integration of Viet Nam into the global economy, before documenting labor reallocation across different types of firms. We then highlight industries that contributed most to the observed expansion of manufacturing employment during the 2000s and briefly compare Viet Nam's growth experience with that of other countries that started the 1990s at similar levels of economic development.

Overall, we find that structural change accounted for 38 percent of the growth in aggregate labor productivity during 1990–2008, which averaged 5.1 percent per year. Not surprisingly, the reallocation of employment away from agriculture toward service industries and manufacturing—all sectors with relatively higher labor productivity—played an important role. Manufacturing experienced particularly rapid growth in labor productivity and a large expansion in employment. We find that manufacturing industries that experienced greater declines in employment in SOEs and greater increases in employment in foreign-owned firms expanded their relative employment, contributing more to the rapid expansion of the manufacturing sector. We also document significant reallocation within sectors away from low-productivity informal firms to higher-productivity formal firms, which contributed to labor productivity growth within sectors. But despite all of these achievements, large productivity gaps remain both among and within sectors, indicating that there is still room for reallocating resources away from the household business sector to the enterprise sector.

Patterns of Structural Change

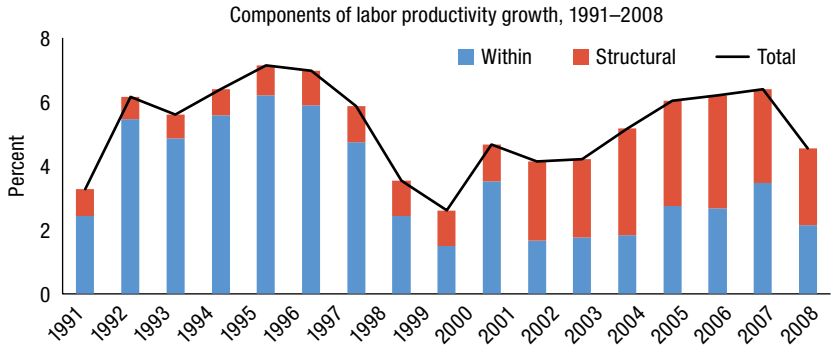
We start by asking to what extent the large shifts of labor out of agriculture contribute to aggregate productivity growth. To answer this question, we use the framework from McMillan and Rodrik (2011), which decomposes the aggregate change in labor productivity into two components: (1) "within," which captures growth within sectors, and (2) "structural change," which captures growth resulting from labor reallocation across sectors that differ in their labor productivity (see the Overview in this book for details on the methodology).[3] We use data provided by the General Statistics Office (GSO) of Viet Nam on output and employment for nine broad sectors (defined in McMillan and Rodrik 2011) from 1990 to 2008. Output is expressed in 1994

3 Algebraically, the decomposition is:

$$\Delta P_t = \sum_{i-1}^{N} \theta_{i,t-k} \Delta p_{i,t} + \sum_{i-1}^{N} p_{i,t} \Delta \theta_{i,t}$$

where ΔP_t is the change in aggregate labor productivity between period $t-k$ and t. The first term is the "within-sector" component, which is a weighted average of the change in labor productivity in each of the N sectors, with the weight for sector i being the labor share of that sector in period $t-k$, measured by $\theta_{i,t-k}$. The second term is the "structural change" component, which is a weighted average of the change in labor shares in the N sectors, with the weights captured by the labor productivity of the sector in period t.

FIGURE 2.2 Structural change played a greater role in the 2000s than in the 1990s



Source: Authors' calculations based on data from the General Statistics Office of Viet Nam and decomposition described in the text.

Vietnamese dong. Labor productivity is measured as real output per worker in a sector.[4]

Our results show that aggregate labor productivity grew on average by 5.1 percent annually, with within-sector change accounting for the majority (62 percent) of the growth during this period (Figure 2.2). At the same time, productivity growth was quite uneven across sectors (Table 2.1). While productivity levels more than doubled in mining, manufacturing, and public utilities, they stayed relatively unchanged for the wholesale and retail trade, hotels, and restaurants sector, and for financial services. In agriculture, productivity grew impressively (at an average annual rate of 3.5 percent), but remained low relative to other sectors. Even so, agriculture contributed 15.1 percent to aggregate labor productivity growth, owing to its large share of total employment. In comparison, manufacturing productivity grew at an average annual rate of 5.1 percent and contributed 22.1 percent to aggregate labor productivity growth.

If we break up the period, we find that aggregate productivity grew marginally slower in the 2000s than in the 1990s, by 4.9 versus 5.2 percent,

4 These labor productivity measures capture average productivity rather than marginal productivity. As discussed in McMillan and Rodrik (2011), comparisons of average productivity gaps across sectors can be misleading if the production function is not Cobb-Douglas and if labor shares of value-added differ across sectors. McMillan and Rodrik (2011) and Gollin, Lagakos, and Waugh (2012) argue that large gaps in average labor productivity between agriculture and manufacturing likely reflect large gaps in marginal productivity. In addition, in imperfectly competitive industries, these productivity measures may in part capture differences in market power across industries, to the extent that aggregate price deflators do not fully control for this issue.

TABLE 2.1 Huge productivity gaps among sectors

Labor productivity by broad sectors, 1990, 2000, and 2008						
	Productivity (million dong, 1994 prices/person employed)			Annual average productivity growth (%)		
Sector	1990	2000	2008	1990 to 2008	1990 to 2000	2000 to 2008
Agriculture, hunting, forestry, and fishing	1.96	2.54	3.66	3.5	2.6	4.7
Mining and quarrying	17.41	84.04	48.85	5.9	17.0	–6.6
Manufacturing	8.07	16.05	19.81	5.1	7.1	2.7
Public utilities (electricity, gas, and water)	27.79	79.71	66.08	4.9	11.1	–2.3
Construction	11.92	22.00	17.84	2.3	6.3	–2.6
Wholesale and retail trade, hotels, and restaurants	15.63	15.77	16.00	0.1	0.1	0.2
Transport, storage, and communications	8.87	11.55	17.21	3.8	2.7	5.1
Finance, insurance, real estate, and business services	61.3	91.71	59.79	–0.1	4.1	–5.2
Community, social, personal, and government services	7.01	10.96	12.56	3.3	4.6	1.7
Economywide	**4.49**	**7.46**	**10.92**	**5.1**	**5.2**	**4.9**

Source: Authors' calculations based on data from the General Statistics Office of Viet Nam.
Note: The sectors are defined as in McMillan and Rodrik (2011).

respectively. However, a clear feature of Figure 2.2 is that within-sector productivity growth contributed less to productivity growth in the 2000s, accounting for only 45 percent of the growth during this period, as productivity growth within many sectors slowed, in contrast to 81 percent for the 1990s. For example, manufacturing labor productivity grew on average by 7.1 percent per year during the 1990s and by 2.7 percent per year during the 2000s. This trend in part accounts for the lower contribution of sectoral productivity growth to aggregate growth in the 2000s than in the 1990s.[5]

As for structural change, it accounts for the remaining 38 percent of growth in aggregate labor productivity and was a consistent positive contributor over the period 1990–2008. That said, its role was relatively small in the early 1990s, and then became increasingly important, eventually surpassing the within-sector component in 2001. Indeed, structural change increased from accounting for only 19 percent of growth in the 1990s to 55 percent

5 With the exception of construction, the sectors that experienced a decline in productivity between 2000 and 2008 (mining and quarrying; public utilities; and finance, insurance, real estate, and business services) had employment shares below 1 percent. A fall in labor productivity from 2000 to 2008 in these very small sectors may reflect measurement error in employment in either 2000 or 2008. For example, employment share estimates for mining and quarrying and for public utilities from the 2009 census differ by about a third from the GSO estimates.

of growth in the 2000s. The significant contribution of growth-enhancing structural change for Viet Nam confirms the trends in McMillan and Rodrik (2011) for other Asian countries during this period. From 1990 to 2005, they found that Asian countries experienced, on average, 3.9 percent annual labor productivity growth, of which 16 percent can be attributed to structural change. However, Viet Nam's productivity growth exceeded the average growth for Asian economies (5.1 percent versus 3.9 percent, respectively) and more strongly depended on the structural change component (38 percent versus 16 percent, respectively).

What was behind Viet Nam's strong structural change? The biggest influences were the predominantly agrarian nature of the Vietnamese economy in 1990, persistent productivity gaps across sectors, and a drastic move of employment out of agriculture over the two decades. Indeed, the dominant role of agriculture as the source of initial low aggregate productivity in Viet Nam is starkly illustrated in Figure 2.3a, which plots sectoral productivity as a percentage of average economywide productivity against the sector's share in total employment in 1990. Agriculture, with nearly 75 percent of employment, had the lowest labor productivity of all—less than 50 percent of the economywide productivity. At the same time, manufacturing's productivity was substantially higher, although it accounted for only 8 percent of employment. However by 2008, almost 30 percent of workers had moved out of agriculture, and as shown in Figure 2.3b, although agriculture's productivity was still significantly lower than in the rest of the economy, its share of employment had shrunk to 53 percent. Thus by 2008, nearly half of the employed population worked in sectors with relative productivity more than onefold and less than twofold the aggregate productivity.

For the period as a whole, we can visualize the big move from low- toward higher-productivity sectors in Figure 2.4, which summarizes these shifts in employment across sectors by plotting the initial sectoral productivity against the sectoral employment growth. The size of the circle reflects the sector's share of total employment in 1990, and the positive slope of the scatter plot illustrates this movement. A decrease of more than 20 percentage points in agriculture's share of employment was accompanied by about an 8 percentage point expansion in the share of employment in wholesale and retail trade, hotels, and restaurants; a 6 percentage point expansion in manufacturing's share; and about a 3 percentage point expansion in construction's share.

One possible explanation for the accelerated pace of structural change in the 2000s could be the low initial levels of economic development in Viet

FIGURE 2.3a Low-productivity agriculture dominates employment in the 1990s . . .

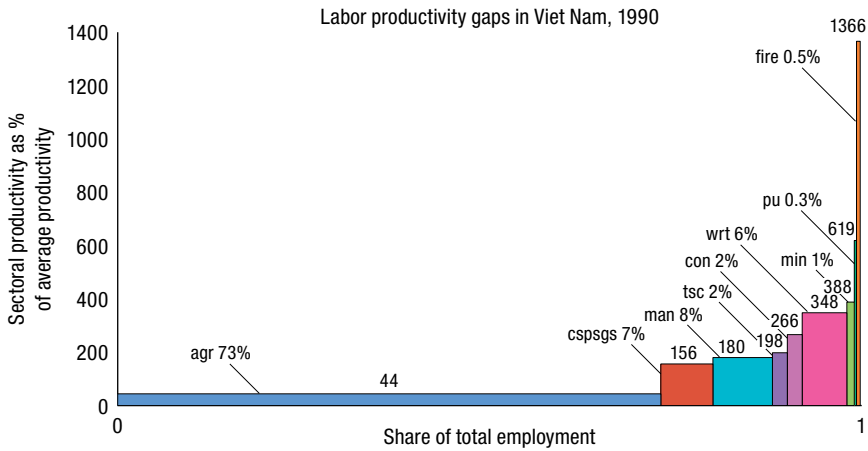
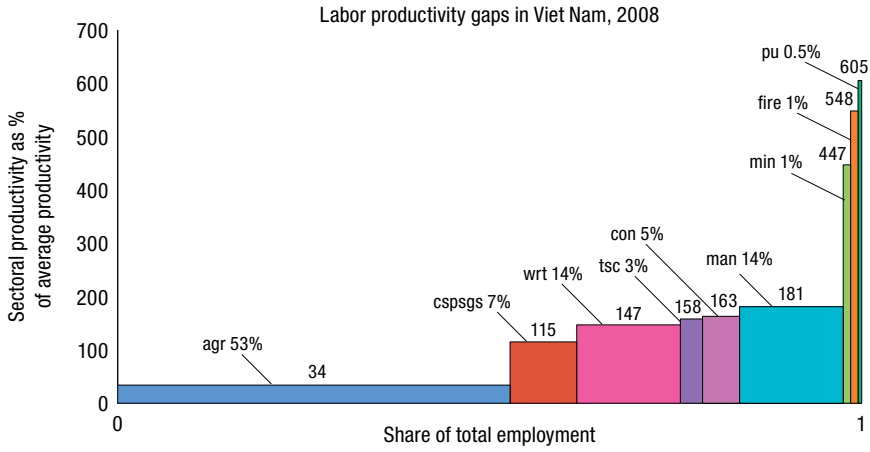


FIGURE 2.3b . . . and 2000s, although its role is decreasing

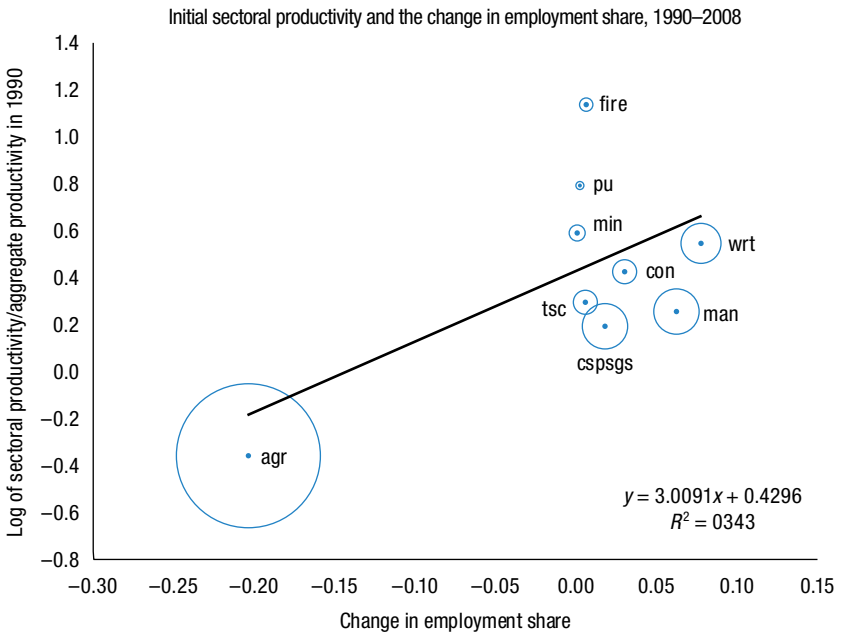


Source: Authors' calculations based on data from the General Statistics Office of Viet Nam.

Note: agr = agriculture; con = construction; cspsgs = community, social, personal services, and government services; fire = finance, insurance, real estate, and business services; man = manufacturing; min = mining and quarrying; pu = public utilities (electricity, gas, and water supply); tsc = transport, storage, and communication; wrt = wholesale and retail trade. Numbers in percent show sectoral share in total employment.

Nam and the adoption of drastic domestic reforms at the end of the 1980s. Poor economic conditions in the 1980s induced policy makers to implement wide-ranging reforms in agriculture, the enterprise sector, and international integration—reforms that likely contributed to higher agricultural productivity and greater productivity in manufacturing and services during the 1990s.

FIGURE 2.4 Big move from low- to high-productivity sectors over two decades



Source: Authors' calculations based on data from the General Statistics Office of Viet Nam.

Note: The circle size indicates the share of total employment in 1990. agr = agriculture; con = construction; cspsgs = community, social, personal services, and government services; fire = finance, insurance, real estate, and business services; man = manufacturing; min = mining and quarrying; pu = public utilities (electricity, gas, and water supply); tsc = transport, storage, and communications; wrt = wholesale and retail trade.

These initial improvements in sectoral productivity could have also contributed to subsequent reallocation of workers from agriculture to manufacturing and services. That is because higher agricultural productivity means that fewer workers are required to maintain food production and leads to higher agricultural incomes, which, combined with an income elasticity greater than one for nonagricultural goods, generates increased demand for nonagricultural goods. Both of these factors would have enabled the subsequent release of agricultural labor. Likewise, productivity gains in nonagriculture sectors during the 1990s and increased demand for Vietnamese nonagricultural goods on the world markets could have subsequently pulled agricultural labor to nonagricultural activities. In both cases, structural change would have followed sectoral productivity improvements.

Another possible explanation might be demographic changes. These changes could have accelerated the decline in the relative share of agricultural employment by increasing the employment share of younger cohorts who

entered the workforce directly into high-productivity sectors (such as manufacturing) and by the exiting of older cohorts (who are more likely to work in agriculture) from the labor force. Keep in mind that shifts in the sectoral composition of the workforce owing to demographics are arguably subject to smaller mobility costs than shifts across sectors among cohorts in the workforce, and that between 2000 and 2008, the workforce grew from an estimated 36.7 million to 44.9 million workers.

However, we believe that demographic changes in Viet Nam can account for only a small part of the story. Over time, younger generations of workers have become less likely to work in agriculture, particularly in 2009 relative to 1989 and 1999 (Table 2.2, Panel A). However, we also find that workers within cohorts left agriculture. For example, 68.2 percent of workers age 20–24 worked in agriculture in 1999, but the share of workers within this cohort in 2009 (who were then age 30–34) fell to 47.2 percent. Thus, the reduction in employment in agriculture is not simply owing to the entry and exit of cohorts from the workforce. In addition, if we decompose the reduction into within and between cohort effects, we find that between 1999 and 2009 (when most of the movement out of agriculture occurred), more than 80 percent of the reduction in the share of agricultural employment reflects the changes within cohorts rather than changes between cohorts (Table 2.2, Panel B).[6]

Yet another possible reason for the acceleration in structural change during the 2000s may be the higher level of internal migration—apparently driven by economic reasons (UNPF 2007; Fukase 2013)—which has led to a rapid shift in the distribution of employment across regions within Viet Nam. In particular, the workforce in Southeast Viet Nam grew from 15.7 to 19.0 percent of the national workforce between 1999 and 2009, according to our estimates using census data. This region has the lowest share of workers in agriculture but the highest share in manufacturing.

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6 The decomposition is based on the formula

$$\Delta S_t = \sum_c \Delta s_{ct} E_c + \sum_c \Delta E_{ct} s_c$$

where s_{ct} is the share of workers in cohort c working in agriculture at time t, E_{ct} is the share of cohort c's employment in total employment at time t, $S_c = 0.5(s_{ct} + s_{ct-1})$, and $E_c = 0.5(E_{ct} + E_{ct-1})$. The "within" effect is the first summation term, which captures changes within cohorts, holding the relative size of cohorts constant, and the "between" effect is the second summation term, which captures changes in the relative sizes of cohorts, holding the prevalence of agriculture employment within the cohort constant. For cohorts that are entering the workforce, we assign a size of 0 prior to entering; and for cohorts that are exiting the workforce, we assign a size of 0 after exit.

TABLE 2.2 Demography plays only a small role in the exit from agriculture

Panel A: Percentage of employment in agriculture, by cohort			
Cohort age (years)	1989	1999	2009
15–19	83.0	79.0	64.5
20–24	71.9	68.2	47.5
25–29	66.8	65.7	43.2
30–34	63.3	67.2	47.2
35–39	63.0	66.9	50.2
40–44	63.8	65.8	54.4
45–49	70.6	67.1	56.3
50–54	76.1	71.8	59.9
55–59	80.2	78.4	68.2
60–64	82.5	84.8	76.4
Total	70.5	69.1	53.0
Panel B: Decomposition of decline in agricultural employment into "within" and "between" cohort components (percentage points)			
Period	Within	Between	Total
1989–2009	–7.9	–9.6	–17.5
1989–1999	–1.6	0.1	–1.4
1999–2009	–13.2	–2.8	–16.1

Source: Authors' calculations based on population census data from MPC, IPUMS International (2015).

Note: Panel A reports the share of agriculture in total employment by cohort and census. Panel B decomposes the change in the share of agricultural employment into "within" and "between" cohort components.

Stark Difference in Regional Trends

At the regional level, labor movements out of agriculture toward sectors like manufacturing were quite uneven between 1989 and 2009, although all of the eight major geographical regions experienced a drop in agriculture's share (Table 2.3).[7] For major economic centers, such as in the Southeast centered around Ho Chi Minh City, there was a significant shift of employment out of agriculture into manufacturing and services, while other regions, such as the Northwest, continued to feature almost complete employment of workers in agriculture. The Southeast, which had the lowest share of agricultural workers in 1989 at 45 percent, experienced one of the largest reductions in agricultural

7 Viet Nam is composed of eight major geographical regions: the Red River Delta, the Northeast, the Northwest, the North Central Coast, the South Central Coast, the Central Highlands, the Southeast, and the Mekong River Delta. These regions differ along important physical and economic dimensions. For example, the Red River Delta and the Southeast contain Viet Nam's two most important economic centers—Hanoi and Ho Chi Minh City, respectively; and the Northeast, Northwest, and Central Highlands are mountainous and populated by many ethnic minorities.

employment—19 percentage points—so that by 2009, only about a quarter of its workers were in agriculture. In comparison, the Northwest, which had the highest share of agricultural workers in 1989 at 85 percent, saw the smallest reduction—3.4 percentage points—so that more than 80 percent of its workers continue to work in the sector with the lowest labor productivity.

The regions also faced uneven changes in the prevalence of manufacturing jobs (Table 2.3). The Southeast and South Central Coast areas started off with the largest manufacturing employment base in 1989, with 24 and 14 percent of workers in manufacturing, respectively. Over the two decades, the manufacturing base expanded relative to total employment in only three regions, and these increases were especially pronounced in the Southeast and the Red River Delta. By 2009, the share of manufacturing employment was noticeably higher than the 14 percent national average in the Southeast (28.9 percent), somewhat higher in the Red River Delta (16.6 percent), and somewhat lower in the South Central Coast (12.2 percent). These same regions also feature the highest share of workers engaged in service industries.

What may explain these regional disparities in the movement of labor? We see that the regions that originally relied less on agriculture and more on manufacturing and that are closer to the major seaports experienced larger movements of labor out of agriculture toward manufacturing and services—no doubt helped by the seaports and the early establishment of industrial zones. Even so, the benefits of Viet Nam's economic growth were distributed throughout the country, as demonstrated by the fall in poverty in all regions. For example, despite the slow movement of workers out of agriculture and the

TABLE 2.3 Big differences among regions in labor movements

Share of workers in agriculture and manufacturing by region, 1989 and 2009						
	Agriculture			Manufacturing		
Region	1989 (%)	2009 (%)	Change (% points)	1989 (%)	2009 (%)	Change (% points)
Red River Delta	71.9	48.6	–23.3	11.9	16.6	4.7
Northeast	77.9	68.2	–9.7	9.1	8.2	–0.9
Northwest	84.7	81.3	–3.4	2.9	2.5	–0.4
North Central Coast	74.3	66.8	–7.5	12.2	7.1	–5.1
South Central Coast	67.1	54.1	–13.1	14.2	12.2	–2.0
Central Highlands	83.0	76.2	–6.8	5.0	3.7	–1.3
Southeast	45.1	26.1	–19.0	24.3	28.9	4.6
Mekong River Delta	77.6	58.2	–19.4	7.5	10.4	2.9

Source: Authors' calculations based on population census data from IPUMS International (MPC 2015).

extremely small manufacturing employment base in the Northwest, the poverty rate dropped from 81 percent in 1993 to 46 percent in 2008 (VASS 2011). This may reflect better agricultural productivity and a growth in crop output (Benjamin et al. 2009).

Overhauling the Vietnamese Economy

What contributed to structural change in Viet Nam? The major reforms began in the late 1980s with a package of policies, collectively known as Doi Moi or "renovation," aimed at gradually transforming the economy. Not only was Viet Nam a very poor and highly agrarian country at the onset of reforms, it also faced low economic growth, famine, large budget deficits, hyperinflation, a trade embargo from the United States, and drastic cuts in Soviet aid. In fact, Dollar and Litvack (1998) and the World Bank (2011) argue that the Communist Party implemented the reforms—which covered agriculture, enterprises, and international integration—in response to the extremely poor economic conditions during the 1980s.

Agricultural Reforms

The agriculture sector was, and continues to be, the largest employer in Viet Nam, employing 53 percent of the workforce in 2009. It was also one of the first sectors to experience substantial reform. Prior to Doi Moi, agriculture in Viet Nam was organized through collectives. The reforms in 1987 and 1988 legalized private economic activity and exposed farms to markets and competition by eliminating price controls and the state procurement system (Dollar and Litvack 1998; Glewwe 2004). The elimination of price controls had dramatic impacts on producer prices. For example, the official procurement price of rice was approximately one-tenth of the market price in 1988 (Dollar and Litvack 1998).

The reforms replaced farming based on collectives with household farms as the main units of production. The land was divided among the member households (Decree No. 10 in April 1988), who received a 15-year lease for their plots and could sell agricultural output produced on the plot for market prices (Glewwe 2004). The 1993 Land Law (Decree No. 5) strengthened household land property rights by increasing tenure to 20 years for annual cropland (50 years for perennial cropland), and by giving households the right to exchange, transfer, lease, inherit, and mortgage their land-use rights (Glewwe 2004). Viet Nam also started the process of land titling, so that by 1997 half of all land had been titled (Benjamin and Brandt 2004).

During the 1990s, agricultural reforms further relaxed restrictions on external and internal trade of agricultural goods and inputs, such as fertilizers.

Rice market liberalization played a particularly influential role, thanks to the dominance of rice in agricultural production at the onset of reforms—with 70 percent of Vietnamese households producing rice (Minot and Galetti 2000), and 77 percent of cultivated land devoted to rice paddies in 1992 (Wiens 1998). At the time, a quota limited exports of rice, and farmers and private traders could not freely trade rice within Viet Nam. These policies depressed the domestic price of rice, especially in the South, and weakened the incentives of farmers to produce rice.

Between 1992 and 1997, Viet Nam increased the quota on rice exports from 1.0 to 4.5 million metric tons and removed restrictions on internal trade in rice (Benjamin and Brandt 2004), leading to a 30 percent increase in the price of rice relative to the consumer price index between 1992 and 1998. Moreover, the government lifted some restrictions on imports of fertilizers, which reduced their price and increased their use, potentially improving labor productivity in agriculture (Benjamin and Brandt 2004).

The mix of these domestic and external reforms contributed to the takeoff in agricultural labor productivity growth. Between 1985 and 1995, rice production increased dramatically, growing at an average annual rate of 4.6 percent (Minot and Galetti 2000), and yields increased from 3.33 to 4.90 tons per hectare between 1992 and 2006 (Benjamin et al. 2009). However, the associated improvements in rural incomes were uneven across regions, benefiting the South and the Red River Delta, where most of the rice is grown, relatively more than the North (Benjamin and Brandt 2004). Even so, all regions experienced an increase in agricultural output, with crop output growing by 2.5–16.0 percent per year between 1992 and 2006 across Viet Nam's major regions (Benjamin et al. 2009). Indeed, the fastest growth was in the Central Highlands, Northeast, and Northwest—regions that are not specialized in rice. Instead, these regions experienced faster growth in crops, such as vegetables and beans (particularly in the Central Highlands); perennials, such as tea and coffee; and fruit (particularly in the Northeast). The widespread gains from agricultural growth may reflect initially fairly equitable allocation of land across households during the Land Law reforms (Ravallion and van de Walle 2008) and the increased opportunity for regions to specialize along lines of comparative advantage.

As for the possible role of "labor push," we are not aware of any study that formally examines this explanation for the observed movement of labor out of agriculture in Viet Nam. The reasoning goes that people in low-productivity agriculture remain in agriculture to produce a sufficient amount of food for subsistence, but can be released from agriculture to more productive activities once agricultural productivity increases above the subsistence threshold.

However, the drastic expansion of rice production subsequent to the reforms in the late 1980s and 1990s suggests that Viet Nam's agricultural productivity reached a sufficiently high level for agriculture to exceed the subsistence level and release labor to more productive activities (as suggested in the structural transformation model by Gollin, Parente, and Rogerson 2007). In fact, following the implementation of the major economic reforms, Viet Nam shifted from subsistence agriculture and importation of rice during the 1980s to being the second-largest exporter of rice on world markets by 1997 (Dollar and Litvack 1998; Minot and Goletti 2000).

Enterprise Reforms

At the same time, Viet Nam also experienced several reforms in the enterprise sector that have likely contributed to observed increases in nonagricultural productivity, and thus provide the "labor pull" explanation for structural change. Prior to Doi Moi, SOEs were the dominant means of production outside of agriculture. Dodsworth et al. (1996) report that in 1989, SOEs produced about 29 percent of overall output and about half of output in industry and services, while employing 16 percent of the Vietnamese labor force and about half of the Vietnamese nonagricultural labor force.

As in agriculture, the Doi Moi reforms decentralized decision making and gave enterprises autonomy over production, pricing, and trading. The government also implemented policies that further introduced competition and private enterprise activities, including the entry of foreign-owned firms. The Foreign Investment Law of 1987 opened all sectors of the economy other than defense to foreign investors, allowed for 100 percent foreign ownership of firms, and offered foreign firms generous tax concessions and duty exemptions (Dodsworth et al. 1996). Foreign investment was further encouraged by forming economic zones, such as export-processing zones and industrial parks (see Decree No. 332-HDBT in October 1991). The first export-processing zone was established near Ho Chi Minh City in November 1991. These zones often offered firms reduced tax rates and exemptions on import and export duties (for example, see Articles 51 and 52 of Decree No. 332-HDBT and Article 15 of Decree No. 192-CP, issued in 1994). More generally, various reforms—such as uniform rules of taxation, the freedom for enterprises to form their own trading relationships, and exposure to foreign competition—aimed to level the playing field among SOEs, foreign enterprises, and private enterprises (World Bank 2011).

Another set of reforms implemented in 1988–1989 directly targeted SOEs. As discussed in Dodsworth et al. (1996), the SOEs received autonomy over

the production process and price setting, and were allowed to lay off workers. Notably, SOEs had to begin operating subject to hard budget constraints and could no longer rely on export subsidies.

The combination of these early reforms immediately changed the production incentives within the SOEs, increasing their exposure to market forces, and led to a drastic consolidation of the sector. Excluding oil production, SOE value-added declined by 7 percent between 1989 and 1991 (Dodsworth et al. 1996), and between 1989 and 1992 about 800,000 SOE employees (about one-third) were laid off (Glewwe 2004). The number of SOEs declined dramatically from 12,000 in 1988 to about 6,500 in the mid-1990s (Dodsworth et al. 1996). The consolidation was accomplished mainly through closures (which disproportionately affected the local government SOEs, as opposed to central government SOEs) and mergers, while privatization was rare (Dodsworth et al. 1996). The consolidation of the SOE sector slowed down during the rest of the 1990s, and much of it was achieved through selling of equity in the SOEs (World Bank 2002). By 2000, about 5,700 SOEs were active, and by 2010, only 3,364 SOEs remained in operation (World Bank 2011)—less than a fourth of the SOEs that operated in 1989. Despite the drastic reform of the sector during the 1990s, its relative contribution to GDP has not changed much—around 36–37 percent from 1991 to 2009 (Minh et al. 2010). Nonetheless, although the SOE share of output was stable and SOE restructuring slowed in the second part of the 2000s (World Bank 2002, 2011), SOEs now employ less than 10 percent of the workforce, compared with 16 percent in 1989, suggesting significant labor allocation out of the sector.

The liberalization of FDI led to a large inflow of capital in the 1990s and 2000s, with FDI as a percentage of GDP increasing from 2.8 percent in 1990 to 11.9 percent in 1994, and then fluctuating between 3.5 and 10.5 percent between 1995 and 2010.[8] This was accompanied by a significant change in the relative share of output produced by the FDI sector, mainly at the expense of the private, nonstate domestic sector. The FDI share grew from 6.4 percent over 1994–1995 to 18.0 percent during 2006–2009, with an accompanying fall in the share of GDP produced by the nonstate domestic sector (Minh et al. 2010).

Another important reform for the private sector has been the 2000 Enterprise Law, which made it easier for private enterprises to register and operate across most industries (World Bank 2002). In Viet Nam, private firms

8 The estimates of FDI as a percentage of GDP are from the World Development Indicators database (World Bank, various years).

operate either as a household business (or a farm) or as an officially registered enterprise. The Enterprise Law reduced the time required to register an enterprise, leading to 50,000 new registered enterprises between January 2000 and October 2002—about three-quarters of the total number of enterprises then registered. Most of the newly registered enterprises were fully privately owned and very small. In fact, the World Bank (2002) reports that those registered in 2002 had an average registered capital of only US$90,000. The 2000 Enterprise Law also contributed to the growth in private enterprise firms by making it more likely that they would start operations in the enterprise sector, as opposed to in the household business sector, and helping firms transition more quickly from the household business sector to the enterprise sector (Malesky and Taussig 2009).

Today, Viet Nam's business environment is dramatically different from that of the 1990s, thanks to the enterprise reforms. According to *Doing Business 2013* (World Bank 2013), Viet Nam is ranked 99th out of 185 countries on the ease of doing business—only slightly behind China (ranked 91st) and ahead of such countries as Indonesia and Bangladesh. The current ranking reflects significant improvements over time in some business environment characteristics tied directly to enterprise sector reforms. For example, the number of days needed to start a business fell from 59 to 38, and the percentage of income per capita required to start a business decreased from 31.9 to 12.1 between 2003 and 2010 (World Bank 2004, 2013).

Overall, the restructuring of SOEs, expansion of private enterprises, inflows of new investment and technology, and better incentive structures for production decisions have all contributed to higher labor productivity in nonagriculture sectors. These sectoral productivity gains not only directly affected the gains in aggregate productivity, but in principle also could have induced labor to move out of agriculture. Agriculture started with lower labor productivity in 1990 and experienced lower subsequent productivity growth than nonagriculture sectors, such as manufacturing. An increase in nonagricultural productivity is predicted to lead to rising wages in the nonagriculture sector, particularly within enterprises, thus inducing workers to move out of agriculture. However, the magnitude of the contribution of these "pull" factors relative to the "push" factors for moving workers out of agriculture, discussed in the previous chapter, remains an open empirical question.

International Integration

Strongly connected to the reforms in agriculture and enterprises was Viet Nam's gradual integration with the global economy. To appreciate the vastness

of the reforms undertaken as part of this integration, one must understand how controlled and closed Viet Nam was at the beginning of the Doi Moi period in comparison with its current openness.

Prior to the reforms, foreign trade in Viet Nam was subject to central decisions and could be carried out only by a small number of state trading monopolies. Exports were discouraged through the overvaluation of the exchange rate and the use of export duties, imports had to proceed through an extensive system of quotas and licenses, and exports had to fulfill partner obligations within the Council for Mutual Economic Assistance before they could be sold to the convertible currency area (Dodsworth et al. 1996). Additionally, Viet Nam faced a trade embargo with the United States that was lifted only in 1994.

But already in 1989, still early in Doi Moi, extensive reforms were undertaken to open up the economy. These included unifying and devaluing the exchange rate, relaxing import and export quotas, eliminating all budget subsidies for exports, simplifying licensing procedures for import and export shipments, and delisting items from export duties and reducing the rates for remaining products—all in 1989; allowing private enterprises to engage directly in international trade in 1991; and removing import permit requirements for most remaining items in 1995 (Dodsworth et al. 1996).

These domestic reforms were quickly followed by international trade agreements and partnerships. In 1992, Viet Nam signed a preferential trade agreement with the European Economic Community (Glewwe 2004). In 1995, Viet Nam became a member of the Association of Southeast Asian Nations (ASEAN) and its associated ASEAN Free Trade Area, which bound Viet Nam to reduce tariffs on imports from ASEAN members to 5 percent or less by 2006 for the vast majority of goods (Athukorala 2006). In 1995, Viet Nam also initiated the application process to join the World Trade Organization (WTO). In December 2001, the U.S.–Viet Nam Bilateral Trade Agreement came into effect, leading to a huge increase in Vietnamese exports to the United States, predominantly in light manufactured products (such as clothing, textiles, and footwear) (McCaig 2011). The culminating act was WTO membership in 2007 (World Bank 2011).

The vast array of trade reforms significantly increased the ability of firms to export and import. According to *Doing Business 2013* (World Bank 2013), Viet Nam ranks better (74th) on trading across borders than on overall ease of doing business, just behind China (68th). In Viet Nam, fewer documents are

needed to export, but more to import, than in China, and container costs are similar. The trading across borders rankings put Viet Nam well ahead of other Asian countries, such as Cambodia (118th), Bangladesh (119th), and India (127th).

These policy changes contributed to a dramatic increase in overall exports and imports as a percentage of GDP between 1986 and 2011. In the mid-1980s, imports and exports averaged about 15 and 5 percent of GDP, respectively. But starting in the late 1980s and early 1990s, imports and exports both began a rapid and continuous increase, reaching 88 and 78 percent of GDP, respectively, by 2010 (Figure 2.5). Between 1990 and 2010, imports and exports grew in value by an average of 18.7 and 18.5 percent per year, respectively (based on data from the GSO).

The trade reforms not only increased the overall value of trade and its importance to the economy, but also altered the composition of trade in two important dimensions: the types of goods being traded and the ownership of the firms involved in trading. On the export side, the composition of goods shifted significantly away from agricultural and aquaculture products, such as rice and fish, and crude petroleum (within mineral fuels, lubricants, and related materials) to manufactured exports, such as clothing and footwear (within miscellaneous manufactured products) and office machinery (within

FIGURE 2.5 Viet Nam has swung from a closed economy to an open one



Source: World Development Indicators database (World Bank, various years).

machinery and transport equipment) (Figure 2.6a). While exports of primary products constituted more than 60 percent of exports in 1995, by 2010, they had fallen to about 30 percent—in large part because of relative declines in rice and crude petroleum exports.[9] Data constraints prevent us from constructing a consistent series stretching further back in time, but Chu and Dickie (2006) report that in 1992, manufactured exports accounted for only 6 percent of exports. On the import side, the major compositional shift was away from miscellaneous manufactured goods—primarily owing to a fall in the share of clothing and footwear imports—toward manufactured goods classified chiefly by materials (such as iron and steel and nonferrous metals) (Figure 2.6b).

These reforms and changes in the composition of traded products likely contributed to reallocating labor from agriculture (including aquaculture) to manufacturing, as agricultural exports became relatively less important over time. In fact, Viet Nam dramatically expanded exports of unskilled labor-intensive manufactured goods, such as clothing, footwear, and office machinery, which grew at average annual rates of 16.8, 13.9, and 67.5 percent, respectively, from 1997 to 2010.[10] At the same time, the share of light manufactured goods in imports declined. This expansion of net exports and the changes in the composition of manufacturing trade likely contributed to higher demand for labor within manufacturing, where employment expanded at an average annual rate of 7.5 percent during this period, and changes in the structure of employment across manufacturing industries.

Additionally, the liberalization of foreign investment and SOE reforms interacted in important ways with trade reforms and affected the composition of ownership of firms involved in international trade. By 2010, foreign-invested firms were responsible for more than 50 percent of all exports, compared with only about 25 percent of exports in 1995, while imports by foreign firms rose from 18 to 44 percent of total imports during the same period.[11] Thus, Viet Nam's trade reforms likely also influenced the structure of the workforce across firms of different ownership type.

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9 Data from the UN Comtrade database suggest that rice (Standard International Trade Classification (SITC) 42) dropped from 9.5 percent of exports in 1997 to 4.5 percent of exports in 2010. Crude petroleum exports (SITC 333) declined from 15.6 to 6.9 percent of total exports during the same period.

10 Authors' own calculation based on data from UN Comtrade and on nominal prices.

11 The data series are "Exports of goods by kind of economic sector and by commodity group" and "Imports of goods by kind of economic sector and by commodity group" from the GSO's website.

FIGURE 2.6a Exports of manufactured goods have risen . . .

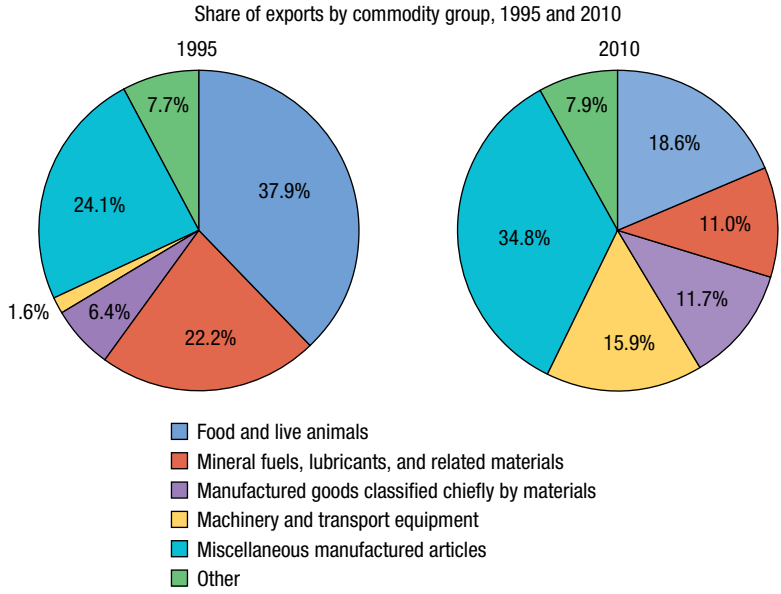
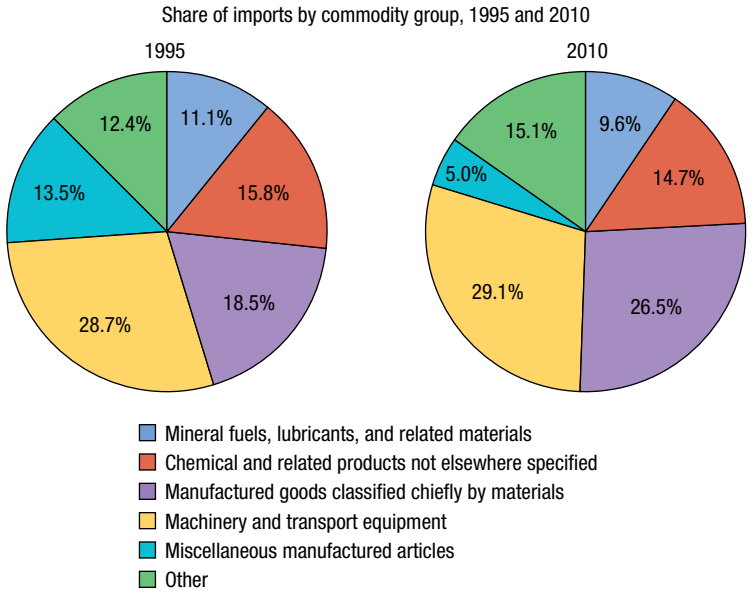


FIGURE 2.6b . . . while the types of manufactured goods being imported have changed



Source: General Statistics Office of Vietnam.

How Labor Moved Across Firm Types within Sectors

Over the past two decades, movements of labor away from agriculture toward services and manufacturing have contributed significantly to Viet Nam's economic growth. Extensive literature emphasizes why the allocation of labor across different types of firms within sectors is an important source of overall productivity (see, for example, Hsieh and Klenow 2009; Melitz 2003; Melitz and Redding 2014; Pavcnik 2002; Restuccia and Rogerson 2008). In fact, the sectoral labor productivity improvements noted in Table 2.1 could in part stem from such a reallocation of labor from less productive to more productive firms within each sector. To explore this issue further, we begin with a look at how workers have been allocated between household businesses and firms in the formal enterprise sector, before turning to how they have been allocated across SOEs and firms in the private domestic and foreign sectors.

Moving Out of Household Businesses toward Registered Firms

A large share of workers in low-income countries work for informal household businesses or farms—which is usually associated with lower productivity (McMillan and Rodrik 2011; La Porta and Shleifer 2008; McCaig and Pavcnik 2014) and lower wages than similar workers in the formal sector (Goldberg and Pavcnik 2003, 2007). If firms in the formal sector are more productive than firms in the informal sector, a reallocation of labor toward formal firms could, in principle, contribute to growth in aggregate productivity.

Did this happen in Viet Nam? We explored this issue using the Vietnamese Household Living Standards Survey (VHLSS) conducted between 2002 and 2008 to allow for a consistent definition of informal employment based on the ownership sector in which the individual worked. The surveys identify whether the individual is self-employed on a household farm or business; working for another household's farm or business; or working in the state, collective, private, or foreign sector. Our definition of household business employment encompasses workers who are either self-employed or working for another household's farm or business.[12] Firms in the state, collective, private, or foreign sector are registered as an enterprise with the government. Household farms and businesses (henceforth household businesses) are not officially registered with the government as an enterprise. As such,

12 The censuses cannot be used in a similar manner because the required definitions were not consistently applied over time.

they are subject to looser regulations on employment conditions for workers. Our focus on household businesses thus conforms to an important distinction across different types of businesses in Viet Nam as per national legislation.

We found that, as in many less developed economies, a large share of Viet Nam's labor force works for household businesses or farms (Table 2.4), although the share has decreased over time. In 2002, despite Viet Nam's rapid growth during the 1990s, most workers (86.3 percent) continued to work for a household business, with big differences among sectors. Almost all workers (98.5 percent) in agriculture, hunting, forestry, and fishing worked for household businesses. While rates were lower elsewhere, household business employment still exceeded 80 percent in construction and in wholesale and retail trade, hotels, and restaurants, and accounted for 66.7 percent in manufacturing. But by 2008, Viet Nam saw a sharp decline of 5.6 percentage points in the overall share of household business employment. Almost all sectors experienced large drops, but the declines were largest in manufacturing and in mining and quarrying, followed by transport, storage, and communications and utilities. However, there was no change in agriculture or in finance, insurance, real estate, and business services.

This decline in household business employment partly reflects the structural change in Viet Nam's workforce. Between 2002 and 2008, workers

TABLE 2.4 Most workers are still in informal businesses

Share of workers in household businesses, 2002 and 2008			
Sector	2002 (%)	2008 (%)	Change (% points)
Agriculture, hunting, forestry, and fishing	98.5	98.7	0.1
Mining and quarrying	57.9	45.0	–12.9
Manufacturing	66.7	54.4	–12.3
Public utilities (electricity, gas, and water)	12.5	5.9	–6.6
Construction	82.7	80.5	–2.1
Wholesale and retail trade, hotels, and restaurants	93.4	89.6	–3.8
Transport, storage, and communications	75.1	67.7	–7.3
Finance, insurance, real estate, and business services	27.6	28.5	0.9
Community, social, personal, and government services	26.3	23.8	–2.5
Total	**86.3**	**80.7**	**–5.6**

Source: Authors' calculations based on Vietnamese Household Living Standards Surveys data.

Note: The reported numbers are the shares of workers in household businesses in a sector. The sample is restricted to workers age 15 and older. The estimates are population estimates based on using sampling weights. The sectors are defined as in McMillan and Rodrik (2011).

tended to move away from sectors with a high incidence of household business employment (such as agriculture) toward those with a lower incidence (such as manufacturing). This relationship is strongly influenced by the agriculture, hunting, forestry, and fishing sector, which contracted sharply as a share of total employment and features a high prevalence of household business jobs. In fact, about half of the decline in the aggregate share of employment in household businesses in the first half of the 2000s is driven by movements of labor between industries—notably away from agriculture and aquaculture toward other industries (McCaig and Pavcnik 2014).[13] The remaining half is driven by the reallocation of workers from household businesses to firms in the enterprise sector within an industry. This latter mechanism could have contributed to the productivity increases in such sectors as manufacturing (Table 2.1), because household businesses tend to have substantially lower labor productivity than firms in the enterprise sector (McCaig and Pavcnik 2014). The difference in productivity between household businesses and enterprises persists, even when state and foreign enterprises are excluded. For example, estimates from the 2006 VHLSS suggest that private enterprises report average revenue per worker of 46.3 million dong, compared with 17.7 million dong for household businesses across all industries; within manufacturing, the figures are 78.9 million and 18.0 million dong, respectively.

Within industries, Viet Nam's greater access to export markets contributed to the observed declines in household business employment. Recent trade theory based on Melitz (2003) highlights the reallocation of labor toward more productive firms within an industry in response to declines in trade costs. The reductions in trade costs benefit the large, high-productivity firms, since they are able to produce and sell exported goods to cover the fixed costs of exporting. In contrast, small, low-productivity firms are not able to profitably export. This shifts workers to high-productivity firms as they expand in size in response to new export opportunities. Although informal and formal firms differ in a variety of ways aside from productivity, informal firms tend to be less productive than formal firms, and thus labor is predicted to move toward formal firms within an industry because of new export opportunities.

More generally, if trade increases the opportunity cost of working in a household business by increasing the relative profitability of firms in the formal enterprise sector, workers are expected to reallocate away from household businesses toward larger, more formal employers, and these effects are expected to be more

13 The findings are based on a decomposition of the aggregate decline in household business employment into between- and within-industry shifts across 60 distinct industries.

pronounced in industries that face increased export opportunities. Indeed, following the 2001 US–Viet Nam Bilateral Trade Agreement, Vietnamese exports to the US market reduced the probability of household business employment (McCaig and Pavcnik 2014), especially in Vietnamese industries that experienced the largest US tariff cuts. The effect was larger for workers in younger cohorts and in provinces closer to major seaports. These findings imply that industry tariff cuts on manufacturing exports could account for up to 40 percent of the decline in household business employment in manufacturing between 2001 and 2003. In addition, greater access to export markets, which disproportionately benefits larger, more productive firms in the enterprise sector, helped boost manufacturing productivity during the 2000s.

Moving Out of SOEs toward the Private Sector

The major enterprise reforms exposed SOEs to market competition and eased the entry and growth of private domestic and foreign-owned enterprises, setting the stage for the potential reallocation of resources, such as labor away from SOEs toward firms in the private sector.

At the onset of reforms in 1989, employment in SOEs was the most prevalent form of employment in services (such as finance, insurance, real estate, and other business services at 88.0 percent and construction at 68.0 percent), and was also significant in transport, storage and communications (48.0 percent) and manufacturing (37.5 percent). The exception is community and government services, where virtually all employment was in state jobs. But as Table 2.5 shows, the reforms had reduced the number of workers at SOEs in absolute numbers from 4.4 million in 1989 to 3.8 million in 1999. This decline occurred in all sectors, except community, social, personal, and government services, and finance, insurance, real estate, and other business services. Overall, between 1989 and 1999, the share of the Vietnamese labor force working for SOEs declined from 15.7 to 10.7 percent. While all industries observed a shrinking share of SOE employment, the most notable declines occurred in construction; transport, storage, and communications; and wholesale and retail trade, hotels, and restaurants.

Labor was clearly being reallocated from the SOE sector toward the growing private sector in the decade following the initial reforms, in part thanks to FDI. But while Viet Nam attracted employment in foreign-owned firms during the 1990s, the expanding foreign-owned sector employed fewer than 200,000 workers by 1999 and accounted for less than 1 percent of the economywide workforce. That said, these overall numbers mask differences in FDI exposure across broad industrial sectors. Notably, by 1999, 87 percent of the

TABLE 2.5 Workers increasingly moved to the growing private sector, especially in manufacturing

Employment in state and foreign-owned firms by sector, 1989, 1999, and 2009 censuses								
	1989		1999			2009		
Sector	Total	State	Total	State	Foreign	Total	State	Foreign
Panel A: Number of workers (000s)								
Agriculture, hunting, forestry, and fishing	19,809	407	24,854	252	4	25,710	183	12
Mining and quarrying	0	0	184	84	1	294	112	3
Manufacturing	3,391	1,273	3,179	969	165	6,545	583	1,465
Public utilities (electricity, gas, and water)	0	0	82	73	0	167	132	1
Construction	585	398	929	213	3	2,620	154	20
Wholesale and retail trade, hotels, and restaurants	2,102	628	3,265	221	8	6,444	152	62
Transport, storage, and communications	587	282	947	210	1	1,510	269	13
Finance, insurance, real estate, and business services	132	117	207	154	4	671	243	43
Community, social, personal, and government services	1,380	1,278	2,134	1,668	3	3,661	2,740	22
Total	**27,986**	**4,383**	**35,782**	**3,843**	**190**	**47,622**	**4,569**	**1,642**
Panel B: Percentage of workers within the sector								
Agriculture, hunting, forestry, and fishing		2.1		1.0	0.0		0.7	0.0
Mining and quarrying				45.6	0.3		38.1	1.2
Manufacturing		37.5		30.5	5.2		8.9	22.4
Public utilities (electricity, gas, and water)				89.0	0.6		79.3	0.8
Construction		68.1		22.9	0.4		5.9	0.7
Wholesale and retail trade, hotels, and restaurants		29.9		6.8	0.3		2.4	1.0
Transport, storage, and communications		48.0		22.2	0.1		17.8	0.9
Finance, insurance, real estate, and business services		88.0		74.1	1.8		36.2	6.4
Community, social, personal, and government services		92.6		78.2	0.2		74.9	0.6
Total		**15.7**		**10.7**	**0.5**		**9.6**	**3.4**

Source: Authors' calculations based on census data.

Note: The 1989 census did not separately identify mining and quarrying and public utilities from manufacturing; thus, manufacturing includes all three sectors in 1989. The 1989 census also did not separately identify employment in foreign-owned firms.

workers in the FDI sector were employed in manufacturing—the only sector where employment in foreign-owned firms exceeded 5 percent.

In the state sector, while the number of workers increased by 1.7 million between 1999 and 2009, in aggregate terms it was neither expanding nor contracting as a share of total employment, accounting for about 10 percent of overall employment. This mainly reflects the growth of state employment in community, social, personal, and government services. For other sectors, the share of SOE employment dropped by 30 percent between 1989 and 1999, and by 16 percent between 1999 and 2009. The declines were particularly pronounced in manufacturing (from 30 to 9 percent), construction (from 23 to 6 percent), and finance, insurance, real estate, and other business services (from 74 to 36 percent).[14] SOE employment actually dropped in absolute numbers in manufacturing; construction; and wholesale and retail trade, hotels, and restaurants.

In the private sector, FDI employment played an increasingly important role in the 2000s. Further expansion of private investment and jobs may have been spurred by implementation of several additional reforms, such as the Domestic Investment and Promotion Law in 1998 and the Common Investment Law in 2006. During this period, the number of workers in foreign-owned firms increased by almost 1.5 million, although the share of individuals employed by these firms continues to be low economywide (about 3.4 percent in the 2009 census). FDI's impact was mainly felt in manufacturing, where foreign-owned firms employed 22 percent of workers, and in finance, insurance, real estate, and business services, where foreign-owned firms employed 6.4 percent of workers. No other sector saw its share of workers in foreign-invested firms grow by more than a few percentage points.

This drastic shift of workers away from SOEs toward private firms, including foreign-owned firms, could have contributed to aggregate productivity improvements, given that firms in the state sector tend to be less productive than private establishments (World Bank 2011). In addition, most of the closed or merged SOEs were smaller, less productive, and unprofitable (Tuan, Long, and Phuong 1996). As a result, reallocation of labor away from SOEs toward private or foreign-owned firms may have contributed to the growth in sectoral productivity, especially in such sectors as manufacturing; wholesale and retail trade, hotels, and restaurants; and construction.

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14 Some of the reductions in state employment may reflect the formation of joint ventures with foreign firms, in which case the firm would become classified as a foreign-invested firm. Thus, the reduction in state employment may not translate one-to-one into job losses. Nonetheless, these reductions show the declining importance of SOEs.

However, a recent World Bank report (2011) indicates that the process of SOE restructuring slowed down between 2005 and 2009. SOEs now employ less than 10 percent of the workforce, but they remain an important sector in terms of production, accounting for about 35 percent of GDP in 2009. They still have a virtual monopoly on production in such sectors as fertilizer, coal, electricity and gas, telecommunications, water supply, and insurance (World Bank 2011). SOEs also tend to have better access to capital and land markets, receiving about 27 percent of domestic credit in 2009, and capital accumulation among the SOEs accelerated during the 2000s (World Bank 2011). Even so, the labor productivity of SOEs lags relative to private enterprises. These observations suggest that Viet Nam could increase aggregate productivity either by further implementation of reforms in the SOE sector or by reallocation of resources, especially capital, from SOEs to the private sector.

Digging Deeper in the Manufacturing Sector during the 2000s

Zeroing in on manufacturing, we see a large expansion of employment and output over the past two decades, rising from 8 percent to 14 percent of the Vietnamese workforce between 1990 and 2008 (Figure 2.1b). But what was behind this dramatic increase? Here, we can gain insights from information on employment patterns across 23 manufacturing industries from the 1999 and 2009 Vietnamese census data (data constraints preclude this analysis for the 1990s).

In 1999, four industries employed 61 percent of manufacturing workers in Viet Nam, with clothing accounting for 25 percent of manufacturing employment, followed by food products and beverages (16 percent), furniture (12 percent), and footwear (8 percent).[15] Over the next 10 years, manufacturing employment grew at an average annual rate of 7.5 percent, absorbing about 3.3 million workers, with the vast majority of manufacturing jobs added in the initially largest industries (Table 2.6). The four largest industries expanded

15 Employment in the furniture industry also includes manufacturing not elsewhere classified (industry 36 in ISIC revision 3). Employment in furniture accounts for 81 percent of total employment in the industry based on estimates from the 1999 census; thus, for brevity, we simply refer to this industry as furniture. Similarly, employment in footwear also includes employment in tanning and dressing of leather and manufacturing luggage, handbags, saddlery, and harnesses (industry 19 in ISIC revision 3), but employment in footwear is the dominant component at 88 percent of total employment in the industry according to estimates from the 1999 census; thus, we simply refer to this industry as footwear.

TABLE 2.6 Most manufacturing jobs were added in the top four industries

Employment in manufacturing industries, 1999 and 2009								
	Total number of workers (thousands)				Number of workers in enterprises (thousands)			
Industry	1999	2009	Change	Annual growth (%)	2000	2008	Change	Annual growth (%)
Food products and beverages	496	993	497	7.2	268	501	233	8.1
Tobacco products	10	13	3	2.7	12	14	2	1.7
Textiles	169	289	120	5.5	126	179	53	4.5
Clothing	790	1,387	597	5.8	233	758	525	15.9
Footwear	268	709	441	10.2	297	632	336	9.9
Wood and products of wood and cork, except furniture; articles of straw and plaiting materials	226	498	273	8.2	60	130	70	10.2
Paper and paper products	37	117	81	12.3	37	81	44	10.4
Publishing, printing, and reproduction of recorded media	51	80	29	4.5	23	58	35	12.4
Coke, refined petroleum products, and nuclear fuel	4	9	6	10.0	1	1	0	2.3
Chemicals and chemical products	80	139	59	5.6	66	112	46	6.8
Rubber and plastic products	55	142	87	10.0	51	162	111	15.5
Other nonmetallic mineral products	216	435	219	7.2	128	252	124	8.8
Basic metals	32	68	36	7.7	29	60	31	9.6
Fabricated metal products, except machinery and equipment	213	418	205	7.0	51	191	141	18.0
Machinery and equipment not elsewhere classified	40	68	28	5.6	31	68	37	10.2
Office, accounting, and computing machinery	1	22	21	33.7	3	25	22	29.7
Electrical machinery and apparatus not elsewhere classified	26	68	41	9.9	38	109	72	14.3
Radio, television, and communications equipment and apparatus	23	101	78	16.1	18	66	48	17.3
Medical, precision, and optical instruments; watches and clocks	6	16	10	9.8	7	17	10	12.2
Motor vehicles, trailers, and semi-trailers	12	58	46	16.7	14	44	31	15.9
Other transport equipment	44	199	155	16.2	41	127	86	15.1
Furniture	376	708	332	6.5	65	352	287	23.5
Recycling	3	8	5	10.9	0	2	2	27.7
Total	**3,179**	**6,545**	**3,366**	**7.5**	**1,598**	**3,943**	**2,345**	**11.9**

Source: The numbers for 1999 and 2009 are population estimates calculated from the 1999 and 2009 censuses. The sample is restricted to workers age 15 and older. The numbers of workers in enterprises are based on the 2000 and 2008 enterprise surveys.

the most in terms of number of employees and continued to dominate manufacturing jobs. These are all industries in which Viet Nam, as a relatively low-skilled, labor-abundant country, has a comparative advantage; indeed, Viet Nam exports significant quantities of clothing, footwear, and furniture. For example, almost 600,000 new workers joined the clothing industry, accounting for 18 percent of the total growth in manufacturing employment.

Viet Nam also appears to be transitioning into industries that traditionally did not account for much of its manufacturing labor force. Some initially very small industries experienced very rapid growth in employment—including motor vehicles, trailers, and semi-trailers; other transport equipment; and radio, television, and communications equipment and apparatus. In fact, employment grew the fastest in office, accounting, and computing machinery industry, rising to an astounding average annual rate of 33.7 percent, although the industry still accounts for a relatively small share of total manufacturing employment at just 0.3 percent in 2009.

Much of this employment expansion occurred in the officially registered enterprises, which tend to be substantially larger and have higher labor productivity than nonregistered household businesses (McCaig and Pavcnik 2014).[16] Between 2002 and 2008, registered manufacturing sector employment added 2.3 million workers, representing an average annual growth of 12 percent. The registered sector observes similar patterns in employment expansion as the overall manufacturing sector, highlighting the dominant role of larger firms in manufacturing expansion. The initially largest industries, such as clothing, experienced the largest increases in the number of workers, but some initially smaller industries, such as office, accounting, and computing machinery, experienced faster growth rates. Clothing was a key industry for employment growth, as it added about 525,000 workers, accounting for more than 20 percent of total job growth in the formal manufacturing sector. Other industries that experienced large expansions in absolute terms include footwear, furniture, and food products and beverages, as they all added more than 200,000 employees. The fastest growth was observed in office, accounting, and computing machinery and

16 The household surveys used in "Moving out of household businesses toward registered firms" also collect information on whether the individual worked for an enterprise. These unreported estimates are very similar to those from the enterprise data. For example, the employment shares are highly correlated: 0.971 using the 2001 enterprise data and the 2002 VHLSS household survey data, and 0.963 using the 2005 enterprise data and the 2006 VHLSS household survey data. Thus, both data sources depict broadly similar employment patterns among officially registered firms.

in furniture, which both experienced average annual growth rates above 20 percent.[17]

The observed changes in the structure of employment across manufacturing industries relate to changes in the relative importance of SOE employment and FDI employment within an industry during the 2000s. Industries that observed the biggest declines in the share of state sector employment and the biggest increases in the share of FDI employment expanded relative to other manufacturing industries between 1999 and 2009. These patterns in relative employment changes are documented in Figure 2.7a, which plots the change in an industry's share of manufacturing employment against the change in prevalence of SOE jobs, and in Figure 2.7b, which plots the change in an industry's share of manufacturing employment against the change in the prevalence of FDI jobs. The correlation between 1999 and 2009 in the change in the share of workers within an industry working for a state firm and the change in the industry's share of manufacturing employment is –0.26. Between 1999 and 2009, the correlation between the change in an industry's share of manufacturing employment and the change in the share of workers in FDI firms within an industry is 0.18. These relationships suggest either that foreign investors have selectively targeted sectors with the greatest employment growth potential or that these sectors grew because they attracted foreign capital.

Viet Nam's Structural Change in International Perspective

How does Viet Nam's experience of positive structural change compare with other less developed economies during the last two decades? We know from McMillan and Rodrik (2011) that structural change increased aggregate productivity in Asian countries but decreased in Latin American and African countries within their sample. In addition, they find that reallocation of labor across sectors tended to enhance aggregate productivity in countries with a comparative disadvantage in natural resources, an undervalued exchange rate, and a more flexible labor market.

We briefly compare Viet Nam's growth experience with other countries of similar initial economic development in 1990 and discuss the potential role of the factors identified by McMillan and Rodrik (2011) in enhancing

17 Recycling also grew at an average annual rate above 20 percent, but it started from an extremely small base of just a few hundred workers.

FIGURE 2.7a Moving away from state-owned enterprises goes hand in hand with bigger industry size . . .

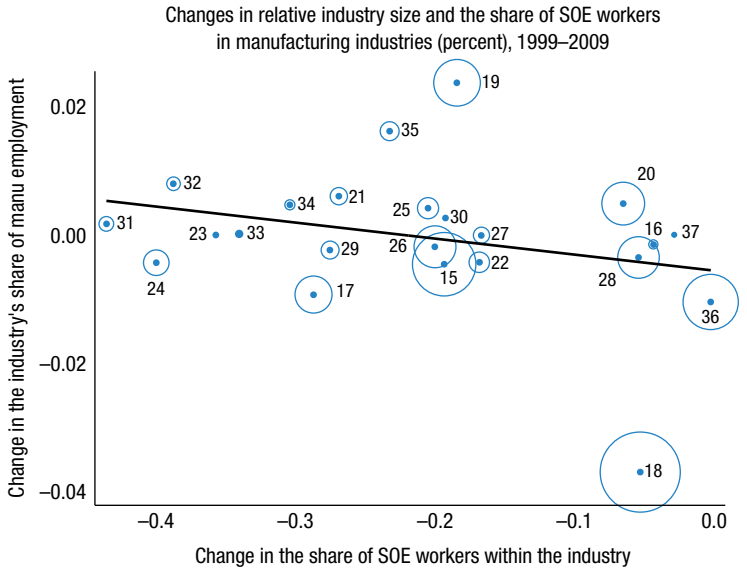
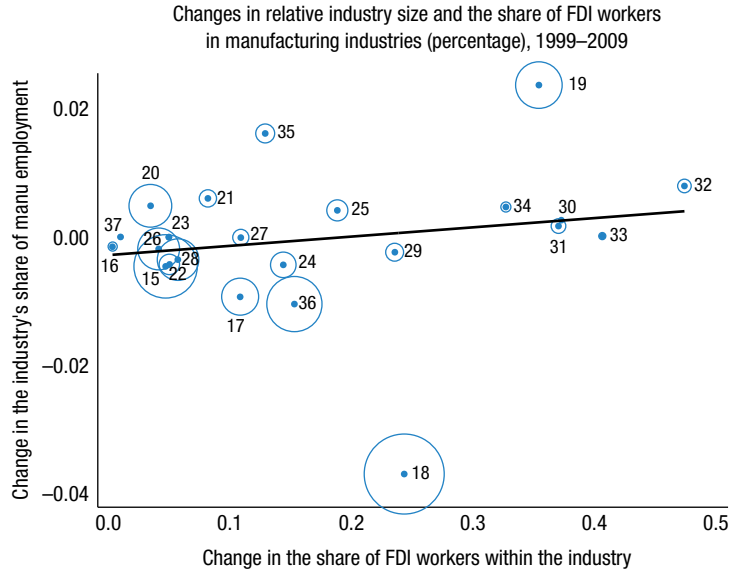


FIGURE 2.7b . . . as does attracting foreign direct investment



Source: Authors' calculations based on the 1999 and 2009 population censuses.

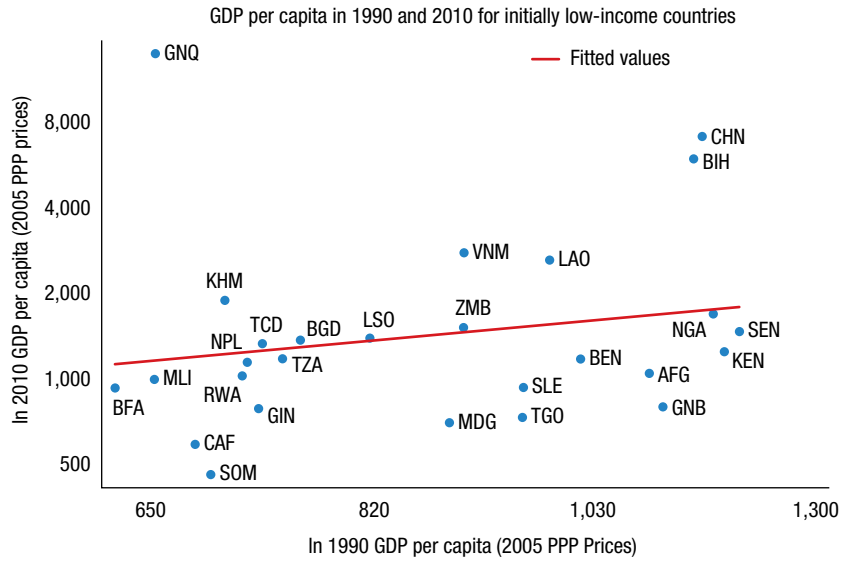
Note: The circle size indicates the share of manufacturing employment in 1999. Industry codes are International Standard Industrial Classification revision 3. The y-axis measures the change in the share of industry employment in total manufacturing employment. FDI = foreign direct investment; SOE = state-owned enterprise.

Viet Nam's ability to expand its manufacturing and service sectors relative to other low-income countries. This grouping predominately includes countries in Africa (such as Zambia, Lesotho, and Kenya) and Asia (such as Cambodia, China, and Laos).

First, Viet Nam experienced remarkable economic growth between 1990 and 2010 (Figure 2.8). Indeed, it moved from the middle of the pack to the fourth-richest country, trailing only Bosnia and Herzegovina, China, and Equatorial Guinea.

Second, Viet Nam experienced a relatively fast movement of workers out of agriculture, even compared with many other agrarian economies. As already noted, slightly more than a third of Viet Nam's growth can be attributed to structural change induced by movements of labor from low-productivity agriculture toward more productive manufacturing and services. The relatively large contribution of structural change in Viet Nam may in part be the result of Viet Nam's high initial concentration of workers in low-productivity agricultural activities—in fact, its workforce was more agrarian in 1990 than

FIGURE 2.8 Viet Nam leapfrogged over many peers



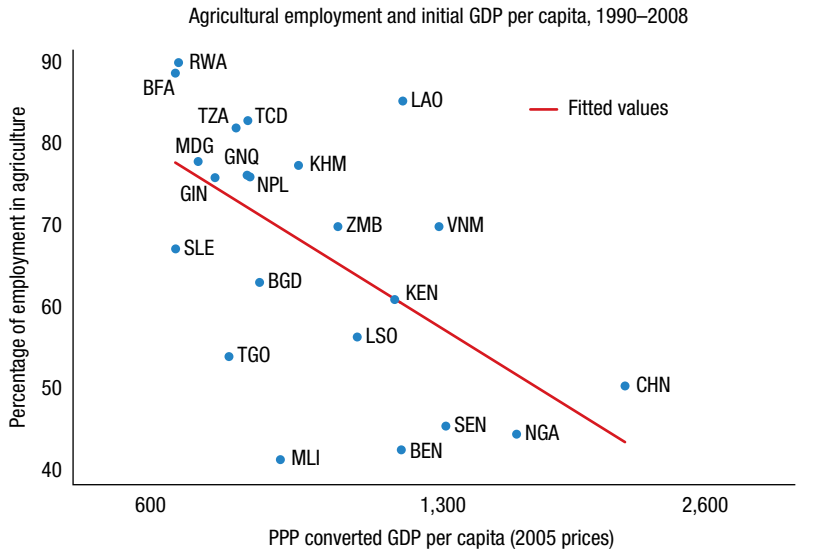
Source: Data are based on Penn World Tables 7.1 (Heston, Summers, and Aten 2012).

Note: Gross domestic product (GDP) per capita is expressed in 2005 purchasing power parity (PPP) prices. The sample includes all countries with GDP per capita within $300 of Viet Nam's 1990 GDP per capita. AFG = Afghanistan; BEN = Benin; BFA = Burkina Faso; BGD = Bangladesh; BIH = Bosnia and Herzegovina; CAF = Central African Republic; CHN = China; GIN = Guinea; GNB = Guinea-Bissau; GNQ = Equatorial Guinea; KEN = Kenya; KHM = Cambodia; LAO = Laos; LSO = Lesotho; MDG = Madagascar; MLI = Malawi; NGA = Nigeria; NPL = Nepal; RWA = Rwanda; SEN = Senegal; SLE = Sierra Leone; SOM = Somalia; TCD = Chad; TGO = Togo; TZA = Tanzania; VNM = Viet Nam; ZMB = Zambia.

would have been predicted based on its initial level of income. However, as Figure 2.9 shows, the 20 percentage point drop in the share of agricultural employment in Viet Nam between 1990 and 2008 is not solely owing to the initially highly agrarian nature of Viet Nam's economy, given that many other highly agrarian countries experienced a much slower reallocation of workers out of agriculture and slower overall economic growth. For example, the share of workers in agriculture dropped by only 4 percentage points between 1994 and 2005 in Burkina Faso and by only 8 percentage points between 1991 and 2006 in Tanzania. Both countries also experienced notably slower growth than Viet Nam between 1990 and 2010 (Figure 2.9).

Why were Vietnamese workers who left agriculture and less productive employers absorbed fairly quickly into more productive sectors and firms in manufacturing and services? The expansion of manufacturing employment is

FIGURE 2.9 Viet Nam outperformed many other agrarian economies



Source: The percentage of employment in agriculture is from the World Development Indicators database (World Bank, various years), and gross domestic product (GDP) per capita is from the Penn World Tables 7.1 (Heston, Summers, and Aten 2012).

Note: For Viet Nam, the percentage of employment in agriculture is first reported for 1996. For each country, we plot the closest observation by year to 1996 for which the employment information is available. Purchasing power parity (PPP)-converted GDP per capita is plotted for the same year as employment in agriculture. AFG = Afghanistan; BEN = Benin; BFA = Burkina Faso; BGD = Bangladesh; BIH = Bosnia and Herzegovina; CAF = Central African Republic; CHN = China; GIN = Guinea; GNB = Guinea-Bissau; GNQ = Equatorial Guinea; KEN = Kenya; KHM = Cambodia; LAO = Laos; LSO = Lesotho; MDG = Madagascar; MLI = Malawi; NGA = Nigeria; NPL = Nepal; RWA = Rwanda; SEN = Senegal; SLE = Sierra Leone; SOM = Somalia; TCD = Chad; TGO = Togo; TZA = Tanzania; VNM = Viet Nam; ZMB = Zambia.

the beneficiary of Viet Nam's comparative advantage in labor-intensive manufacturing industries, rather than in natural resource sectors, which tend to be more capital intensive and appear to deter growth-enhancing structural change (McMillan and Rodrik 2011).

Third, Viet Nam's exports benefited from relatively greater openness and a competitive exchange rate. Viet Nam's labor-intensive manufacturing industries, which accounted for an increasing share of Viet Nam's exports in the 2000s, were important recipients of FDI and accounted for a large share of Viet Nam's employment expansion. The country's export performance also benefited from relatively lower administrative barriers to trade (for example, measured by fewer documents needed to export goods and lower domestic costs of exporting) than in comparison with such countries as Zambia, Laos, and Lesotho (World Bank 2013). And the traded sector benefited from the undervalued exchange rate, which tends to be positively associated with structural change (McMillan and Rodrik 2011). Indeed, as Figure 2.10a shows, Viet Nam's exchange rate was significantly undervalued, by more than 80 percent (a positive value indicates undervaluation), and was well above the trend line, suggesting that Viet Nam was ranked high in terms of its competitiveness relative to the comparison countries.[18]

Fourth, Viet Nam reaped the rewards of relatively more flexible labor markets and better education among this group of low-income countries. The flexibility of Viet Nam's labor markets is similar to that of China (Figure 2.10b). And Viet Nam's relatively more educated labor force (90 percent literacy rate)—versus around 70 percent literacy rates in Laos, Madagascar, and Zambia—may further contribute to a more rapid transition of labor toward more productive sectors and employers.[19]

Although this analysis is purely descriptive, it seems that relative to other initially low-income countries, Viet Nam possesses characteristics that tend to be associated with a positive contribution of structural change to aggregate productivity growth (McMillan and Rodrik 2011). These characteristics include a comparative advantage in labor-intensive manufacturing, low trade costs, a significantly undervalued currency, and flexible labor markets—all of which may help account for a relatively fast transition of labor toward more productive sectors and employers and subsequent overall growth.

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18 Bems and Johnson (2012) show that Viet Nam's real effective exchange rate, which takes into account its position in global production chains, is less undervalued than the conventional exchange rate measure.

19 Based on data from the World Development Indicators database (World Bank, various years).

FIGURE 2.10a Viet Nam was helped by a competitive exchange rate . . .

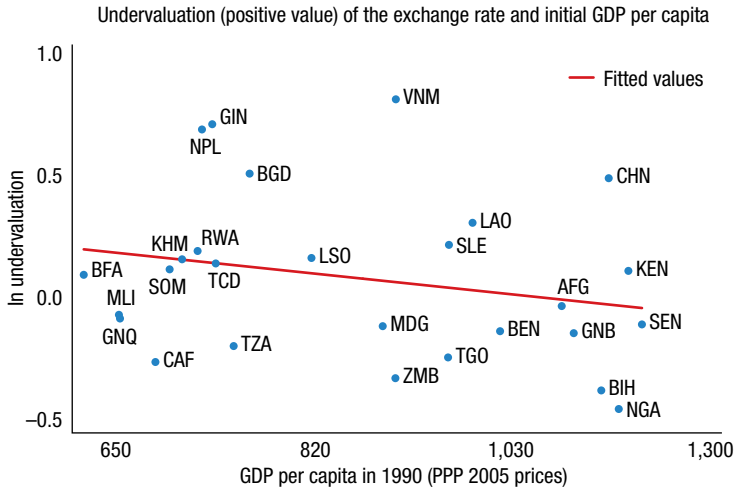
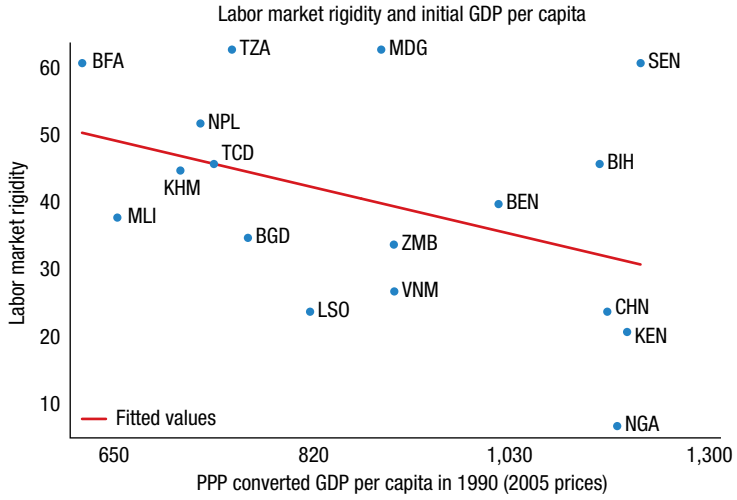


FIGURE 2.10b . . . and flexible labor markets



Source: *Figure 2.10a:* The data for undervaluation of exchange rate are from Rodrik (2008) and are the average for 1990–2004. The data for gross domestic product (GDP) per capita are the 1990 value from World Tables 7.1 (Heston, Summers, and Aten 2012). *Figure 10b:* The data for labor market rigidity are from the World Bank Doing Business database, as reported in the World Economic Forum's *Global Competitiveness Report 2008–2009* (Schwab and Porter 2008). The data on GDP per capita are 1990 values from Penn World Tables 7.1 (Heston, Summers, and Aten 2012).

Note: A higher index number of labor market rigidity corresponds to higher rigidity. Gross domestic product (GDP) per capita is expressed in 2005 purchasing power parity (PPP) prices. AFG = Afghanistan; BEN = Benin; BFA = Burkina Faso; BGD = Bangladesh; BIH = Bosnia and Herzegovina; CAF = Central African Republic; CHN = China; GIN = Guinea; GNB = Guinea-Bissau; GNQ = Equatorial Guinea; KEN = Kenya; KHM = Cambodia; LAO = Laos; LSO = Lesotho; MDG = Madagascar; MLI = Malawi; NGA = Nigeria; NPL = Nepal; RWA = Rwanda; SEN = Senegal; SLE = Sierra Leone; SOM = Somalia; TCD = Chad; TGO = Togo; TZA = Tanzania; VNM = Viet Nam; ZMB = Zambia.

Room for Still More Labor Reallocation

Like most less developed countries, Viet Nam is characterized by large productivity gaps across sectors, especially between agriculture and manufacturing and some services. During the 1990s and 2000s, Vietnamese workers moved out of low-productivity agriculture toward higher-productivity manufacturing and services. These movements of workers from less to more productive sectors accounted for more than a third of the average annual 5.1 percent aggregate productivity growth. An analysis that focused solely on the manufacturing sector would miss this important role of economywide worker reallocation when assessing the sources of aggregate labor productivity growth in Viet Nam. Our discussion suggests that reforms in agriculture, the enterprise sector, and international integration all likely contributed to the movement of labor out of agriculture toward manufacturing and services.

Viet Nam's aggregate labor productivity growth also is the result of improved sectoral productivities, which account for almost the remaining two-thirds of the growth. Resource reallocation from less to more productive firms within sectors in part contributed to these sectoral labor productivity improvements, as workers reallocated from less productive household businesses toward more productive registered firms in the enterprise sector, and from SOEs toward more productive private domestic and foreign-owned firms.

Manufacturing stands out as a sector that experienced a large increase in productivity during this period, averaging an annual growth rate in labor productivity of 5.1 percent, and a large expansion of its employment base at an annual growth rate of 7 percent. Moreover, in the 2000s, manufacturing experienced a large expansion of exports and a growing presence of foreign-owned enterprises. The beneficiaries of expanding relative employment tended to be those manufacturing industries with greater declines in the share of employment in SOEs and a greater inflow of employment to foreign firms.

Despite all of these achievements, however, large productivity gaps remain both among and within sectors. Recent reports point to lagging productivity performance of the SOE sector, accompanied by preferential access of SOEs to credit and capital markets (McKinsey Global Institute 2012; World Bank 2011). Our own research emphasizes the potential importance of further reallocating resources from the household business sector to the enterprise sector. Although employment in household businesses dropped substantially during the 2000s, it continues to account for 80 percent of economywide jobs and 54 percent of manufacturing employment in 2008. And estimates from the 2006 VHLSS suggest substantially lower labor productivity in household businesses than in private enterprises.

How could this next wave of reallocation be facilitated? Two possible avenues stand out: either workers would need to leave household businesses to join firms operating in the enterprise sector or household businesses would have to register as enterprises. Recent research suggests that the first avenue would more likely lead to the reallocation of labor away from low- to high-productivity firms, as few household businesses become registered enterprises, whereas workers are shifting to the enterprise sector in response to new export opportunities (Pavcnik and McCaig 2013; McCaig and Pavcnik 2014). This has the potential to raise aggregate productivity, as workers increasingly work in higher-productivity firms within the enterprise sector.

To help understand the role that policy could play in promoting future structural change, more research could be devoted to examining the relationship between policy and structural change during the 1990s and 2000s. As we noted, at the start of Doi Moi, Viet Nam's economy was plagued by policy-induced distortions that likely caused an inefficient allocation of resources and lowered the incentives to invest. The removal of various distortions (such as price controls, export limits for rice, and restrictions on FDI) no doubt contributed to Viet Nam's rapid growth and structural transformation by both releasing workers from agriculture and increasing the demand for workers outside of agriculture. However, because of the removal of many distortions during these two decades and the length of time required to adjust, it is very difficult to determine empirically which policy changes were the most important for promoting structural change. Careful research has shown that the rise in the price of rice, after the removal of internal and external barriers to rice trade, was associated with a shift of labor to the wage market (Edmonds and Pavcnik 2006), but many other policy changes and their impacts on structural change remain underexplored. Viet Nam's economy continues to feature large distortions (in particular, access to land and capital) that may be hindering both the transition of workers out of agriculture and further improvements in agricultural productivity.

Finally, a word of caution is required regarding the expected pace of structural change. Viet Nam experienced rapid structural change during the 1990s and 2000s, but more than 50 percent of workers remained in agriculture by 2008. Although many workers within cohorts moved out of agriculture—and new cohorts are more likely to work outside of agriculture upon entering the workforce—some workers are likely to remain in agriculture until exiting the workforce. For example, McCaig and Pavcnik (2015) show that rural, poorly educated, older workers are very unlikely to transition from the informal to the formal sector. The same frictions likely exist in the stock of agricultural workers.

Appendix 2A: Data Description

Employment and GDP Data by Broad Sectors

The analysis in this chapter's section "Patterns in Structural Change" uses data on employment, GDP (in constant 1994 prices), and labor productivity (also in constant 1994 prices), disaggregated into economic sectors. Our source of data is the GSO, available at http://www.gso.gov.vn/, which provides data on employment and GDP in current Vietnamese dong and 1994 dong disaggregated into 19 economic activities. We categorize these 19 activities into the sectors used by McMillan and Rodrik (2011), as shown in Table 2A.1.

The employment series shows a break in trend between 2002 and 2003. For example, the percentage of workers employed in agriculture fell by 5.9 percentage points, compared with 1.1 and 1.5 percentage points during 2001–2002 and 2003–2004, respectively. We thus omit the decomposition between 2002 and 2003 in our decomposition of productivity growth in Figure 2.3. Despite the apparent change in estimation procedure used in the GSO employment data between 2002 and 2003, the overall employment trends are very consistent with those estimated using census data.

Population Censuses

Samples of the 1989, 1999, and 2009 population censuses are publicly available through IPUMS-International (MPC 2015). Each census asked individuals some basic questions related to their working status. The 1989 census provides the industry of affiliation at a relatively aggregate level, whereas the 1999 and 2009 census industry codes are adaptations based on three-digit ISIC revision 3 and ISIC revision 4. Thus, while we can use the 1999 and 2009 censuses to look at the growth of employment within various manufacturing industries, we cannot use the 1989 census for this purpose. However, the 1989 census can be used for verifying the aggregate trends described in "Patterns in Structural Change." Additionally, the censuses contain information on the type of ownership (for example, self-employed, working for the state) for each employee, which we use for looking at the changing role of SOEs and foreign-invested enterprises.

Household Surveys

We use four nationally representative household surveys conducted in 2002, 2004, 2006, and 2008. The GSO conducted these surveys with technical advice from the World Bank. Each survey contained modules on education,

TABLE 2A.1 Mapping between GSO sectors and McMillan and Rodrik sectors

McMillan and Rodrik sector	Abbreviation	GSO sectors
Agriculture, hunting, forestry, and fishing	agr	Agriculture and forestry
		Fishing
Mining and quarrying	min	Mining and quarrying
Manufacturing	man	Manufacturing
Public utilities (electricity, gas, and water)	pu	Electricity, gas, and water supply
Construction	con	Construction
Wholesale and retail trade, hotels, and restaurants	wrt	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
		Hotels and restaurants
Transport, storage, and communications	tsc	Transport, storage, and communications
Finance, insurance, real estate, and business services	fire	Financial intermediation
		Scientific activities and technology
		Real estate, renting, and business activities
Community, social, personal, and government services	cspsgs	Public administration and defense; compulsory social security
		Education and training
		Health and social work
		Recreational, cultural, and sporting activities
		Activities of party and of membership organizations
		Community, social, and personal service activities
		Private households with employed persons

Source: General Statistics Office of Viet Nam and McMillan and Rodrik (2011).

health, income and production activities, expenditures, and employment. The employment modules collected information on the industry of affiliation, wage payments if applicable, and the type of ownership for the individual's primary job during the past 12 months. Although the surveys also collected information on additional jobs, we restrict our focus to the individual's primary job. Like the censuses, the surveys use industry codes based on adaptations of ISIC revisions 3 and 4 and are available at the two-digit level. The ownership variable includes information on whether the individual was self-employed, working for another household, working in the formal private sector, working in a collective, working in the state sector, or working in the foreign-invested sector. In our analysis on informality, we make use of the ownership sector to define informal employment as being either self-employed or working for another household. One caveat to this definition is that the 2002 household survey did not distinguish between self-employment in a

household business versus in a private enterprise, whereas the other three surveys did. Thus, our estimate of informality is a slight overestimate, since we include all self-employment as informal, even those self-employed in a private enterprise. The subsequent surveys demonstrate that this leads to only a slight overestimate. For example, in 2004, we estimate that 83.1 percent of workers were working informally. Removing workers who are self-employed in private enterprises reduces this to 82.7 percent. Therefore, including self-employed workers in private enterprises will not significantly alter our results and allows us to use a consistent definition across all of the household surveys and thus have a longer period to study.

Enterprise Surveys

Beginning in 2000, the GSO has been conducting annual surveys of all formally registered enterprises in Viet Nam. Basic information, such as industry and employment, is collected for all enterprises, regardless of the size or the sector. We use information on the industry of the firm (we rely on the primary industry of the firm for multi-industry firms) and the number of employees. The industry codes are based on an adaptation of ISIC revision 3 and thus are easily matched with information from the household surveys and the other two censuses. This allows us to cross-check our results for consistency across various sources.

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Chapter 3

STUCK IN THE MIDDLE? STRUCTURAL CHANGE AND PRODUCTIVITY GROWTH IN BOTSWANA

Brian McCaig, Margaret McMillan, Íñigo Verduzco-Gallo, and Keith Jefferis

In 1966 when Botswana gained independence, it was one of the poorest countries in the world. But by 1986, Botswana had achieved middle-income status, and in 2005, the World Bank classified it as an upper-middle-income country. The only other country to enjoy such rapid economic growth over such a long period is China—an average of 9 percent between 1968 and 2010. Botswana has also maintained democracy throughout its recent history, and this combination of economic and political success has earned it the reputation of an "African success story" (Acemoglu, Johnson, and Robinson 2002).

Botswana's rapid economic growth has nonetheless left many individuals behind. Unemployment is a major issue, particularly among the young. Income inequality is extremely high, as is poverty. As such, it is important to understand the sources of Botswana's economic growth to better appreciate where it may come from in the future and what prospects it has for being more inclusive.

Historically, diamonds played a significant role in fueling this economic growth, although this has changed in recent years. Between 1968 and 2010, the landscape of Botswana's economy changed dramatically (Figure 3.1a), as economic activity shifted out of agriculture first to mining and later to services. Between 1968 and 2010:

- Agriculture's share of value-added fell from 27.4 percent to 2.7 percent.
- Services' share of value-added increased from 40.4 percent to 64.4 percent.
- Manufacturing's share of value-added climbed from 3.6 percent to 7.7 percent.
- Mining and quarrying rose rapidly from 11.7 percent to 57.7 percent in 1984, before gradually declining to 17.7 percent in 2010.[1]
- Construction peaked at 24.5 percent in 1972, and then gradually declined to around 7.5 percent by 2010.

1 Part of the sharp decline in the share of value-added in mining in 2009 and 2010 is attributed to the global recession.

Although diamonds contributed significantly to value-added, they never directly accounted for more than 3.2 percent of total employment, given the highly capital-intensive nature of diamond extraction. Thus, although there were dramatic shifts in Botswana's occupational structure (Figure 3.1b), this

FIGURE 3.1a Services now dominates in value-added . . .

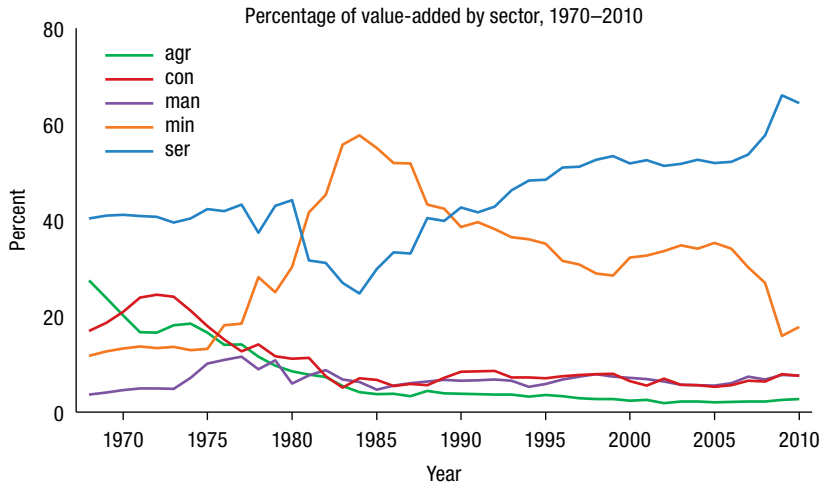
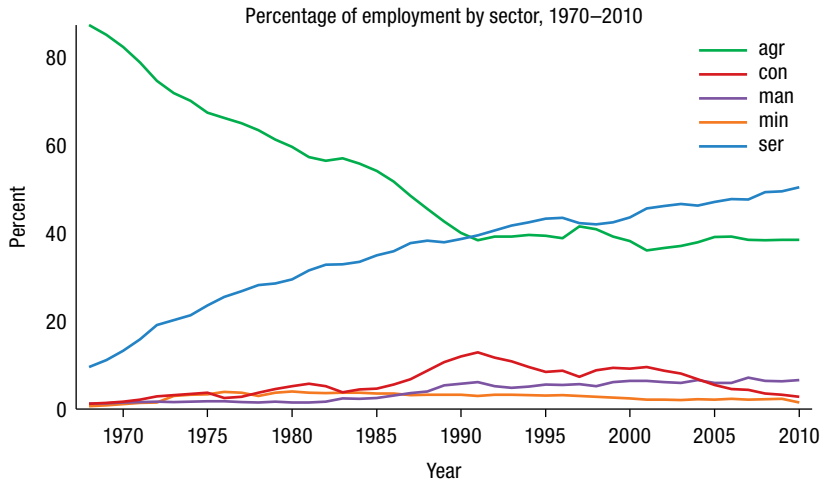


FIGURE 3.1b . . . and in terms of employment



Source: Authors' calculations with data from the Groningen Growth and Development Centre Africa Sector Database.
Note: agr = agriculture; con = construction; man = manufacturing; min = mining; ser = services.

did not involve movements in and out of mining. Instead, between 1964 and 2010:

- Agriculture's share of employment fell from 87.5 percent to 38.6 percent.
- Services' share of employment increased from 8.5 percent to 50.6 percent.
- Manufacturing's share of employment rose from 1.4 percent to 6.6 percent.
- Mining and quarrying's share of employment inched up from 1.1 percent to 1.5 percent.
- Construction's share of employment rose from 1.2 to 12.9 percent in 1991, but then slowly fell back to 2.8 percent in 2010.

Like many less developed countries today, Botswana's economy was characterized by large productivity gaps between different parts of the economy when it first gained independence. Sir Arthur Lewis (1954) was one of the first to recognize that these large productivity gaps in less developed countries could be an important engine of growth. The idea is that when labor and other resources move from less productive to more productive activities, the economy grows even if there is no productivity growth within sectors. More recently, McMillan and Rodrik (2011) document significant gaps in labor productivity between sectors for a large set of developing countries, and substantial differences in the contribution of structural change—that is, the movement of workers among sectors, as opposed to changes in productivity "within" sectors—to the overall economic performance of these economies between 1990 and 2005. Structural change enhanced growth in Asian economies, while it decreased growth in Latin America and Africa. However, the story for Africa switches to a positive role for structural change when a large sample of African countries is examined for a more recent time period—between 2000 and 2010 (McMillan, Rodrik, and Verduzco Gallo 2014).[2]

How does Botswana fit into this African story? Here we should note that it was not included in either of these studies because of data issues. This chapter, using newly obtained data, traces the extent to which structural change played a role in Botswana's rise to middle-income status, as well as its role in Botswana's more recent economic performance. Overall, we find that structural change accounted for more than half of Botswana's spectacular labor

2 Neither McMillan and Rodrik (2011) nor McMillan, Rodrik, and Verduzco-Gallo (2014) include Botswana. This is because a significant amount of work was required to make sense of the Botswana data. We discuss these issues later on in this chapter.

productivity growth between 1970 and 1989, averaging 8.6 percent per year. The reallocation of employment away from agriculture toward service industries played the most important role. However, between 1990 and 2010, overall labor productivity growth slowed to 1.9 percent per year, with within-sector productivity growth much higher at 3.6 percent per year, and structural change a drag on overall productivity growth. Indeed, there was almost no change in the agricultural share of employment, and the share of employment in wholesale and retail trade expanded significantly.

What contributed to the early period of growth-enhancing structural change and the more recent experience in which structural change has been reducing growth? This is an important question, because structural change has played significant positive and negative roles in Botswana's growth performance. To answer this question, we review Botswana's most salient trade and industrial policies over these two periods. One event that stands out that has not received much attention in the literature is Botswana's exposure to South Africa's massive trade liberalization in 1994. Because Botswana is a member of the Southern African Customs Union (SACU), its tariffs are set by the government of South Africa, making them effectively exogenous. Thus, Botswana presents an unusual case for studying the impact of trade liberalization on structural change.

As for growth-enhancing structural change, we believe it was fueled by the discovery of diamonds and subsequent policies to expand the public service; attract the private sector; and invest in education, health, and infrastructure. However, the triggers for growth-reducing structural change remain a mystery, leaving a big question for researchers and policy makers as Botswana continues to try to promote economic diversification and inclusion. One possible trigger that we can rule out is trade liberalization. We found that despite the large size of the tariff cuts, there was no strong link between them and changes in the workforce.

The Birth of a Nation

The term "Batswana" originated from the country's major ethnic group—the "Tswana" in South Africa—and refers to the people of Botswana. Botswana was originally inhabited by the San from around 17,000 BC, but in the early 1880s during the Zulu war, the Tswana moved into the area from South Africa, bringing with them the custom of holding "town meetings" for consultation and consensus on public issues. Prior to European contact, the Batswana lived as herders focusing on cattle ranching, because 84 percent of land is desert and only 4 percent is arable (Fibaek 2010).

The present-day boundaries of Botswana reflect direct appeals by the Batswana to the British to first establish political boundaries for protection and subsequently to remain separate from what would become South Africa. In the late 19th century, antipathy between the Batswana and Boer from the Transvaal emerged. In response to requests for assistance, the British government put "Bechuanaland" under its protection in 1885. Then in 1895, the southern portion was incorporated into the Cape Colony, while the northern portion remained under direct administration as the Bechuanaland Protectorate. Residents of the Bechuanaland Protectorate (current Botswana), Basutoland (current Lesotho), and Swaziland requested that they not be included in the proposed Union of South Africa. The British agreed, thereby keeping the Bechuanaland Protectorate outside of the Union of South Africa formation in 1910. In 1964, Britain agreed to democratic self-government, and independence was granted in 1966 (ERB, n.d.).

When Botswana achieved independence from Britain in 1966, it was one of the poorest countries in Africa, with a GDP per capita of about US$70. In the following years, and partly owing to the discovery of diamonds in three sites—Jwaneng, Orapa, and Letlhakane—Botswana's economy was radically transformed. Between 1960 and 1990, the average GDP growth rate was around 12 percent—the highest sustained real GDP growth rate in the world for that time. In 2005, Botswana joined the ranks of the upper-middle-income countries.

Today, economic diversification is a high priority (BEAC 2008), given that export revenues continue to be dominated by diamonds, a resource that may be depleted sometime in the not so distant future (MFDP 2009). Attempts at industrialization have so far not worked, leaving employment dominated by agriculture and services (of which the public sector accounts for more than half). The heavy reliance on mining—employing a tiny fraction of the labor force (3.5 percent) owing to its highly capital-intensive nature—may partly contribute to Botswana's inequality, poverty, and unemployment problems.[3] Income inequality is the third highest in the world (UNDP 2010), and the poverty head count ratio was about 19 percent in 2009 (World Bank 2014).

A Strong Role for Structural Change ... Initially

Shortly after independence, Botswana was characterized by large differences in labor productivity across sectors (Figure 3.2a). In 1970, 82.5 percent of

3 Additionally these jobs do not require any particular set of skills, and they are typically reserved for men.

the workforce was involved in agriculture—a very low productivity sector (24.4 percent of overall labor productivity)—but only 1.5 percent of workers were in higher-productivity manufacturing (with labor productivity more than three times higher than overall labor productivity), and only 1.7 percent of workers were in construction (with labor productivity more than 12 times higher than overall labor productivity). Thus, the reallocation of workers out of agriculture into higher-productivity sectors could be a key factor in boosting overall growth in labor productivity (Lewis 1954; McMillan and Rodrik 2011). Indeed, in the following decades, as Figure 3.2b shows, the structure of employment changed greatly as the share of workers in agriculture fell dramatically. By 2010, less than 40 percent of workers were still in agriculture, with the workforce shifting to higher-productivity sectors.

How much did the reallocation of workers across sectors contribute to growth in overall labor productivity? Our methodology for measuring structural change follows McMillan and Rodrik (2011), and decomposes aggregate changes in labor productivity into two components: (1) "within," which captures growth within sectors, and (2) "structural change," which captures growth resulting from labor reallocation across sectors that differ in their labor productivity (see the Overview in this book for details on the methodology).[4] We use value-added and employment data from the Groningen Growth and Development Centre (GGDC) Africa Sector Database (ASD). Value-added is expressed in 2005 pula, and labor productivity is measured as real output per worker in a sector.

Our results show that aggregate labor productivity grew on average by 5.0 percent per year between 1970 and 2010, but with significantly higher growth between 1970 and 1990 than between 1990 and 2010 (Figure 3.3). Labor productivity grew at 10.8 percent annually between 1970 and 1980, and then declined significantly in the subsequent three decades. Structural change accounted for almost three-quarters of the labor productivity growth in the 1970s, but by the 1990s, it started to become a drag on growth. In effect, our analysis paints a clear picture of two distinct periods in Botswana's

4 Algebraically, the decomposition is:

$$\Delta P_t = \sum_{i-1}^{N} \theta_{i,t-k} \Delta p_{i,t} + \sum_{i-1}^{N} p_{i,t} \Delta \theta_{i,t}$$

where ΔP_t is the change in aggregate labor productivity between period $t-k$ and t. The first term is the "within" component, which is a weighted average of the change in labor productivity in each of the N sectors, with the weight for sector i being the labor share of that sector in period $t-k$, measured by $\theta_{i,t-k}$. The second term is the "structural change" component, which is a weighted average of the change in labor shares in the N sectors, with the weights captured by the labor productivity of the sector in period t.

FIGURE 3.2a After independence, most workers were in low-productivity agriculture . . .

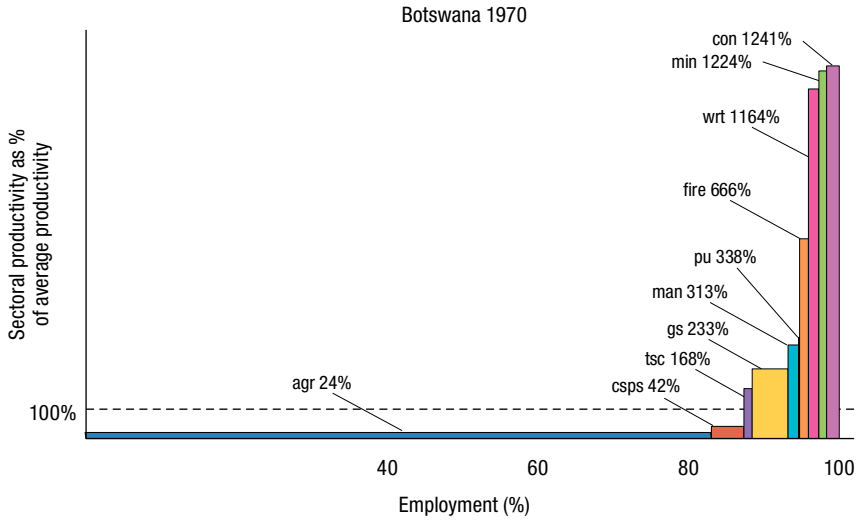
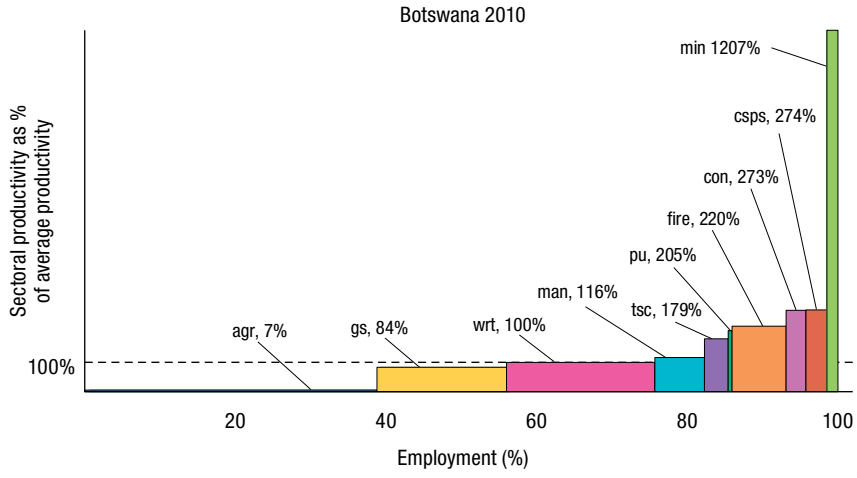


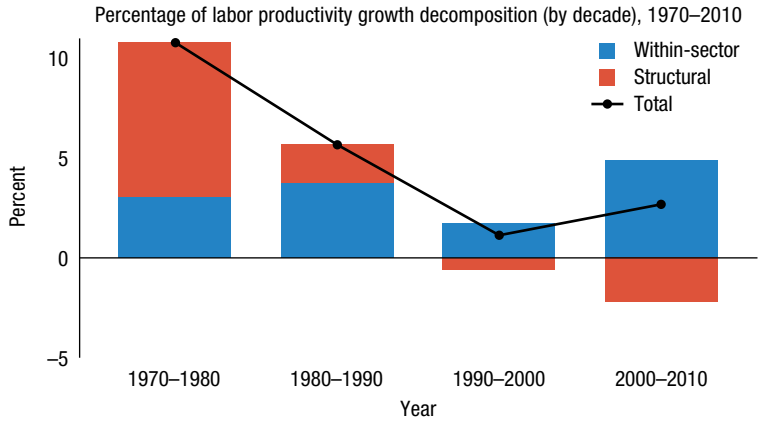
FIGURE 3.2b . . . but today, most workers are in higher-productivity sectors



Source: Authors' calculations with data from the Groningen Growth and Development Centre Africa Sector Database.

Note: agr = agriculture; con = construction; csps = community, social, personal services; fire = finance, insurance, real estate, and business services; gs = government services; man = manufacturing; min = mining; pu = public utilities; tsc = transport, storage, and communications; wrt = wholesale and retail trade.

FIGURE 3.3 From a big role for structural change to a drag on growth



Source: Authors' calculations with data from the Groningen Growth and Development Centre Africa Sector Database.
Note: Graph shows decomposition of average annual labor productivity growth (value-added in 2005 pula per worker) during each decade.

growth since independence: 1970–1990 and 1990–2010. During the first period, a significant portion of Botswana's growth was driven by structural change. During the latter period, structural change was growth reducing, and all of the productivity growth was driven by within-sector productivity growth.

At the sectoral level, productivity growth was quite uneven (Table 3.1). Notably, agriculture contributed very little to within-sector productivity growth over a period of more than 40 years as a result of very modest productivity gains. The low contribution of agriculture to value-added reflects, at least in part, the fact that most of Botswana's land is not conducive to agricultural production. In addition, most of the agricultural activities outside of cattle ranching are of a subsistence nature—and because crops are rainfed, these activities are subject to frequent disruption as a result of drought. Another notable trend is the changing driver of within-sector change. In the first decade, mining accounted for the majority of labor productivity growth stemming from within-sector productivity improvements and growth in the share of the workforce in mining, but in the following decades other sectors also contributed significantly to overall labor productivity growth: construction and community, social, personal, and government services.

Why do these two periods look so different? It is relatively easier to understand the patterns in the first period. Botswana's economy in 1966 was largely agrarian in nature, and workers in agriculture were the least productive. The

TABLE 3.1 Mining initially drove sectoral productivity growth

	Labor productivity compound annual growth rate (percentage)				
Sector	1970 to 2010	1970 to 1980	1980 to 1990	1990 to 2000	2000 to 2010
Agriculture, hunting, forestry, and fishing	1.8	4.9	1.6	–3.1	3.8
Mining and quarrying	5.0	5.6	10.4	2.3	1.8
Manufacturing	2.4	13.6	–6.9	0.9	3.1
Public utilities (electricity, gas, and water)	3.7	1.3	2.3	10.1	1.4
Construction	1.1	–7.1	–5.5	1.3	17.5
Wholesale and retail trade, hotels, and restaurants	–1.3	5.4	–10.0	–0.5	0.6
Transport, storage, and communications	5.2	7.7	4.4	6.1	2.6
Finance, insurance, real estate, and business services	2.1	10.4	-2.2	0.3	0.5
Community, social, and personal services	10.0	–3.6	22.3	8.1	15.1
Government services	2.3	–0.4	6.7	–0.5	3.7
Economywide	**5.0**	**10.8**	**5.7**	**1.1**	**2.7**
	Change in employment share (percentage points)				
	1970 to 2010	1970 to 1980	1980 to 1990	1990 to 2000	2000 to 2010
Agriculture, hunting, forestry, and fishing	–43.9	–22.8	–19.6	–1.9	0.3
Mining and quarrying	0.4	2.9	–0.7	–0.8	–1.0
Manufacturing	5.2	0.0	4.3	0.6	0.2
Public utilities (electricity, gas, and water)	0.4	0.6	0.4	–0.5	–0.1
Construction	1.1	3.5	6.8	–2.9	–6.4
Wholesale and retail trade, hotels, and restaurants	18.2	1.4	4.7	3.2	8.9
Transport, storage, and communications	2.0	–0.1	1.2	0.2	0.8
Finance, insurance, real estate, and business services	5.8	0.4	2.0	1.1	2.3
Community, social, and personal services	–1.5	6.7	–1.4	–4.5	–2.3
Government services	12.3	7.4	2.2	5.4	–2.6

Source: Authors' calculations using the Groningen Growth and Development Centre Africa Sector Database.

gaps in productivity between agriculture and the rest of the activities in the economy provided huge incentives for people to move out of agriculture. This is exactly what happened from 1968 to 1974 and from 1975 to 1989 (Figures 3.4a and 3.4b). In each period, the share of the labor force in agriculture contracted by about 20 percentage points, while it expanded in all other activities. This process was facilitated by heavy state involvement via direct hires into public service and by programs targeted at increasing investments in

FIGURE 3.4a Starting with a highly agrarian society . . .

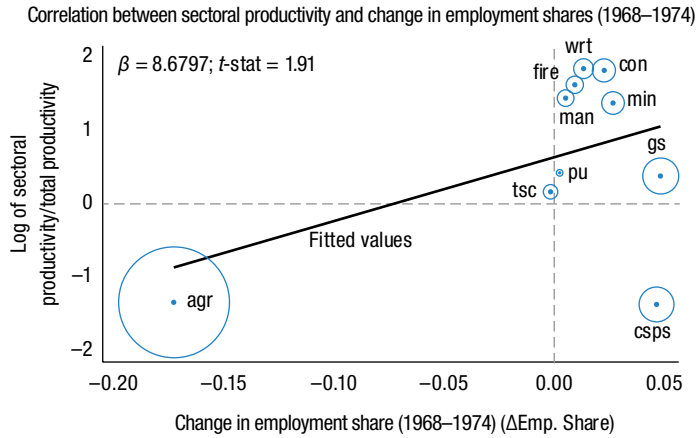
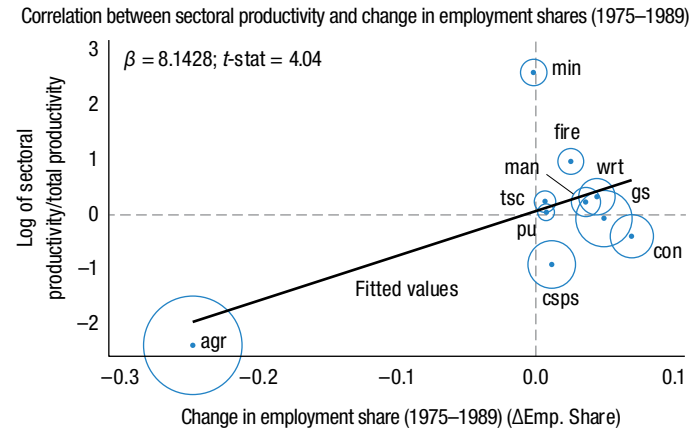


FIGURE 3.4b . . . Botswana becomes less so, then stabilizes at 40 percent for its agrarian share . . .



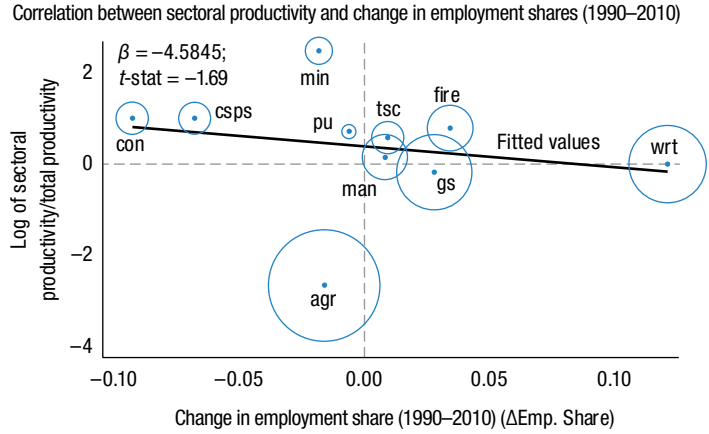
Source: Author's calculations with data from Timmer and de Vries (2009); McMillan and Rodrik (2011).

Note: β denotes coefficient of independent variable in regression equation: $\ln(p/P) = \alpha + \beta\Delta\text{Emp. Share}$; agr = agriculture; con = construction; csps = community, social, personal services; fire = finance, insurance, real estate, and business services; gs = government services; man = manufacturing; min = mining and quarrying; pu = public utilities (electricity, gas, and water); tsc = transport, storage, and communications; wrt = wholesale and retail trade.

education, health, and infrastructure. Programs were also put into place to facilitate investment by the private sector in all kinds of activities.

A second possible explanation for the observed patterns in the earlier decades concerns the repatriation of men who had migrated to South Africa to find wage labor. It has been well documented that the hut tax imposed by

FIGURE 3.4c . . . even though productivity is still relatively low



Source: Author's calculations with data from Timmer and de Vries (2009); McMillan and Rodrik (2011).

Note: β denotes coefficient of independent variable in regression equation: $\ln(p/P) = \alpha + \beta\Delta\text{Emp. Share}$; agr = agriculture; con = construction; csps = community, social, personal services; fire = finance, insurance, real estate, and business services; gs = government services; man = manufacturing; min = mining and quarrying; pu = public utilities (electricity, gas, and water); tsc = transport, storage, and communications; wrt = wholesale and retail trade.

the colonial regime on the largely rural Batswana encouraged young men to migrate to South Africa where they could usually find work in the mines. Two things happened to precipitate the return of these men. The economy started to pick up in Botswana with the discovery of diamonds and the subsequent public investment. Also, starting in the 1980s, the mines in South Africa started to retrench, leaving some men with few choices but to return to Botswana. Having already been employed as wage laborers, it is likely that a disproportionate share of these men went to Gaborone to seek work rather than returning to the rural areas. This type of migration would partly explain the large increase in the employment shares in services and construction, which accounts for much of the positive contribution of structural change to aggregate productivity growth.

Another possible explanation may be demographic changes, which could have accelerated the decline in the relative share of agricultural employment by increasing the employment share of younger cohorts who entered the workforce directly into high-productivity sectors (such as manufacturing), and by ushering older cohorts out of the labor force directly from agriculture. Shifts in the sectoral composition of the workforce owing to demographics are arguably subject to smaller mobility costs than shifts across sectors among cohorts in the workforce. This is likely to be part of the story in Botswana, because it is so difficult to make a decent living in most of agriculture, although

we lack sufficient data for this period to test the relative importance of this explanation.

It is more difficult to understand why the share of employment in agriculture stopped contracting around 1990 and subsequently stabilized at around 40 percent (Figure 3.4c), given that relative labor productivity in agriculture was significantly lower in 2010 than in 1970. Although McMillan and Rodrik (2011) have identified overvalued exchange rates and labor market rigidity as two possible determinants of structural change, we can dismiss these in Botswana's case. To begin with, Botswana has maintained a competitive exchange rate since independence, as the degree of undervaluation (a positive value) or overvaluation (a negative value) has been small (Figure 3.5a). In addition, its labor markets seem to be quite flexible when compared with other countries at similar levels of income, as estimates of labor market rigidity in Botswana are consistently below the trendline (Figure 3.5b).

One explanation for why agricultural workers have not moved points to the myriad social assistance programs offered by the Botswana government—that is, productivity differences may not reflect effective differentials in income and consumption. Another may be the lack of opportunities for low-skilled workers in urban areas. Each of Botswana's national development plans has stressed economic diversification as an important goal. In its efforts to diversify the economy, the government is pursuing various industrial incentive schemes aimed at promoting the growth of other sectors, particularly manufacturing, tourism, and other service sectors (Table 3.2).

- In 1976, the Local Procurement Program was initiated. Then in 1997, it was subsequently replaced as the Local Preference Scheme, which reserves 35 percent of government purchases for local producers. The government has also introduced complementary programs designed to provide technical assistance to small-scale entrepreneurs wishing to compete for government projects.

- In 1982, the government initiated the Reserved Sectors Policy, which economically empowers citizens and reduces competition in the market. This policy has been flexible in that it allows for joint ventures between citizens and foreign investors in the manufacturing sector.

- The Financial Assistance Policy, established in 1982, was Botswana's largest incentive system aimed at promoting local production capacity by subsidizing the use of labor and capital. The policy was terminated in 2000 because of high failure rates and widespread abuse, but in 2001, it was

FIGURE 3.5a Botswana's currency has remained competitive . . .

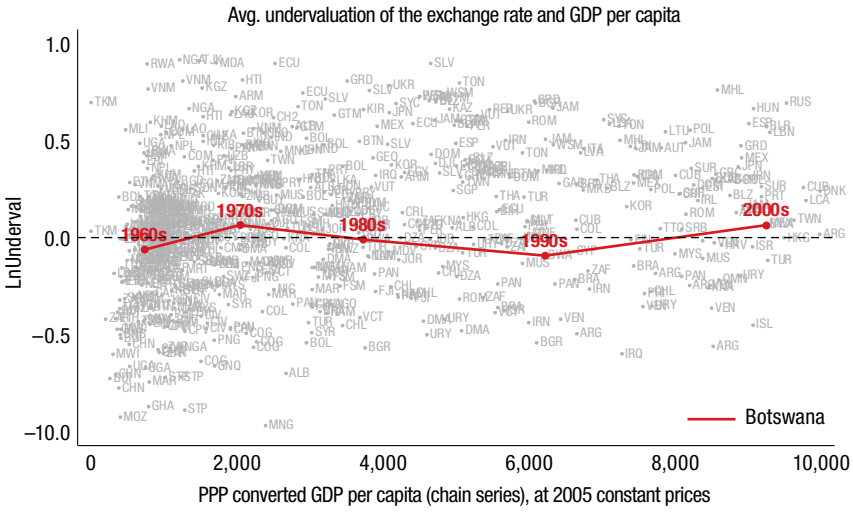
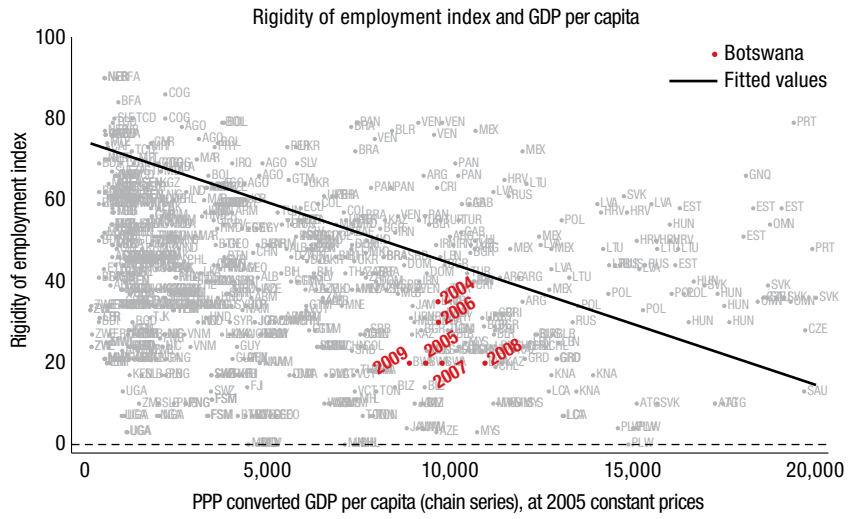


FIGURE 3.5b . . . and its labor markets have remained flexible



Source: Authors' calculations using data from World Bank's Doing Business reports (various years) and Penn World Tables version 7 (Heston, Summers, and Aten 2012).

Note: *Figure 3.5a:* A negative value for ln (underval) represents an overvalued exchange rate. *Figure 3.5b:* A higher index number of labor market rigidity corresponds to higher rigidity. Fitted values correspond to fixed-effects regression of rigidity of employment index against real gross domestic product (GDP) per capita in purchasing power parity (PPP).

TABLE 3.2 Summary of major incentive schemes

Incentive scheme	Objective	Status
Local Procurement Program (1976); Local Preference Scheme (1997)	To give local producers preference in the supply of goods for government contracts.	Revised and superseded by the Local Preference Scheme in 1997.
Reserved Sectors Policy (1982)	To promote the participation of Botswana and Botswana-owned firms in economic activity by limiting certain activities to them only.	Policy continues with some flexibility having been introduced, especially now that joint ventures are allowed.
Financial Assistance Policy (1982)	To provide capital and labor grants based on labor employed as well as location.	Terminated in 2000 following a review report by BIDPA in 1999, which found a high failure rate as well as large-scale abuse, waste, and high costs per job created.
Selebi-Phikwe Regional Development Project (1988)	To stimulate economic development in the area around the copper mining town.	Phased out in 1996.
Citizen Entrepreneurial Development Agency (2001)	To support the development of citizen-owned business through funding, training, and mentoring.	Replaced the Financial Assistance Policy in 2001.
Local Enterprise Authority (2004)	To be an implementing agency for the SMME Policy intended to improve service delivery programs.	This ongoing reform process involves the separation of policy formulation and implementation functions of the SMME Ministry.

Source: Modified from BIDPA and World Bank (2006).

Note: BIDPA = Botswana Institute for Development Policy Analysis; SMME = small, micro, and medium-sized enterprises.

replaced with the Citizen Entrepreneurial Development Agency, which supports developing locally owned businesses through funding, training, and mentoring.

- The Local Enterprise Authority was founded in 2004 as a one-stop shop for small and medium-sized enterprises. It runs business skills training and management support services for these enterprises (Zizhou 2009).

Besides these incentive schemes, the government is currently pursuing a range of investor-friendly policies, including the establishment of an International Financial Services Centre. Also high on the policy agenda are efforts to reduce unemployment and to mitigate the effects of the HIV/AIDS epidemic on productivity.

Another partial explanation has to do with measurement error. The GGDC ASD tells us that the share of workers in agriculture stopped falling. But when we verify this trend with individual-level data from the 1995/1996 and 2005/2006 Central Statistics Office Labour Force Surveys (LFSs), we find that the share of employment in agriculture is likely overestimated in the

GGDC—in fact, it has more likely continued to fall during the 1990s and 2000s, although much more slowly than in the 1970s and 1980s (Box 3.1). This slowdown may in part reflect the fact that less educated and older workers are more likely to work in agriculture, and they may find it more difficult to move into other sectors. Major policy changes took place in the 1990s and 2000s, including significant trade reforms, which have influenced the relative demand for workers in various sectors—an issue that we turn to next.

BOX 3.1 Is it possible that the share of agricultural workers has continued to fall?

One difficult-to-explain development in Botswana's structural change story is that after two decades of the share of agriculture contracting dramatically, it stabilized around 1990 at 40 percent and has remained there ever since. Many explanations are often offered, but what about the possibility that the widely used measure is simply wrong?

To check this, we begin by comparing employment estimates from the 2005/2006 LFS with those in the GGDC ASD. Seasonality in agriculture is a big concern when trying to properly measure employment in Botswana. Usual employment (main activity during the past 12 months) in agriculture is much higher than current employment (last 7 days) (Table B3.1). The estimate of agricultural employment in the GGDC ASD is based on the worker's usual activity, whereas employment estimates for all other sectors are based on the worker's current activity. The difference between current and usual employment is greatest in agriculture, but using current employment also leads to an underestimation of employment in other sectors, and consequently leads to an overestimation of the employment share of agriculture.

Therefore, if we use usual (rather than current) employment, we estimate that for 2005/2006, agricultural employment is 34.3 percent, not 39.3 as estimated in the GGDC ASD. However, because of a lack of data, we cannot estimate the usual industry of employment from data sources other than the 2005/2006 LFS. Thus, we are unable to check the sensitivity of the estimates of the share of workers in agriculture to differing definitions of work (like usual versus current) for other years. Thus, the approach taken in the GGDC ASD likely leads to an overestimation of the share of agricultural employment.

In sum, it is possible that the share of employment in agriculture has actually continued to decrease slightly from the 1990s to the 2000s.

(continued)

Table B3.1 Possible case of measurement error

	Comparison of employment estimates		
Sector	Africa Sector Database	LFS (current activity)	LFS (main activity)
Agriculture	236,107	161,712	236,270
Mining	14,173	14,289	14,854
Manufacturing	35,973	35,973	43,415
Utilities	4,163	4,163	5,055
Construction	27,587	27,587	38,312
Trade services	92,068	92,177	118,243
Transport services	16,050	16,094	19,109
Business services	33,679	33,724	38,184
Government services	117,404	117,498	127,847
Personal services	24,291	36,684	47,829
Total	**601,495**	**539,901**	**689,118**

Source: The Africa Sector Database (ASD) employment estimates are for 2006 from the Groningen Growth and Development Centre (GGDC) ASD (de Vries, Timmer, and de Vries 2013). The Labour Force Survey (LFS) estimates are the authors' own calculations using the Botswana Central Statistics Office 2005/2006 LFS. The Groningen Growth and Development Centre Africa Sector Database agricultural employment estimates are in part based on previous work by some of the authors (McCaig and McMillan 2014).

Note: Current activity refers to employment during the past 7 days, and main activity refers to employment during the past 12 months.

A Growing Workforce and Informality

What was happening to the composition of the labor force as these changes in labor productivity took place? Using LFS data covering the period 1995/1996–2005/2006, we examine other margins of adjustment not covered in the GGDC ASD employment estimates: labor force participation, unemployment, and informality. The following patterns stand out.

More individuals are in the labor force. We begin by examining the reported activity of working-age individuals—those between the ages of 15 and 60 (Table 3.3). We find that the number of working-age individuals increased by 24.2 percent, in line with population growth. But surprisingly, the number of people in the labor force increased much faster, by 43.4 percent. As a result, the labor force participation rate increased from 55.9 percent to 64.5 percent—that is, by 8.6 percentage points (or 15 percent). If we extend the conventional definition of the labor force to include workers who are currently available to work, but not actively searching for a job, then the labor force participation rate increased from 66.8 percent to 78.4 percent. This figure does not include those who are sick, which is of interest, given that

TABLE 3.3 Higher labor force participation

Activity	Number of individuals		Percentage change	Percentage of working-age individuals	
	1995/1996	2005/2006		1995/1996	2005/2006
Total working-age individuals	**743,403**	**923,055**	**24.2**	100.0	100.0
In labor force:	**415,251**	**595,402**	**43.4**	**55.9**	**64.5**
Working	323,034	483,818	49.8	43.5	52.4
Actively seeking work	92,217	111,584	21.0	12.4	12.1
Not in labor force:	**328,152**	**327,653**	**–0.2**	**44.1**	**35.5**
Not available to work	247,073	199,610	–19.2	33.2	21.6
Attending school	109,821	109,904	0.1	14.8	11.9
Engaged in household duties	101,658	38,915	–61.7	13.7	4.2
Too old	876	1,798	105.3	0.1	0.2
Sick	22,570	31,523	39.7	3.0	3.4
Disabled	5,826	4,101	–29.6	0.8	0.4
Other	6,322	13,368	111.4	0.9	1.4
Available to work, but did not look for work during past 30 days	81,079	128,043	57.9	10.9	13.9
Thought no work available	41,409	61,101	47.6	5.6	6.6
Awaiting reply for earlier inquiries	6,089	9,037	48.4	0.8	1.0
Waiting to start arranged job in business or agriculture	2,598	3,142	21.0	0.3	0.3
Occupied with household duties	25,989	37,331	43.6	3.5	4.0
Other	4,994	17,432	249.1	0.7	1.9

Source: Authors' calculations using 1995/1996 and 2005/2006 Labour Force Survey data.

Note: The sample is restricted to individuals age 15 to 60. The numbers reported are population estimates using sample weights. The estimates are based on the individual's activity during the past 7 days.

HIV prevalence is extremely high in Botswana, at an estimated 17 percent (Levinsohn and McCrary 2010). That said, the share of the population reporting as not being in the labor force because of illness increased only marginally, from 3 percent in 1995/1996 to 3.4 percent in 2005/2006. This is possibly a testament to the government's aggressive campaign to treat individuals who are HIV positive.

Unemployment remains high, especially for youths. Outside of agriculture, unemployment remained high and relatively unchanged—20.2 and 21.2 percent in 1995/1996 and 2005/2006, respectively (22.2 and 18.7 percent, respectively, if individuals in agriculture are included). Unemployment is a major concern for young workers (ages 15–19 and 20–24), who are significantly more likely to be unemployed than older workers (Table 3.4a). Individuals in the 20–24 age group participate in the labor force at the same rate as older workers, but the

TABLE 3.4a High unemployment, particularly for youth …

	Unemployment rate (%)		Labor force participation rate (%)	
Excluding agriculture	1995/1996	2005/2006	1995/1996	2005/2006
All	20.2	21.2	54.3	60.2
Males	18.1	19.3	60.9	66.8
Females	22.2	22.9	48.9	55.4
15–19 years old	37.1	39.7	12.7	14.6
20–24 years old	35.9	38.7	55.6	61.4
Urban	20.7	20.1	64.3	64.9
Rural	19.3	24.0	42.3	50.7
No formal education	21.4	20.0	51.2	51.9
Primary education	20.6	21.9	60.3	61.8
Secondary education	19.4	21.2	51.0	61.0

Source: Authors' calculations using 1995/1996 and 2005/2006 Labour Force Survey (LFSs).

Note: The sample is restricted to individuals age 15 to 60 and excludes individuals currently working or unemployed and previously working in agriculture. The numbers reported are population estimates using sample weights. The estimates are based on the individual's activity during the past 7 days. Unemployed includes people who were available to work (but did not work) in the past 7 days, which includes workers who did not actively seek work. The labor force is defined as individuals who worked during the past 7 days, sought work, or were temporarily absent. The labor force participation rate differs from Table 3.3 because of the exclusion of agriculture.

TABLE 3.4b … and rising informality

	Percentage of informal workers		Percentage
Industry description (excluding agriculture)	1995/1996	2005/2006	point change
Public administration	0.1	0.7	0.5
Foreign missions and international organizations	0.0	0.0	0.0
Mining and quarrying	0.0	0.0	0.0
Manufacturing	27.0	31.3	4.3
Electricity, gas, and water supply	0.0	0.0	0.0
Construction	17.5	26.5	9.1
Wholesale and retail trade, hotels, restaurants, etc.	32.4	41.6	9.3
Transport, storage, and communications	27.0	36.0	9.0
Finance, insurance, real estate, and business services	3.7	6.9	3.2
Community, social, household, and personal services	12.7	9.2	–3.6
Total	**13.2**	**17.9**	**4.8**

Source: Authors' calculations using 1995/1996 and 2005/2006 Labour Force Survey (LFSs).

Note: The sample is restricted to workers age 15 to 60 outside of agriculture, forestry, hunting, and fishing. Informal workers are all those workers in the private sector employed at firms with fewer than 10 employees and defined as informal in the survey by question 30 in the 1995/1996 LFS and question 39 in the 2005/2006 LFS. The numbers reported are population estimates based on using sampling weights. The estimates are based on the individual's activity during the past 7 days.

unemployment rate is almost double the national average, at 38.7 percent in 2005/2006. Although labor force participation is much lower for individuals age 15–19, reflecting school attendance, 39.7 percent of them are unemployed.[5]

Males are the best off. We find that males are less likely to be unemployed and are more likely to be in the labor force than females in either year, although both genders achieved significantly higher labor force participation rates between 1995/1996 and 2005/2006 (Table 3.4a). As for schooling, there is not much difference in either unemployment or labor force participation rates across individuals with primary or secondary education by 2005/2006, as the gap in labor force participation in 1995/1996 between individuals with primary and secondary education closed. However, having some education, compared with no formal education, is an important determinant of labor force participation.

Informality rose. As the workforce expanded and unemployment fell, the prevalence of informal employment outside of agriculture rose by a significant 4.8 percentage points (or 36 percent) (Table 3.4b).[6] Notably, the incidence of informality in manufacturing increased by 4.3 percentage points, which is slightly below the overall increase, but may be partly related to the SACU tariff cuts. Many sectors experienced an increase in the share of informal workers. In fact, the only sector to experience a decrease was community, social, household, and personal services.

Major sectoral shifts. We also see some important changes in the distribution of nonagricultural workers across sectors (Table 3.5).[7] The share of

5 Unfortunately, because of seasonal employment in agriculture, it is difficult to consistently estimate unemployment for all working-age individuals using the LFS data. The LFSs were not conducted during similar months in rural areas, leading to concerns about whether agricultural workers were more likely to be surveyed during working periods in one survey relative to the other. Thus, to obtain consistent estimates of unemployment, we focus on individuals outside of agriculture (Table 3.5). This means excluding individuals currently working in agriculture, as well as individuals currently unemployed but who most recently worked in agriculture.

6 The Labour Force Surveys define informality according to a series of questions related to the ownership sector (such as government, parastatal, nongovernmental organization (NGO), or private); the number of workers in the business; the location of the business; whether the business is registered; and whether the business keeps a complete set of accounts. The enumerator evaluated whether the worker was formal or informal based on these questions. The questions about location, business registration, and accounts were asked only for workers in businesses with 10 or fewer workers in the private sector. Thus, we do not have a direct indicator of formality for workers in larger workplaces in the private sector or workers in other sectors. Consequently, for all workers who were not asked the detailed questions related to formality, we classify them as formally employed if they worked either in large private firms or in sectors more likely to be formal (such as government, parastatal, or NGOs).

7 We restrict the analysis to nonagricultural workers because of difficulties in accurately measuring agricultural employment across the two LFSs.

TABLE 3.5 A major move out of construction and public administration

	Number of workers		Percentage of workers	
Industry sector	1995/1996	2005/2006	1995/1996	2005/2006
Public administration	99,526	114,850	35.6	31.6
Foreign missions and international organizations	224	895	0.1	0.2
Mining and quarrying	15,028	14,289	5.4	3.9
Manufacturing	27,899	34,077	10.0	9.4
Electricity, gas, and water supply	2,794	4,132	1.0	1.1
Construction	38,759	26,474	13.9	7.3
Wholesale and retail trade, hotels, restaurants, etc.	51,973	85,416	18.6	23.5
Transport, storage, and communications	7,644	15,904	2.7	4.4
Finance, insurance, real estate, and business services	11,379	32,606	4.1	9.0
Community, social, household, and personal services	24,572	34,486	8.8	9.5
Total	**279,798**	**363,128**	**100.0**	**100.0**

Source: Authors' calculations using 1995/1996 and 2005/2006 Labour Force Survey data.

Note: The sample is restricted to workers age 15 to 60 outside of agriculture, forestry, hunting, and fishing. The numbers reported are population estimates using sample weights.

workers in manufacturing fell, but only by a 0.6 percentage point, and the share of workers in mining fell by 1.5 percentage points (or 27 percent). Elsewhere, the share of workers in public administration and construction fell appreciably, while the number of workers rose in both (1) wholesale and retail trade, hotels, restaurants, etc.; and (2) finance, insurance, real estate, and business services. The remaining sectors experienced only marginal changes in their shares of the nonagricultural workforce.[8]

How Trade Reform Influenced Structural Change

Why has it been so difficult to expand the production of traded goods in Botswana? Many studies note that the country is landlocked with a small domestic market, reflecting a population of less than 2 million. But Botswana also has distinct trade advantages. Since 1910, it has enjoyed duty-free access to markets in South Africa as a member of SACU, which also enables it to share the revenues generated by tariffs on imported goods coming from outside of SACU. The problem is that member countries have typically not been involved in setting tariffs—a task undertaken by South Africa.

8 These changes are broadly consistent with those in the GGDC ASD.

In Botswana, SACU matters are handled by the Ministry of Finance and Development Planning (MFDP), rather than the Ministry of Trade and Industry. The logic of this arrangement is that for Botswana, the key responsibility associated with the tariffs has been managing resources received through the revenue-sharing agreement. Historically, the government has paid limited attention to trade negotiations, both because of the SACU arrangement and because of the country's historical concentration of trade in two commodities: diamonds and beef. Diamonds were covered by agreements with De Beers (and were not subject to tariffs in end markets), while beef exports enjoyed preferential access to Europe.

Prior to the end of apartheid in 1994, South Africa pursued a vigorous policy of import substitution (Edwards 2005), resulting in a wide range of prohibitive tariffs on imports. But in 1994, the process of trade liberalization gained momentum as a result of South Africa's commitment to the General Agreement on Tariffs and Trade Uruguay Round. Export subsidies, which were incompatible with the WTO, were phased out and finally terminated in 1997. Additionally, between 1994 and 2006, import tariffs on all traded goods fell significantly. Because levels of initial tariffs varied widely across products and because the goal was to ultimately harmonize tariffs, the percentage point decline in tariffs varied widely across products, with some falling by more than 300 percent. In addition to multilateral liberalization, the government has engaged in a number of bilateral and regional trade agreements, culminating in South Africa's implementation of the Southern African Development Community (SADC) Free Trade Protocol and the implementation of the European Union–South Africa Trade, Development and Cooperation Agreement (TDCA) in 2000. More recently, Botswana was granted preferential access to markets in the European Union.

For Botswana, the period of import substitution would have meant that prices of imported intermediates were artificially high, making it more difficult for firms in Botswana to be profitable. At the same time, the protection afforded to Botswana may have allowed some firms to flourish that would have been unprofitable otherwise. Thus, South Africa's trade liberalization in the 1990s may have influenced the allocation of workers across sectors and consequently played a role in structural change, reducing labor productivity growth in the 1990s and 2000s—a possibility that we explore to get a sense of not only past developments but also the hurdles Botswana may face in its efforts to diversify its economy. To do this, we examine the changes in trade flows and employment between 1995/1996 and 2005/2006—years for which detailed labor force surveys exist and the period that coincides with South

Africa's trade liberalization and Botswana's experience of growth-reducing structural change.

From a theoretical standpoint, the tariff reductions are expected to have the following effects:

- Lower the cost of imports directly. This arises because imports from parties outside of SACU are now taxed at a lower rate.
- Lower the cost of imports indirectly. This arises because most of Botswana's imports come from or through South Africa. The imports from third parties will be cheaper so long as some of the tariff reduction is passed on to consumers, while the imports of products made in South Africa that rely on imported intermediate inputs may also be cheaper if some of the lower production costs are passed on to consumers.
- Shrink the size of Botswana's importables sector. This arises because of the increase in imports.
- Expand the size of the nontrading and exporting sectors. General equilibrium effects predict the reallocation of resources away from import-competing sectors and firms to other uses. Additionally, lower costs for imported intermediated goods may lead to further expansion of these sectors.
- Possibly erode Botswana's market share in South Africa, which may reduce the number or value of products that Botswana exports to South Africa. This may arise because South Africa has been, and still is, the primary destination for some of Botswana's nonmineral exports.

The net effect of these competing forces will determine the impact of trade liberalization on sectoral shifts in employment and labor productivity in Botswana.

Changes in Trade Flows and Tariffs

Beginning with trade flows, between 1994 and 2009, import tariffs on all traded goods fell significantly. Because levels of initial tariffs varied widely across products and because the goal was ultimately to harmonize tariffs, the percentage point decline in tariffs varied widely across products, with some falling by more than 60 percent. In addition to multilateral liberalization, the government engaged in a number of bilateral and regional trade agreements, culminating in South Africa's implementation of the SADC Free Trade Protocol and the European Union–South Africa TDCA in 2000.

How much did tariffs fall, and what was the impact on Botswana's trade? If we take the period between 1988 and 2009, we see that tariffs fell by 16.3 percentage points in manufacturing, 10.3 percentage points in mining, and 4.6 percentage points in agriculture (Figure 3.6a). However, the large reductions in tariffs are not associated with an obvious response in imports and exports (Figure 3.6b). Imports as a percentage of GDP fluctuated around 45 percent, while exports as a percentage of GDP fluctuated around 50 percent. At the product level, there was strong growth in some import sectors that are likely to include inputs for businesses in manufacturing (such as machinery and electrical equipment) (Table 3A.1).

FIGURE 3.6a Tariffs fell sharply, especially in manufacturing . . .

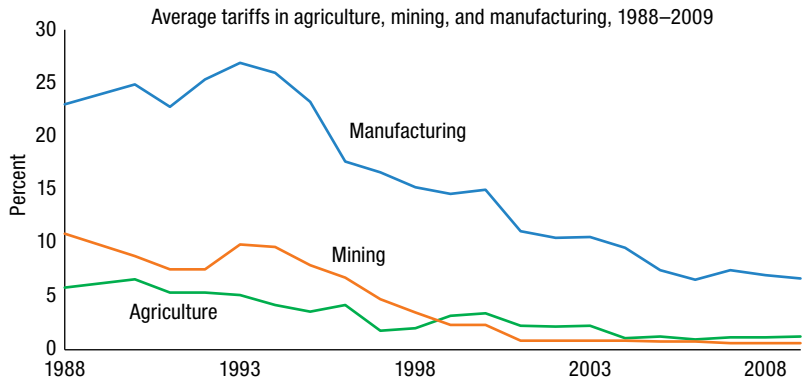
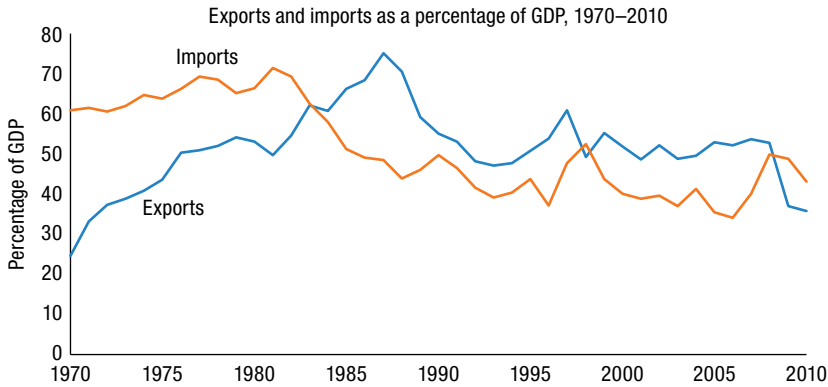


FIGURE 3.6b . . . but import and export volumes held steady



Source: Edwards (2005); World Bank (various years).

Note: The average tariff within each sector is a simple average of industry-level tariffs, where the industry-level tariffs are a weighted average of four-digit Harmonized System tariffs using 2000 imports as weights. GDP = gross domestic product.

Compared with exports, Botswana's import profile is much less concentrated. Oil and motor vehicles, including their parts, were a significant share of imports in both 1991 and 2005 (Table 3A.2). The one notable change is that medicine became the fourth most important import in 2005, but was not among the top 10 in 1991.[9] On the export side, there has been some limited diversification, with diamonds falling from 79.5 percent to 76.6 percent of total exports from 1991 to 2005; however, mining-based exports still account for more than 85 percent of total exports. Products that gained in significance include copper and apparel, while meat and meat products' share of exports declined.

Furthermore, despite the tariff cuts on products originating outside of SACU, imports from South Africa still constitute more than 80 percent of total imports, suggesting that, at an aggregate level, the SACU tariff cuts did not lead to a significant change in Botswana's trading partners. Indeed, as Table 3A.3 shows, the share of imports from South Africa even rose slightly between 1991 and 2005. Export destinations have not changed significantly, except for the shift from Switzerland to the United Kingdom, which is driven by changes in the diamond trade.

Thus, the SACU tariff liberalization seems to have had limited impacts on Botswana's economy. This is consistent with McCaig and McMillan (2014), who find the relative size of manufacturing industries did not change significantly in relation to industry tariff cuts. The effects on agriculture are also likely to be small, as Botswana continues to import a large fraction of its food (MFDP 2002, 2009), primarily from South Africa and other SACU members to which it already had duty-free access. In 2011, 93.6 percent of food, beverage, and tobacco imports came from South Africa and 96.2 came from all SACU members, respectively (Statistics Botswana 2014). This pattern is relatively unchanged from 2004, when 95.4 percent came from South Africa and 96.4 percent came from all SACU members (CSO 2009).

Looking to the Future

South Africa's trade liberalization had a modest impact on employment in Botswana and very little impact on diversification. Employment shares in industries that were exposed to tariff reductions—agriculture, manufacturing, and mining—fell slightly. In addition, both unemployment (broadly defined)

9 This reflects the impact of HIV/AIDS and the import of antiretroviral medicines for the national treatment program.

and informality increased, although the magnitude of these effects is not large. Somewhat ironically, Botswana's lack of diversification appears to have shielded its workforce from larger adjustment costs.

Perhaps this outcome is not surprising. Botswana started with a tiny manufacturing sector, so the main impact of the tariff reductions was an increase in the volume of trade. The composition of tradables was largely unchanged by the tariff reductions. Imports remained highly diversified and consumer oriented, while exports continued to be dominated by natural resources. The increase in the volume of imports likely provided petty traders with greater opportunities for informal trade. Even though these informal jobs are not secure, they still provide a much better living than most jobs in the agriculture sector.

But for a country that has been hailed as an African success story, the results are dissappointing and demand further explanation, with a large share of workers still in low-productivity agriculture, high rates of unemployment, and discouraged workers. Time is of the essence. Botswana's diamond revenues are currently predicted to decline sharply from the mid-2020s onward. Even if this were not the case, the current structure of the diamond industry is such that it does not and cannot provide enough jobs to make a dent in Botswana's levels of poverty and income inequality. This is not a secret. The government has launched campaign after campaign targeted at diversification. The puzzle is: why have these campaigns not been more successful? After all, Botswana has an impressive track record marked by good governance and prudent macroeconomic and fiscal policy.

We do not pretend to have the answer to this puzzle, but only note that understanding why things have stayed the same for so long is key to unlocking Botswana's future potential. One hypothesis is that a strong industrial sector stands to threaten the political and economic power of the longstanding ruling party, the Botswana Democratic Party (BDP) (Robinson 2013). The lack of diversification has allowed the elites in Botswana to maintain their grip on the country for 50 years. Although unemployment and inequality would also threaten the BDP, so far, the government has been able to manage these threats through myriad social assistance programs.

An alternative hypothesis points to Botswana's current structure of production, which is highly specialized in a handful of peripheral activities based on natural resource exports, thereby making (export) diversification a major challenge (Hausmann and Klinger 2010). Moreover, although Botswana had been developing its garment sector, these activities are disappearing with the erosion of trade preferences.

A complementary explanation is Botswana's structural problem of a high-cost base—such as high transport costs—which poses challenges in achieving competitiveness in the production of exportables. Diversification policies have failed to address the high costs of production to sufficiently raise productivity. High levels of public spending on education and training have not succeeded in alleviating shortages of skills or in producing secondary school graduates and tertiary education graduates with the attributes needed by the private sector. Combined with a very large public sector and a restrictive immigration policy, this combination has led to high costs for the available skilled labor. Furthermore, public-sector investments in infrastructure have not been well targeted at addressing economic constraints. For instance, extensive spending on rural roads and infrastructure has yielded limited economic benefits, while businesses remain constrained by electricity shortages and inadequate Internet connectivity and bandwidth. This prioritization in infrastructure spending may have political roots. The BDP gains its strongest support in rural areas; hence, rural infrastructure directly benefits its electoral base, rather than the economy as a whole.

Several much-needed reforms that would help to address competitiveness concerns are politically sensitive and could affect the BDP's support base. For instance, the cattle/beef sector has stagnated in recent years, but improving productivity and competitiveness requires addressing cattle husbandry practices of small-scale farmers on communal land. Addressing the shortage of land for business requires introducing elements of land markets in place of traditional, administrative land allocation processes, and allowing noncitizens better access to land. And relaxing immigration restrictions to improve the supply of skilled labor and decrease production costs will reduce the rents earned by those with skills. Hence, addressing the constraints to diversification is as much a political economy consideration as a technical consideration.

Finally, one obvious reason for persistent poverty is the large share of the population working in an extremely unproductive agriculture sector. An important constraint on agricultural productivity in Botswana is the limited availability of water. Many problems affecting water availability are in the hands of the government, such as international agreements on the diversion and use of water sources that cross borders (such as the Zambezi River). Public investment in scientific research for agriculture, largely in the domain of the public sector, has also been limited (Hausmann and Klinger 2010). It is curious that the 10th National Development Plan devotes less than two pages to the agriculture sector (MFDP 2009).

This lack of emphasis on agriculture may reflect just how challenging the sector is in Botswana. As Lewis (1954) pointed out a long time ago, we know how to raise agricultural output in tropical areas with adequate rainfall or access to irrigation water, but arid lands have low yields, and in the absence of water do not respond to fertilizers or to the potential of high-yielding crop varieties. Lewis (1954) also noted that this area is where the real poverty exists, and that unlocking this prison is the greatest challenge to development. For Botswana, it probably means devoting significantly fewer resources to agriculture. Getting to this point will be a slow process, because so many of the poor and uneducated are still tied to agriculture.

Despite these challenges, Botswana has significant potential for diversification based on services. It has recently built a new university of science and technology where students from across Africa can train. Plus, Botswana has better governance, more effective public services, relatively high educational attainment, and relatively little crime compared with its neighbors. Thus, Botswana would be an ideal location as a business service center for Southern Africa. Firms based in Botswana would have duty-free access to all of the members of SACU, including South Africa. But for this to happen, the government needs to work harder to provide the necessary telecommunications and transportation infrastructure at a reasonable cost.

Appendix 3A: Data

For our analysis, we rely on different sources of data: individual-level employment data from the 1995/1996 and 2005/2006 LFSs, value-added data from Statistics Botswana, and trade and tariff data at the four-digit Harmonized System (HS) level. Below, we provide details on each of these data sources, including the time period covered and the level of aggregation.

Labor Force Survey Data

The 1995/1996 and 2005/2006 LFSs are designed to be a source of nationally representative information on the size, structure, and main characteristics of the labor force, and include information on both formal and informal employment, unemployment, and underemployment. Data for these surveys were collected throughout the 12 months of the duration of the survey.[10] Both the 1995/1996 and 2005/2006 LFSs asked virtually the same questions, with the

10 Note that unless it was necessary to ensure data accuracy, each household was visited only once during the survey.

2005/2006 LFS adding some questions on child employment, so data from both surveys are comparable.[11]

There are two main definitions of employment in the LFSs, each with its own timeframe. The surveys ask about the main type of work the person has been doing in the past 12 months ("usual employment") and the type of work the person did in the past 7 days ("current employment"). Respondents were asked, for each month of the year, whether they had worked part or all of the month, and whether they had been available or unavailable for work. If the participant had done any work in any month, an additional question asked was whom the individual was working for (for example, self-employed, government, private sector).[12] The LFSs classify workers as "usually employed" if they were economically active (if number of months working and available to work was 6 or higher) in the past 12 months and they worked for most of the time for which they were economically active. Additionally, the LFSs ask about work during the past 7 days. If the respondents did work during this period, they were asked about whom they were working for, along with employment status, occupation, and industry.[13,14] With the exception of agriculture, we rely on questions related to the current job (the past 7 days), as the surveys asked a broader set of questions for this job than for the usual job during the past 12 months.

Because of the seasonality of agriculture and because the surveys were not conducted in rural areas during the same months across years, we classify agricultural workers by their usual job.

Value-Added Data

We use data on value-added by sector in constant values that cover the period 1995/1996–2005/2006. The data come from Statistics Botswana (2014) and are reported by 10 broad sectors at the major division level of the Botswana

11 The 2005/2006 LFS sample included people 7 years old and older, while the 1995/1996 LFS included only people 12 years old and older. Nevertheless, both surveys can be easily compared by controlling for age.

12 The 2005/2006 LFS also asked questions related to occupation and industry for usual employment, but these questions were not included in the 1995/1996 LFS.

13 Both LFSs report industry of work using Botswana Standard Industrial Classification Revision 3 codes.

14 Note that if a person reported not having worked in the past 7 days because of a temporary absence from work (such as annual leave or sickness) but would resume work in the near future, that person was classified as currently employed. People who reported not having worked in the past 7 days and not planning on resuming work in the near future were counted as either unemployed or out of the labor force.

Standard Industrial Classification. The data are reported for the fiscal year, which begins on July 1 of each year, and generally coincides with the timing of the LFSs.

Trade Data

Bilateral trade data for 1990–2008 were provided by the Botswana Institute for Development Policy Analysis (BIDPA). This dataset consists of yearly bilateral imports and exports disaggregated at the six-digit HS level and uses the 1988/1992 HS nomenclature. These data are consistent with the trade flows for Botswana reported in the UN Comtrade database. Since the maximum level of disaggregation in our tariff data was at the four-digit HS level, we aggregated exports and imports to the four-digit HS level in order to have a correspondence between our tariff data and our trade flow data. The resulting bilateral trade dataset has annual exports and imports (in both current US dollars and Botswanan pula) at the HS four-digit level starting in 1990 and ending in 2008.

We also gathered data on value, volume, and unit value indexes on total exports and total imports for the 1990–2008 period to help us understand whether Botswana's changes in export and import values were mostly driven by changes in volumes or prices. The data on trade flow volumes come from United Nations Conference on Trade and Development's (UNCTAD's) online database (UNCTADstat).

Tariff Data

As noted above, tariffs on trade with non-SACU members have been typically set by South Africa, with little or no input from Botswana. Thus, we use South Africa's tariff structure—representing the SACU tariff structure—to determine the level of trade protection for Botswana. We measure trade protection using tariffs (including ad valorem equivalents), plus surcharges for South Africa. Our data on trade protection, provided by Lawrence Edwards, span the period 1990–2008 and are described in great detail in Edwards (2005). This dataset comprises tariff rates (including ad valorem equivalents) and surcharges at the eight-digit HS level. We aggregated these rates and surcharges to the four-digit HS level to match our trade-flow data. To construct the four-digit HS tariffs, we used a weighted average, where the weight for each eight-digit HS tariff is that product's share of imports within the four-digit HS product imported by Botswana between 1990 and 1992. We used a similar procedure to construct industry-level tariffs according to the industry classification used in the LFSs.

Table 3A.1 Trade flows by commodity group, 1991–2005/2006

		Total imports			Imports not from South Africa			Total Exports			Exports not to South Africa		
Commodity group	Year	Value (million pula)	Share (%)	Growth (%)	Value (million pula)	Share (%)	Growth (%)	Value (million pula)	Share (%)	Growth (%)	Value (million pula)	Share (%)	Growth (%)
Animals and animal products	1991	91	2.33		4	0.65		129	3.36		99	2.71	
	2005/06	375	2.14	312.1	25	1.03	5,25.0	465	1.81	260.5	269	1.13	171.7
Vegetable products	1991	184	4.71		62	10.03		12	0.31		10	0.27	
	2005/06	928	5.30	404.3	37	1.52	–40.3	42	0.16	250.0	12	0.05	20.0
Foodstuffs	1991	274	7.01		51	8.25		35	0.91		16	0.44	
	2005/06	1188	6.78	333.6	99	4.07	94.1	172	0.67	391.4	38	0.16	137.5
Mineral products	1991	349	8.93		28	4.53		1	0.03		0	0.00	
	2005/06	3,398	19.40	873.6	121	4.97	332.1	287	1.12	28600.0	257	1.08	
Chemicals and allied industries	1991	196	5.02		15	2.43		34	0.88		11	0.30	
	2005/06	1,539	8.79	685.2	165	6.78	1,000.0	177	0.69	420.6	95	0.40	763.6
Plastics/rubber	1991	165	4.22		13	2.10		5	0.13		2	0.05	
	2005/06	688	3.93	317.0	66	2.71	407.7	76	0.30	1420.0	11	0.05	450.0
Raw hides, skins, leather	1991	13	0.33		4	0.65		24	0.62		17	0.47	
	2005/06	34	0.19	161.5	4	0.16	0.0	32	0.12	33.3	6	0.03	–64.7
Wood and wood products	1991	213	5.45		32	5.18		6	0.16		4	0.11	
	2005/06	723	4.13	239.4	102	4.19	218.8	55	0.21	816.7	17	0.07	325.0
Textiles	1991	254	6.50		65	10.52		127	3.31		104	2.85	
	2005/06	688	3.93	170.9	133	5.46	104.6	1072	4.17	744.1	730	3.06	601.9

		Total imports			Imports not from South Africa			Total Exports			Exports not to South Africa		
Commodity group	Year	Value (million pula)	Share (%)	Growth (%)	Value (million pula)	Share (%)	Growth (%)	Value (million pula)	Share (%)	Growth (%)	Value (million pula)	Share (%)	Growth (%)
Footwear	1991	72	1.84		8	1.29		9	0.23		1	0.03	
	2005/06	200	1.14	177.8	22	0.90	175.0	11	0.04	22.2	2	0.01	100.0
Stones and glass (includes diamonds)	1991	119	3.05		15	2.43		3,031	78.89		3,027	82.86	
	2005/06	567	3.24	376.5	258	10.60	1620.0	19,349	75.24	538.4	19,143	80.36	532.4
Metals	1991	449	11.49		36	5.83		332	8.64		323	8.84	
	2005/06	1,420	8.11	216.3	143	5.87	297.2	3,272	12.72	885.5	3,060	12.85	847.4
Machinery/ Electrical	1991	690	17.66		139	22.49		47	1.22		17	0.47	
	2005/06	3,011	17.19	336.4	749	30.76	438.8	253	0.98	438.3	111	0.47	552.9
Transportation	1991	646	16.53		123	19.90		43	1.12		20	0.55	
	2005/06	2,021	11.54	212.8	346	14.21	181.3	426	1.66	890.7	60	0.25	200.0
Miscellaneous	1991	192	4.91		23	3.72		7	0.18		2	0.05	
	2005/06	732	4.18	281.3	165	6.78	617.4	28	0.11	300.0	11	0.05	450.0
Total	**1991**	**3,907**	**100.00**		**618**	**100.00**		**3,842**	**100.00**		**3,653**	**100.00**	
	2005/06	**17,512**	**100.00**	**348.2**	**2435**	**100.00**	**294.0**	**25,717**	**100.00**	**569.4**	**23,822**	**100.00**	**552.1**

Source: Authors' calculations using UNCTAD & BIDPA data

Note: Data for 2005/06 were calculated using average levels between years.

Table 3A.2 Botswana's top-10 imports and exports, 1991 and 2005

	1991			2005		
Rank	Commodity	Value (million USD)	%	Commodity	Value (million USD)	%
Panel A: Top-10 imported commodities (HS 4-digit level)						
1	Motor vehicles for the transport of goods	125	8.0	Petroleum oils, etc, (excl. crude)	372	13.7
2	Petroleum oils, etc, (excl. crude)	96	6.1	Motor cars and other motor vehicles principally designed for the transport of persons (other than those of heading 87.02), including station wagons and racing cars	113	4.2
3	Motor cars and other motor vehicles	51	3.3	Motor vehicles for the transport of goods	112	4.1
4	Portland cement, aluminous cement, slag cement, super-sulphate cement and similar hydraulic cements, whether or not coloured or in the form of clinkers.	35	2.2	Medicaments consisting of mixed or unmixed products for therapeutic or prophylactic uses, put up in measured doses (including those in the form of transdermal administration systems) or in forms or packing	74	2.7
5	Parts and accessories of motor vehicles	31	2.0	Parts of railway or tramway locomotives or rollingstock	65	2.4
6	Other aircraft (for example, helicopters, aeroplanes); space-craft (including satellites) and suborbital and spacecraft launch vehicles	29	1.8	Nickel ores and concentrates	59	2.2
7	Structures (excluding prefab-ricated buildings of heading 94.06) and parts of structures (for example, bridges and bridge-sections, lock-gates, towers, lattice masts, roofs, roofing frame-works, doors and windows and their frames and thresholds for doors	28	1.8	Transmission apparatus for radio-telephony, radiotelegraphy, radio-broadcasting or television, whether or not incorporating reception apparatus or sound recording or reproducing appara-tus; television cameras; still image video cameras and other video cam	54	2.0
8	Other furniture and parts thereof	27	1.7	Parts and accessories of motor vehicles	46	1.7
9	Insulated wire, cable, other insulated electric cables	26	1.7	Portland cement, aluminous ce-ment, slag cement, supersulphate cement and similar hydraulic cements, whether or not coloured or in the form of clinkers	43	1.6
10	New pneumatic tires, of rubber	22	1.4	Self-propelled bulldozers, angledozers, graders, levellers, scrapers, mechanical shovels, ex-cavators, shovel loaders, tamping machines and road rollers	36	1.3

	1991			2005		
Rank	Commodity	Value (million USD)	%	Commodity	Value (million USD)	%
Panel B: Top-10 exported commodities (HS 4-digit level)						
1	Diamonds, whether or not worked, but not mounted or set	1459	79.5	Diamonds, whether or not worked, but not mounted or set	3322	76.6
2	Nickel mattes, nickle oxide sinters, and other intermediate products	154	6.9	Copper mattes; cement copper (precipitated copper)	456	10.5
3	Meat of bovine animals, fresh or chilled	32	5.1	Tractors (other than tractors of heading 87.09)	78	1.8
4	Woven fabrics of cotton, with ≥ 85% cotton	21	4.9	Jerseys, pullovers, cardigans, waist-coats and similar articles, knitted or crocheted	76	1.8
5	Meat of bovine animals, frozen	20	1.4	Meat of bovine animals, fresh or chilled	41	0.9
6	Pile fabrics, including long pile fabrics and terry fabrics, knitted or crocheted	16	0.6	Meat of bovine animals, frozen	32	0.7
7	Carbonates; peroxocarbonates (percarbonates); commercial ammonium carbonate containing ammonium carbamate	11	0.3	Women's or girls' blouses, shirts and shirt-blouses	30	0.7
8	Motor cars and other motor vehicles principally designed for the transport of persons (other than those of heading 87.02), including station wagons and racing cars	7	0.3	Women's or girls' suits, ensembles, jackets, blazers, dresses, skirts, divided skirts, trousers, bib and brace overalls, breeches and shorts (other than swimwear), knitted or crocheted	26	0.6
9	Motor vehicles for the transport of goods	7	0.3	Gold (including gold plated with platinum) unwrought or in semi-manufactured forms, or in powder form	25	0.6
10	Yarn (other than sewing thread) of artificial staple fibres, not put up for retail sale	6	0.2	Men's or boys' suits, ensembles, jackets, blazers, trousers, bib and brace overalls, breeches and shorts (other than swimwear), knitted or crocheted	23	0.5

Source: Authors' calculations using data from UNCTAD and BIDPA (various years).

Table 3A.3 Botswana's top-10 source countries for imports and destination countries for exports, 1991 and 2005

	1991			2005		
Rank	Country	Value (million US$)	%	Country	Value (million US$)	%
Panel A: Top-10 source countries (imports)						
1	South Africa	1,586	84.7	South Africa	2,632	86.8
2	Zimbabwe	101	5.4	Zimbabwe	47	1.5
3	United States	69	3.7	United Kingdom	38	1.3
4	Turks and Caicos Islands	20	1.1	United States	37	1.2
5	Germany	15	0.8	China	34	1.1
6	Switzerland	12	0.6	Sweden	28	0.9
7	Sweden	11	0.6	Germany	28	0.9
8	Italy	9	0.5	India	22	0.7
9	Japan	6	0.3	Japan	20	0.7
10	France	5	0.3	Namibia	15	0.5
Panel B: Top-10 destination countries (exports)						
1	Switzerland	1,458	79.5	United Kingdom	3,350	76.1
2	Zimbabwe	127	6.9	South Africa	382	8.7
3	Norway	94	5.1	Norway	262	6.0
4	South Africa	90	4.9	Zimbabwe	183	4.2
5	United States	26	1.4	United States	97	2.2
6	Germany	11	0.6	Germany	28	0.6
7	Zambia	6	0.3	Faeroe Islands	20	0.5
8	Malawi	5	0.3	Zambia	12	0.3
9	Netherlands	5	0.3	Namibia	11	0.2
10	Italy	4	0.2	Israel	10	0.2

Source: Authors' calculations using United Nations Conference on Trade and Development UNCTADstat and Botswana Institute for Development Policy Analysis data (various years).

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Chapter 4

STRUCTURAL CHANGE IN A POOR AFRICAN COUNTRY: NEW HISTORICAL EVIDENCE FROM GHANA

Robert Darko Osei and Rémi Jedwab

Each country has its own story of how it developed, but at the regional level, some stark patterns stand out. For Asia, the development path was rather traditional, with the decline of agriculture and the rise of manufacturing (that is, industrialization) and services. In fact, it is the path that eight high-performing Asian economies followed between 1960 and 1990 to reach rapid, sustained, and inclusive growth rates—higher than those of all other regions—earning the title the "East Asian miracle."

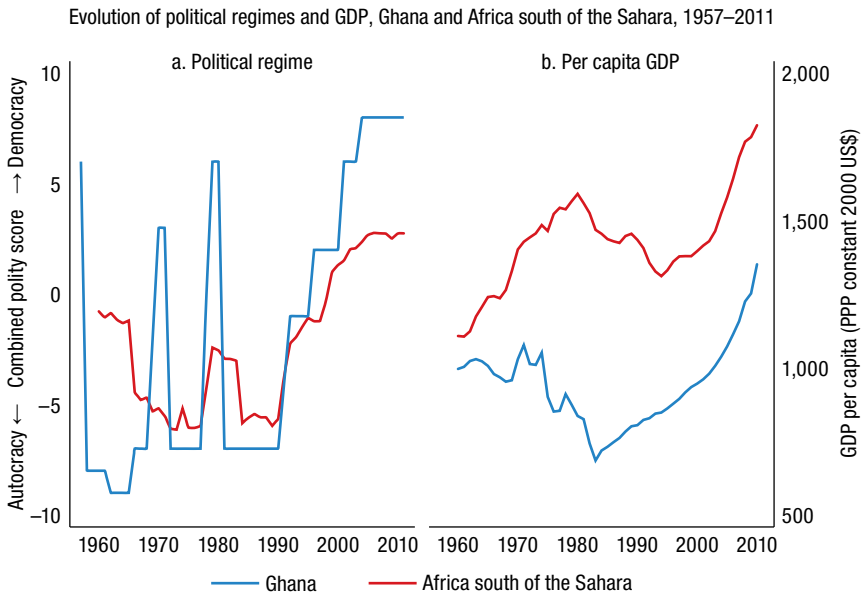
But for Africa, the development path has been quite different. It, too, saw a decline in agriculture, but it still lacks a vibrant manufacturing sector. There is reason to believe that a major culprit is insufficient growth in labor productivity, which is composed of a "within" component (changes in productivity within a sector) and a "structural change component" (changes in productivity resulting from labor movements across sectors).

To shed more light on the African story, a good case study is Ghana. It is one of a handful of countries in Africa that has sufficient data on sectoral productivity and employment over a long period. But it is also a fascinating case of structural change in a poor African country for a variety of reasons.

- Ghana's political progression has often been a leading indicator of the rest of Africa's political evolution (Figure 4.1). It was the first country in Africa south of the Sahara to gain independence (1957), quickly becoming a single-party autocracy. With the overthrow of Kwame Nkrumah in 1966, there were a series of military coups and fragile political regimes, followed by a transition to democracy in 1992. Ghana is now one of the most democratic African countries.

- Ghana's economic progression has been a leading indicator of the rest of Africa's economic evolution. It evolved from postindependence reliance on natural resource exports—like cocoa, mining (mostly gold), and timber—to

FIGURE 4.1 A harbinger of political and economic changes in Africa



Sources: Maddison (2008), World Bank (2010), and Polity IV (2013).

Notes: Panel (a) plots the combined polity score for Africa south of the Sahara (population-weighted average) and Ghana. Polity IV defines three regime categories: autocracies (–10 to –6), anocracies (–5 to +5), and democracies (+6 to +10). There were only four independent countries in the region before 1960. Panel (b) plots gross domestic product (GDP) per capita (purchasing power parity (PPP), constant 2000 US$) for Africa south of the Sahara and Ghana.

import-substitution industrialization (ISI) and a bigger role for government in the 1960s. Then income declined in the 1970s and early 1980s (Figure 4.1), as a result of macroeconomic disequilibria and austerity measures adopted to reduce the mounting public deficits. This decline was followed by renewed growth after two structural adjustment programs (1983 and 1987–89), and accelerating growth after a post-2000 improvement in the business environment and a commodity price boom. Ghana is now an African transition economy, along with Senegal, Kenya, and Mozambique (McKinsey Global Institute 2011).

- Ghana is also very much a "work in progress." Despite enormous progress in the past 20 years, the economy remains highly dependent upon natural resource exports, the manufacturing sector is still uncompetitive, and the socioeconomic indicators are not good—in 2013, Ghana ranked 138 out of 177 countries on the Human Development Index. With a still fast-growing population, jobs (especially for youth) are difficult to find,

and a large part of the population is underemployed. In addition, income inequality is rising.

- Plus, Sir Arthur Lewis, the intellectual father of structural transformation, not only wrote a report on Ghana's industrialization (Lewis 1954b) but also was the country's first chief economic advisor (1957–1958).

We already know from McMillan and Rodrik (2011) that, drawing on data for 38 countries (29 developing and 9 high-income) in 1990–2005, structural change was growth enhancing in Asia and growth reducing in Africa. That means that economic growth in Africa was driven by the within-sector component. We also know that in a later study of Africa, using data for 19 countries from 1990 to 2010, McMillan (2013) finds that while structural change was growth reducing in 1990–1999, it was growth enhancing in 2000–2010. As productivity also increased within sectors, the within-sector and structural change channels combined to dramatically increase productivity, which was the basis of what is now being termed the "African growth miracle" (Young 2012).

For developed countries, structural change has been a fundamental driver of long-term development (Duarte and Restuccia 2010; Herrendorf, Rogerson, and Valentinyi 2011). But we know now that the lack of it can lead to poverty traps. As Matusyama (2008) puts it: "Productivity growth can cause structural change, which in turn leads to further growth in productivity. The circular causality, however, is a double-edged sword, as the lack of productivity growth and the lack of structural change can reinforce each other, creating the vicious cycle of poverty." However, if productivity increases sufficiently within sectors, the lack of structural change may not be a major constraint to economic development.

This chapter begins with a conceptual framework to analyze structural changes in poor countries. and then describes the broad patterns of economic and structural change in Ghana from 1957 to date, before focusing in on the agricultural, industrial, and service sectors. Next, we document the relationship between structural change and economic growth in Ghana, and then discuss the role of public policies in promoting structural change in Ghana and the future outlook.

Our findings—which draw on new sectoral employment and value-added data over 50 years (1960–2010)—suggest that until 1992, aggregate income changes were mostly driven by changes in the productivity of specific sectors, rather than structural change. While real GDP per capita growth ranged from about −4 to +3 percent per year during 1960–1992, the contribution

of structural change remained almost nil. But over time, structural change has become a significant factor of productivity growth, as many agricultural workers were absorbed by the (relatively more productive) industrial and service sectors. Labor productivity has grown at 3.0 percent per year post-1992, and about 50 percent of that growth—1.6 percent per year—came from structural change. This confirms that structural change has been growth enhancing in Ghana, too. However, our results also suggest that the "nature" of structural change in Ghana remains different from that in other successful developing countries, in that it has occurred without a green revolution, an industrial revolution, or a service revolution of the types seen, for example, in Asia. Moreover, going forward, there is still a lot of room for further structural change to help Ghana realize its full potential.

The Many Forms of Structural Change

So how can we interpret the types of structural changes that occur in poor countries, and how these changes feed into economic growth? Let us begin with the standard model and then explore some other possibilities.

Standard Model of Structural Change: Labor Push versus Labor Pull

Most countries follow a standard pattern: structural change is a by-product of either a push from agricultural productivity growth or a pull from industrial productivity growth.

Positive rural push ("labor push"): In poor countries, large fractions of land and labor are devoted to producing food for subsistence needs (Schultz 1953; Gollin, Parente, and Rogerson 2002). This "food problem" prevents the reallocation of productive resources to other sectors. The "labor push" approach shows how a rise in food productivity—a "green revolution"—reduces the food problem and releases labor to the modern sector (Matsuyama 1992; Caselli and Coleman II 2001; Gollin, Parente, and Rogerson 2002). Likewise, consistent with Engel's Law, a rise in agricultural productivity and higher rural incomes lead to a greater demand for non-foodstuffs (that is, goods and services produced in the urban areas) (Jedwab 2013; Voigtländer and Voth 2013). This rural push is positive for growth when it leads to higher agricultural wages, lower food prices, and greater employment in the modern sector.

Positive urban pull ("labor pull"): In this case, a rise in manufacturing productivity—an "industrial revolution"—attracts underemployed labor from agriculture into the industrial sector (Lewis 1954a; Harris and Todaro 1970;

Hansen and Prescott 2002; Lucas 2004). In the long run, developed countries deindustrialize and specialize in tradable services (Herrendorf, Rogerson, and Valentinyi 2011; Buera and Kaboski 2012). However, developing countries can also specialize in, and export, tradable services (Gollin, Jedwab, and Vollrath 2015). The "service revolution" becomes another factor of the labor pull.[1]

Other Labor Push and Labor Pull Factors

In the case of Africa, however, these models are not sufficient to explain the apparent nature of structural change that it has undergone—that is, low income growth, nonindustrialization, and the rise of services. Four theories have emerged to account for these facts (see Jedwab and Vollrath 2015, for a recent survey of these theories).

Less positive urban pull: It is possible for an economy to undergo structural change without any changes in agricultural, manufacturing, and service productivity if the country experiences a "natural resource revolution" (Jedwab 2013; Gollin, Jedwab, and Vollrath 2015). If resource windfalls are spent on manufactured goods and services, this creates opportunities in the modern sector. Resource-rich countries can use their trade surplus to import food. And if these countries also systematically import manufactured goods, structural change does not lead to industrialization, leaving the modern sector to consist of nontradable services.

Negative urban pull: If there is urbanization without economic growth, the excessive urbanization is often attributed to the urban-biased policies (agricultural taxation, public employment in the manufacturing and service sectors, and food price subsidies). These urban pull factors can lead to structural change in the form of "overurbanization" (Lipton 1977; Bates 1981), which some studies contend has occurred in Africa (Bairoch 1988; Fay and Opal 2000). This theory is consistent with the previous theory, except in this case the resource rents are captured by the government and used to generate public employment.

Negative rural push: Rural poverty (whether it is the result of agricultural taxation or not), land pressure (stemming from demographic growth), and man-made or natural disasters (like wars or climate change) constitute rural push

1 It is assumed that there is no food problem and labor can be reallocated to the modern sector. This could occur because (1) there could be surplus labor in the food sector, (2) the industrial revolution could be preceded by a green revolution, (3) an industrial revolution could facilitate the modernization of agriculture, or (4) a country could import food. This urban pull is positive for growth when it leads to greater employment in the modern sector and less underemployment or higher wages in the agriculture sector.

factors feeding rural exodus (Barrios, Bertinelli, and Strobl 2006; Poelhekke 2010). A relative decrease in the agricultural wage leads to structural change, as migrants flock to the cities and seek employment in the modern sector. If they are unskilled, they will work in the low-productivity service sectors.

Negative urban push: Structural change out of (rural) agriculture and into the (urban) modern sector implies that labor reallocation is associated with migration. But another source of urban growth can be a natural increase in population, stemming from a combination of high urban fertility and lower urban mortality because of the epidemiological transition. Indeed, two studies find that this natural increase causes the population of African cities to double every 15 years (Jedwab, Christiaensen, and Gindelsky 2015b; Jedwab and Vollrath 2015a). These labor supply shocks may have been absorbed by the low-productivity service sectors.

Type of Structural Change and Economic Growth

What is the tie-in with growth? Per capita GDP is a function of the employment-to-population ratio and overall productivity (the average productivity of each worker). If the employment ratio is stable, the evolution of per capita GDP is driven by changes in labor productivity. Overall productivity increases if either some sectors become more productive (the "within-sector" channel) or labor moves to higher-productivity sectors (the "structural change" channel). The latter implies that labor was somewhat misallocated before. This could be the result of institutional barriers to entry in the modern sector (for example, state ownership of plants in China and licensing in India, as in Hsieh and Klenow 2009). Or it could be the result of sectoral differences in the production function—for example, agricultural productivity could be low because of a lack of a green revolution. Farmworkers may not move into the more productive modern sector if that sector is skill intensive and cannot absorb the surplus labor.

The six push–pull theories described above lead to various predictions regarding the effects of structural change on growth. The standard labor push and labor pull are always growth enhancing.

- With *positive rural push*, as food productivity increases, the demand for nonfood goods also increases and the modern sector expands. If wages are relatively higher in the modern sector, structural change is growth enhancing.
- With *positive urban pull*, the rise in manufacturing productivity and wages leads to an enlargement of this sector, and structural change is growth enhancing.

However, the story is different for the nonstandard factors, which may be either growth enhancing or growth reducing, and may be only briefly growth enhancing:

- **Other pull factors (negative urban and less positive urban pull):** In the resource-rich or urban-biased economies, the consumption of resource and nonresource rents on nonagricultural goods increases wages and employment in the modern sector. Structural change is growth enhancing, but these effects may not last long. If the quality of institutions is low and manufactured goods are imported, structural change occurs through an expansion of low-productivity services (like a bloated government sector).
- **Other push factors (negative urban and negative rural push):** Rural poverty and the natural increase in the urban population lead to labor supply shocks that must be absorbed by the modern sector. Structural change is growth enhancing if the urban wage is relatively higher for the rural migrants. However, it is growth enhancing simply because the rural wage had previously decreased. Structural change is then clearly growth reducing if the urban natural increase is absorbed by low-productivity service sectors.

How Ghana's Economy Has Evolved since Independence

Focusing in now on Ghana, let us trace how the economy has developed and evolved at the aggregate and sectoral levels since independence. This section helps identify 1992 as the year when the nature of structural change was modified in Ghana.[2]

1957: At independence, Ghana was one of the most developed African countries, in part thanks to the boom in cocoa production, which made it one of the leaders of the "cash crop revolution" (Hill 1963; Teal 2002; Jedwab 2013). Sir Arthur Lewis (1954b) believed that Ghana could not develop without ISI, yet pursuing this strategy was not possible in the 1950s (Pickett and Shaeeldin 1990; Agyeman-Duah 2008). First, wages were high because land was relatively abundant, there was no agricultural labor surplus, and developing labor-intensive manufacturing implied that the country primarily needed a "vigorous agricultural program." Although Lewis is often described as

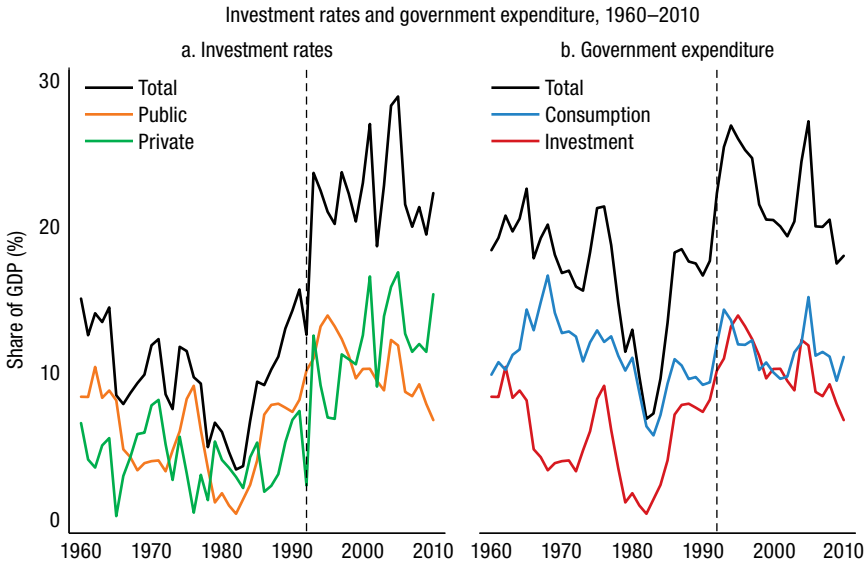
2 This section draws on Aryeetey, Harrigan, and Nissanke (2000); Agyeman-Duah (2008); and Breisinger et al. (2011).

supporting the labor pull hypothesis and industrialist policies, at that point he thought that labor push factors were more important. Second, there were not enough skilled people, so developing capital-intensive manufacturing was not a sound economic strategy. Instead, Lewis encouraged the government to increase agricultural productivity and lay the foundations for future industrialization. By providing infrastructure and investing in human capital, it would be possible to create a larger and more productive labor force.

1957–1966: When Kwame Nkrumah took power in 1957, his government adopted a capital-intensive ISI strategy. This strategy was in line with Lewis' model of development, but contradicted his recommendations to be more patient. The rationale behind Nkrumah's policy was that the surplus from the cocoa sector had to be used to expand the industrial sector. But faced with coordination failures, only an enlightened leader could implement this massive industrial policy. Another benefit of a strong state was that it promoted nation building in a context of marked ethnic fractionalization. As it turned out, investment rates increased but, as Figure 4.2 shows, this was driven by public investments (in 1966 there were 53 state enterprises and 12 public boards) (Agyeman-Duah 2008). Government consumption increased, as the number of public employees rose from 140,000 in 1957 to 280,000 in 1965. However, these investments had no impact on per capita GDP because of misguided investment decisions, mismanagement, and the inflationary effect of import restrictions. When cocoa prices collapsed in 1965, the government relied on printing money and public debt. Nkrumah was overthrown in 1966.

1966–1981: The Nkrumah presidency was followed by a succession of military coups and fragile political regimes, which were interrupted by short democratic episodes. The National Liberation Council (NLC) was composed of army officers and assumed executive power until 1969, when Kofi Busia was democratically elected. Busia was overthrown by another army coup in 1972, and Colonel Acheampong became the new head of state. Although Nkrumah was held responsible for the lack of economic growth before 1966, the following NLC, Busia, and Acheampong governments all adopted the same policies, with a more limited budget. Government consumption remained high (Figure 4.2). At the same time, the country accumulated debt, inflation was soaring, and private investment was collapsing. Population growth was high as mortality dropped, and urban natural increase became a major factor of urban growth (Jedwab, Christiaensen, and Gindelsky 2015). Between 1974 and 1983, per capita income declined by 34.9 percent (Figure 4.1), hitting both the (rural) agriculture sector and the (urban) modern sector.

FIGURE 4.2 Private investment starts to lead in the 2000s



Source: Statistical Yearbooks of Ghana 1961–1970, CBS (1970), Ewusi (1986), Aryeetey and Fosu (2002), and World Bank (2010).

Note: Panel (a) plots the investment rates for Ghana as a whole (defined as the share of gross fixed capital formation in gross domestic product (GDP)), and separately for the private and public sectors. Panel (b) plots the share of total government expenditure in GDP. Total government expenditure can be separated into government consumption (recurrent expenditure) and government investment (development expenditure, as already shown in Panel (a). The vertical dashed line is for 1992, the year when the nature of structural change was modified in Ghana.

1981–2001: When Jerry Rawlings came to power after two coups in 1979 and 1981, he also thought that the bleak economic picture reflected mismanagement rather than poor policies (Agyeman-Duah 2008). Ghana was as poor as in 1939. Cocoa production had collapsed; the manufacturing sector was severely affected by cronyism, import restrictions, and price controls; and infrastructure was in a dire state. Moreover, Ghana had just been hit by the worst drought in 50 years, it was suffering from hyperinflation, and the state was bankrupt. The repatriation of about 1 million Ghanaians from Nigeria further heightened economic, political, and social pressures (Killick 2010). Rawlings had no choice but to implement the Economic Recovery Program in 1983, a structural adjustment program (SAP) under the guidance of international organizations. The government reduced expenditure while creating incentives for the development of the private sector (such as abolishing price controls and import restrictions). From 1987 to 1989, state enterprises were privatized and the currency was devalued. The urban sector was particularly

affected by the SAPs, as in most African countries (Potts 1995). The economy slowly recovered though (Figure 4.1), and Rawlings was democratically elected in 1992 and re-elected in 1996.

2001–2010: Rawlings peacefully handed over power to his main opponent John Kufuor in 2001. The macroeconomic situation was still unstable, but the economy rapidly took off, recording annual growth rates of 5 percent (Figure 4.1). This evolution was not coincidental, as there was an improvement across all dimensions. The business environment has become more favorable, captured by rising investment rates in the private sector (Figure 4.2), the value of cocoa and gold exports has boomed, and the service sector has become more competitive.

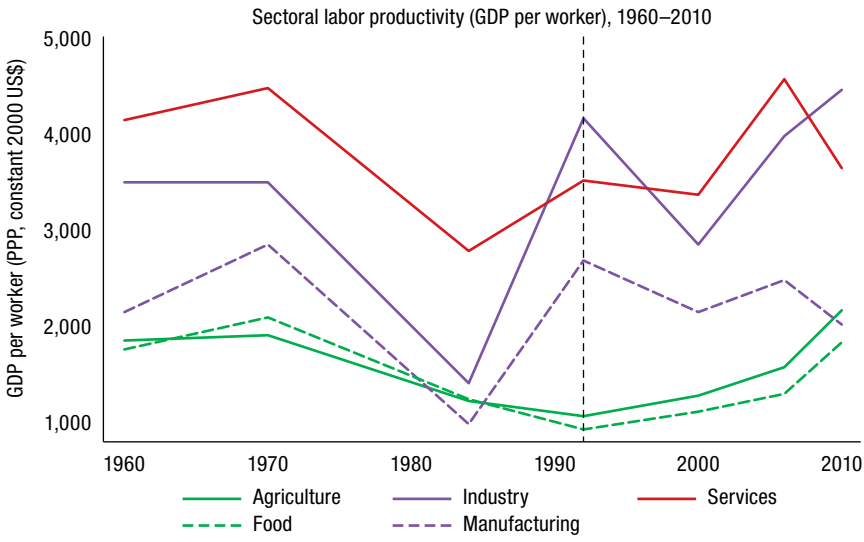
All in all, the economic history of Ghana suggests that the country has managed its economic development without experiencing a green revolution, an industrial revolution, or a service revolution—that is, the positive rural push and urban pull—as in Asia. Instead, it has relied heavily over the past 50 years on cocoa production and gold mining (the less positive urban pull), urban-biased policies (the negative urban pull), agricultural overtaxation and rural shocks (the negative rural push), and urban natural increase (the negative urban push).

The issue is whether the nature of structural change was modified post-1992, when the country became democratic.[3] We know that in 1960, agriculture accounted for 43.3 percent of GDP and 61.8 percent of employment (Figure 4.3). While Ghana experienced some positive structural change until 1966—as evidenced by a decline in agricultural employment—the period from 1967 to 1984 saw a significant decline in economic activity and structural change in the wrong direction. The GDP share of agriculture increased to 52.8 percent in 1978, while the industrial and service sectors collapsed.[4] The service sector resumed its expansion in the late 1970s and early 1980s, while industrial output returned to its pre-crisis level in 1986. Likewise, productivity remained stable or increased across all sectors in the 1960s, dropped

3 Turning points are the years 1957, 1966, 1974, 1983, 1992, 2001, and 2010. We have sectoral GDP data for all years between 1960 and 2010, but that is not the case for sectoral employment data. Although employment data are only available for 1960, 1970, 1984, 1992, 2000, 2006, and 2010, the periodicity of the dataset captures well the economic history of Ghana. The 1960–1970 period was characterized by ISI policies and income stagnation. The 1970–1984 period was marked by structural problems and economic decline. The Ghanaian economy slowly recovered in 1984–1992 and 1992–2000, after two SAPs were adopted in 1983 and 1987–1989; it later boomed in 2000–2006 and 2006–2010.

4 This result is consistent with Engel's Law. As people became poorer, they mechanically spent a higher share of their budget on food items, and many workers moved back to the agriculture sector, thus causing a "re-agriculturalization" of the economy in the aggregate.

FIGURE 4.3 Agricultural productivity remains far below that of industry and services



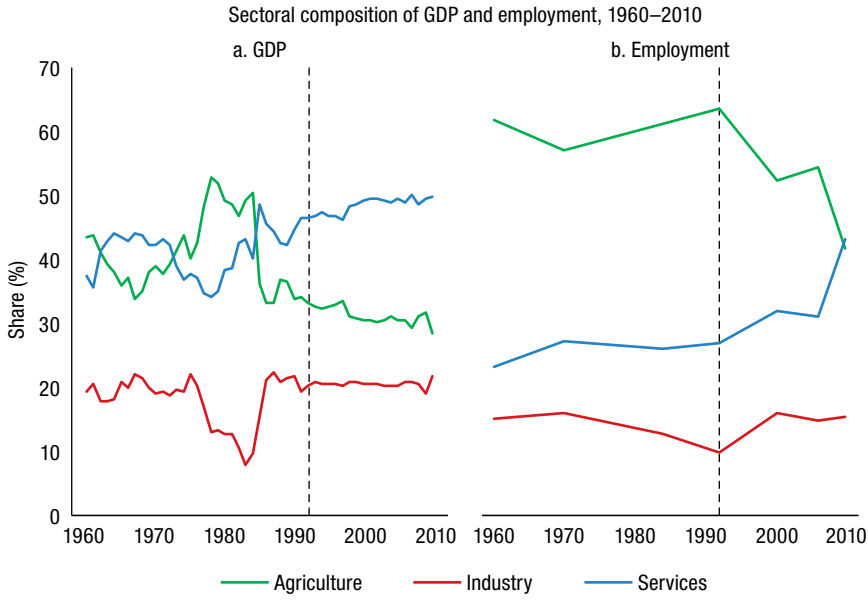
Source: Economic Survey of Ghana 1961–1982, Population and Housing Censuses 1960, 1970, 1984, 2000, and 2010, Ghana Living Standards Survey 1991–92 and 2005–2006, Singal and Nartey (1971), Androe (1981), Ewusi (1986), Maddison (2008), GSS (2010), and World Bank (2010).

Note: This figure plots sectoral labor productivity (PPP, constant 2000 US$), using three aggregate sectors "agriculture," "industry," and "services." Sectoral labor productivity is the ratio of sectoral GDP to the number of workers in that sector. Data is available for the following years: 1960, 1970, 1984, 1992, 2000, 2006, and 2010. The vertical dashed line is for the year 1992, the year in which the nature of structural change was modified in Ghana.

in the 1970s and early 1980s, and increased from then on (Figure 4.3). These patterns lead us to the following conclusions:

- **Economic development and structural change are intertwined.** Periods of economic growth were associated with decreasing agricultural shares of GDP and employment, whereas periods of economic stagnation or decline saw a rise in the same shares (Figure 4.4).
- **Structural change manifested itself in less agriculture and more services—not more industry.** The GDP and employment shares of industry are almost the same in the 2000s as in the 1960s. Ghana's structural change occurred without industrialization, in contrast to Asia but in line with what we find for Africa as a whole in 2000.
- **Ghana has undergone major positive structural changes post-1992.** In the 1960s and the 1980s, agriculture's employment share was still 60 percent, but by 2010, it fell to almost 40 percent.

FIGURE 4.4 Bypassing industry and into services



Source: Economic Surveys of Ghana (CBS 1961–1982); Population and Housing Censuses 1960, 1970, 1984, 2000, and 2010 (GSS various years); Ghana Living Standards Surveys 1991–1992 and 2005–2006 (GSS 1995, 2008); Singal and Nartey (1971); Androe (1981); Ewusi (1986); GSS (2010); and World Bank (2010).

Note: This figure plots the sectoral composition of GDP and employment, using the same three sectors. Data for both figures are available for the following years: 1960, 1970, 1984, 1992, 2000, 2006, and 2010. The vertical dashed line in both figures is for 1992, the year when the nature of structural change was modified in Ghana.

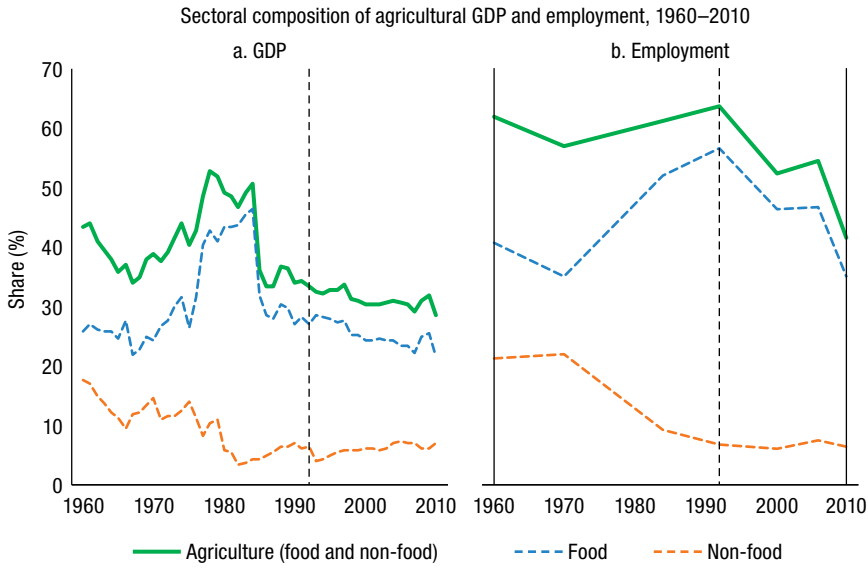
A "Nonevolution" of Agriculture and an Industrial Bypass

So what was behind a structural change pattern that saw an eventual shift out of agriculture and largely into services, almost bypassing industry? And what are the main constraints on economic growth for each of these sectors? We begin with agriculture.

Structural Change Out of Agriculture

Between 1960 and 1992, the GDP and employment shares of agriculture remained almost unchanged—except for 1967–1984, when the economy was contracting and the shares of industry and services in GDP and employment fell (Figure 4.5). What could account for this nonevolution? Two notable developments stand out: (1) the lack of a green revolution in the food subsectors ("agriculture, hunting, and livestock" and "fishing"); and (2) troubles with exports in the nonfood subsectors ("cocoa" and "forestry and logging").

FIGURE 4.5 Agriculture's employment share remained fairly steady for decades before falling sharply after 1992



Source: Economic Survey of Ghana (CBS 1961–1982; Population and Housing Censuses 1960, 1970, 1984, 2000, and 2010 (GSS various years); Ghana Living Standards Surveys 1991–1992 and 2005–2006 (GSS 1995, 2008); Singal and Nartey (1971); Androe (1981); Ewusi (1986); GSS (2010); and World Bank (2010).

Note: Panel (a) plots the sectoral composition of agricultural gross domestic product (GDP), when distinguishing the food subsectors ("agriculture, hunting, and livestock" and "fishing") and the nonfood subsectors ("cocoa" and "forestry and logging"). Panel (b) plots the sectoral composition of agricultural employment, using the same subsectors. Employment data are available for the following years: 1960, 1970, 1984, 1992, 2000, 2006, and 2010. The vertical dashed line is for 1992, the year when the nature of structural change was modified in Ghana.

Low food productivity forces farmers to remain producers in the food sector (Breisinger et al. 2011), which is what appears to have happened in Ghana. Why was it so low? The reasons range from population pressure and a decrease in the land-to-labor ratio to insecure property rights, a low adoption rate of modern inputs, and a low level of mechanization. So why did employment decrease and productivity increase after 1992? It is true that the employment share decreased faster than the GDP share in 1992–2005—but not because of a positive rural push, as food productivity did not increase (cereals and starchy roots yields remained unchanged) during the period. Rather, surplus labor in agriculture was attracted to other sectors when urban wages increased, which in turn raised productivity. After 2006, higher yields—up 30 percent between 2005 and 2010 for cereals and starchy roots—kicked in, and labor was released for the modern sector (the positive rural push). Based on a few years of data, it is difficult to assert whether

this evolution indicates the beginning of a green revolution (see Nweke 2004, for a study on cassava), plus productivity is the same in 2010 as in 1960 (Figure 4.3). But even if Ghana has not experienced a green revolution, food productivity has increased in the rest of the world, and trade implies that Ghana has also benefited from these productivity gains—its share of imports in cereal consumption increased from around 10 percent in the mid-1980s to 30 percent before the food price spike of 2007–2008 (FAO 2010). In the absence of high international food prices, a green revolution is no longer necessary, as food can be imported.

As for cocoa, Ghana is the world's largest exporter, accounting for almost 50 percent of exports between 1960 and 2010 (Jedwab 2013). Yet the cocoa subsector collapsed in the 1960s–1980s (Jedwab 2013) because of low producer prices after 1958, restrictive migratory policies after 1969, and frequent droughts in the early 1980s. Producer prices were fixed by the government and its Cocoa Marketing Board, to protect farmers against fluctuant international prices. Given that the producer price was always below the international price, this actually served as a taxation mechanism (Bates 1981). As the average taxation rate was 46 percent on average in 1960–2010, cocoa really accounted for 10 percent of GDP (instead of 5 percent when not accounting for taxation). Growth has now resumed in the subsector. The producer price of cocoa rose in the 1990s and the subsector was liberalized, with production increasing from 200,000 tons to a record 1 million tons in 2010. However, cocoa's share of GDP remained low, as the rest of the economy was also growing.

As for the other nonfood subsector, forestry and logging took off after 1992 and saw a rising share of employment. But these recent improvements in the nonfood subsector are tempered by findings that the resource rents of the cocoa and forestry subsectors were spent either by farmers, logging companies, and the government or on (urban) manufactured goods and services (Jedwab 2013). Thus, as manufactured goods were imported from abroad, this urban pull produced "urbanization without industrialization"—that is, cities consisting of nontradable services (Gollin, Jedwab, and Vollrath 2015).[5]

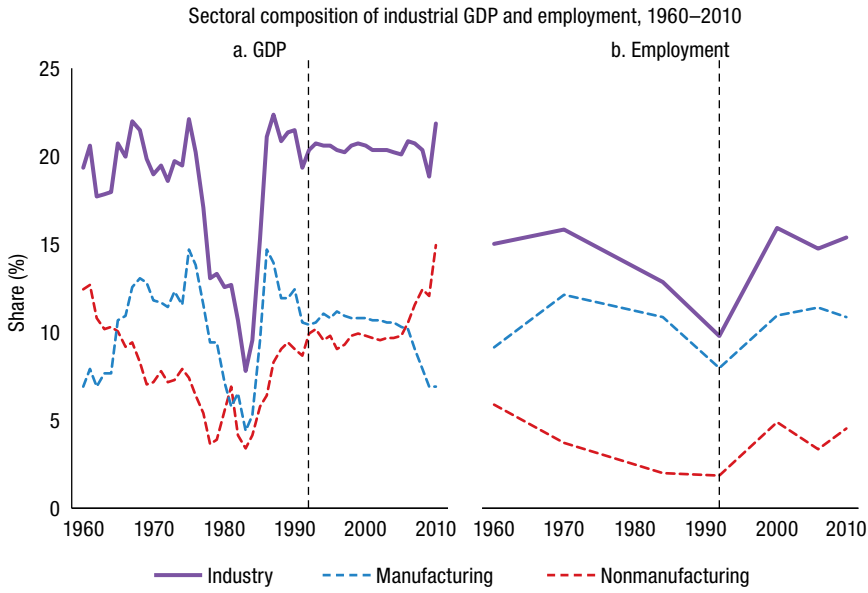
5 We classify the cocoa subsector as a "natural resource" subsector, in line with the literature on the Dutch disease (Bates 1981; Isham et al. 2005; Gollin, Jedwab, and Vollrath 2015). As explained by Isham et al. (2005), "countries can only export crops such as [...] cocoa if they have appropriate climates." The agronomic literature (for example, Ruf 1995a, 1995b) has also shown that cocoa cultivation required very specific and exhaustible soils. As a result, very few countries are able to produce cocoa on a large scale, making cocoa supply highly inelastic, thus generating high profits in the subsector (Bates 1981; Ruf 1995a; Jedwab 2013). In particular, Ghana, Indonesia, and Côte d'Ivoire account for 75 percent of the world's cocoa exports. Other agriculture subsectors tend to be much less concentrated.

Structural Change without Industrialization

For industry—which include manufacturing, public utilities, mining, and construction—the GDP and employment shares have not changed much over the past 50 years, with the exception of the 1970s and early 1980s, when the sector shrank (Figure 4.6). In 2010, industry still only accounted for 21.8 percent of GDP and 15.4 percent of employment.

The key explanation for industry being largely bypassed is the lack of an industrial revolution. The Nkrumah government and the following governments all thought that industrialization was the only source of development, prompting massive public investments in the 1960s and 1970s. This led to a slight increase in the GDP and employment shares of manufacturing, and productivity increased. However, this rise was unsustainable, as it reflected biased public policies (negative urban pull), not positive structural change. When per capita income declined after 1976, the manufacturing sector contracted

FIGURE 4.6 No big move into manufacturing



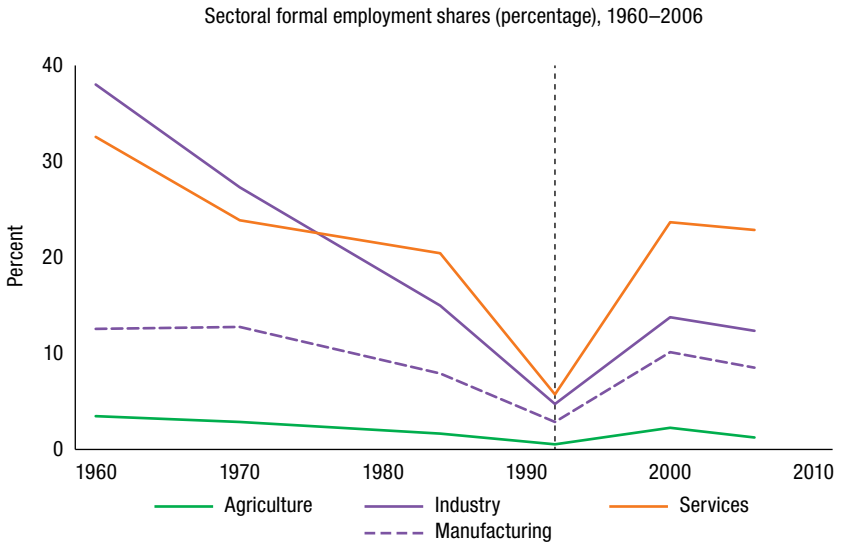
Source: Economic Survey of Ghana (CBS 1961–1982); Population and Housing Censuses 1960, 1970, 1984, 2000, and 2010 (GSS various years); Ghana Living Standards Surveys 1991–1992 and 2005–2006 (GSS 1995, 2008); Singal and Nartey (1971); Androe (1981), Ewusi (1986); GSS (2010); and World Bank (2010).

Note: Panel (a) plots the sectoral composition of industrial gross domestic product (GDP), when distinguishing manufacturing from other industrial subsectors ("mining," "construction," and "public utilities"). Panel (b) plots the sectoral composition of industrial employment, using the same subsectors. Employment data are available for the following years: 1960, 1970, 1984, 1992, 2000, 2006, and 2010. The vertical dashed line is for the year 1992, the year in which the nature of structural change was modified in Ghana.

and productivity dropped. The sector also became more informalized post-1970, and remained so until post-1992 (Figure 4.7). It was only after the SAP in 1983 that manufacturing production was resumed. Yet the fact that manufacturing productivity in 2010 was the same as in 1960 confirms the lack of an industrial revolution (positive urban pull) (Jedwab 2013). Manufacturing exports have also remained low as a result of high wages relative to productivity (Teal 1999) and the competition from China. The reality is that Ghana—like many African countries—has urbanized without industrialization (Gollin, Jedwab, and Vollrath 2015).

As for the other subsectors, construction follows economic activity, and two housing and infrastructure construction booms occurred in the 1960s and the 2000s. The mining subsector collapsed post-1961, as a result of low investments and poor maintenance, but its contribution to GDP recently increased (8.5 percent in 2011), thanks to rising gold prices and booming oil exports. Finally, the employment share and labor productivity in the public

FIGURE 4.7 Manufacturing's level of formality is still quite low



Source: Statistical Yearbook of Ghana 1961–1970; CBS 1970; *Quarterly Digest of Statistics* (CBS 1981–1997); Population and Housing Census (GSS 2000); and Ghana Living Standards Survey 2005–2006 (GSS 2008).

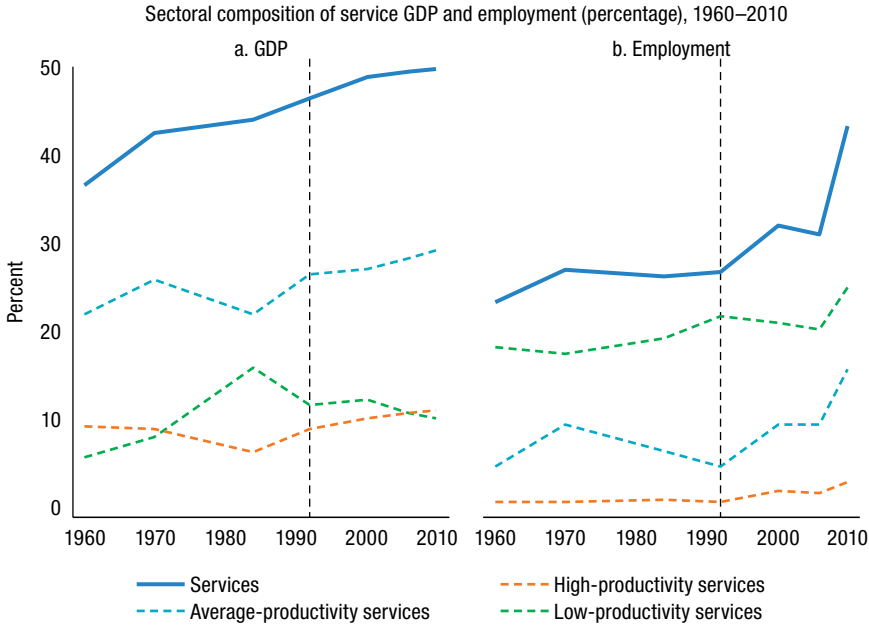
Note: This figure displays the shares of formal employment in sectoral employment, using the three aggregate sectors "agriculture," "industry," and "services" and the subsector "manufacturing." Data are available for the following years: 1960, 1970, 1984, 1992, 2000, and 2006. Formal employment includes recorded employees of the formal establishments of the public and private sectors. The vertical dashed line is for 1992, the year when the nature of structural change was modified in Ghana.

utilities sector also followed economic activity. Productivity is now twice as high as at independence, thanks to the modernization of the energy sector that took place in the 1990s and the 2000s.

Structural Change with a Dramatic Expansion of Services

In services, the GDP share is at the time of this writing 49.8 percent, up from 37.4 percent in 1960, and the employment share is at 43.3 percent, sharply up from 23.2 percent in 1960—providing the strongest evidence for positive structural change in Ghana (Figure 4.8). While productivity is twice as high in services as in agriculture, it is still four times lower than in Asia and nearly the same in 2010 as it was in 1960. Moreover, the rise in service employment had only a

FIGURE 4.8 Not really a "service revolution"



Source: Economic Survey of Ghana (CBS 1961–1982); Population and Housing Censuses 1960, 1970, 1984, 2000, and 2010; Ghana Living Standards Surveys 1991–1992 and 2005–2006 (GSS 1995, 2008); Singal and Nartey (1971); Androe (1981); Ewusi (1986); GSS (2010); and World Bank (2010).

Note: Panel (a) plots the sectoral composition of service gross domestic product (GDP), when distinguishing the low-productivity service subsectors (wholesale and retail trade, and community, social, and personal services); the average productivity service subsectors (government services, transport and storage, and hotels and restaurants); and the high-productivity service subsectors (communications, and finance, insurance, real estate, and business services). Panel (b) plots the sectoral composition of service employment, using the same subsectors. GDP and employment data are available for the following years: 1960, 1970, 1984, 1992, 2000, 2006, and 2010.

limited effect on per capita income. Therefore, this evolution in Ghana does not suggest a service revolution of the type seen in Asia.

One way to view the evolution of the service sector between 1960 and 2010 is to divide the seven subsectors into three groups, depending on whether the subsector belongs to the top tier (communications; and finance, insurance, real estate, and business services), middle tier (government services; transport and storage; and hotels and restaurants), or lower tier (wholesale and retail trade; and community, social, and personal services) of all the subsectors in terms of labor productivity in 2010. High-productivity services are twice as productive as average-productivity services and tenfold more productive than low-productivity services.[6] A few patterns stand out (Figure 4.8).

- **Service GDP.** The increase in service GDP was driven by average-productivity services, whose share increased from 21.8 percent in 1960 to 29.0 percent in 2010. Although employment increased in low-productivity services, it did not alter the GDP share of services, as productivity was too low. Nor did high-productivity services contribute much to structural change, which confirms that Ghana has not experienced a service revolution.

- **Service employment.** The rise in service employment was driven by average-productivity and low-productivity services, with their combined shares rising from 22.7 percent in 1960 to 40.6 percent in 2010.

- **Government.** In the pre-1992 period, service employment first increased, then decreased. In the 1960s, the expansion was the result of government consumption and a rising number of civil servants, which together also boosted productivity. But after 1970, the government sector contracted, also bringing down productivity. Post-1992, employment increased relatively more in the private service sector. However, the employment and GDP shares of the government sector also rose, as economic growth led to a higher budget.

- **Tourism.** Post-1992, the employment and GDP shares of hotels and restaurants increased, with the number of tourists jumping from 100,000 arrivals in 1985 to 1 million in 2010, and the share of service exports rising

6 This "economic dualism" within a same sector is not specific to the service sector. Within the agriculture sector, the cocoa and forestry subsectors are also much more productive than the more subsistence subsectors. Within the manufacturing sector, one can also note large productivity differences *across* but also *within* manufacturing subsectors, depending on how capital intensive each subsector and/or group of firms is.

from 0.6 percent of GDP in 1985 to 10.3 percent in 2005 (mostly resulting from tourism).

- The employment and GDP shares of low-productivity services—which are employers of last resort—increased with the economic crisis.
- The negative rural push, urban pull, and urban push probably all contributed to the expansion of services before 1992. After that, there is no evidence of a major positive urban pull in the case of tradable services—with the exception of tourism—but nontradable services managed to attract workers from the food sector.

Structural Change and Economic Growth in Ghana

Now that we have examined developments in the individual sectors, the big question is how much of the growth in overall labor productivity can be traced to within-sector versus structural change? To answer this, we use the methodology of McMillan and Rodrik (2011) and McMillan (2013) to estimate the respective contributions of the two channels (see the Overview in this book for details on the methodology).[7]

Our results (Table 4.1) show that for the overall period 1960–2010, labor productivity rose just 0.4 percent, with structural change accounting for a 0.3 percentage point and within-sector productivity accounting for the remaining 0.1 percentage point. However, the stories for before and after 1992 differ dramatically. Before 1992, no matter the decomposition used, the changes in overall productivity were essentially driven by the within-sector component. The structural change component was actually growth reducing in 1970–1992, as many workers returned to agriculture or were hired by retail trade or personal services—all unproductive sectors that acted as employers of last resort. Within-sector productivity was positive in 1960–1970, but then collapsed in 1970–1984, with some sectors—agriculture, cocoa, manufacturing (whose productivity dropped by a whopping

7 Algebraically, the decomposition is:

$$\Delta P_t = \sum_{i-1}^{N} \theta_{i,t-k} \Delta p_{i,t} + \sum_{i-1}^{N} p_{i,t} \Delta \theta_{i,t}$$

where ΔP_t is the change in aggregate labor productivity between period $t-k$ and t. The first term is the "within" component, which is a weighted average of the change in labor productivity in each of the N sectors, with the weight for sector i being the labor share of that sector in period $t-k$, measured by $\theta_{i,t-k}$. The second term is the "structural change" component, which is a weighted average of the change in labor shares in the N sectors, with the weights captured by the labor productivity of the sector in period t.

TABLE 4.1 Structural change kicks in after 1992

Decomposition of overall productivity growth, 1960–2010						
	Labor productivity		Component of annual growth (percent) due to:			
Period	at starting year (2000 PPP US$)	growth (annual, percent)	within (9 sectors)	structural (9 sectors)	within (15 sectors)	structural (15 sectors)
1960–1970	2,622	0.8	0.5	0.3	0.5	0.3
1970–1984	2,850	–3.8	–3.6	–0.2	–3.8	0
1984–1992	1,651	2.5	3.2	–0.7	4.2	–1.7
1992–2000	2,017	1.0	-0.9	2.0	–1.8	2.9
2000–2006	2,190	4.5	6.0	–1.5	6.1	–1.7
2006–2010	2,851	2.7	0.0	2.6	–0.5	3.2
1960–2010	2,622	0.4	0.2	0.2	0.1	0.3
1992–2010	2,017	3.0	1.9	1.1	1.4	1.6

Source: Jedwab and Osei (2012).

Note: This table displays labor productivity at starting year (2000 purchasing power parity (PPP) US$) and the decomposition of annual productivity growth (percentage) into its within-sector and structural change components using two sectoral decompositions: 9 sectors, as in McMillan and Rodrik (2011), or 15 sectors. The advantage of using 15 sectors is that it allows us to isolate the effect for the food sector, instead of studying the whole agriculture sector (and likewise for the other subsectors).

65 percent), finance, and government services—more severely hit than others. The fact that the decline was widespread suggests the importance of national factors rather than sectoral factors. However, productivity then turned positive in most sectors in 1984–1992, although it was stronger in nonagriculture sectors than in agriculture, probably hampered by agricultural overtaxation (the negative rural push).

After 1992, productivity growth was driven by both within-sector productivity and structural change. For the 1992–2010 period, when labor productivity increased by an annual average 3 percent, structural change actually contributed slightly more than half of the total (1.6 percentage points versus 1.4 percentage points for the within component). During 1992–2000, many workers left the food sector and entered relatively more productive sectors (like construction, manufacturing, mining, tourism, transport, finance and business services, and government services). Surplus labor in agriculture was absorbed by other sectors, probably thanks to new opportunities in these sectors. The within-sector component was then negative because these sectors were characterized by declining marginal returns to labor—as employment increased, sectoral productivity decreased, even if the aggregate effect on overall productivity was positive.

However, during 2000–2006, the within-sector effect was very high—at around 6 percent of annual growth—with, interestingly, productivity up in all sectors. But the structural change component was negative, because the

economy was further rationalized after the economic reforms of the 1980s and 1990s. Each sector got rid of its less efficient workers, who had to enter a relatively less productive sector. During 2006–2010, we find exactly the same effects for exactly the same sectors as in 1992–2000, with urban pull factors probably explaining why these sectors hired more workers.

To what extent was growth driven by internal or foreign demand? This is difficult to decipher. When adding both the within-sector and the structural change components for each sector during the whole period 1992–2010, we find that growth was driven by mostly seven sectors (food production, cocoa, construction, mining, tourism, finance and business services, and government services). Construction and government services are procyclical, so their growth is tied to the rest of the economy. It is clear that the economy grew because of rising international demand for Ghana's natural resources (cocoa, gold, timber, and oil) and tourism services, with the combined GDP share of these sectors up from 9 percent to 18 percent in 1992–2010. In that case, the urban pull is driven by natural resources and tourism, rather than industrialization or high-productivity services, with the exception of finance and business services. But there was also a positive rural push, as higher food yields released labor for the modern sector, and stronger food imports post-1992 fed even more urban workers.

As for manufacturing, its total contribution was actually nil, which confirms that Ghana has experienced structural change without industrialization. Moreover, the manufacturing sector is relatively unproductive, with informality accounting for at least 90 percent of employment in 2000, and manufacturing productivity being 22.7 times lower in the informal sector than in the formal sector. In other words, Ghana has the "wrong" manufacturing sectors. For example, the informal clothing and furniture subsectors accounted for almost 40 percent of total manufacturing employment in 2000. Yet they serve the domestic market and are not that different from nontradable services.

Structural Change and Informal Employment

Most African countries implemented SAPs in the 1980s, paving the way for higher economic growth in the 1990s and 2000s. Yet these economies also witnessed a rise in informal or small-scale employment, while it would have been expected that a better business environment and fewer policy distortions would have led to formalization.[8] In Ghana, the proportion of employment

8 See Kingdon, Sandefur, and Teal (2006) for a survey of recent trends in several countries in Africa south of the Sahara.

in small firms (fewer than 30 employees) increased from 33 percent in 1987 to 52 percent in 2003—a change driven by a massive new entry of small firms (Sandefur 2010). One study finds that this could be the result of distortionary taxes that disfavor large firms, although it also suggests that a uniform rate of taxation would not dramatically improve overall productivity, as large firms are not necessarily more productive than small firms (Gollin 1995).

Two criteria are used to distinguish formal and informal employment: the type of employment and the size of the employer. Using the first method, Ghanaian formal employment includes the recorded employees of the formal establishments of the public and private sectors, while informal employment consists of unrecorded employees, self-employed people, employers, and unpaid family workers (Gollin (1995) favors this approach). The other approach separates small-scale employment (in establishments with fewer than 30 employees) and large-scale employment (in establishments with more than 30 employees) (Sandefur (2010) favors this method). Given that it is much more difficult to "hide" large-scale establishments from government authorities, this threshold is likely to capture the difference between formal and informal employment. Yet many "formal" establishments have fewer than 30 people, and their employees are mistakenly defined as belonging to the informal sector.

For our analysis, we use the first method, because we have no panel data on employment in large-scale establishments at the sectoral level. Thus, formal employment includes all wage and salary earners in formally registered establishments. We also focus strictly on employment because we lack data on informal GDP.[9] We find that the level of formal employment is extremely low—only 9.5 percent of total employment in 2006—even lower than the 13 percent in 1960, with more than half of workers in the public sector. Second, the share of formal employment fell to 2.9 percent between 1984 and 1992 (with only 0.2 percent in the private sector), as a result of the 1983 and 1988 SAPs. This result goes against the current belief that informality is rising in Ghana. The nonagriculture sectors were particularly affected by the SAPs. Third, by sector today, we find a large variation in the formalization rate, ranging from 52.6 percent in community, social, personal, and government services (followed by 45.6 percent in finance, insurance, real estate, and business services, and 32.4 percent in public utilities) to 10.1 percent in

9 We have panel data for 18 formal and informal sectors (2 times the 9 sectors of the main analysis) for the periods 1960–1970, 1970–1984, 1984–1992, 1992–2000, and 2000–2006. Data are missing for the year 2010.

manufacturing; 5.9 percent in wholesale and retail trade, hotels, and restaurants; and a mere 2.2 percent in agriculture, hunting, forestry, and fishing.

How much of this formalization stemmed from within-sector versus structural change? Our results show that the within-sector component is far more important than the structural component (Appendix 4B). This suggests that national factors—not sectoral factors—account for the evolution of the overall formalization rate. When the formalization rate collapsed after 1984, the contribution of the structural component was almost nil. This means that the formalization rate did not increase because people were moving to more informal sectors (that is, informal sectors are employers of last resort), but because each sector was becoming more informal. The within-sector component increased in 1992–2000 when the economy improved (the share of formal employment increased to about 11 percent). The formal firms rehired workers who ended up working for the informal firms of the same sector, or the formal firms that had to leave the formal sector during the economic crisis re-entered it. These results are somewhat in line with the results on structural change (Table 4.1). In addition, the structural change component was positive in the 1960s when nonagriculture sectors formalized as a result of public investments, and in the 1990s when the economy recovered and the more formal nonagriculture sectors hired more farmworkers.

Potential Gains from Structural Change

The main results are clearly ambiguous. On the optimistic side, our data for the post-1992 period indicate the following:

- Productivity increased continuously after 1992, and Ghana transitioned into a more efficient and formalized economy.
- The structural change component was mostly positive, which showed a reallocation of labor toward more productive sectors.
- This reallocation was permitted by an increase in the food supply (the positive rural push), whether it was the result of imports or rising food yields.
- This reallocation benefited other sectors as well, such as construction, and finance and business services. As urban wages increased, they attracted more workers from the food sector (the positive urban pulls).
- The economy diversified—while cocoa, timber, and mining accounted for almost all exports in 1960, Ghana now also exports tourism services and crude oil.

On the pessimistic side, these positive growth rates were not high, considering that the economy collapsed in the 1980s, which resulted in a catching-up effect in the next periods. The economy was so depressed that it could only get better. Moreover, Ghana is still two times as poor as India. Our data indicate the following:

- Income and sectoral productivities did not increase much between 1960 and 2010.
- Changes in labor productivity are volatile, and the overall economy can improve or deteriorate in a matter of years, as exemplified by the 1970s.
- The economy has not experienced a green revolution, which has limited its ability to release agricultural labor for the modern sector.
- Structural change occurred without industrialization, as shown by how little manufacturing and tradable services have contributed to productivity growth.
- Productivity growth was actually driven by the natural resource and tourism sectors, and the expansion of the construction and government sectors could just be the result of that economic growth.

How do these results compare with what we know from other studies? McMillan (2013, Figure 5) finds that structural change in Africa was growth reducing in 1990–1999 and growth enhancing in 2000–2005, with structural change's contribution to growth almost nil during the whole period 1990–2005. In Ghana, the contribution of structural change was relatively low during the whole period. However, we also use data for the period 2006–2010, when the contribution of structural change clearly increased (Table 4.1). The structural change components are also stronger when using the decomposition of 15 sectors, instead of 9 sectors as in McMillan (2013), as we isolate the effect for the food sector, instead of studying the whole agriculture sector (and likewise for the other subsectors). In Ghana, structural change was actually growth enhancing in 1992–2000 and 2006–2010. Besides, the sample of McMillan (2013) includes many countries for which patterns could have been different. Our results are in line with Adeyinka, Salau, and Vollrath (2013, Table 4), who find that the contribution of structural change to growth was positive for Nigeria (at 2.3 percent per year) in 1996–2009. However, in Ghana as well as in Nigeria, it is not obvious to what extent these changes are ultimately stemming from resource exports or agricultural modernization and industrialization.

Promoting structural change can clearly enhance overall productivity, provided workers from the low-productivity sectors can be absorbed by

higher-productivity sectors. But workers are unlikely to move from the least productive sector (such as food production) to the most productive sectors (such as public utilities or finance). These are capital- or skill-intensive sectors, which limit their ability to absorb unskilled workers from other sectors. Besides, the demand for the goods and services produced by these sectors is limited by the size of the domestic economy or the growth of exports.

But workers could gradually climb the productivity ladder and move to the next more productive sector, as the constraints to sectoral mobility would then be less stringent. In the case of Nigeria, Adeyinka, Salau, and Vollrath (2013) show that value-added could be 54 percent higher if there were perfect sectoral mobility—an assumption not credible, given sectoral differences in the production function. They find that it would be just 25 percent higher when accounting for sectoral differences in skill intensity. In the case of Ghana in 2000, the mean number of years of schooling was 2.8 in the food sector, but 7.1 in the rest of the economy (6.2 in manufacturing, 10.5 in finance, and 13.4 in government services). Within the agriculture sector, only 25 percent of the workers had at least 7 years of schooling, which shows how limited sectoral mobility is in Ghana. These farmers could move to the least productive urban sectors, although wages are probably not much higher once we account for rural–urban differentials in housing and consumer prices.[10]

The Role of Government Policies in Structural Change in Ghana

The fact that all sectors were affected by the economic crisis in 1967–1984 and were then able to recover through economic growth in 1984–1992 confirms that poor economywide policies—not just poor sectoral policies—constrained economic development during the pre-1992 period. One major problem was the quality of institutions, with regulatory and nonregulatory constraints on the private sector hampering economic development. After the first phase of the Economic Recovery Program in 1983, which was aimed at halting the economic decline and reviving moribund sectors (like agriculture, manufacturing, and mining), growth resumed (at 2.5 percent per year in 1984–1992), private investment increased, and most sectors benefited from the better economic and institutional climate. However, in the agriculture sector, growth resumed more slowly, as the

10 Another possibility would be that farmers climb the productivity ladder *within* the agriculture sector, by specializing in riskier—but in typical years more rewarding—crops (Chapoto, Mabiso, and Bonsu 2013). Ghana potentially has a comparative advantage in horticulture and fruits (such as pineapples and fruit juices) in addition to cocoa (Wolter 2009).

urban-biased policies of the 1960s–1980s disproportionately hurt cocoa and non-cocoa farmers. It took some time before farmers were convinced to invest again.

So which government policies helped or hindered structural change between 1992 and 2010? Here we apply the growth diagnostics framework of Hausmann, Rodrik, and Velasco (2008) to identify the binding constraints to growth.[11] Two possibilities that we can probably rule out are poor geography and low human capital. On the former, although Ghana is in the tropics, it is close to international markets, with the population concentrated in the forested south, which has been exploited for cultivating cocoa (Hill 1963; Jedwab 2013). As such, physical geography does not seem to be a major constraint, relative to countries like Mauritius or Thailand. On the latter, Ghana's stock of human capital is relatively high for its income level (relative to other West Africa countries), and the returns to education are around 4 percent versus 8–12 percent on average in developing countries. Like most resource-rich economies, Ghana does not typically rely on human capital (Gollin, Jedwab, and Vollrath 2015), and even if the demand for labor were high and there were a skill shortage, the country could rely on its large, well-educated, and entrepreneurial emigrant population in the developed world.

The biggest constraints seem to be the cost of finance, poor infrastructure, and market failures, followed by macro and micro risks.

Cost of finance. The low level of investment in Ghana (20 percent of GDP versus almost 35 percent in India and 50 percent in China) could be owing to a high cost of finance. During the pre-SAP period, savings were captured by the government and "misallocated." After the SAPs, the level of private investment rose, but firms still cite the inadequate availability of finance as a major constraint. For example, one recent study finds that capital is still highly misallocated in Ghana, as the marginal return to investment is higher in firms with less access to finance (Kalemli-Ozcan and Sorensen 2012). Firms also complain that the domestic demand for their products is too low.[12] Thus, the lack of credit is understandable, and the question becomes why firms seem to be unable to sell their nonresource goods and services to the rest of the

11 This section draws extensively on the analyses of Lejárraga (2010) and USG-GoG (2011).

12 For example, according to the Doing Business database of the World Bank, Ghana was ranked 120th in the world in terms of "Ease of Access to Credit" in 2010. Ghana is ranked lower than other African countries, such as South Africa (27th), Botswana (61th), Kenya (65th), Nigeria (90th), and Zambia (98th). Ghana is then ranked 84th in terms of "Overall Doing Business Score," which suggests that the lack of access to credit is a relatively important constraint. One factor explaining this poor performance is the fact that less than 15 percent of individuals and firms are listed by a public or private credit bureau with information on their borrowing history, versus more than 50 percent in Botswana and South Africa.

world. Likewise, foreign firms may not be credit constrained, so why do we not see more FDI inflows to Ghana? If the cost of finance is not an issue, the private sector's poor performance must be explained by a low return to economic activity.

Poor infrastructure. Ghana has relatively better infrastructure than most countries with the same income level (Lejárraga 2010), but poor roads continue to be a key factor behind the lack of a green revolution. Transportation costs are high, which increases the price of agricultural inputs and decreases farmgate prices (Breisinger et al. 2011), and there is a lack of competition in the transport sector, with numerous roadblocks. In addition, the energy sector is facing significant challenges, with frequent disruptions to power. Firms are relying increasingly on their own power generation, and should this situation continue, it is unlikely that manufacturing firms can improve their competitiveness—in 2007, power outages cost 6.5 percent of annual sales for Ghanaian firms on average (Lejárraga 2010).

Market failures. The lack of self-discovery and coordination externalities (when the actions of economic agents need to be coordinated to improve efficiency) could account for the low level of private investment. To begin with, the economy has not diversified its exports much, although in the past 20 years, there seem to have been many "export discoveries" (products that are exported for the first time by a country) (Lejárraga 2010). However, these products failed to mature in larger export sectors, owing either to a lack of international demand or to constraints in the expansion of small firms (which predominate because of asymmetric taxes and regulations) (Gollin 1995). In addition, smaller exporting firms tend to rely on export intermediaries to sell their products, possibly the result of an imperfect knowledge of foreign markets or difficulties obtaining an export license (Lejárraga 2010). One example is in the agriculture sector. Ghana has an unexploited comparative advantage in horticulture and fruits (such as pineapples and fruit juices) (Wolter 2009). An agriculture-based industrial policy could be initially needed to support this nascent agribusiness industry.

Macro risks. The macro picture improved markedly after the democratization process started in 1992. Government consumption was rationalized, the fiscal deficit narrowed, and inflation fell. Ghana also achieved debt relief by participating in the Highly Indebted Poor Countries initiative, which required adopting the Poverty Reduction and Growth Facility. Further, there have been two peaceful political transitions from one party to another in 2000 and 2008, engendering more confidence in the institutions and the economy (Osei 2012). Yet, while a stable macroeconomic environment is a

necessary condition for long-run growth, it is not a sufficient condition for developing a strong (nonresource) tradable sector (Lejárraga 2010). Since the 2008 oil discovery, private investment has been concentrated in the resource sector (Barthel, Busse, and Osei 2011), and in recent years, the macroeconomic situation has deteriorated as a result of the oil boom. A big worry is that oil revenues may not be used to further transform the economy—in fact, the share of capital spending in government expenditure decreased from 50 percent in 2000 to 40 percent in 2011, as the choice was made to hire more civil servants and pay them better (Osei 2012).

Micro risks. Institutional change in the 1990s—including efforts by the government to rebalance the economy in favor of the private sector—has facilitated a better business environment (Asem et al. 2013). Evidence of this policy shift is seen in lower transaction costs associated with doing business in Ghana. Over the period 2006–2012, Ghana was one of the top-10 reformers according to the World Bank's Doing Business database. It is now ranked 64th in the world (out of 185) and 5th in Africa south of the Sahara (out of 46). It is also ranked 64th in the world according to the Corruption Perceptions Index of Transparency International. And it outperforms other countries in registering property (45/185), enforcing contracts (48/185), and protecting investors (49/185).

Even so, Ghana underperforms other countries in paying taxes (89/185), starting a business (112/185), resolving insolvency (114/185), and dealing with construction permits (162/185). One problem seems to be high tax rates for firms. While taxes are necessary for funding public goods (like roads), they often include informal payments to tax inspectors (Lejárraga 2010). Taxes are also higher for large firms, which skews the firm distribution toward small firms (Gollin 1995). In addition, the regulatory framework is constraining, as it is complicated to start and shut down a business and to hire and fire workers in the formal sector (Lejárraga 2010). The current regulations favor large, politically connected firms, while smaller but successful firms cannot mature into larger ones. Thus, changes in the regulatory environment have not always benefited the majority of firms in Ghana (Asem et al. 2013). Another example of micro risks is the insecurity of property rights in the agriculture sector (USG-GoG 2011).

Tackling the Binding Constraints

In Africa, structural change was not synonymous with industrialization, but was defined by a dramatic expansion of services. One hypothesis is that structural change in Africa has not been as growth enhancing as in Asia. Our results for Ghana suggest the following:

- Structural change is both a factor and a consequence of development, as episodes of negative economic growth are associated with structural change in the wrong direction.
- The contribution of structural change to productivity growth was nil or negative until the 1980s, as the political and economic environment was not conducive to long-run growth.
- While structural change was thus growth reducing until the 1980s, it became growth enhancing after the country democratized in 1992. Therefore, structural change can also be a factor of economic development in Africa.
- The "nature" of structural change remains different in Ghana—it has occurred without a green revolution, an industrial revolution, or a service revolution of the types seen in Asia.

Although Ghana is hailed as one of Africa's success stories, its economy remains highly dependent upon natural resource exports; the manufacturing sector is still uncompetitive; and there are still enormous hurdles on the socioeconomic front, with troubling levels of poverty, unemployment, and underemployment—especially for young people—and income inequality. The bottom line is that Ghana must cope with several binding constraints that contribute not only to the lack of a green, industrial, or service revolution but also to the causes and consequences of the other mechanisms of structural change (like the negative rural push, urban pull, and urban push).

While the contribution of structural change was positive in 1992–2010, it could increase further. In Asia, manufacturing and tradable services have absorbed the surplus labor from the food sector (Breisinger et al. 2011; Gollin, Jedwab, and Vollrath 2015). But in Ghana, these sectors are 19 and 6 times less productive than in the rest of the world, respectively. Labor costs are relatively high, because so much food is still imported. Nonlabor costs are also high because of a constraining regulatory framework, power outages, and poor roads. Although the business environment has improved considerably in the past 20 years, much remains to be done for Ghana to be as competitive as Mauritius or South Africa. Ghana is unlikely to develop a strong nonresource tradable sector in the near future. But anything is possible in the longer run, as exemplified by the development experience of the countries mentioned above. The reverse scenario is also true—the recent cocoa, gold, and oil booms could cause a new "resource curse" in Ghana.

Appendix 4A: Data Sources

This appendix describes in detail the data we use in our analysis. We consider the following 9 sectors for the decomposition analysis: agriculture, hunting, forestry, and fishing (agr); mining and quarrying (min); manufacturing (man); public utilities (pu); construction (con); wholesale and retail trade, hotels, and restaurants (wrt); transport, storage, and communications (tsc); finance, insurance, real estate, and business services (fire); and community, social, personal, and government services (cspg). To obtain 15 sectors, we decompose the agr sector into agriculture and hunting, cocoa, forestry and logging, and fishing; the wrt sector into wholesale and retail trade, and hotels and restaurants; the tsc sector into transport and storage, and communications; and the cspg sector into community, social, and personal services, and government services.

We use various sources to recreate total GDP (in constant 2000 US$, PPP) for the 9 or 15 sectors annually from 1960 to 2010: Economic Surveys of Ghana (CBS 1961–1982), Singal and Nartey (1971), Androe (1981), Ewusi (1986), *Quarterly Digest of Statistics* (CBS 1981–1997), Maddison (2008), GSS (2010), and World Bank (2010). Employment data were reconstructed for the 9 or 15 sectors in 1960, 1970, 1984, 1992, 2000, 2006, and 2010 from various sources: Population and Housing Censuses (PHCs) (GSS 1960, 1970, 1984, 2000, and 2010); and Ghana Living Standards Surveys (GLSS) in 1991–1992 and 2005–2006 (GSS 1995, 2008). Sectoral labor productivity was then calculated as the ratio of sectoral GDP to sectoral employment. For the 9 sectors, formal and informal employment data were reconstructed in 1960, 1970, 1984, 1992, 2000, and 2006 from various sources: Statistical Yearbooks of Ghana 1961–1970, *Statistical Handbook of the Republic of Ghana 1970* (CBS 1970), *Quarterly Digest of Statistics* (CBS 1981–1997), the 2000 PHC (GSS 2000), and the 2005–2006 GLSS (GSS 2008).

Appendix 4B: Results of Informality

We decompose the aggregate evolution of the formalization rate between its within-sector component, when sectors become more informal, and its structural component, when labor moves from more formal to less formal sectors as follows:

$$\Delta F_t = F_t - F_{t-1} = \Sigma_j E_{j,t} \times (f_{j,t} - f_{j,t-1}) + \Sigma_j (E_{j,t} - E_{j,t-1}) \times f_{j,t-1}$$

where f_t and $f_{j,t}$ refer to economywide and sectoral formalization rates (for sector j), respectively, and $E_{j,t}$ is the share of employment in sector j. Results are reported in Table 4B.1, below. First, the within-sector component of

TABLE 4B.1 Decomposition of formal employment growth in Ghana, 1960–2006

	Share of formal employment		Component (percent) due to:	
Period	at starting year (percent)	growth (annual, percent)	within (9 sectors)	structural (9 sectors)
1960–1970	15.5	–2.2	–4.3	2.2
1970–1984	12.4	–2.8	–1.7	–1.1
1984–1992	8.3	–12.3	–12.4	0.1
1992–2000	2.9	18.0	15.1	2.9
2000–2006	10.9	–2.2	–0.6	–1.6

Source: Jedwab and Osei (2012).

Note: This table displays the share (percentage) of formal employment in total employment at the starting year of the period and the decomposition of the growth of this share into its "within-sector" and "structural change" components using nine sectors, as in McMillan and Rodrik (2011).

formalization is far more important than its structural component. This suggests that national factors, not sectoral factors, account for the evolution of the aggregate formalization rate. When the formalization rate collapsed after 1984, the contribution of the structural component was almost nil. This means that the formalization rate did not increase because people were moving to more informal sectors (that is, informal sectors are employers of last resort), but because each sector was becoming more informal. The within-sector component increased in 1992–2000 when the economy improved. The formal firms rehired workers who ended up working for the informal firms of the same sector, and/or the formal firms that had to leave the formal sector during the economic crisis re-entered it. These results are in line with the results on structural change (Table 4.1). Second, the structural change component was positive in the 1960s when nonagriculture sectors formalized as a result of public investments, and in the 1990s when the economy recovered and the more formal nonagriculture sectors hired more farmworkers.

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Chapter 5

STRUCTURAL CHANGE AND THE POSSIBILITIES FOR FUTURE GROWTH IN NIGERIA

Adedeji Adeyinka, Sheu Salau, and Dietrich Vollrath

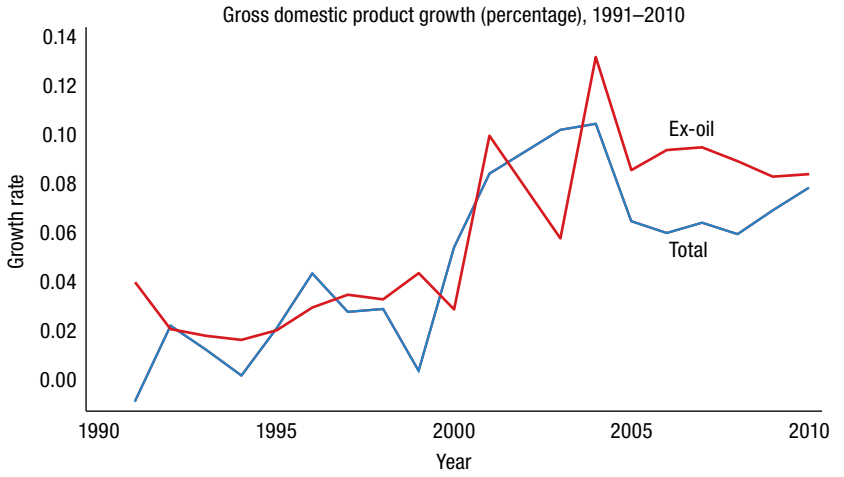
Since the turn of the century, overall economic growth in Nigeria has been consistently strong—averaging around 5.4 percent per year, up substantially from about 2.0 percent during 1990–2000. Moreover, overall GDP growth in the past decade is even higher if the oil sector—which accounts for 20–30 percent of GDP—is excluded, averaging around 8.4 percent per year, up sharply from 2.0 percent per year (Figure 5.1). This growth pickup has occurred alongside shifts in the composition of employment, mainly out of agriculture and into sectors such as manufacturing and finance and business services.

The Nigeria of today has the highest GDP in Africa south of the Sahara—even higher than South Africa, although South Africa has a much higher GDP per capita rate. Nigeria's *Vision 20:2020* (adopted in 2010) is centered on positioning Nigeria to become one of the top-20 economies in the world by 2020 (FRN/NPC 2010). Yet GDP per capita is still quite low, along with living standards (54 percent of the population lives on less than US$1.25 a day).[1,2] The latest United Nations Development Programme Human Development Index places Nigeria in the low human development category, with a ranking of 152 out of 186 countries and territories. The World Bank's recent Doing Business database ranks Nigeria 169th out of 189 economies on "ease of doing business" and 182nd on "getting electricity," underscoring concerns about reliable power and good governance. And unemployment and underemployment, especially for youths, pose serious challenges. On the demographic side, Nigeria, already the continent's most populous country with 170 million people, is expected to see enormous population growth in the decades ahead. In fact, the United Nations

1 In April 2014, Nigeria rebased its GDP data for 2010–2013, using 2010 as a base year for prices. In this chapter, we use the older GDP figures with a base year of 1990, as this provides sector-level breakdowns of GDP from 1990 to 2010. It is not immediately clear what effect rebasing the year would have on our results, as some sectors have been scaled up (telecommunications and information technology), while others have been scaled down (wholesale and retail trade).

2 All currency in this chapter is in US dollars unless otherwise specified.

FIGURE 5.1 Slow growth in the 1990s turns into rapid growth in the 2000s



Source: Authors' calculations using data from the Nigerian National Bureau of Statistics (FRN/NBS, various years).
Note: The figure shows the growth rate of aggregate GDP in Nigeria, on a year-by-year basis. The year 2003 is excluded because of a one-time change in reporting that falsely inflated growth.

forecasts that by 2050, Nigeria's population will surpass that of the United States (UN 2013).

Fortunately, Nigeria is rich in human capital and natural resources (especially oil and gas, but also mineral deposits). So the big question is how best to use its enormous resources to stimulate growth and place the country on a path of sustained and rapid socioeconomic development. Clearly, policies will need to reflect the lessons learned from past efforts on the growth front. This chapter hopes to add to this knowledge base by dissecting Nigeria's growth between 1996 and 2009—in particular, assessing how much of the growth in labor productivity has come from its two key components: (1) structural change (impacts on productivity from sectoral rearrangements of the labor force), and (2) within-sector change (impacts on productivity from overall increases within sectors). We also examine what has been occurring at the sector level, the potential gains for Nigeria if it removes obstacles to greater structural change, and the key levers of structural change. Mostly, we focus on the nonpetroleum portion of the economy, which despite being only 70 percent of GDP accounts for nearly 100 percent of employment.

Our findings show that growth in labor productivity between 1996 and 2009 was about 4.5 percent per year in the nonpetroleum economy. Of this,

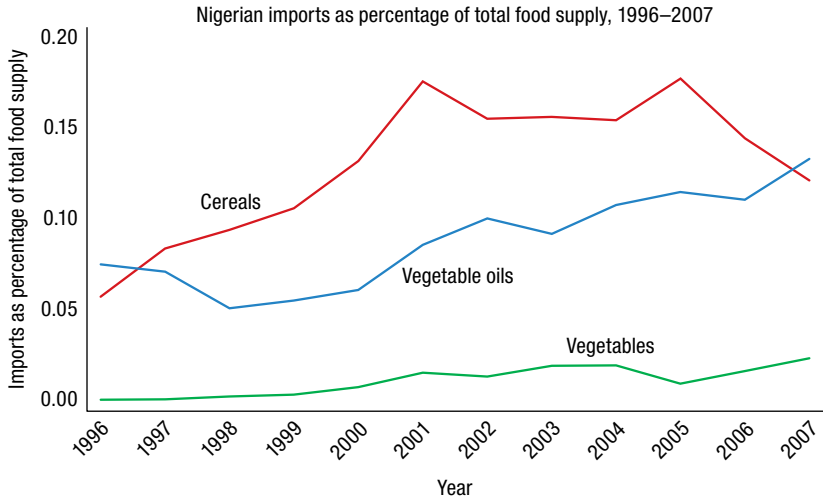
about 1.0 percentage point of labor productivity growth was the result of structural shifts of labor from low-productivity to high-productivity sectors, with the remaining 3.5 percentage points coming from within-sector productivity improvements. If we include the petroleum sector, growth in labor productivity in the same period dips to roughly 2.9 percent per year—with 2.2 percentage points stemming from structural change and a 0.7 percentage point from within-sector productivity.

Despite the positive role of structural change in this period, we also find that it could have contributed much more to growth. In fact, labor productivity could have jumped by roughly 50 percent between 1996 and 2009 under a better economic environment and, had that occurred, growth in labor productivity in the nonpetroleum economy would have been 3.2 percentage points higher. The challenge now is for Nigeria to tackle a range of economic barriers, including (1) policies that restrict agricultural productivity (like an inadequate supply of fertilizers and the lack of appropriate infrastructure to bring agricultural products to market); (2) a lack of infrastructure to allow the manufacturing and business services sectors to expand and meet demands; and (3) a lack of quality education, which limits the supply of appropriately trained workers.

Evolution of the Nigerian Economy

When Nigeria gained independence in 1960, it was largely an agrarian economy, securing most of its export earnings and government revenues from agriculture. But today, oil accounts for 96 percent of export earnings and 70 percent of government revenues, and the country has gone from being self-sufficient in food to a major food importer, especially in cereals and vegetable oils (Figure 5.2). Over much of this period, there was little net economic growth, although the growth rate was quite volatile—reflecting an oil boom (and soaring revenues) in the 1970s and a sharp fall in oil prices (and collapsing revenues) in the 1980s. Per capita income went through similar swings, even falling by the early 2000s to one-quarter of its mid-1970s high, below the level at independence. Since the mid-2000s, when Nigeria secured multilateral debt relief, the civilian government has focused on economic reforms, most recently laid out in the 2010 *Nigeria Roadmap for Power Sector Reform* (PTFP 2013) and *Vision 20:2020* (FRN/NPC 2010). The emphasis is on building up and further diversifying the nonpetroleum economy to boost growth and development. At the same time, Nigeria continues to be Africa's largest oil exporter (despite large cutbacks in production over the past two years, amidst

FIGURE 5.2 From net food exporter to net importer



Source: Authors' calculations using data from the FAOSTAT database (FAO, various years).

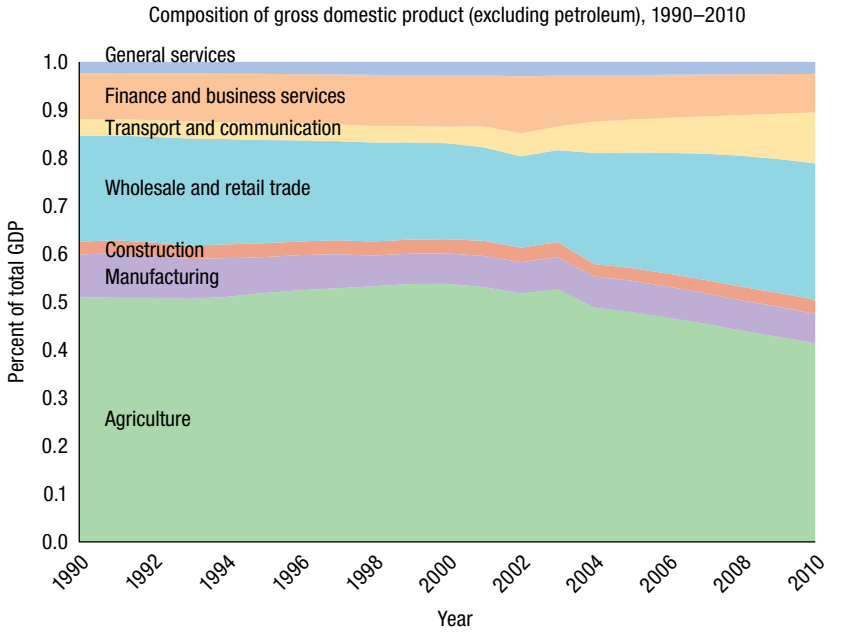
Note: Food supply is the total amount of food available for consumption in Nigeria, roughly equal to production plus imports minus exports, with modifications for use as feed and seed in agricultural production. Both the supply and the imports are originally measured in metric tons.

allegations of corruption and rent seeking) and a major supplier of liquefied natural gas to European buyers.

The current GDP breakdown at the sectoral level—in terms of the nonpetroleum part of the economy—is typical of developing countries in Africa. Agriculture accounts for a dominant portion of GDP, at around 50 percent of the nonpetroleum economy (or about one-third of total GDP) (Figure 5.3). The second major sector is wholesale and retail trade, which makes up 20 percent of nonpetroleum GDP (or about 15 percent of total GDP). This structure is not static, however, and over the two decades from 1990 to 2010, Nigeria experienced a slow process of structural change away from agriculture—now closer to 40 percent—and into new sectors such as transport and communications.

What has happened to labor productivity? We find that, not surprisingly, agriculture makes up the greatest portion of employment, with nearly 60 percent, and has a relatively low level of labor productivity—at only about two-thirds of the aggregate level (Figure 5.4). However, services, which includes not only public employees but also many informal workers, actually has even lower productivity, at only about 30 percent of the aggregate. Note that the oil and gas sector is excluded from this figure because labor productivity is so large in that sector (roughly 10,000 percent higher than average),

FIGURE 5.3 Agriculture, although losing ground, still dominates



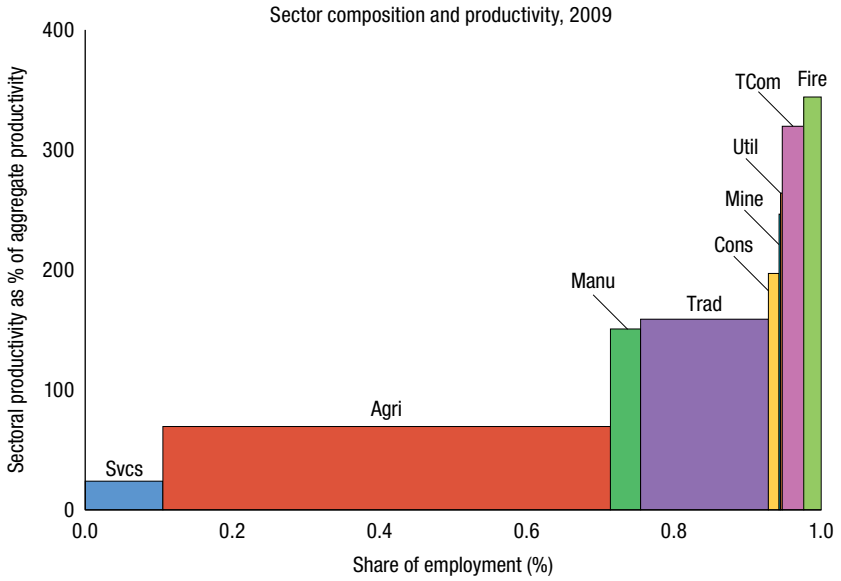
Source: Authors' calculations from National Bureau of Statistics data on the composition of gross domestic product (GDP), in constant 1990 prices (FRN/NBS, various years).

Note: The figure shows the fractions of GDP coming from the seven largest sectors—excluding petroleum, which typically accounted for 20–30 percent of GDP. Other excluded sectors, because of their negligible size, are electricity, gas, and water; mining and quarry; and undefined activities. The breakdown is based on data on crop production, and electricity value-added is adjusted for discrepancies, as described in the text.

and employment in that sector is so small (less than one-fifth of 1 percent), that the figure would lose all meaning.

Using household survey data for 1996–2009, we can see how the labor shares have changed over time (Table 5.1a). Agriculture, comprising 66.5 percent of workers in 1996, dipped to 60.8 percent by 2009. The next-largest sectors, but still only a fraction of agriculture, are wholesale and retail trade (employing 19.4 percent of workers in 1996 before falling slightly to 17.4 percent by 2009) and general services (averaging 10.0 percent of workers, with a temporary spike in 2005 that appears to be an anomaly). Over these 13 years, as we see in Table 5.1b, agriculture and wholesale and retail trade were the sectors losing employment share, which translated into larger fractions of labor employed in general services, transportation and communications, manufacturing, and finance and business services. In this sense, the pattern of structural change follows the "typical" pattern one might expect from a developing country.

FIGURE 5.4 Agriculture and services have the lowest levels of productivity



Source: Authors' calculations using data from the Nigerian National Bureau of Statistics (FRN/NBS, various years).

Note: The figure shows the relative labor productivity of a sector (the height of the box) against the share of employment (the width of the box) for all sectors in Nigeria, excluding oil and gas. agri = agriculture; cons = construction; fire = finance, insurance, real estate, and business services; manu = manufacturing; mine = mining activity, excluding oil and gas; svcs = services; tcom = transport and communications; trad = wholesale and retail trade; util = utilities.

Here, we should note that data from the General Household Surveys (GHS) conducted by the National Bureau of Statistics in Nigeria for the periods 1996–1999 and 2005–2009 (see Appendix 5B) paint a picture of a labor force that is poorly paid and not sufficiently using both women and youths.

- The fraction of the employed working for wages is extremely low, averaging around 10 percent over all the surveys, and only rising to 13 percent by 2010. The vast majority of workers are engaged in relatively informal arrangements, working either for themselves or within the family.
- Women make up slightly more than one-third of employment in the 1990s, before rising slightly to average around 40 percent of employment in the 2000s. (It seems likely that women who are not employed in our calculations are concentrated in the agriculture sector, which likely understates total agricultural employment in our calculations.)

TABLE 5.1a Agriculture still employs the most labor . . .

Share of employment in major sectors (percentage), 1996–2009				
	Time periods			
Sector	1996	1999	2005	2009
Agriculture	66.5	62.0	58.4	60.8
Wholesale and retail trade	19.4	20.5	17.7	17.4
General services	9.4	10.4	19.5	10.6
Transport and communications	2.0	2.4	2.3	2.9
Manufacturing	1.9	3.1	1.1	4.1
Finance and business services	0.2	0.5	0.4	2.4

Source: Authors' calculations using the Nigerian General Household Surveys (FRN/NBS 2013).

Note: Sectors are defined as in the ISIC revision 2 classification to facilitate comparison across years. See Appendix 5A for specifics on how sectors are assigned in later years.

TABLE 5.1b . . . even though it has seen the biggest labor falls, followed by trade

Change in share of employment in major sectors (percentage points), 1996–2009				
	Time periods			
Sector	1996–1999	1999–2005	2005–2009	1996–2009
Agriculture	–4.4	–3.6	2.4	–5.6
Wholesale and retail trade	1.1	–2.8	–0.4	–2.1
General services	1.0	9.1	–9.0	1.1
Transport and communications	0.3	0.0	0.6	0.9
Manufacturing	1.2	–2.0	3.0	2.2
Finance and business services	0.3	–0.1	1.9	2.2

Source: Authors' calculations using the Nigerian General Household Surveys (FRN/NBS 2013).

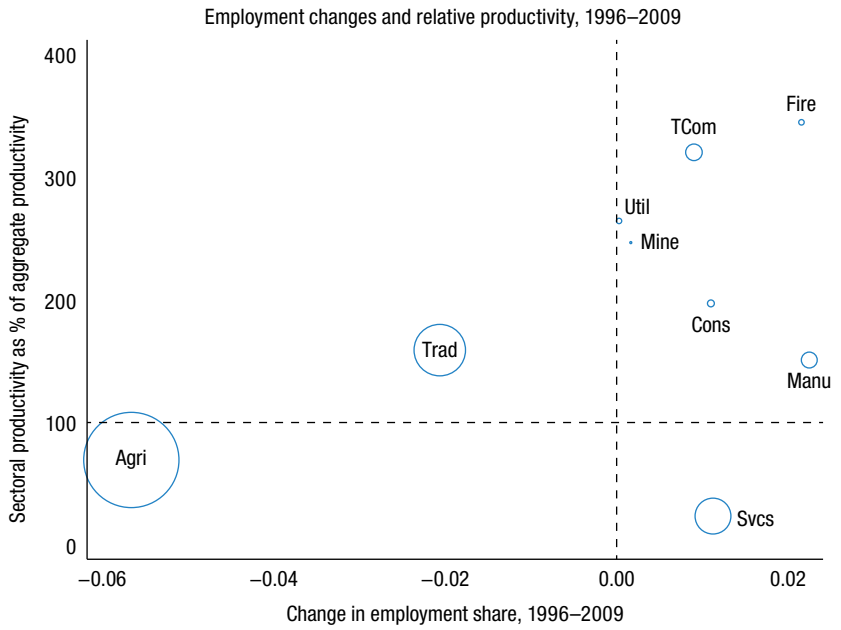
Note: Changes are percentage point differences between values reported in Table 5.1a.

- Only 25–30 percent of the population age 15–25 is employed, with another 40–49 percent in school, which leaves 25–30 percent as neither in school nor employed—the possible result of a skills mismatch.

A Growing Role for Structural Change

How large were these movements of employment between sectors? To provide a rough guide to the scale of the movements and their relationship to labor productivity, Figure 5.5 shows the changes in employment shares between 1996 and 2009 against the log of relative productivity in each sector. The sizes of the circles denoting each sector reflect their employment share in 1996.

FIGURE 5.5 A picture of positive structural change



Source: Authors' calculations using data from the Nigerian National Bureau of Statistics (FRN/NBS, various years).

Note: The figure shows the productivity of a sector in 2009 relative to aggregate productivity against the change in the share (percentage) of employment in that sector from 1996 to 2009. agri = agriculture; cons = construction; fire = finance, insurance, real estate, and business services; manu = manufacturing; mine = mining activity, excluding oil and gas; svcs = services; tcom = transport and communications; trad = wholesale and retail trade; util = utilities.

Agriculture—the largest sector, but with low productivity—saw the largest drop in employment share during this period. Wholesale and resale trade also witnessed a decline in employment share, despite being slightly above average in labor productivity. Services actually grew but remained a low-productivity sector. The remaining sectors—including manufacturing—witnessed growth in their share of employment and had relatively high productivity.

Looking across sectors, the general relationship is positive, indicating that growth in employment was occurring in sectors that were highly productive—thus raising overall productivity between 1996 and 2009. Here, again, the oil and gas sector is excluded, because its relative labor productivity is so large that it would make the figure unreadable. In addition, its share of labor grew from only 0.03 percent in 1996 to 0.2 percent in 2009. That said, our analysis of the role of structural change covers the differences that arise whether the oil and gas sector is included or excluded.

What is of special interest is that this positive correlation between relative productivity and shifts in labor is consistent with the findings of a study by McMillan and Harttgen (2014), which looks at Africa south of the Sahara. In the case of Nigeria, it also found a positive correlation using the period 1999–2009. However, our finding contradicts the negative correlation found by McMillan and Rodrik (2011), who looked at 38 countries (29 developing and 9 high-income), including Nigeria, for the period 1990–2005. We believe that the likely reason for the discrepancy is the specific time frame that McMillan and Rodrik (2011) use. The years prior to both 1996 and 2005 appear to have several anomalous features when compared with the rest of the 2000s. Using a consistent set of data (as we do here and McMillan and Harttgen (2014) do) results in a positive correlation.

Did the movement of employment between sectors actually contribute meaningfully to growth in labor productivity in Nigeria? To address this, we follow McMillan and Rodrik (2011) and decompose the overall percentage change in labor productivity in Nigeria from 1996 to 2009 into a "within-sector" component representing only increases in sector-level productivity and a "structural change" component representing the reallocation of employment between sectors (see the Overview in this book for details on the methodology).[3] The data on value-added are available from 1990 to 2010 and are reported in constant 1990 US dollars, calculated using sector-specific deflators applied to sector-specific nominal value-added (Appendix 5C).

Let us start by dividing the 1996–2009 period into three subperiods (excluding oil and gas). As panel A in Table 5.2 shows, labor productivity undergoes major swings, beginning with overall growth of only 0.8 percent per year in the first subperiod (1996–1999), then jumping to 4.8 percent in the second subperiod (1999–2005), and rising again to 7 percent in the final subperiod (2005–2009). For the period as a whole, labor productivity grew at 4.5 percent per year.

At the same time, structural change experienced major swings. In the first subperiod (1996–1999), it was the only factor contributing positively

3 Algebraically, the decomposition is:

$$\Delta P_t = \sum_{i=1}^{N} \theta_{i,t-k} \Delta p_{i,t} + \sum_{i=1}^{N} p_{i,t} \Delta \theta_{i,t}$$

where ΔP_t is the change in aggregate labor productivity between period $t-k$ and t. The first term is the "within-sector" component, which is a weighted average of the change in labor productivity in each of the N sectors, with the weight for sector i being the labor share of that sector in period $t-k$, measured by $\theta_{i,t-k}$. The second term is the "structural change" component, which is a weighted average of the change in labor shares in the N sectors, with the weights captured by the labor productivity of the sector in period t.

TABLE 5.2 Structural change starts to take on a bigger role in the mid-2000s

Structural components of labor productivity change, 1996–2009				
	Time periods			
Structural components	1996–1999	1999–2005	2005–2009	1996–2009
Panel A: Excluding oil and gas				
% annual growth productivity	0.8	4.8	7.0	4.5
of which:				
% "within-sector" productivity	–2.0	9.4	2.6	3.5
% "structural change"	2.8	–4.6	4.4	1.0
Panel B: Including oil and gas				
% annual growth productivity	–0.8	4.4	4.1	2.9
of which:				
% "within-sector" productivity	–7.1	6.2	–1.6	0.7
% "structural change"	6.3	–1.8	5.7	2.2

Source: Authors' calculations. Data on output by industry are from Nigerian National Bureau of Statistics (FRN/NBS, various years), and workers engaged in each industry are calculated from the Nigerian General Household Surveys (FRN/NBS 1996–2009).

Note: See Appendix 5A for a translation of industries reported by NBS into standard International Standard Industrial Classification revision 2 codes. See Appendix 5B for a description of labor force data.

(2.8 percent per year) to overall productivity growth, as within-sector productivity actually fell by 2 percent per year, although the transfer of labor from low-productivity sectors to high-productivity sectors was able to turn overall labor productivity positive.

In the next two subperiods, we can see the effect of the spike in services' share of employment in 2005. Between 1999 and 2005, the implied contribution of structural change was negative, reflecting the anomalous increase in services. Then from 2005 to 2009, the reversion to the typical level of services employment shows up as a very large contribution of structural change to labor productivity growth.

Given the service spike anomaly, a look at the decomposition of the full time span (1996–2009) is likely the most informative of all. We find that during the robust growth in labor productivity (4.5 percent per year), the big driver was within-sector growth (with 3.5 percentage points), while structural change accounted for the remaining 1.0 percentage point (about 21 percent of the total). On net, labor moved away from agriculture and wholesale and retail trade, with relatively low productivity, and into finance and business services, manufacturing, services, and transport, which as a group had relatively high productivity—although this effect was small relative to the overall increase in labor productivity within sectors.

What happens if we include the oil and gas sector? As panel B in Table 5.2 shows, several of the patterns remain intact, but the role of structural change becomes exaggerated. In particular, if we take the whole period (1996–2009), growth is lower—just 2.9 percent per year, as opposed to 4.5 percent when the oil and gas sector is excluded. Of this gain, the main factor is structural shifts, at 2.2 percentage points, unlike when the oil and gas sector is excluded (then "within" is the main factor). This exaggeration arises because there is a minute change in the fraction of workers in the mining industry (which includes oil and gas), rising from 0.03 percent of the workforce in 1996 to 0.2 percent of the workforce by 2009. In addition, labor productivity in the oil and gas sector is so high that this small shift in labor implies an enormous gain in overall labor productivity.

Which non-oil sectors pulled in the most labor from agriculture and wholesale and retail trade, and what were their relative labor productivities? Table 5.3 shows the labor productivity in 2009 of each major sector relative to agriculture, as well as the change in employment share in each sector. We can see that while wholesale and retail trade is relatively productive, it lost 2.1 percentage points of employment in this period. Moreover, employment shifting out of agriculture and trade into general services was actually bad for productivity, as general services had a productivity of only one-third of agriculture's level.

The biggest sources of the positive structural change were the movements of employment into transportation and communications and the finance industries. Each of these sectors has labor productivity more than four times

TABLE 5.3 Transportation and communications sector outperforms other sectors

Sector productivity levels relative to agriculture and employment changes, 1996–2009			
Sector	Change in employment, 1995–2009 (percentage points)	Relative labor productivity, 2009	Change in labor productivity 1996–2009 (percentage)
Agriculture	–5.6	1.00	58.6
Wholesale and retail trade	–2.1	2.29	164.0
General services	1.1	0.34	58.4
Transportation and communications	0.9	4.60	236.1
Manufacturing	2.2	2.17	–30.9
Finance and business services	2.2	4.95	–86.7

Source: Authors' calculations using output data from the Nigerian National Bureau of Statistics (FRN/NBS, various years) and labor force in each industry from the Nigerian General Household Surveys (FRN/NBS 1996–2009). Changes in employment are taken from Table 5.1.

Note: Labor productivity is reported relative to agriculture for each sector.

higher than agriculture. By together adding about 3 percentage points to their share of employment, these two sectors contributed significantly to growth between 1996 and 2009.

It is interesting to examine the distinction between levels of productivity and growth in productivity. Structural change was positive for growth because the levels of productivity in transportation, finance, and manufacturing were generally higher than in agriculture and trade. However, growth in productivity in those three sectors was not necessarily positive. As can be seen in Table 5.3, in manufacturing and finance and business services, productivity growth was actually negative during 1996–2009, consistent with declining marginal returns to labor in those sectors.

Contrast this performance to that of the transportation and communications industry, which had both productivity growth and levels of productivity that were higher than those of any other major sector. The combination of high productivity growth and an inflow of employment provides prima facie evidence of either technological improvements or significant capital accumulation in transportation and communications. In the declining sectors, agriculture and trade, the level of productivity was relatively low, but grew over this period. These sectors thus contributed in two ways to overall labor productivity growth: first, by passing employment off to more productive uses; and second, through their own labor productivity growth.

Gradual Move into New Economic Areas

Drilling down into the subsectors, we gain more insights into Nigeria's economic evolution, especially a gradual broadening of economic activities. One caveat here is that the data are fragile, given that we are using the GHS and the absolute numbers of people reporting activity in any given subsector can be quite small.

Manufacturing. In 1996, nearly two-thirds of the manufacturing employees in Nigeria were reported to be in the textile, apparel, and leather goods subsector. However, by 2009, the distribution of manufacturing work had shifted substantially, with this subsector employing less than 30 percent of manufacturing labor. The main beneficiary of this drop was the manufacture of food, beverages, and tobacco, which employed 36 percent of manufacturing labor, as opposed to only 4 percent in 1996. Given the absolute growth in manufacturing workers from 1996 to 2009, the food and beverage subsector grew by a factor of nearly 27 in absolute terms, absorbing most of the additional manufacturing labor.

Finance and business services. This sector grew by roughly the same number of workers as manufacturing between 1996 and 2009. By using the more detailed ISIC revision 4 classifications available in 2009, we can see that much of the labor engaged in this industry appears to have come from the expansion of office administration and security services activities.

Transportation and communications. This sector is dominated by transportation activities. In 2009, 84 percent of the sector worked in the transportation subsector, while in 1996 the comparable number was 94 percent. The three largest nontransportation subsectors in 2009 were information services, telecommunications, and computer programming. Together these three accounted for about 14.5 percent of the entire sector employment. The relatively high-tech subsectors of information services, telecommunications, and computer programming contributed significantly to overall labor productivity growth.

General services. Unlike the others, this sector has a relatively small labor productivity level, and so the shift of employment into this industry was actually a net drag on aggregate labor productivity. This shift into the services industry was almost exclusively the result of the addition of employment in education and personal and household services (mostly "other personal services," which likely is a catch-all for domestic service and similar work, and may reflect part of the reason why the general services sector had such low levels of measured labor productivity).

Thus, between 1996 and 2009, Nigeria saw a broad shift of employment out of agriculture and trade into a few particular subsectors: the manufacture of food products; office administration and support; security and investigation; high technology (telecommunications, computer programming, and information services); education; and other personal services. This movement appears to reflect a general broadening of the types of economic activities Nigerians engage in as they move out of the agricultural and trade activities that still dominate employment (Table 5.4).

Using Human Capital to Measure Labor Effort

But before we move on, it is important to ask whether this decomposition of growth may misstate the role of structural change, given that we have used productivity per worker, rather than a more refined measure that accounts for human capital and time spent working by those workers. Here we ask whether accounting for human capital levels and/or hours worked changes our prior decomposition significantly. We do this by decomposing value-added

TABLE 5.4 Agriculture and trade still dominate employment

ISIC revision 4 subsector employment shares, 2009	
ISIC-4 subsector	**Percentage of employment**
Crop and animal production	59.43
Retail trade, excluding motor vehicles	13.44
Education	3.27
Other personal services	3.17
Public administration and defense	2.32
Land transport and transport via pipeline	2.28
Food and beverage service activities	1.51
Wholesale, retail, and repair of motor vehicles	1.50
Manufacture of food products	1.38
Construction of buildings	1.03
Human health activities	0.92
Fishing and aquaculture	0.90
Manufacture of wearing apparel	0.89
Office administration, support	0.84
Wholesale trade, excluding motor vehicles	0.82
Security and investigation	0.48
Manufacture of furniture	0.36

Source: Authors' calculations using the 2009 Nigerian General Household Survey (FRN/NBS 2010).
Note: The subsectors are International Standard Industrial Classification (ISIC) revision 4 categories, as reported in the GHS.

per unit of human capital, value-added per hour worked, and value-added per hour worked by each unit of human capital (see Appendix 5D for details). We report the results excluding the oil and gas sector, but the adjustment to the results of including that sector are similar to what was seen in Table 5.2, where overall growth in labor productivity is slower, but structural change accounts for a larger fraction of that growth.

Our results show that from 1996 to 2009, human capital productivity grew by 2.3 percent per year—roughly half of what we saw for growth in labor productivity (Table 5.5, panel A). This implies that human capital per worker roughly doubled, accounting for a large portion of the raw labor productivity increase. Of this, the share attributable to the structural shift of human capital between sectors was about a 0.5 percentage point—which is a share proportionally similar to, if slightly higher than, that seen for labor productivity. The similar breakdown of growth into within-sector and structural change growth

TABLE 5.5 Structural change was broad based in terms of human capital

Components of productivity change using human capital, 1996–2009				
	Time periods			
Components	1996–1999	1999–2005	2005–2009	1996–2009
Panel A: Productivity per unit of human capital				
% change productivity	–1.9	1.2	7.4	2.3
of which:				
% "within-sector" productivity	–2.0	4.2	3.1	1.8
% "structural change"	0.1	–3.0	4.3	0.5
Panel B: Productivity per hour				
% change productivity	6.1	3.5	7.4	5.3
of which:				
% "within-sector" productivity	4.8	7.2	3.7	4.3
% "structural change"	1.3	–3.7	3.6	0.9
Panel C: Productivity per hour of human capital				
% change productivity	0.8	1.2	8.0	3.1
of which:				
% "within-sector" productivity	2.2	3.7	4.3	2.7
% "structural change"	–1.3	–2.5	3.7	0.5

Source: Authors' calculations using data described in Appendix 5D.

Note: The panels show the decomposition of productivity growth in the noted periods. For a comparison, see Table 5.2, which measures productivity in terms of output per worker.

implies that the shifts of human capital were broad based. That is, there is not any indication that only high-education or low-education workers were moving from and into sectors.

What about productivity per hour of work? Here, too, our results are quite similar to those for labor productivity (Table 5.5, panel B). In other words, variation in hours across industries is not very significant, and there has not been a significant change in the average hours worked in the whole economy in this period. There is an overall growth in hourly productivity of 5.3 percent per year from 1996 to 2009; of this, a 0.9 percentage point is the result of structural shifts from industries with low hourly productivity to high-productivity industries.

Finally, we can adjust for both hours and human capital, and measure hourly human capital productivity changes. Once again, the overall story remains similar to that of labor productivity (Table 5.5, panel C). From 1996 to 2009, structural shifts into industries with relatively high productivity per

human capital hour accounted for about 0.5 percentage points of the overall 3.1 percent growth rate in productivity. Thus, the structural change in Nigeria over this period was broad based in the sense that individual workers, hours worked, and human capital all shifted similarly out of agriculture and the trade sectors into the rest of the economy.

Potential Gains from Further Structural Change

The big question, though, is whether structural change could have been an even greater force for growth. Here, we ask the following question: If labor (or human capital) had been able to flow into the sectors where it was the most productive, how much higher would value-added per worker (or per unit of human capital) have been? Or taking a forward perspective, how much growth could we possibly still expect from structural change?

To answer these questions we employ a very simple theoretical setting that describes how value-added per worker is related to the number of workers in a sector. It is quite similar to the setting used by other studies on the role of misallocations between sectors (such as Chanda and Dalgaard 2008; Vollrath 2009; and Cordoba and Ripoll 2009). Essentially, we ask how much higher value-added per worker would be if we shifted workers among sectors until we reached the optimal allocation. Notably, we assume that each sector exhibits diminishing returns to labor. This means that moving workers from agriculture to transportation and communications will raise aggregate output per worker, but eventually per-worker productivity in transportation and communications will fall (and that in agriculture will rise), and there will no longer be any gain from moving workers. The optimal allocation is where all workers have the same value-added per worker, and there is no longer any gain from shifting a worker into another sector (see Appendix 5E for more details on the methodology).[4]

Using this method, we find a possible gain in value-added per worker of 54 percent. This gain comes primarily from moving workers out of agriculture. The fraction of workers who remain in agriculture in our counterfactual calculation is only 4.24 percent—a very low number that reflects the extremely low productivity in Nigerian agriculture. Maximizing output per worker would involve shifting a massive number of workers out of low-productivity

4 The implication is that the current allocation of labor across sectors in Nigeria is inefficient, in the sense that income is not maximized. This does not necessarily mean that the allocation is suboptimal from a welfare perspective. There may be costs to shifting labor between sectors that make the current allocations welfare maximizing from an individual perspective.

agriculture into other sectors. In comparison, the proportion in transportation and communications would be 33 percent, and that in finance and business services would be 34 percent. Unsurprisingly, the allocation that maximizes value-added per worker is heavily skewed toward those sectors with the highest actual value-added per worker. If these shifts had occurred over the period under study, 1996–2009, this would have raised labor productivity growth by approximately 3.2 percent per year.

What if we use the units of human capital instead of the number of workers? Now we find value-added could be 25 percent higher if human capital were rearranged among sectors to equalize the value-added per unit of human capital. If this shift had occurred between 1996 and 2009, it would have raised growth in labor productivity by about 1.7 percent per year.

An important caveat to these results is that they ignore the oil and gas industry. A collapse of oil prices or a slowdown of production would lead to a significant loss of GDP, but likely would have an impact on the structure of employment within Nigeria as well. While we cannot calculate a precise number, some of the structural change that has actually taken place to this point is likely driven by oil revenues, leading to greater demand for services—often urban services. If oil revenues were to collapse, then this demand would shrink, causing a shift of labor out of service sectors. Where precisely this labor would go is unclear, but a likely outcome is a flow of labor back into rural areas and possibly agricultural work. Moreover, if oil revenues were to disappear rapidly, the structural change that has occurred so far might come undone.

Levers of Structural Change

Clearly there appears to be great scope for growth through further structural change, but so far, little progress is being made. What are the key barriers that hinder further development? Let us start with the biggest non-oil sector, agriculture, where productivity is still very low.

Agricultural Production Needs to Be Stimulated

A number of constraints on agriculture prevent it from being a larger contributor to the process of structural change. One of the most important is the sector's limited use of fertilizer and improved varieties of crops. Nigeria uses about 10–15 kilograms per hectare (kg/ha) of fertilizer—far below the 100–200 kg/ha used in most developed nations. In the early 2000s, the National Fertilizer Company of Nigeria (NAFCON) was shuttered, and ever

since all the fertilizer used in Nigeria has been imported.[5] Increases in international fertilizer prices have kept imports low, despite the presence of subsidies of 25 percent since 2001 (Phillip et al. 2009).

An additional issue is that the fertilizer that is imported often fails to make it to the smallholders who dominate the agriculture sector. Several barriers prevent an efficient distribution to those who might benefit most, such as poor transportation links from ports to inland destinations and a lack of any meaningful distribution network (Phillip et al. 2009). The World Bank (2007) notes that the density of roads in the rural areas is extremely low, with only 0.06 kilometers (km) of road per 10 hectares of cultivable land, compared with rates of 0.18 km in Tanzania and 0.19 km in India. This leaves 30 million rural inhabitants more than 2 km from the nearest road.

Several studies corroborate that it is actually constraints on the supply of necessary inputs that limit the reach of improved farming techniques, rather than an unwillingness of farmers to try them. In cases where extension services have introduced improved varieties of crops, adoption rates are often above 75 percent, and normally well above 50 percent of treated farmers. However, packages of improvements (which include improved techniques and use of larger quantities of fertilizer) have a much lower adoption rate (World Bank 2008, Annex 6; Taiwo 2007). Moreover, the limited infrastructure to deliver needed inputs to agriculture is mirrored in a lack of infrastructure to get agricultural products to market, with transportation costs between one-third and one-half of the cost of bringing agricultural crops to market (Fade-Aluko 2007).

Another major hurdle, especially for smallholders, is securing financing for improving productivity. One study reports that none of the farmers in its sample in Oyo and Ogun states was able to access conventional bank loans to finance projects, relying instead on cooperatives or friends and family (Phillip and Adetimir 2001). At a national level, the loan picture is getting even worse. The Central Bank of Nigeria reports that in 1993, 16.4 percent of all loans were made to the agriculture sector, while by 2009 that percentage was down to 1.5 percent (CBN 2010). In terms of total value-added from agriculture, loans were equal to 12 percent of the total in 1993 and only 3 percent by 2009.

Three parastatal entities are supposed to deliver credit services to the agriculture sector. The Nigerian Agricultural, Cooperative, and Rural Development Bank was created in 2000 to provide credit directly as well as

5 A company named Notore acquired many of the assets of NAFCON in 2009, and is now beginning to produce again for the domestic market.

loan guarantees. The Agricultural Credit Guarantee Scheme Fund has existed for more than 30 years, guaranteeing credit on behalf of farmers. And the Agricultural Credit Support Scheme was established in 2006 to subsidize commercial bank loans to the agriculture sector. But the extent to which these institutions have penetrated the rural market is quite limited.

Over the past decade, there have been several major policy initiatives to improve the situation, although all of them have fallen short. The Presidential Initiative on Cassava—launched in 2002 to increase the production of starch, chips, and flour, and raise exports of cassava products by $5 billion by 2007—has received only a fraction of the 65.6 billion naira budgeted (FAO). Major constraints to exporting cassava include a lack of adequate storage facilities, a lack of railway systems for moving large volumes of cassava from inland production areas to processing plants, and a lack of port facilities for agricultural exports.

Similar issues plague the Presidential Initiative on Rice and the Presidential Initiative on Vegetable Oil Development. Promised funds have not been released, and output and the ability to process the output have not grown appreciably. In fact, neither rice nor cassava production has grown any faster than maize, a crop that was not subject to a specific initiative (Phillip et al. 2009).

The bottom line is that the shifts of labor out of agriculture are a positive contributor to aggregate labor productivity growth. But if better practices—such as increased fertilizer use and better infrastructure for bringing crops to market—were adopted, the gains to agricultural labor productivity could be quite large, accelerating the structural changes that are now proceeding only very slowly.

Trade Policies Need to Be Further Liberalized

The specific patterns of tariff protection within certain sectors are closely correlated with the patterns of employment within those sectors, although the tariff protection itself does not appear to have a significant effect on the scale of structural change itself. This shows up most clearly within manufacturing.

Overall, manufacturing raised its share of employment from 1.9 percent in 1996 to 4.1 percent in 2009. Within that sector, tariffs on intermediate and final goods vary by subsector.

For four key subsectors (food and beverages, textiles, wood products, and paper and printing), there is a distinct degree of tariff escalation across stages of production (WTO 2005)—meaning low tariffs on imports involved in the initial stage of production (that is, raw materials) combined with high tariffs

on imports of the final goods. As a result, raw materials and necessary inputs can be purchased relatively cheaply, while their output is competitive because of the high end-product tariffs. The differences in tariff rates between the final and initial stages are quite large (20 percentage points for food and beverage, 25 for textiles, 30 for wood products, and 15 for paper and printing).

The protection accorded these subsectors shows up in sectoral allocations. In manufacturing, the subsectors with the largest shares of workers are food products (1.38 percent), wearing apparel (0.89 percent), and furniture (0.36 percent) (Table 5.4). While none of these shares is particularly large relative to the economy as a whole, these subsectors form the dominant proportion of all manufacturing work.

Textiles are a particularly interesting case, as they face not only a favorable tariff structure but also outright import bans on 70 percent of tariff lines—which continue to exist despite Nigeria's adoption of the Economic Community of West African States common external tariff in October 2005. Yet despite this degree of protection, the share of labor working in textiles has been falling, and a vibrant textile industry has yet to materialize. Moreover, these measures appear to have diverted resources into smuggling (Raballand and Mjekiqi 2010). One issue may be that after the Multi-Fibre Arrangement expired in 2005, a flood of low-cost producers from Southeast Asia and elsewhere entered the market. While Nigeria may have low-cost labor capable of supporting a larger textile sector, it becomes uncompetitive once nonlabor costs to trade are factored in.

Tariff structures for the remaining areas of manufacturing do not have a similar escalation across stages of production. For nonmetallic mineral products, tariffs on initial-stage products are nearly 10 percentage points higher than final-stage tariffs, meaning that producers face high input costs and limited output protection. Within the manufacturing sector as a whole, then, tariff patterns appear to be closely correlated with the type of work done. This pattern favors food, textiles, and furniture production relative to the remaining subsectors. But while the protection ensures that these sectors do not face intense international competition, it has not engendered any sustained expansion of these sectors.

In general, agricultural end products face very high tariffs. From the late 1990s until 2002, the average tariff rate on the output of the agriculture sector was 27 percent, rising to 42 percent after that. This compares with an average tariff on the output of the manufacturing sector of 24 percent prior to 2002 and 28 percent afterward. Within agriculture, fruits and vegetables carry import tariffs of 98 percent; tobacco, 90 percent; and nonwater beverages,

75 percent. Additionally, several agricultural products are simply prohibited from being imported (like wheat flour, sorghum, cassava, and frozen poultry). Although numerous products were removed from the banned list in October 2008, the remaining bans cover many goods with significant trade possibilities. Similarly, imports of major construction goods (like cement, steel, and wood) are restricted. In each case, this leads to shortages and higher prices for construction projects. In the case of timber, builders are forced to use local hardwood, which is more expensive and could otherwise be exported.

On the export side, several programs were set up to explicitly foster growth. The Export Expansion Grant (EEG) program makes grants of 15–30 percent of export value. A similar Manufacture-in-Bond (MIB) program involves the duty-free importation of raw materials for use in producing exportable products. Also, the Pioneer Tax program provides tax holidays for those who export at least half of their total production. And there are 17 free trade zones (FTZs), some of which target specific industries (particularly oil and gas).

How have these programs fared? One recent study finds a very limited impact, citing a low uptake of the programs (Mousley 2010). It says that only 94 firms accessed the Pioneer Tax program from 2006 to 2010, while almost all FTZs are related to oil and gas. Further, the EEG and MIB programs generated very few jobs, with firms stymied by daunting documentation requirements.

More broadly, policy and practice act to limit trade. Nigeria ranked 144th out of 181 countries in the World Bank's Doing Business 2009 rankings (World Bank). Hurdles include a large number of export documents required (10 for Nigeria, compared with 6 in Ghana and 4 in Singapore); high export container costs ($1,179, which is roughly twice that of the most efficient operators in the world); hefty import container costs ($1,306, which is between two and three times higher than the most efficient countries); and lengthy import clearance times (nearly 42 days, compared with 26 in Kenya, 29 in Ghana, and only 3 in Singapore).

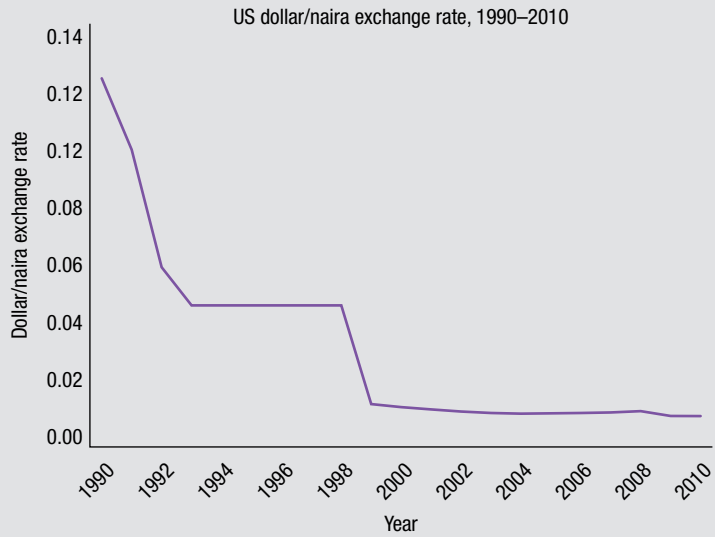
Complicating matters is the naira's exchange rate. Although the naira has maintained a stable exchange rate with the US dollar over the past 12 years, following a major depreciation in 1999 (Box 5.1), the dollar itself has been slowly depreciating over most of this time period versus other major currencies (especially the euro and pound sterling). Given that the United Kingdom and Europe are major trading partners with Nigeria, this means that imports from those countries have been getting more expensive over time, limiting further the ability to import necessary inputs. While the depreciated exchange rate should also make exports more competitive, restrictive tariff policies and

BOX 5.1 The naira's role in foreign trade

The sharp depreciation of the naira after 1999 (Figure B5.1)—part of the package of financial reforms that took place with the return to democracy—should have made exporting more lucrative and raised the prices of imports. Also, the more transparent foreign exchange management system has led to a much less volatile exchange rate, which has helped boost oil revenues.

However, the sectors that may have been expected to benefit through exports (like textiles) have not expanded appreciably because of the high costs of exporting. On the other hand, the depreciated naira—not only in nominal but also in real terms—has increased the cost of imports, which has had direct effects on consumer prices of food and vegetable oils, as well as on imports that may be useful in raising productivity. An example is fertilizer, whose limited use stands as a major barrier to higher agricultural productivity. Still, an open question is whether a further depreciation will be needed in the absence of trade liberalization.

Figure B5.1 Stability after depreciation



Source: Authors' calculations from the World Development Indicators database (World Bank, various years).
Note: A lower dollar/naira exchange rate value means a depreciation of the naira.

the lack of infrastructure have likely prevented Nigerian exporters from taking full advantage.

In the end, the restrictive tariff policies and import bans have acted to freeze Nigeria's economic structure. Insulated from competition, there is little incentive for firms to improve their productivity, which would allow for either an expansion of output or a shift of resources away from the protected sectors. The tariff structure has managed to focus manufacturing on several specific subsectors, but it has not been able to significantly boost manufacturing employment overall. Import bans have not provided any incentive for domestic industries to expand, instead simply shifting trade into unofficial channels. The costs of necessary inputs that would contribute to productivity growth (like fertilizer and cement) are made more expensive by an exchange rate policy that favors a stable but devalued naira.

Moreover, regardless of the precise tariff policies in Nigeria, competition from numerous other developing countries producing similar entry-level manufactured goods (like textiles)—but operating with lower transportation costs—certainly hinders the ability of manufacturing to grow significantly. To the extent that there are economies of scale involved in manufacturing, then the developing industries in Southeast Asia will continue to be lower-cost producers than those in Nigeria. Overcoming that advantage and making manufacturing exports a driver of structural change will require a significant reduction in costs in Nigeria, either directly through lowering the logistical barriers to trade or indirectly by a significant devaluation of the naira.

Infrastructure Needs to Be More Widespread and Reliable

A commonly cited reason for low productivity in Nigerian industry is the lack of reliable power. As a result, firms are forced to rely on self-generation to ensure electricity supplies, which requires substantial resources that could otherwise be used to invest in the firms' productivity or for expansion and the creation of new wage positions. Take the following examples.

- Nigeria produces only around 4,000 megawatts (MW) of power—far below the 39,000 MW of South Africa, with only one-third of Nigeria's population (World Bank 2007).
- In the 2002 World Bank Regional Program on Enterprise Development survey, about 94 percent of firms reported power as being their number one problem—more than twice the percentage of any other individual constraint on growth—and more than 90 percent of them had some facility to generate their own power (World Bank 2002).

- A 2003 survey of firms in Abia and Anambra states found that 90 percent of firms named infrastructure as a constraint on their business, and 85 percent cited the high cost of utilities (World Bank 2007).
- Up to 15 percent of total payrolls for industrial firms in Nigeria goes toward maintaining self-generation facilities; 20 percent of the costs of new investment projects is for infrastructure investments (like power, water, and telecoms); and 22 percent of the value of equipment and machinery in business is for electricity generation (World Bank 2007).

Thus, it seems safe to assert that disruptions and limitations caused by the sporadic power supply are a significant constraint on Nigerian manufacturing and industry, leading to a constriction of the nonagriculture sectors. At this point, fewer firms are entering the manufacturing sector because of the high costs of start-up associated with providing one's own power, and firms are operating below capacity because of the lack of reliable power supplies.

Similarly, infrastructure related to transportation is a major problem for industry. While some roads are relatively well maintained (for example, Lagos-Kano), almost half (46 percent) of Nigeria's roads are classified as being in poor condition. More than half of the local roads, in particular, which constitute two-thirds of the total kilometers in the system, are in poor condition (World Bank 2007). The railway system also has major problems that make reliability low and limit its usefulness to industry. Locomotive availability at the Nigerian Railway Corporation is only 6 percent, compared with an average of 75 percent in the rest of Africa. Wagons and passenger coaches both have an availability of less than 30 percent (World Bank 2007). As a result, nearly all cargo is transported by road.

One notable contrast to these infrastructure problems is telecommunications. Following liberalization in 1999, this subsector has grown demonstrably, with four mobile operators and more than 20 fixed-line operators. The density of telephone subscriptions reached 16 percent by 2005 from a rate of less than 1 percent in 2000. We noted before the rapid growth of the telecommunications subsector as a part of the overall growth in the transportation and communications sector. It is worth recalling that this subsector also showed the most notable growth in labor productivity between 1996 and 2010. It is regulated by the Nigeria Communications Commission, which is independent of the national telecommunications company NITEL, in which the government is pursuing the sale of a large stake.

In other areas of infrastructure, the Infrastructure Concession Regulatory Act of 2005 allows for public–private partnerships in delivering electricity,

water, and other basic utilities. The act allows the government to contract with private companies to either build, operate, and transfer new infrastructure projects, or take on the repair, maintenance, and operation of existing facilities. An Infrastructure Concession Regulatory Commission was established to regulate and monitor the contracts. To the extent that these new regulations will generate an expansion in infrastructure services similar to telecommunications, they can foster positive structural change, although at this point the verdict is still out.

Human Capital Needs to Be Further Developed

A final major barrier to structural change appears to be the lack of suitable human capital for formal sector, technical jobs. As a recent World Bank report notes, "...there are mismatches between skills being developed by present public policies and those required to support structural change and employment in the labor market" (Billetoft 2010). This is a problem for a nation with only 28 percent of young people (age 15–25) in the labor force, and only 63 percent of them age 25–35.

The first source of this mismatch can be traced to general education. Even in 2009, a large portion of the workforce (including most agricultural workers) consisted of individuals with only a primary education. The actual breakdown was: about 37.0 percent of all individuals over the age of 20 had completed only primary school or less; 6.0 percent had completed junior secondary school; 34.0 percent had completed senior secondary school; 8.0 percent had the equivalent of a baccalaureate degree (which includes the Higher National Diploma); 2.1 percent had a postbaccalaureate degree; another 10.0 percent obtained the National Diploma, the Nigerian Certificate in Education, or nursing degrees (all technical or vocational tertiary degrees); and less than 0.1 percent had completed a degree at a vocational or technical college that serves as an alternative to senior secondary school.

The lack of graduates from this last group seems particularly relevant to the process of structural change. These programs involve teaching skills, such as electrical installation, welding and fabrication, bookkeeping, plumbing, and carpentry. While higher education is generally valuable, the supply of graduates with baccalaureate degrees appears to be out of proportion to the supply of graduates with the skills appropriate for the developing manufacturing and construction sectors.

A reason for the limited supply of workers who may be likely to move into growing sectors—such as manufacturing and construction—is that the

National Board of Technical Education (NBTE) has not been able to provide sufficient resources to train these students. The African Development Fund (2005) found that technical colleges are unable to respond to labor market needs because their capital and methods are outdated.

In an effort to improve the education picture, two types of new institutions were introduced by the Federal Ministry of Education in 2007—the Vocational Enterprise Institutions (VEIs) and Innovation Enterprise Institutions (IEIs). These privately run institutions serve secondary school leavers (VEIs) and those with some postsecondary education (IEIs). They were designed to equip the students with the technical skills demanded by industry, enabling them to take on formal-sector jobs that otherwise they would not be qualified for, even if they held baccalaureate degrees. The NBTE reports that in 2008 a total of 138 program areas were being offered in 2 VEIs and 22 IEIs (Billetoft 2010). It is too early to evaluate whether these institutions will have a material impact on structural change within Nigeria, as their first graduates only entered the job market in 2010.[6]

Several tertiary institutions (including the polytechnics and monotechnics) ostensibly already provide some of this kind of training, although their poor funding and low status serve as roadblocks to increasing their enrollment (Billetoft 2010). In 2000, the Ministry of Education formulated a Master Plan for Technical and Vocational Development, with proposed actions to take in the following decade (Billetoft 2010). One of the main tools called for was the creation of a National Vocational Qualifications Framework, which would standardize the certification of programs, thereby allowing the private sector to step in and take on a more active role in providing skills training. However, to date, this idea, too, has yet to be fully realized.

Focusing on Barriers to Growth

As policy makers debate the road ahead for Nigeria, it is encouraging to know that growth-enhancing structural change is occurring in Nigeria, with employment tending to shift from agriculture and trade activities into manufacturing, transportation, and services. We find that between 1996 and 2009, structural change accounted for about one-quarter of the overall growth in labor productivity (4.5 percent), excluding the oil and gas sector, with the remainder accounted for by within-sector productivity growth. Moreover, if

6 There are not enough observations of individuals in the GHS with vocational schooling to make any concrete statements about their unemployment rates versus those with higher degrees.

we include oil and gas, the structural change share rises to three-quarters of overall labor productivity growth (2.2 percent). This transition fits within a typical model of structural transition, with labor leaving agriculture and basic trade activities and moving to higher-productivity activities. Looking more closely, the main beneficiaries of this shift were the food products, textile, and wood products subsectors of manufacturing, as well as education, office services, security services, and telecommunications.

This push-out of agriculture has occurred despite the lack of appreciable gains in total agricultural output in this period—likely constrained by a lack of fertilizer and poor infrastructure. Without those constraints, the transition out of agriculture to higher-productivity sectors may well have been higher. Moreover, we hypothesize that removing those constraints could induce a larger structural shift in the future.

For the manufacturing sector, the lack of sufficient infrastructure to support high-productivity activities has likely led to its relatively slow growth. This includes not only utility provision but also the availability of efficient transport and port facilities, which lower the cost of trade. Sectors that have grown quickly, such as telecommunications, have done so in an environment explicitly free of many of the regulatory barriers in other sectors.

Complicating matters has been an apparent mismatch of the skill development of the Nigerian workforce and the needs of high-productivity sectors. The trade and vocational skills that are demanded by many sectors are not being adequately supplied by the technical education system—as manifested in the relatively low labor force participation rate for the younger generations of Nigerian workers.

We estimate that removing those barriers and allowing the economy to efficiently allocate human capital among sectors would raise value-added in Nigeria by about 25 percent. In other words, these barriers are holding back a potentially significant source of growth in labor productivity in Nigeria.

Appendix 5A: Translation of ISIC Revision 4 to ISIC Revision 2

Data from later years of the Nigerian GHS (2006 through 2009) use ISIC revision 4, while the earlier data use revision 2. To make data comparable, we translated the revision 4 codes into revision 2 categories, following the standard concordance provided by the United Nations Statistical Division. The following shows the two-digit ISIC revision 4 codes that were included under each one-digit ISIC revision 2 category:

- 1 (Agriculture, Forestry, and Farming): 01, 02, 03
- 2 (Mining and Quarrying): 05, 06, 07, 08, 09
- 3 (Manufacturing): 10 through 33, inclusive
- 4 (Electricity, Gas, and Water): 35, 36
- 5 (Construction): 41, 42, 43
- 6 (Wholesale and Retail Trade and Restaurants and Hotels): 45, 46, 47, 55, 56
- 7 (Transport, Storage, and Communications): 49, 50, 51, 52, 53, 58–63 inclusive
- 8 (Finance, Insurance, Real Estate, and Business Services): 64, 65, 66, 68, 69–82 inclusive
- 9 (Community, Social, and Personal Services): 84–96 inclusive, 99
- 10 (Activities not adequately defined): 97, 98, 99

Assigning National Accounts Data to Industries

The breakdown of Nigerian GDP into economic activities does not conform directly to the ISIC revision 2 categories of activities. The following lists the one-digit ISIC codes and the economic activities from the national accounts that were aggregated into them:

- 1 (Agriculture, Forestry, and Farming): crop production, livestock, forestry, fishing
- 2 (Mining and Quarrying): coal mining, metal ores, and other quarrying
- 3 (Manufacturing): oil refining, cement, and other manufacturing
- 4 (Electricity, Gas, and Water): water
- 5 (Construction): construction
- 6 (Wholesale and Retail Trade and Restaurants and Hotels): whole sale and retail trade, hotels, and restaurants
- 7 (Transport, Storage, and Communications): road transportation, rail transportation, pipelines, water transportation, air transportation, post office, telecommunications, and broadcasting

- 8 (Finance, Insurance, Real Estate, and Business Services): financial institutions, insurance, real estate, and business services
- 9 (Community, Social, and Personal Services): public administration, education, health, private nonprofits, and other services

Two economic activities listed in the Nigerian national accounts data are not included in our calculations. The first is the oil and gas sector, which is excluded because of its large size and relatively small local labor force. The second is the electricity sector, which in the national accounts data experienced an unexplained increase in GDP of approximately 1,000 percent in 2003.

Appendix 5B: Employment Data

To define who is included in our measures of employment, we use a common question across all the GHS: "What was your main job in the last week?" The possible answering options are: (1) worked for pay, (2) got job but did not work, (3) worked for profit, (4) attached but did not work, (5) got an apprenticeship, (6) stayed home, (7) went to school, and (8) did nothing.

We count anyone under the first five categories as being employed. Haywood and Teal (2010) use a similar definition, but also include those who did nothing but reported themselves as either looking for work or recently laid off. We have excluded those individuals, as our interest is ultimately in the sector affiliation of employed workers, and these job seekers have none listed. Table 5B.1 shows that employed workers were approximately one-third of the entire sample over all years.

We can describe several features of employment that conform to common findings regarding the Nigerian labor market. First we identify individuals involved in wage work as those who responded "worked for pay" to the question regarding their main job. We also count as wage workers those who reported "got job but did not work," "attached but did not work," or "apprenticeship"—along with reporting their employment status on a separate question as "employee."[7]

While we have 10 different surveys available, several irregularities in the data confine our analysis to a limited number of years. By focusing specifically on 1996, 1999, 2005, and 2009, we can track changes over the longest possible time period, while still providing some information on intermediate

7 The other alternatives for this separate questionnaire are "Employer," "Own account worker," "Member of cooperative," "Unpaid family worker," and "Other."

Table 5B.1 Summary data from Nigerian General Household Surveys, 1996–2009

Category	1996	1997	1998	1999	2005	2006	2007	2008	2009
Observations (number)	28,168	32,164	34,249	35,567	97,699	83,880	83,700	85,183	107,425
Percentage employed	33.6	34.0	34.7	36.3	35.1	32.3	32.4	33.4	36.0
Of employed:									
Percentage with wage work	9.6	9.1	10.7	10.6	10.9	11.1	11.1	13.6	11.4
Percentage women	35.4	33.3	36.4	37.6	40.1	37.0	37.0	41.7	40.9
Percentage with second job	6.3	5.5	7.8	7.6	38.7	12.8	12.7	17.3	17.6
Age 15–25 (number)	5,308	6,202	6,542	6,587	20,429	16,549	16,557	16,321	21,207
Percentage employed	26.2	27.4	28.6	29.2	28.7	24.0	24.0	25.7	29.7
Percentage in school	40.2	39.8	41.7	43.6	49.2	44.3	44.3	43.1	46.3

Source: Authors' calculations using the Nigerian General Household Surveys (FRN/NBS 1996–2009).
Note: Definitions of the different percentage breakdowns are described throughout the chapter.

years. The problems relate to the nature of the data on industry of employment, notably in 2006 and 2007, when there is an aberration—17 percent of the labor force is coded as working in coal mining (compared with essentially 0 percent in the prior and following years). We believe that these individuals may have been miscoded as "service sector workers," but we have no way of identifying the right sector more precisely.

For 2008, the reported industry codes do not correspond directly to the ISIC definitions. In 2010, there is a distinct shift of employment into manufacturing (roughly an additional 6 percent of the labor force) that appears anomalous compared with the movements into manufacturing over the rest of the years. Again, as we have a relatively long time frame by summarizing data from 1996 to 2009, dropping the years with suspicious outcomes does not severely limit our ability to measure the role of structural change.

To stay consistent, these industries are all coded to match the top levels of ISIC revision 2. This gives us nine major sectors, as well as a tenth for "activities not adequately defined." The most important sectors, both in size and in terms of changes over this period, are agriculture, manufacturing, wholesale and retail trade, transportation and communications, finance and business services, and general services.[8]

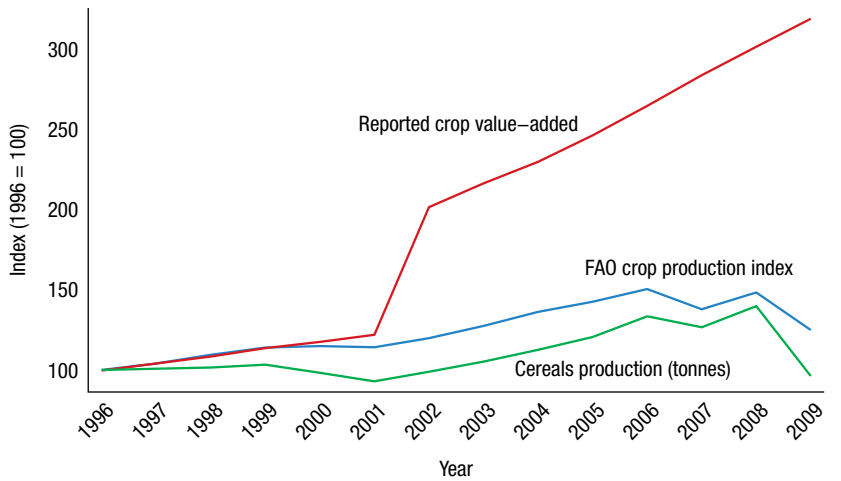
8 The other sectors are mining and quarrying; electricity, gas and water; and construction. These three account for very small fractions of the labor force and do not reveal large changes in those fractions over time.

Appendix 5C: Value-added Data

Data on value-added are available from 1990 to 2010. These data are reported in constant 1990 US dollars, calculated using sector-specific deflators applied to sector-specific nominal value-added. The specific sectors do not conform directly to the two-digit ISIC revision 2 categories on which our labor force data are organized. We aggregate the reported sectors from the Nigerian national accounts into the two-digit ISIC categories ourselves.

Two anomalies in the reported value-added data require modification. In particular, crop production (a large component of total agricultural value-added) experiences an unexplained spike in output in 2002. This will inflate the measure of aggregate labor productivity, as well as labor productivity in agriculture. Figure 5C.1 shows a plot of the reported crop production value-added from the national accounts data, as well as two measures of real crop production from the Food and Agriculture Organization of the United Nations (FAO). All are scaled to 100 in 1996 to facilitate comparison. The one-time spike in production in the national accounts data can be seen clearly in 2002. Additionally, after 2002, the growth rate of the value-added in crop

Figure 5C.1 Measures of crop production, 1996–2009



Source: "Reported crop value-added" is from the Nigerian national accounts, in constant 1990 dollars. "FAO Crop Production Index" and "Cereals production (tonnes)" are both from the FAOSTAT database (FAO various years).

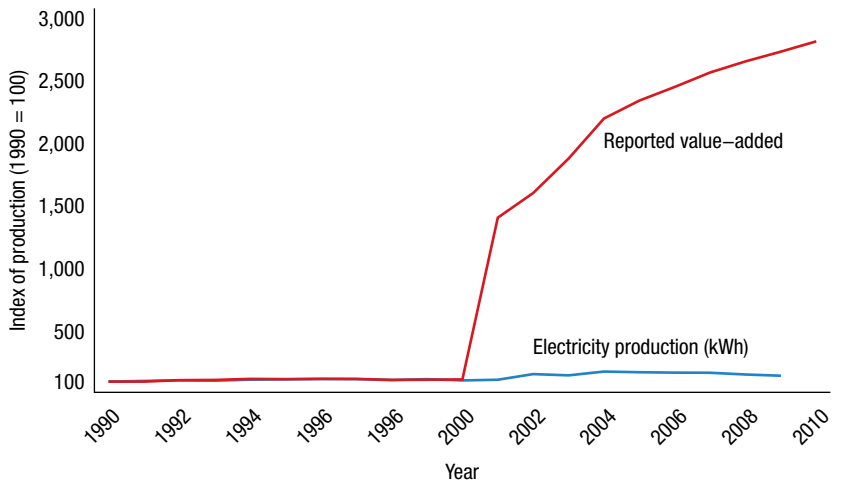
Note: Each series in the figure has been scaled to equal 100 in 1996. The crop production index is a measure created by FAO to capture production of field crops valued at reference world prices, constant at 2005 international dollars. Cereals production is the metric tons of rice-milled equivalents of major cereal crops produced. Rice-milled equivalents scale crops by nutritional value to be comparable.

production is much higher than the apparent growth in real output, as evidenced by the other indexes.

A similar issue appears with respect to value-added in the electricity sector. Here there is a disjoint in the series in 2001, with value-added rising by roughly 1,300 percent in one year. Figure 5C.2 shows how the reported value-added in electricity evolves compared with kilowatt-hours (kWh) reported in the World Development Indicators (WDI) database (World Bank, various years). As can be seen, the jump in 2001 is remarkable, and there continues to be a distinct upward trend after 2001 that is not matched in the WDI data.

We adjust the electricity value-added data in a manner similar to that used for the process of crop production. For 2001, we assume that the growth rate of electricity value-added is equal to the average growth rate after 2001. This eliminates the one-time spike in value-added in 2001, but retains the pattern of growth in the value-added data subsequently. Given the relatively small size of the electricity sector, this change does not have a material impact on the role of structural change in aggregate growth.

Figure 5C.2 Measures of electricity production, 1990–2010



Source: "Reported value-added" is from the Nigerian national accounts, in constant 1990 dollars. Authors' calculations using the Nigerian General Household Surveys (FRN/NBS various years). "Electricity production (kWh)" is taken from the World Development Indicators (World Bank, various years).

Note: Each series in the figure has been scaled to equal 100 in 1990.

Appendix 5D: Human Capital and Hours Worked

There are distinct differences across industries in the human capital levels of workers. As can be seen in Table 5D.1, in agriculture, most workers have completed only primary education, and just about one-third have completed secondary or postsecondary schooling. In the trade, transport, and manufacturing industries, roughly half of the workers have only a primary education, with the remainder possessing secondary or postsecondary education. It is only in the general services and finance and business services industries that a significant majority of workers have completed at least secondary schooling. In services, roughly half have completed postsecondary education, which includes not only typical bachelor's degrees, but also vocational degrees (such as nursing certificates, the Higher National Diploma, or the National Diploma).

What these differences imply is that while output per worker may be much higher in finance and business services than in agriculture, output per unit of human capital may not be. To address the role of the reallocation of human capital across sectors, we generate for each individual in our dataset an imputed level of human capital based on a standard Mincerian technique. This method has two components. First, it assumes that workers' human capital is a function of their stock of schooling. Specifically, human capital is equal to $exp(S)$, where S is the stock of schooling. Second, the stock of schooling is equal to a rate of return applied to each year, $S = \varphi \times years$, where φ is a coefficient that is derived from studies of labor markets, and captures the average

Table 5D.1 Human capital and hours worked by industry, 2009

Sector	Percentage with highest level of schooling				Average weekly hours worked
	Below primary	Primary	Secondary	Postsecondary	
Agriculture	2.9	64.1	28.0	5.1	40.8
Wholesale and retail trade	1.1	50.8	40.4	7.7	43.7
General services	0.4	20.7	28.5	50.5	41.2
Transport and communications	0.6	45.6	45.6	8.3	48.5
Manufacturing	0.9	53.9	36.3	8.9	41.5
Finance and business services	0.1	17.9	33.7	48.3	44.5

Source: Authors' calculations using the 2009 Nigerian General Household Survey (FRN/NBS 2010).

Note: The industry definitions are translated from the reported ISIC revision 4 data in the 2009 GHS to International Standard Industrial Classification revision 2 to be consistent with the data across all years. See Appendix 5A for details on the translation.

gain in wage for an additional year of schooling. In our case, we adopt a typical assumption that $\varphi = 0.10$ (a 10 percent increase in wage per year of school). With that value, each individual is assigned human capital equal to $exp(0.1 \times years)$. Using an alternative return rate does not produce results that are qualitatively different.[9] Using the exponential function in this formulation implies that human capital rises with years of schooling, but at a decreasing rate.

One thing to note is that we are assuming that human capital itself is perfectly fungible among sectors. That is, if a female worker has 10 years of education, then her human capital is $exp(0.1 \times 10) = 2.72$, regardless of the sector that she works in. This is a crude measurement of her human capital, and it ignores sector-specific skills that she may possess. Measuring human capital as we do here means that all workers can carry their human capital with them between sectors, so it makes sense to think of productivity per unit of human capital. In the prior section, we considered only productivity per worker. In that formulation, we were implicitly assuming that every worker within a sector was identical in productivity—meaning that when our worker left agriculture she left behind her agricultural human capital and instantly gained a new set of manufacturing human capital. Comparing the two measures allows us to discover if the labor shifts we observe are broad based in the sense that workers of all levels of education are moving, or if it is only a smaller group of workers with specific levels of education who are moving.

With human capital measured for each individual, we can calculate the share of total human capital engaged in each sector. The results present distinct differences compared with the per-worker measures. For example, while 61 percent of workers in 2009 worked in agriculture, only 40 percent of human capital was employed in that sector in the same year. On the other hand, while only 11 percent of workers were employed in the general services sector, nearly 23 percent of total human capital was employed there. Therefore, the gap in human capital productivity between sectors is smaller than the gap in labor productivity between sectors.

9 Practically, for years of schooling, workers with less than primary education are assigned 0 years; those with primary education, 6 years; those with secondary education, 12 years; and those with postsecondary education, 16 years. While some surveys report specifically the years of education completed, the surveys are not consistent in how they report this information across years. Alternative means of allocating years of schooling do not produce meaningfully different results.

Appendix 5E: Calculating the Potential Gains from Reallocation

To begin, each sector *i*'s value-added is described by the following production function:

$$VA_i = X_i L_i^{1-\alpha} \tag{1}$$

where X_i is a fixed-productivity term specific to sector *i*. In terms of more traditional Cobb-Douglas production functions, the X_i combines the role of physical capital and total factor productivity. For our purposes, those quantities are held constant, and so are combined into a single term.[10]

L_i is the labor employed in a sector, and $(1 - \alpha)$ is the elasticity of value-added with respect to labor. This value will be important, in that it determines how much labor productivity will fall (rise) as labor is added to (subtracted from) a sector. Value-added per worker, our measure of labor productivity, is

$$\frac{VA_i}{L_i} = \frac{X_i}{L_i^{\alpha}} \tag{2}$$

As seen earlier in Table 5.5, there are large differences in value-added per worker across sectors in Nigeria. To assess the potential gains from structural change, we will ask how large aggregate value-added would be if value-added per worker were equalized across all the sectors. This will entail moving labor out of low-productivity sectors (such as agriculture) into high-productivity sectors (such as manufacturing). Labor is moved until the value-added per worker in agriculture has risen, and that in manufacturing has fallen, to the same level. At that point, there are no more gains to be exploited.

With *n* sectors, it can be shown that the allocation of labor that equalizes value-added per worker is equal to

$$\frac{L_i}{L} = \frac{X_i^{\alpha}}{\sum_j^n X_j^{\alpha}} \tag{3}$$

10 If we explicitly modeled the role of capital and capital accumulation, then the potential gains would be even larger, as the increased productivity from structural change would induce more investment and a higher capital stock overall.

in sector i. Essentially, the higher X_i is for a given sector, the more labor it should be allocated. Given these allocations, this potential aggregate value-added can be expressed as

$$VA^{Pot} = \left(\sum_j^n X_j^{\alpha}\right)^{\alpha} L^{1-\alpha} \tag{4}$$

where L is the total of all labor available.[11] We are interested in the ratio of potential value-added to actual value-added. This ratio M, which represents the maximum possible gains available from structural change, is written as

$$M = \frac{VA^{Pot}}{\sum_j^n VA_j} = \frac{\left(\sum_j^n X_j^{\alpha}\right)^{\alpha} L^{1-\alpha}}{\sum_j^n X_j L_j^{1-\alpha}} = \frac{\left(\sum_j^n X_j^{\alpha}\right)^{\alpha}}{\sum_j^n X_j \left(L_j/L\right)^{1-\alpha}} \tag{5}$$

To calculate M, we require information on X_i as well as on the fraction of labor currently employed in each sector. We can back out X_i from equation (2) for each sector, given our data on value-added per worker and labor allocations, as well as an assumption regarding α. For our purposes here, we will assume that $\alpha = 0.3$, matching the typical assumptions made in the literature. If the value of α were sector specific, that would complicate the calculations, but would not change the general concept behind our exercise. As it stands, there is little evidence that labor shares differ across sectors substantially (Gollin, Lagakos, and Waugh 2011). Additionally, assuming that $\alpha = 0.3$ matches estimates of the own price elasticity of labor demand found in Hamermesh (1993).

11 We have not explicitly accounted for the change in relative prices that would occur following shifts of labor among sectors. In practice, allowing for such changes does not prove to be significant in such calculations (Vollrath 2009).

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Chapter 6

THE POLITICAL ECONOMY OF ZAMBIA'S RECOVERY: STRUCTURAL CHANGE WITHOUT TRANSFORMATION?

Danielle Resnick and James Thurlow

Long considered the archetype of economic decline in Africa, Zambia more recently has been heralded as an example of Africa's economic resurgence. Thanks to rapid growth during the 2000s, the country reclaimed its "middle-income" status that had been lost after independence in 1964. This coincided with macroeconomic stability and a burgeoning consumer class, symbolized by the rising number of shopping malls in the capital city Lusaka.

Such a rosy picture, however, contrasts sharply with the message presented by multiple scholars, civil society organizations, and political figures during the 2000s. They noted the sharp rise in the cost of living and service delivery for those in low-income neighborhoods (Simatele and Simatele 2009) and observed popular resentment toward signs of growing income disparities (Larmer and Fraser 2007). In addition, the veteran politician Michael Sata, who led the opposition Patriotic Front (PF) until he was elected president in 2011, repeatedly argued that the country had experienced rising unemployment and inequality under the tenure of Movement for Multiparty Democracy (MMD). Over the course of three elections between 2006 and 2011, Sata targeted his campaigns in Zambia's major cities, where rapid urbanization contributed to large numbers of voters. His massive and sustained electoral support among those living in shanty compounds and working in informal markets suggested that his message regarding uneven transformation strongly resonated with a large share of the populace (Cheeseman and Hinfelaar 2010; Gould 2007; Larmer and Fraser 2007; Resnick 2013).

Why did Zambia's growth trajectory change so radically over the 1991–2010 period? Why did Zambians vote out the party that oversaw unprecedented economic growth? And was there any empirical validity to Sata's message? This chapter examines these questions, with a special focus on the sources of economic growth and whether these were associated with positive structural change—defined as a shift in the share of employment toward more productive sectors. We begin with a look at how Zambia's five key economic sectors (mining, manufacturing, agriculture, informal trade, and high-value

services) contributed to social outcomes. Next, we trace how the PF capitalized on perceptions of widening social disparities in urban areas during successive presidential campaigns, even as the MMD attempted to mobilize rural voters and higher-income urbanites who benefited from the MMD's tenure. And we conclude by discussing lessons from the Zambian experience and the long-term potential for social transformation, given recent policy decisions.

Overall, we find that Zambia recovered remarkably from its poor performance in the 1990s, and national welfare was much higher in 2010 than it was in 1991. The 1990s saw de-urbanization and pronounced *negative* structural change, which was only somewhat offset by slightly higher productivity within sectors, leaving overall productivity growth also *negative*. However, the 2000s saw a reversal of these trends, with labor productivity growth up 3.56 percent per year, roughly split between the structural change (1.77 percent per year) and within-sector (1.79 percent per year) components. Even so, for the whole period (1991–2010), the positive structural change of the 2000s did not outweigh the negative structural change of the 1990s. As a result, labor productivity growth for 1991–2010 was only 0.31 percent per year, with the major driver being the within-sector component (0.87 percent per year) and the structural change component still negative (–0.65 percent per year). Had within-sector labor productivity not increased over the past two decades, overall productivity would have declined, because a greater proportion of workers in 2010 found themselves employed in traditionally low-productivity sectors. Moreover, we find that, at least over the short term, the characteristics of the more recent economic growth and positive structural change did not translate into significant social transformation, which was reflected in the country's shifting political landscape.

Dramatic Change in the Role of Structural Change

Zambia's transition to lower-middle-income status in the 2000s reflected the country's rapidly rising level of per capita GDP. This new designation represented a major shift from the 1990s, when Zambia experienced a period of economic decline. At that time, President Frederick Chiluba and his MMD-led government implemented major structural reforms in response to a severe macroeconomic crisis (Rakner 2003). But while total GDP managed to grow at 1.1 percent per year during 1991–2002, this was well below population growth of 2.9 percent per year, causing GDP per capita to fall from US$1,065 in 1991 to US$875 in 2002.[1]

1 All GDP values reported in this paper are in constant 2002 prices and account for differences in purchasing power across countries. Also, all currency is in US dollars, unless specified otherwise. GDP and employment data are discussed in Appendix 6A.

The economic decline occurred in all sectors, except trade services and finance and business services (Table 6.1). The most dramatic slippage occurred in the mining sector, which accounted for almost three-quarters of the drop in GDP. In 1991, mining contributed one-fifth of total GDP, generating most of Zambia's foreign exchange earnings via copper exports. But by 2002, its contribution to total GDP had more than halved, with agriculture and trade replacing mining as Zambia's largest sectors.

In contrast, the 2000s was a period of rapid economic recovery, overseen largely by Chiluba's two successors, Levy Mwanawasa (who entered office in 2001) and Rupiah Banda (who was elected president in 2008 in the wake of Mwanawasa's death). During their tenure, and especially during 2002–2010, total GDP grew at 6.4 percent per year and population growth slowed to 2.3 percent per year. As a result, GDP per capita increased by a third to $1,204 in 2010, marking a return to pre-crisis levels and paving the way for middle-income status.

All sectors contributed to the economic recovery, which saw a major change in Zambia's economic structure. Although much attention has been given to the recovery of copper exports, mining accounted for only a sixth of the increase in total GDP. Instead, construction, communications, and finance dominated economic growth, together accounting for more than half of the increase in GDP. Manufacturing continued its relative decline, with modest gains in GDP driven almost entirely by food processing.

TABLE 6.1 Mining is no longer in the top spot

Shares of gross domestic product, 1991, 2002, and 2010			
Sectors	**1991**	**2002**	**2010**
GDP per capita (2002 US$ PPP)	1,065	875	1,204
Sectoral share of total GDP (%)	100	100	100
Agriculture	15.2	16.9	13.4
Mining	20.1	8.7	10.7
Manufacturing	10.7	11.9	9.9
Construction and utilities	11.7	9.8	15.2
Trade services	18.5	23.3	19.0
Transport and communication	6.1	6.8	10.6
Finance and business	9.8	14.0	12.1
Community services	7.9	8.5	9.2
GDP per worker (2002 US$ PPP)	3,339	2,680	3,544

Source: Authors' calculations using data from the Central Statistical Office (RoZ/CSO 1993, 2004, 2011, 2012) and the International Monetary Fund (1999).

Note: GDP = gross domestic product or total value-added; PPP = purchasing power parity.

Structural Change Is Finally Helping Growth

Did economic growth go hand in hand with positive structural change? To answer this question we look at what types of changes occurred in national labor productivity (that is, value-added or GDP per worker). We use the methodology in McMillan, Rodrik, and Verduzco-Gallo (2014), which decomposes economywide labor productivity into two components: (1) within-sector change: the sum of sectoral productivity changes weighted by initial employment shares, assuming that changes in national employment are distributed proportionally across sectors; and (2) structural change: the additional effect of reallocating labor across sectors after accounting for changes in sectoral productivity (see the Overview in this book for details on the methodology).[2] When workers move, in aggregate, from low- to high-productivity sectors or when job creation is faster in higher-productivity sectors, then structural change is said to have contributed positively to national labor productivity.

Our results show that the roles of these two components varied dramatically during the 1990s and 2000s (Table 6.2). During the structural adjustment period of 1991–2002, value-added per worker fell by $659 (or –1.98 percent per year) from $3,339 in 1991. This decline was almost entirely the result of *negative* structural change, with workers moving out of industry and services into low-productivity agriculture. It was exacerbated by falling productivity within agriculture and industry and was only partly offset by rising productivity in services.

In contrast, the economic recovery in 2002–2010 was associated with a large increase in labor productivity, with value-added per worker rising by $864 (or 3.6 percent per year) from $2,680 in 2002. About half of this increase was attributable to positive structural change, driven by faster employment growth in services and a relative decline in farm employment, where value-added per worker was very low. Productivity improvements within sectors, particularly industry, accounted for the remaining half of economywide productivity growth.

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2 Algebraically, the decomposition is:

$$\Delta P_t = \sum_{i-1}^{N} \theta_{i,t-k} \Delta p_{i,t} + \sum_{i-1}^{N} p_{i,t} \Delta \theta_{i,t}$$

where ΔP_t is the change in aggregate labor productivity between period $t–k$ and t. The first term is the "within" component, which is a weighted average of the change in labor productivity in each of the N sectors, with the weight for sector i being the labor share of that sector in period $t–k$, measured by $\theta_{i,t-k}$. The second term is the "structural change" component, which is a weighted average of the change in labor shares in the N sectors, with the weights captured by the labor productivity of the sector in period t.

TABLE 6.2 Positive structural change is the new story

Labor productivity decomposition, 1991–2010						
	Change in value-added per worker (2002 US$ PPP)					
	1991–2002		2002–2010		1991–2010	
Change components	US$	%	US$	%	US$	%
Total productivity change	–659	100.0	864	100.0	205	100.0
Within-sector component	12	–1.8	435	50.3	595	289.8
Agriculture	–96	14.5	52	6.0	–49	–23.7
Industry	–189	28.7	364	42.1	286	139.1
Services	297	–45.0	19	2.2	358	174.5
Structural change component	–671	101.8	430	49.7	–390	–189.8
Agriculture	40	–6.1	–28	–3.3	16	7.9
Industry	–414	62.8	86	10.0	–439	–213.7
Services	–297	45.1	372	43.0	33	15.9
Annual productivity growth rate	—	–1.98	—	3.56	—	0.31
Within-sector component	—	0.03	—	1.79	—	0.91
Structural change component	—	–2.02	—	1.77	—	-0.60

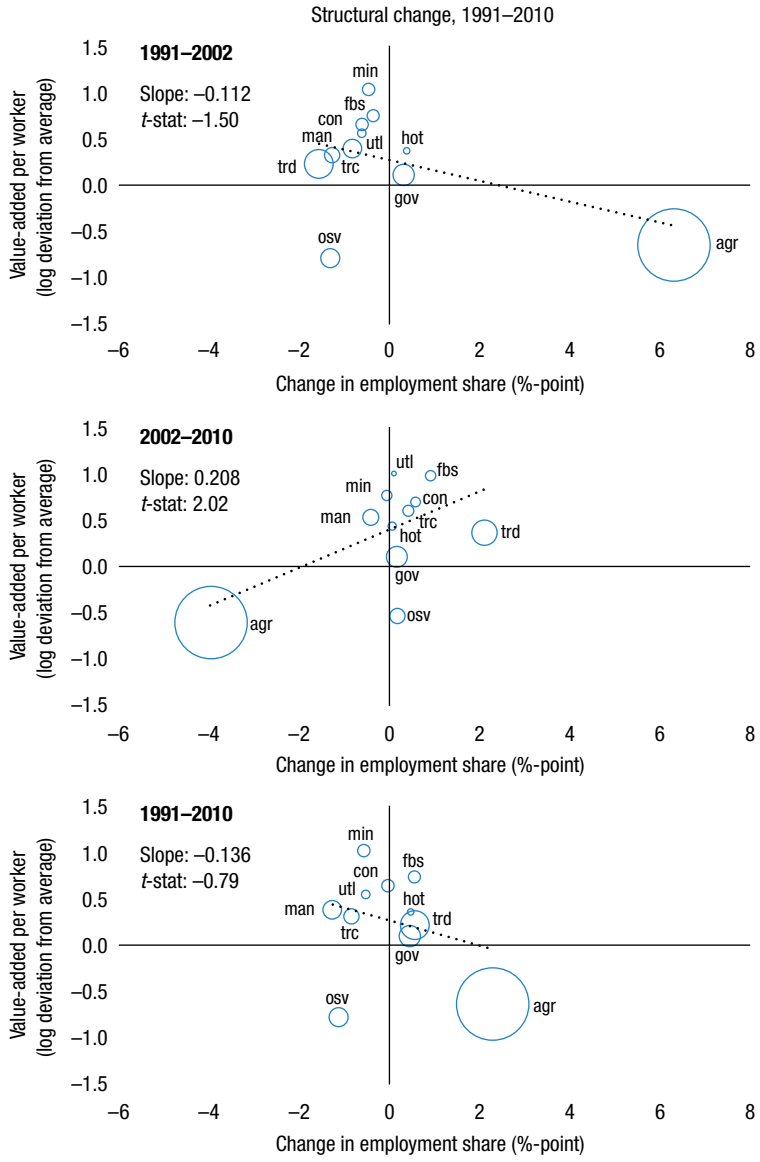
Source: Authors' calculations using data from the Central Statistical Office (RoZ/CSO 1993, 2004, 2011, 2012).
Note: PPP = purchasing power parity.

One way to visualize the pendulum effect that agriculture has had on the economy is shown in Figure 6.1. The vertical axis shows sectoral productivity relative to economywide productivity. A positive value means that a sector generated above-average value-added per worker. The horizontal axis shows the percentage point change in employment shares. A negative value means that a sector's share of total employment has fallen, even if it has grown in absolute terms. The size of the circles represents the sectors' initial contributions to total employment. Given that at least two-thirds of Zambians are farmers, agriculture has the largest circle.

We can see quite clearly that farm employment, especially in low-value subsistence agriculture, dominates structural change (see "agr" in the three charts in Figure 6.1). During the 1990s, there was a shift into agricultural employment as the nonfarm economy contracted. This reduced national labor productivity because all nonfarm sectors generated more value-added per worker than agriculture. Nonfarm employment fell in less productive sectors, such as community services and trade, as well as in high-productivity sectors, such as mining and financial services. Only government services and hotels and catering recorded small increases in employment shares.

The pendulum swung back during the 2000s, with a decline in agricultural employment following the recovery of the nonfarm economy. The largest

FIGURE 6.1 The seesaw role of agriculture



Source: Authors' calculations using data from the Central Statistical Office (RoZ/CSO 1993, 2004, 2011, 2012) and International Monetary Fund (1999).

Note: The size of a circle equals the sector's original employment share. agr = agriculture; con = construction; fbs = finance, business, and real estate; gov = government (administration, health, and education); hot = hotels and catering; man = manufacturing; min = mining; osv = other services (such as domestic work and community services); trc = transport and communications; trd = trade services; utl = utilities (electricity, gas, and water). The estimated slope and its t-statistic are from linear regressions.

increase in employment share was in trade services. Since trade's productivity level is higher than agriculture's, the move from farming to trading represented positive structural change. Nevertheless, productivity is lower in the trade sector than in the rest of the nonfarm economy, so the increase in trade employment only accounted for about a quarter of the total gain from structural change. Most of the gain came from small increases in employment shares in higher-value construction, finance, and communications. Finally, mining's and manufacturing's contributions to national employment stagnated during the 2000s, even though GDP was rising in these sectors. This explains why, unlike services, industrial growth during the 2000s was driven almost entirely by improvements in within-sector productivity, rather than structural change.

The bottom line is that half of the increase in GDP per worker during the 2000s resulted from positive structural change, whereas the decline in worker productivity during the 1990s was almost entirely the result of negative structural change. As Table 6.2 shows, for the full 1991–2010 period there was a small net gain in GDP per worker of $205 (or 0.31 percent per year), which was the result of strong within-sector productivity gains in industry and services, with agricultural productivity declining. However, key negative structural changes of the 1990s were not reversed by the end of the 2000s. This was mainly because of the large decline in the importance of employment in mining and manufacturing—once the sectors with the highest value-added per worker. In other words, while the Zambian recovery in worker productivity was underpinned by positive structural change, it was not driven by a replication of the precrisis era economic structure.

Rising Urbanization and Marginalized Youth

How do these changes in labor productivity relate to overall economic growth and employment in Zambia? And how do they fit into the country's broader demographic and labor market dynamics? The equation below helps explain the relationship between GDP per worker (GDP_{pw}), which was decomposed above, and GDP per capita (GDP_{pc}).

$$GDP_{pw} = \frac{Total\ GDP}{Employment} = \frac{Total\ GDP}{Population \cdot ER} = GDP_{pc} \cdot \frac{1}{ER}$$

GDP per worker is total GDP divided by the number of employed people in the economy.

Total employment in turn is equal to the total population multiplied by the share of the population who participate in the labor market and are able to find

jobs (that is, the employment rate *ER)*.[3] If the share of the employed population remains constant, then GDP per capita and GDP per worker move in unison. If employment rates change, then national labor productivity and GDP per capita diverge. This was the case in Zambia, where GDP per capita grew at 4.1 percent per year during 2002–2010, whereas GDP per worker grew at only 3.6 percent per year. This means that employment grew faster than the population during this period (that is, *ER* increased). The higher employment rate was caused by an increase in labor force participation that outweighed rising unemployment rates (Table 6.3). Conversely, GDP per capita declined more slowly than GDP per worker during 1991–2002 as a result of falling employment rates. This was caused by a substantial drop in the rate of participation in the labor market and a more modest decline in unemployment rates. Demographic and labor force dynamics were therefore important in determining how labor productivity resulting from structural change translated into changing GDP per capita.

Perhaps the most important demographic change was the level of urbanization. From 1991 to 2002, the urban population share fell from 46 to 35 percent when the nonfarm economy contracted—a trend that was most pronounced in the Copperbelt, where most of Zambia's copper is mined (Potts 2005). Although some migrants from urban areas became agricultural workers, adding to the declining share of nonfarm employment, there was also a sharp drop in rural participation rates, suggesting that many migrants opted out of the rural labor market. In addition, the decline in the urban unemployment rate suggests that migrants were often those who were already unemployed in urban areas prior to the reforms. This would also explain why the drop in the urban employment share was smaller than the drop in the urban population share. Migrants appear to have treated family farms in rural areas as a safety net, rather than as an employment opportunity during the reform period. Therefore, the large shift into agricultural employment reported earlier hides an even larger de-urbanization process that was characterized by the inability of both the rural economy to absorb new migrants and the urban secondary and tertiary sectors to provide new employment.

But with the 2002–2010 economic recovery, Zambia began urbanizing again. Although the urban population in 2010 was still well below that of 1991, the urban employment share and the share of nonfarm jobs had both recouped about two-thirds of their previous losses. This was partly the result of a large increase in urban labor market participation, which unfortunately

3 As defined here, the employment rate is the participation rate multiplied by one minus the unemployment rate.

TABLE 6.3 Rising urbanization and high youth unemployment

Employment profiles, 1991, 2002, and 2010			
Demographics	**1991**	**2002**	**2010**
Population (1,000s)	7,896	10,785	12,913
Urban areas (%)	46.0	34.9	36.2
Adolescents, 12–17 years (%)	13.6	17.5	18.1
Youths, 18–34 years (%)	28.4	32.0	32.8
Participation rates (%)	60.5	48.4	53.4
Rural areas	71.6	50.8	55.8
Urban areas	47.9	44.2	49.4
Adolescents, 12–17 years	29.0	9.5	10.9
Youths, 18–34 years	62.2	56.8	63.9
Adults, 35+ years	78.4	65.1	71.2
Inactive adolescents in school (%)	57.4	81.9	94.7
Inactive youths in school (%)	16.4	36.3	61.1
Employed (1,000s)	2,362	3,520	4,385
Urban areas (%)	31.2	27.0	29.2
Nonfarm sectors (%)	31.6	28.3	32.3
Paid formal sector workers (%)	21.6	12.2	15.6
Adolescents, 12–17 years (%)	7.1	3.8	4.0
Youths, 18–34 years (%)	43.9	47.9	48.7
Finished primary school (%)	33.8	36.4	42.7
Finished secondary school (%)	10.2	12.4	17.4
Unemployment rates (%)	21.8	9.4	15.0
Rural areas	14.5	2.0	7.1
Urban areas	34.1	24.9	29.5
Adolescents, 12–17 years	45.9	24.9	30.6
Youths, 18–34 years	25.7	13.9	21.1
Adults, 35+ years	11.9	2.9	5.6
Finished primary school	23.4	10.7	14.1
Finished secondary school	20.8	21.4	25.9
Share of total private consumption (%)	100	100	100
Poorest 50% of the population	6.9	15.4	9.1
Middle 40% of the population	41.3	36.9	38.3
Richest 10% of the population	51.7	47.7	52.6

Source: Authors' calculations using data from the Central Statistical Office (RoZ/CSO 1993, 2004, 2011, 2012).

Note: "Inactive" excludes those who are working (employed) or looking for work (unemployed). Private consumption is based on the official basket of goods used to measure national poverty.

led to not only more urban job seekers but also higher urban unemployment rates. While the economic growth of the 2000s returned GDP per capita to precrisis levels, it did not imply a return to previous demographic structures. Many of the migrants who left urban areas during the reform period still remained in rural areas in 2010, where unemployment rates had started to rise.

One population group that benefited the least during the reform and recovery periods was Zambia's youths—defined here as those ages 12 to 35.[4] Youth participation rates fell during the reform period when adult participation rates were rising, and they did not increase by as much during the recovery. Part of this was a result of Zambia's free primary school program, which began in 2002 and greatly increased the share of youths who opted out of the labor market in favor of attending school. Nevertheless, youth unemployment rates remained very high and rose faster than those for adults during the 2000s. Unemployment rates also increased for better-educated job seekers, suggesting that the economy failed to create enough jobs to accommodate new school leavers, especially those with higher education. Clearly, not all of the labor force participated in the economic recovery.

Sectoral Drivers of Social Change

In the 1990s and 2000s, the growing social disparities were felt more strongly among some groups than others—a pattern that could be traced back to how Zambia's economy was evolving. To better understand what occurred, it is helpful to focus on the following five sectors for a number of reasons. Mining, which is predominantly in the Copperbelt, continues to represent the main driver of Zambia's export revenues, while agriculture remains the sector in which a majority of the population derives its livelihood. Manufacturing, which has been concentrated in Lusaka, collapsed during the reform period and contributed to large-scale unemployment. The sector's inability to fully recover during the 2000s is deserving of special attention. Finally, trade, along with construction and high-value services, represented the main sources of positive structural change during the 2000s, and their expansion highlights a fundamental shift in the foundations of Zambia's economy.

Mining Remained an Enclave Sector

Zambia lost about a third of its mining jobs in the 1990s, prompting large-scale migration back to rural areas in the Copperbelt (Potts 2005). Despite

4 Zambia's own youth policy identifies 35 as the upper cut-off for this group.

TABLE 6.4 Agriculture is driving job growth but not GDP

Drivers of GDP and formal employment growth, 1991–2010						
	GDP (millions of 2002 US$)			Employment ("000s people)		
	Initial	Change over period		Initial	Change over period	
Sectors	1991	1991–2002	2002–2010	1991	1991–2002	2002–2010
Value (US$ millions or '000s)	8,410	1,023	6,108	2,519	1,001	865
Contribution (%)	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture	15.2	30.5	8.1	65.4	87.6	51.4
Mining	20.1	-84.4	13.6	1.9	0.2	1.0
Manufacturing	10.7	21.3	6.8	4.3	1.4	1.3
Utilities	3.3	2.6	1.6	0.9	–1.2	0.7
Construction	8.4	–8.0	21.9	1.9	–0.3	4.2
Trade	17.3	49.3	9.8	10.3	4.8	19.6
Hotels, catering	1.2	14.0	2.5	0.5	1.9	1.3
Transport, communications	6.1	12.1	16.5	2.9	–1.5	3.7
Finance, business services	9.8	48.8	9.0	1.8	0.6	6.1
Government	7.1	11.4	8.9	5.6	6.7	6.7
Other services	0.7	2.3	1.4	4.5	–0.2	4.1

Source: Authors' calculations using data from the R02/CSO (1993, 2004, 2011, 2012) and International Monetary Fund (1999).

the sector's impressive recovery in the 2000s, it failed to increase its share of total employment. While mining generated 14 percent of the increase in total GDP during 2002–-2010, it only accounted for 1 percent of employment growth (Table 6.4).[5] Mining therefore remained an "enclave" sector, with weakening links to the broader economy. It was also one of the main sources of paid employment in 1991, but its declining labor intensity constrained job creation in the formal sector.

Zambia's state-owned mines were very inefficient at the start of the 1990s and were a large drain on the government budget (Thurlow and Wobst 2006). Although privatizing the mines was a cornerstone of the structural adjustment program, this reform did not start in earnest until after 2000. By this time, world copper prices were low, and Zambian copper production had fallen from 430,000 tons in 1991 to 320,000 tons in 2002. This made it difficult

5 Zambia's formal enterprise survey (that is, the Quarterly Employment and Earnings Inquiry) reports that 21,000 paid mining jobs were created in 2002–2009, while the household surveys report only 9,000 new jobs in 2002–2010. Both surveys suggest that mining accounted for a total of almost 60,000 jobs in 2010.

to attract and retain foreign buyers until after 2003, when copper prices rose again. Privatization led to large inflows of FDI that recapitalized the mines and allowed copper production to reach 690,000 tons in 2010—a level that surpassed the previous peak in the 1960s.

One reason why mining growth did not create many new jobs in the 2000s—a period that was driven by rising value-added per worker rather than employment—is that government subsidies in the 1980s created a form of protected overemployment. This artificially high labor intensity ended when the mines were privatized (Thurlow and Wobst 2006). Another reason is that Zambia's mining unions prevented job creation in the 2000s by bargaining for higher wages for "insiders" rather than new jobs for "outsiders" (World Bank 2011). Indeed, high labor costs partly explain why, despite privatization, Zambia has some of the world's least efficient copper mines.

Moreover, mining growth failed to generate much tax revenue. To attract foreign investors when copper prices were low, Zambia had offered low tax rates and royalties as well as generous allowances for writing off investment costs (Otto et al. 2006). In 2010, when copper accounted for most of the value of exported goods—85.9 percent—royalties accounted for only 2.6 percent of government revenues. Moreover, mining taxes accounted for only 3–5 percent of Zambia's export revenues, well below the 25–40 percent level in the rest of the world (World Bank 2011). Thus, the government lacked the revenues that might have been used to spread the benefits of mining growth to the broader economy.

In addition, the main link between mining and the rest of the economy was not job creation or tax revenues, but rather the exchange rate. An increase in world copper prices and mining exports during the 2000s caused the real exchange rate to appreciate—making imported goods cheaper (especially for urban consumers) and constraining exports and job creation in agriculture and manufacturing.

Manufacturing Continued Its Decline

Zambia's manufacturing sector was one of the hardest hit during the reform period, and it struggled to recover afterward. Manufacturing accounted for 6.8 percent of the increase in national GDP during 2002–2010, but only 1.3 percent of employment growth (Table 6.4). This was still a major improvement over the 1990s, when most manufacturing contracted (particularly metals beneficiation). Although manufacturing GDP grew during the 2000s, it lagged far behind the rest of the economy and its composition narrowed dramatically. By 2010, 70 percent of the sector's GDP was from food

processing, up from 50 percent in 1991, while textiles and clothing virtually collapsed.

Why did manufacturing perform so poorly? First, many SOEs could not compete after being privatized in the 1990s—the total number of manufacturing jobs in SOEs fell to 2 percent in 2010 from almost 33 percent in 1991. Second, trade liberalization exposed domestic firms to foreign competition. Zambia's import tariff rates halved from 19.7 to 9.7 percent during 1991–2002 and again to 4.4 percent in 2010.[6] Third, the large influx of FDI and foreign-owned firms into manufacturing generated productivity gains not through horizontal spillovers (that is, technology transfers between firms), but rather through vertical linkages to sectors outside of manufacturing (that is, demand for raw inputs) (Bwalya 2006). Even though foreign firms out-competed local firms, they often strengthened manufacturing's linkages to other sectors. Fourth, Zambia's real exchange rate appreciated in the mid-2000s because of rising copper prices, which lowered the cost of imports, particularly for manufactured goods.

A good example of how Zambian manufacturing suffered setbacks over two decades is the textiles and clothing subsector. In 1991, this subsector was the largest employer within manufacturing, producing a range of products (including cotton, fabrics, and garments). Privatization and deregulation led to large inflows of FDI and, by 2010, multinational companies had come to dominate the country's cotton growing and ginning (Tschirley and Kabwe 2009). Although foreign companies displaced less efficient local companies, their vertically linked outgrower schemes raised the productivity of smallholder cotton farmers and made Zambia one of Africa's larger and more competitive cotton producers. However, unlike in the 1980s, when cotton was supplied to local textile companies, most of Zambia's cotton was now exported. In fact, by 2010, the local textiles industry virtually ceased to exist, despite government efforts to establish export-processing zones (Eliassen 2012), largely the result of increased foreign competition. In 1991, some of Zambia's highest tariffs were on textiles and clothing, but by 2010, these had fallen by two-thirds, leading to a wave of cheap imports from Asia that local firms could not compete against. This was compounded by imported second-hand clothes donated to foreign charities and sold at low prices in Zambia (Hansen 2000). In the end, employment in the textiles sector fell from 25,000

6 Collection rates are import duties collected as a share of the value of imported goods. These are typically lower than statutory tariff rates because of collection inefficiencies and exemptions. Our trade and tariff estimates are calculated using UN Comtrade data for Zambia.

in the 1980s to less than 2,500 in 2002 (Eliassen 2012). And by 2010, textiles and clothing had dropped to less than 0.3 percent of Zambia's GDP from 1.8 percent in 1991.

In contrast, food processing was a success story. One example is the country's largest meat processer, which established a successful partnership with a foreign-owned supermarket chain and is now itself expanding to other African countries (*The Economist* 2013). In this case, manufacturing was a beneficiary of the vertical linkages from upstream FDI. Another example is wheat milling, with millers greatly increasing their production of flour and bread, primarily for urban consumers (Mason et al. 2011). Behind wheat milling's initial success was trade liberalization, which lowered the price of imported wheat and reduced millers' production costs. However, this created tensions with local farmers, and the Zambia National Farming Union eventually convinced the MMD government to ban the import of wheat flour. These restrictions were subsequently removed and reintroduced, reflecting the government's difficulty in balancing the interests of urban consumers, who represent a large share of votes, and commercial farmers. Nonetheless, by 2009, Zambia was self-sufficient throughout the wheat and bread supply chain. Unfortunately, however, these emergent food-processing firms were less labor intensive than either existing food processing or textiles and clothing firms. Consequently, manufacturing as a whole contributed less to national job creation during the 2000s than it did to economic growth.

Agriculture Remained Stagnant

Agriculture is one of Zambia's most important sectors, with at least two-thirds of Zambians living or working on farms. However, agriculture is characterized by a dualistic structure. On the one hand, there exists a well-organized and technically efficient large-scale commercial farming sector that encompasses approximately 8 percent of farmers with landholdings of 20 hectares or more. On the other hand, a majority of the sector, approximately 75 percent of farmers, consists of smallholders with less than 5 hectares of land who use traditional technologies to grow food crops and raise livestock for predominantly subsistence purposes (Thurlow et al. 2012a).[7] Agriculture's productivity was low in the 1990s and remained so even during the economic recovery, and rural poverty rates remained high and virtually unchanged during the 1990s and 2000s. Moreover, while the sector accounted for 51.4 percent of

7 Approximately 17 percent of farmers are known as "emergent farmers," with landholdings of 5–20 hectares (Sitko and Jane 2014).

employment growth during 2002–2010, it accounted for only 8.1 percent of the rise in national GDP (Table 6.4).

In the 1990s, numerous structural adjustment policies were created to improve the sector's performance (Resnick and Thurlow 2009). The main reform was the abolition of pan-territorial maize prices and urban food subsidies. Although this reform raised urban consumer prices, it also led to more appropriate cropland allocations (such as a switch from maize to cassava in the North). This outcome enhanced food security, even though it did not raise agricultural productivity. Cotton farming was another success story, which, as mentioned earlier, benefited from contract arrangements with foreign-owned cotton ginning firms. By the end of the 1990s, a quarter of a million smallholder farmers were growing cotton, which reduced rural poverty, mainly in Eastern Province (Thurlow and Wobst 2006). Nevertheless, these pockets of success were unable to absorb the large influx of migrants as Zambia's population de-urbanized.

Several factors explain agriculture's poor performance. First, most farming in Zambia is rainfed rather than irrigated. The sector was exposed to a series of severe droughts in the 2000s that undermined growth and investment and increased rural poverty (Thurlow et al. 2012b). Second, the prevalence of HIV/AIDS is extremely high in Zambia. Studies indicate that adult deaths reduced farm productivity and exacerbated the effects of droughts (Chapoto and Jayne 2008; Mason et al. 2010). Third, public fertilizer subsidies under the Farmer Input Support Program (FISP) generated modest returns and even then only under fairly ideal agroecological conditions (Zhiying et al. 2009). Evidence also suggests that subsidies may have at times been allocated for political rather than economic reasons (Mason, Jayne, and van de Walle 2013). Fourth, the government established the Food Reserve Agency (FRA) in 1996, which eventually became the dominant buyer of maize in Zambia. Evidence suggests that, even though the FRA raised and stabilized prices, it generated few benefits for small-scale farmers and may have hurt urban consumers (Mason and Myers 2013). And fifth, even though public spending on agriculture rose during the 2000s, approximately 70 percent of the agricultural budget has been directed toward the FRA and FISP (Mason and Myers 2013; World Bank 2012). Less funding was available for other investments that are considered to provide higher returns, such as research and extension (Thurlow et al. 2012a).

Thus, agriculture's stagnation was in spite of large, albeit inefficient, investments in market price stabilization and improved farm inputs. Slow agricultural growth meant that poverty remained high in Zambia and became more concentrated among smallholder farmers (Diao, Hazell, and Thurlow 2010).

Informal Trade Became the Dominant Nonfarm Employer

Trade was by far responsible for the largest increases in nonfarm employment during 2002–2010, accounting for 19.6 percent of total employment growth and 9.8 percent of the increase in GDP (Table 6.4). However, the bulk (more than four-fifths) of the new trade sector jobs created was in the *informal* sector.

In urban areas, informal trade is predominantly retail based and engaged in by street hawkers and market vendors, with more than half of them below the age of 35. Significantly, between 2002 and 2010, one-third of these informal jobs was filled by people who had completed secondary school. Employment in this sector is viewed more as a coping strategy than a source of decent jobs, given that the work is low paid and insecure, and often takes place in substandard conditions. But such trade fills a vital niche in that many of the informal retail markets are located within urban shanty compounds, providing easy access to a wide variety of goods at customizable sizes for the urban poor.

Economic liberalization in the 1990s contributed to the growth of informal trade in cities, particularly Lusaka, by both diminishing the number of jobs available in the formal sector and removing controls on foreign exchange, imports, and prices—which reduced the barriers to entry into the sector (Hansen 2007). Increasingly, street vendors began establishing *tuntembas*, or makeshift plastic, wood, and cardboard stalls, along Lusaka's main streets. According to Hansen (2004), street vending reached "anarchic proportions" by the end of 1998. At the same time, the number of designated informal trade markets recognized by the Lusaka City Council grew from 36 to 57 between 1980 and 2000 (Nchito 2006). While a large variety of goods is found in the markets, *saluala*, or second-hand clothing, represents a major share of the merchandise sold by informal traders because, unlike some other African countries, Zambia did not place quotas on these imports or limit their distribution to solely charitable organizations (Hansen 2000).

Informal trade has demonstrated both negative and positive externalities on employment growth. On the one hand, during the 1990s, the country's dwindling textile sector could not compete with the lower prices offered on second-hand goods and prompted a number of manufacturing firms to leave Zambia or to restructure entirely. In response to demands from the Zambian Association of Manufacturing union, Chiluba's government attempted in 1998 to increase tariffs on imports of *saluala*; however, this was met by large-scale resistance from street vendors and marketers and was ultimately rescinded (Hansen 2000). On the other hand, informal trade creates links

throughout the sector, as vendors often need to purchase food, stall materials, and other goods from each other.

Since the early 2000s, Zambian informal traders have faced a more challenging environment in at least two regards. First, some of the markets were upgraded to provide safer and cleaner stalls, sanitation facilities, and legalized access to electricity. Yet, such upgrades required demolishing old structures and forcing many traders either to return to the streets or to swell already dangerously overpopulated markets. Upon the completion of some of these new markets, traders found that the rents for stalls had increased beyond their means and had allowed Chinese, Indian, and Lebanese traders to gain a foothold in the sector (Hansen 2007). Second, the MMD adopted a more stringent approach toward informal trade during Mwanawasa's tenure. For example, in mid-2002, there was a major effort by the Zambian police and paramilitary and the Lusaka City Council to clear vendors off the streets (Hansen 2004). Moreover, under Mwanawasa's "Keep Zambia Clean and Healthy" initiative, street vendors were targeted for litter, cholera, traffic congestion, and deterring business investment. This initiative involved adding more restricted provisions to the Street Vending and Nuisances Act to fine anyone engaged in street vending or purchasing from vendors (*Times of Zambia* 2007).

Although not as large a source of employment as its informal counterpart, formal trade also provided a number of new jobs over the 2000s. In fact, the number of formal paid employees in the trade services sector doubled between 2002 and 2010, from 51,000 to 101,000. By 2010, trade was Zambia's largest formal-sector employer outside of the government. Driven by foreign investment, tourists, and rising purchasing power among high-income locals, these formal jobs are primarily in retail trade, with some additional employment creation in hotels and restaurants.

Much of the retail trade boom has been concentrated in Lusaka's 11 shopping malls, including the 72-store Levy Junction Mall, which opened in late 2011. A characteristic feature of these malls is that they are located in Lusaka's low-density, more affluent neighborhoods (Nchito 2006), and they primarily house foreign retail chains. Although these foreign chains may have displaced indigenous traders or narrowed their profit margins, they have also in some cases created strong links to local agricultural and food suppliers. For example, the South African-owned retailer, Shoprite, sources much of its stores' meat from the locally owned Zambeef (*The Economist* 2013). Yet, formal-sector trade employment is not always synonymous with decent jobs, as evidenced by multiple strikes since 1999 at Shoprite chains across the country over low pay, lack of pensions, and the casualization of labor.

High-value Services Benefited Mainly the Middle Class

Over the 2000s, the largest contributors to growth were construction, transport and communications, and finance and business services, which collectively accounted for 47.4 percent of the increase in GDP. However, these sectors generated only 14 percent of employment growth (Table 6.4)—meaning that, unlike trade, their growth was driven mainly by rising value-added per worker, rather than by an increase in the number of workers. Moreover, the demand for these services is largely linked to the growth in consumption by those at the higher end of the income distribution, which rose by 5 percent for the richest decile in the 2000s (Table 6.3). In contrast, poorer Zambians failed to significantly benefit either from the services generated by these sectors or from the jobs that they created.

In the construction sector, most of the new jobs were not for casual workers. Instead, they were for paid, formal employees, whose share of construction jobs rose from only 5 percent in 2002 to about 33 percent by 2010. Most of Zambia's construction activities have involved rehabilitating major roads, developing new office blocks, and building shopping malls in Lusaka; mining developments in the Copperbelt; and undertaking suburban residential housing initiatives, such as Lusaka Heights, a 3,700-unit, high-end housing development (Phillips 2007). Notably, the construction of housing for low-income groups in rapidly growing urban areas has been much less expansive. For example, in Lusaka, about 70 percent of the population continues to live in unplanned, shanty settlements (Nchito 2007). Most of these settlements lack proper infrastructure and key services, such as internal plumbing, which in turn often forces communities to share the same latrines and communal water taps (Taylor 2006).

The capital-intensive nature of and need for highly skilled workers in the communications and financial sectors largely explain why they did not represent a major source of employment creation. Much of the growth in the communications sector was the result of the expanding availability of mobile phones, which are serviced by three main companies (UNCTAD 2011). Between 2000 and 2010, the number of mobile phone subscribers increased from 98,000 to more than 5 million (World Bank 2013), benefiting a large number of Zambians. While fixed broadband Internet subscribers also increased, from 21 to more than 10,000 people (World Bank 2013), the fees lie far beyond the reach of much of the population.

In the financial services sector, bank lending increased by almost threefold between 2004 and 2007, and the establishment of a credit bureau in 2008 has enabled banks to assess borrowers' creditworthiness and reduce the

costs of borrowing that were previously inflated by the perceived high risk of default (Baker 2008). There are at least two growing areas in this sector. One is the provision of housing mortgages for the small number of Zambians who are able to afford home ownership (Phillips 2007). The second is the gradual rise in mobile banking, which allows payments to be made to an individual's mobile phone, even if the owner does not possess a bank account (Adongo 2007). Overall, by 2009, 37.3 percent of all Zambians used some type of financial service, with Lusaka and the Copperbelt provinces accounting for 60 percent of the country's total banking customers (FinScope 2010).

Political Ramifications of Uneven Transformation

Not surprisingly, the changing economic and social dynamics in the 1990s and 2000s ultimately filtered into the political sphere. During successive elections in 2006, 2008, and 2011, Sata effectively tapped into public disgruntlement with the lack of broad-based development and other aspects of Zambia's transformation over the 2000s.[8] He overwhelmingly focused on urban areas—including Lusaka and cities in the Copperbelt, such as Ndola and Kitwe—which, given the resurgence of urbanization, contained a large, concentrated source of potential votes. And that meant reaching out to the unemployed and participants in the urban informal trade sector. It is true that the latter, thanks to structural change, were gaining marginally higher wages than Zambians concentrated in rural areas. But the MMD government had not necessarily been actively responsible for promoting this positive structural change; in fact, at times it actively harassed those involved in informal trade and attempted to impose legal restrictions on their activities.

Instead, informal trade essentially became a coping strategy for both those who exited agriculture and those who lost jobs in the formal sector because of the collapse of manufacturing. In other words, while migrants to urban areas were better off than they might have been if they had stayed in agriculture, those born in urban areas were worse off than they might have been because of the failure of mining, manufacturing, and high-value services to generate much employment. The urban milieu undoubtedly reinforced these disparities, as informal workers' living and working conditions were starkly contrasted against those of the increasingly visible symbols of Zambia's small but burgeoning middle and upper classes (Larmer and Fraser 2007). As an

8 Although Sata also competed in the 2001 elections, he established the PF only 59 days before election day, and therefore engaged in very little campaigning.

indicator of such inequalities, Lusaka's Gini coefficient was estimated at 0.66 in 2006 (UN-Habitat 2010).[9] A 2008 government survey underscored a feeling of discontent, with urban, informal workers less sanguine than their formal counterparts about economic conditions—emphasizing the disjuncture between macroeconomic developments and individual perceptions of improvements (Table 6.5).[10]

Within urban areas, Sata explicitly targeted the poor by opening and closing his campaigns in Lusaka's informal markets and shanty compounds (Larmer and Fraser 2007; Kalaluka and Noyoo 2008). A survey in the shanty compounds revealed that foremost among workers' concerns were insufficient job opportunities, low wages, and the high price of basic goods (World Bank 2007). Specifically, the PF's slogan was "lower taxes, more jobs, more money in your pockets." Even outside election years, Sata criticized the electricity outages and lack of clean water faced by the poor (*The Post* 2005), and in 2007 he led a mass procession in Lusaka to denounce a proposal from the IMF to increase value-added taxes on food and agricultural products (Larmer and Fraser 2007), which comprise a large share of the urban poor's daily consumption.

Furthermore, Sata condemned the MMD's harassment of those in the informal sector by emphasizing that the former ruling party had failed to provide adequate jobs for this constituency: "You can't force them [vendors] out of the streets.... If you crack down on them, where are you going to take them? What I'm saying is, if you fail to provide for them, don't bring punitive measures against them" (Michael Sata, cited in Resnick 2013). Similarly, he denounced the MMD's allocation of upgraded market stalls to foreign traders—an issue of considerable contention among marketers (Larmer and Fraser 2007).

Given that the informal sector has been populated by a large share of young people, many youths were in turn attracted to Sata's promises of more jobs. However, he made this appeal even more explicit in 2011 by using a rap song called *Donchi Kubeba* ("Don't Tell") by a popular local artist named Dandy Krazy. The song's message urged Zambians to accept campaign

9 The Gini coefficient is measured on an index from 0 to 1, with values closer to 1 indicating greater inequality.

10 The 2008 Zambian Governance Survey (RoZ/CSO 2009) was commissioned under the aegis of the country's Fifth National Development Plan for 2006–2010 (RoZ/MoFNP 2006). The survey aimed to assess how well Zambians understand governance processes and institutions, as well as to create a benchmark dataset for future analyses of governance progress within the country. The survey covered approximately 4,000 households in rural and urban areas in all nine provinces.

TABLE 6.5 Informal workers are less satisfied than formal workers

Assessments of the economy by employment status, 2008		
In the past 12 months, how would you describe the economic conditions in this country?	Share agreeing with assessment (%)	
	Urban formal workers	Urban informal workers
Good or fairly good	59.8	49.2
Bad or very bad	37.7	44.7
Don't know	2.5	6.1
Number of observations	888	934

Source: Authors' calculations using the 2008 Zambian Governance Survey (RoZ/CSO 2009).

Note: "Formal" refers to Zambians who are working for the central or local government, parastatal entity, private sector, nongovernmental organization, international organization, or embassy, or who are themselves employers. "Informal" refers to Zambians who are self-employed, subsistence farmers, piece workers, or household employees.

handouts from the MMD but to refuse to say which party they would actually support in the elections. Significantly, there were 1.2 million new registered voters in 2011, 54 percent of whom were between the ages of 18 and 35. The largest share of these new young voters was in the Copperbelt and Lusaka, highlighting that it was especially *urban* youths who were mobilized in the last elections (Nyimbili 2012).

Another important component of Sata's message was a focus on the way the mining sector had been managed. He denounced the low levels of tax paid by multinationals operating in the mining sector: "Zambians are paying high taxes while the mines pay little tax. This will change when we [the PF] come to power because the mines must also pay tax" (cited in Seccombe 2006). Specifically, he vowed to implement a 25 percent windfall tax on mining revenues if elected into office and promised to invest the additional revenues in the social services sector.

Given Sata's urban focus, the PF did not focus significantly on the agriculture sector. The PF's former spokesperson noted: "We talk about lower taxes, we talk about jobs for people. Now, that appeals to the people in the urban areas because they're the ones who are looking for jobs, they're the ones whose incomes are overtaxed. So, we appeal to them more than to rural dwellers. We haven't articulated issues of agriculture that strongly" (Given Lubinda, cited in Resnick 2013). In fact, some of Sata's promises in urban areas, such as reducing the price of food, were contrary to the interests of rural producers (Cheeseman and Hinfelaar 2010). Instead, Sata often focused on ethnolinguistic appeals in rural areas, especially in Northern and Luapula provinces, where many of his Bemba co-ethnics reside (Resnick 2013).

The MMD adopted a different strategy by focusing heavily on rural areas and courting higher-income urban Zambians—a group that had

benefited the most from the country's structural change. Its manifestos ranked agriculture as the number one priority for the country's development agenda (Resnick 2013). Despite the sector's relatively weak role in generating structural change, the MMD's rural campaigns emphasized the fertilizer subsidy program and the role played by the FRA, aimed at reminding rural voters of the individual, material benefits they accrued during the party's tenure.[11] In 2008, for example, the MMD's Rupiah Banda promised on the campaign trail to expand the share of fertilizer that it subsidizes from 60 to 75 percent (Miti 2008). The 2011 election campaign in particular coincided with a bumper harvest for maize, which the MMD attributed to the subsidy program (Redvers 2011).

Moreover, in urban areas, Banda launched his 2008 and 2011 campaigns from Lusaka's plush InterContinental Hotel, presenting a sharp contrast to Sata's focus on shanty compounds. With the slogan of "security, stability, and prosperity," Banda tried to convince the new middle class that their standard of living could be threatened if Sata became president (*The Economist* 2011; Redvers 2011). In addition, he highlighted the MMD's investments in roads, schools, and hospitals, while also opposing a windfall tax on mining, claiming it would deter foreign investment and undermine job growth (Commonwealth Secretariat 2011).

Collectively, the impact of these different strategies was evident in each successive election. Sata's highest share of votes continuously came from the two most urbanized regions, increasing from 58 to 63 percent in Lusaka's urban constituencies between 2006 and 2011 and from 51 to 68 percent in Copperbelt Province during the same period.[12] The PF retained an especially strong foothold in high-density, shanty settlements. While the MMD gained support from the affluent and new middle classes in urban centers (Cheeseman and Hinfelaar 2010), the size of this constituency meant that its overall voting power vis-à-vis the urban poor was much smaller.

In rural areas, the MMD continued to obtain the highest share of votes in much of the rest of the country's provinces. Two exceptions were the Bembaphone heartlands of Northern and Luapula provinces, where Sata won in 2011 with 64 and 73 percent of the vote, respectively. During those elections, Sata finally defeated Banda by obtaining 42 percent of the national

11 These programs, in various guises, had been running in Zambia under the MMD since 1996 (Mason, Jayne, and van de Walle 2013).

12 Lusaka Province contains 12 constituencies, but only 7 of these are considered "urban": Chawama, Kabwata, Kanyama, Lusaka Central, Mandevu, Matero, and Munali.

vote.[13] His victory was significant, not only for ending two decades of MMD rule, but also because eight other opposition parties competed, increasing the likelihood that they would split the vote to the MMD's benefit. The PF's successful outcome, therefore, revealed how much the party's message resonated with those who—despite Zambia's economic resurgence during the 2000s—perceived little tangible improvement in their own living conditions.

Structural Change without Transformation

Overall, we found that Zambia's unprecedented levels of GDP growth over the past decade have indeed been accompanied by positive structural change, which accounted for about half of the increase in the GDP per worker during 2002–2010 of 3.56 percent per year. This was a substantial improvement over 1991–2002, when negative structural change (a substantial decline in worker productivity) was somewhat greater than the slight increase in within-sector productivity growth. Yet despite the recent improvement in the country's performance, the negative structural change of the 1990s dominated the past two decades. As a result, labor productivity growth for 1991–2010 was only 0.31 percent per year, with the major driver being the within-sector component (0.87 percent per year), and the structural change component still negative (–0.65 percent per year).

Which sectors were driving growth? Between 2002 and 2010, agriculture and manufacturing remained stagnant, and mining's capital-intensive nature prevented it from generating much employment. Instead, a large share of employment growth occurred in trade, with much of it occurring in the informal sector and a smaller share in the formal sector, thanks to the country's retail boom. A larger proportion of economic growth, but smaller share of job growth generation, emerged from construction and high-value services, where value-added per worker is much higher. Notably, the nature of this structural change did not translate into large-scale social transformation, given that many newly created jobs in trade are low paid and often insecure. Furthermore, both the drivers and the beneficiaries of construction and services tend to be higher-income groups in urban areas, whose consumption share has increased since the 1990s. By the end of the 2000s, this trajectory contributed to a Zambia characterized by three main groups: the rural poor, the urban poor, and a rising middle class that had reaped most of the benefits

13 Election results are available from the Electoral Commission of Zambia: http://www.elections.org.zm.

from macroeconomic growth. As shown by Sata's 2011 election, these economic and social dynamics ultimately filtered into the political sphere.

These dynamics have important policy implications for Zambia's government, especially in agriculture and trade, which are the two sectors that are largely responsible for the country's structural change without transformation. In the agriculture sector, the government's continued focus on FISP, despite much research questioning the program's impact on productivity gains (Mason, Jayne, and Mofya-Mukuka 2013), needs to be reconsidered, and expenditures need to be redirected into areas that may generate more long-term, broad-based benefits for smallholders. Although the political will to eliminate subsidies is difficult to mobilize, the planned incorporation of an e-voucher into FISP (starting in the 2015/2016 agricultural season) will reduce the program's costs by eliminating transport and administrative overheads and also give smallholders the chance to access inputs that are more appropriate for their farms' agroecological conditions.

However, to attract youths to agriculture, particularly, much more effort is needed to increase agriculture's appeal as a business opportunity, rather than simply as a subsistence sector. The country's Farm Block Program represents one effort to this end, as it aims to link smallholder farmers to commercial opportunities by providing specific tracts of land with feeder roads, electricity, irrigation, and communications facilities. Yet, preliminary research suggests that the government needs to be cautious that the farm blocks do not exacerbate the already pronounced dualism in the agriculture sector by creating opportunities for urban-based elites, rather than existing rural smallholders (Sitko and Jayne 2014).

In the trade sector, which is where most of Zambia's structural change has been concentrated, at least two priorities are apparent. First, in the formal trade sector, especially in retail trade, hotels, and restaurants, there must be caution about overextending beyond the demands of the country's still-nascent middle class. Second, in the informal sector, greater attention is needed to ensure opportunities for "decent jobs"—those that involve providing at least secure and hygienic market and trading areas and that limit erratic harassment of informal traders by local authorities. This will entail strengthening legal mechanisms that provide recourse to traders, as well as effective oversight by the Ministry of Local Government to ensure the balanced implementation of such laws across the country's district councils.

The broader challenge for Zambia's transformation is both a lack of macroeconomic stability and persistent policy volatility. At the time of this book's writing, the country is once again confronting the disadvantages of its

lack of diversification away from copper. In the wake of plummeting copper prices, the currency has depreciated significantly, and high levels of debt have increased speculation about the need for an IMF agreement. A lack of commitment to policy decisions is equally problematic, as it deters further investment in agriculture and other sectors. Problems include periodic trade bans on maize exports and wheat imports, ad hoc decisions related to allocating grain levies on smallholders to raise revenues for local councils, and executive decrees related to the price at which the FRA will purchase maize.[14] These episodes of volatility are attributed to changing presidential prerogatives and the ability of the executive to override long-term policy planning by technocrats. The frequent changeover in presidents over the last decade—ranging from Levy Mwanawasa to Rupiah Banda of the MMD and then Michael Sata and Edgar Lungu of the PF—has exacerbated this trend, since each new president aims to create his own legacy and pursues multiple cabinet reshuffles.

These policy issues and the broader findings from this chapter suggest that Zambia's experience is not an anomaly, but is rather an instructive case study for many other African countries. Even in countries without large-scale mineral resources, much of the region is characterized by modest improvements in agricultural production, insignificant levels of indigenous manufacturing, the predominance of informal-sector employment, and a small but burgeoning services sector. These factors are complicated by rapid urbanization, a youth bulge, a rising middle class, and political parties eager to capitalize on citizens' grievances in the region's growing number of democracies. Undoubtedly then, reconciling positive structural change with large-scale transformation will remain a major economic, social, and political concern not only for Zambia but also for much of Africa over the foreseeable future.

Appendix 6A: Data Sources

Total GDP for 28 sectors for 1994–2010 was taken from the Central Statistical Office (RoZ/CSO 2011). These data were measured in constant 1994 prices—the last year when national accounts were rebased. Total GDP for 11 sectors for 1990–1993 was taken from IMF (1999), which reconciled these estimates with the 1994 base year estimates. GDP for six manufacturing subsectors was estimated for 1990–1993 using the index of industrial production (IMF 1999). All

14 In 2012, the government suddenly introduced Statutory Instrument 33, which banned the use of foreign currency for domestic transactions. Two years later, the policy was rescinded without warning, creating further confusion among foreign investors.

values were converted to 2002 US dollars using GDP deflators, exchange rates, and purchasing power parity conversion factors from World Bank (2013).

The main concern about Zambian GDP estimates is the long delay between rebasing national accounts. By 2010, it was possible that national accounts did not accurately reflect the level and structure of GDP. Of particular concern is the nonfarm informal sector, which employment data suggest has grown, but whose growth is difficult to capture without an economic census or large-sample firm surveys. Trade services GDP, for example, might be underestimated, implying that value-added per worker was higher in 2010 than the GDP time series suggests. Less concerning are agriculture and the formal sector, which were tracked using annual surveys and business registers.

Employment estimates were taken from censuses and surveys conducted by the CSO. We compiled an employment time series for 16 sectors using the Population and Housing Censuses (1990, 2000, and 2010); Priority Surveys (PS 1991 and 1993); Living Conditions Monitoring Surveys (LCMSs 1996, 1998, 2002, 2004, 2006, and 2010); and Labor Force Surveys (LFSs 1986, 2005, and 2008). Table 6A.1 reports total employment by sector from these

TABLE 6A.1 Total employment by sector, 1986–2010

Year and source	Employed ('000s)	Share of total employment by sector (%)								
		AGR	MIN	MAN	UTL	CON	TRH	TRC	FBS	CGS
1990 C	1,858	68.4	3.3	5.1	0.6	1.9	3.8	2.9	2.0	12.0
2000 C	2,686	75.7	1.4	2.9	0.4	1.4	7.2	2.0	1.1	8.0
2010 C	3,704	66.5	1.9	3.6	0.4	3.0	9.9	4.2	0.5	10.0
1991 PS	2,519	65.4	1.9	4.3	0.9	1.9	10.8	2.9	1.8	10.1
1993 PS	2,813	73.6	2.5	3.7	0.4	1.0	8.5	2.2	1.4	6.7
1996 LCMS	3,371	67.1	1.8	5.1	0.4	1.1	12.1	1.7	1.4	9.3
1998 LCMS	3,526	70.4	1.6	3.8	0.2	0.9	11.1	2.0	1.3	8.6
2002 LCMS	3,520	71.7	1.4	3.5	0.3	1.3	9.6	1.6	1.5	9.1
2004 LCMS	3,910	69.5	1.6	3.7	0.5	1.5	10.9	2.1	1.3	9.1
2006 LCMS	4,224	71.0	1.6	3.8	0.4	1.3	10.0	2.0	2.0	7.9
2010 LCMS	4,385	67.7	1.3	3.0	0.4	1.8	11.9	2.1	2.4	9.4
1986 LFS	2,506	69.7	1.9	4.3	0.4	1.9	6.9	2.9	1.8	10.2
2005 LFS	4,130	72.2	1.4	4.0	0.4	1.4	10.5	2.1	1.0	7.0
2008 LFS	4,607	71.3	2.0	3.5	0.3	1.7	10.1	2.1	0.6	8.4

Source: Authors' estimates using survey and census data collected by the Central Statistical Office (RoZ/CSO 2011).

Note: AGR = agriculture; CGS = community and government services (government + other services from Figure 6.1); CON = construction; FBS = finance, business, and real estate; MIN = mining; MAN = manufacturing; TRC = transport and communications; TRH = trade, hotels, and catering (trade services + hotels and catering from Figure 6.1); UTL = utilities (electricity, gas, and water). C = Population and Housing Census; LCMS = Living Conditions Monitoring Survey; LFS = Labor Force Survey; PS = Priority Survey.

data sources. Additional formal employment estimates are from the CSO Quarterly Employment and Earnings Inquiry.

The population censuses underestimated total employment compared with the surveys, and the 1990 census underreported informal trade, possibly because a large number of workers did not report their sector of employment and because labor market questions are less detailed in censuses. Therefore, we used the 1991 PS and the 2002 and 2010 LCMSs. Total and sectoral employment trends from these surveys are consistent with the LFSs, which are designed to capture employment data, but whose timing was not ideal for studying the 1990s and 2000s. Table 6A.2 reports value-added per worker based on the GDP and survey data.

TABLE 6A.2 Total value-added per worker by sector, 1990–2010

Year and source	Average annual gross domestic product per worker (2002 US$ PPP)									
	TOT	AGR	MIN	MAN	UTL	CON	TRH	TRC	FBS	CGS
1990 C	4,609	960	30,117	9,559	22,777	20,445	22,459	10,105	21,783	2,933
1991 PS	3,339	778	35,273	8,329	12,126	14,805	5,707	7,050	18,190	2,602
1996 LCMS	2,357	686	18,112	5,222	18,258	10,221	4,151	8,938	18,074	2,245
1998 LCMS	2,294	600	14,604	7,124	32,703	13,958	4,666	7,841	23,073	2,276
2000 LCMS	3,210	819	16,911	13,016	25,339	12,874	10,174	11,227	42,294	3,476
2002 LCMS	2,680	631	16,440	9,174	28,618	13,962	6,483	11,012	25,946	2,511
2004 LCMS	2,717	643	15,573	8,725	16,471	16,143	5,782	8,645	29,258	2,308
2005 LFS	2,722	582	18,721	7,822	18,443	19,864	5,872	8,992	36,284	3,149
2006 LCMS	2,849	592	16,322	8,476	22,027	24,005	6,223	11,631	18,225	2,969
2008 LFS	2,946	556	12,878	9,041	24,945	20,676	6,012	14,059	61,394	3,234
2010 LCMS	3,544	704	28,010	11,522	23,950	24,270	5,672	18,223	18,042	3,468
2010 C	4,196	848	23,533	11,498	26,768	17,680	8,041	10,591	101,244	3,861

Source: Authors' estimates using survey and census data collected by the Central Statistical Office (RoZ/CSO 2011).

Note: AGR = agriculture; CGS = community and government services (government + other services from Figure 6.1); CON = construction; FBS = finance, business, and real estate; MIN = mining; MAN = manufacturing; PPP = purchasing power parity; TOT = total; TRC = transport and communications; TRH = trade, hotels, and catering (trade services + hotels and catering from Figure 6.1); UTL = utilities (electricity, gas, and water). C = Population and Housing Census; LCMS = Living Conditions Monitoring Survey; LFS = Labor Force Survey; PS = Priority Survey.

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Chapter 7

STRUCTURAL CHANGE, PRODUCTIVITY GROWTH, AND TRADE POLICY IN BRAZIL

Sergio Firpo and Renan Pieri

Throughout the course of only a few decades in the postwar period, the Brazilian economy experienced an intense and fast process of industrialization, which went hand in hand with a major increase in labor productivity and periods of annual growth rates above 10 percent. The rapid growth of the industrial sector was not unintentional. It was driven by a set of policies introduced in the 1950s to protect domestic industries from foreign competition. However, by the early 1980s, these isolationist policies had turned into a curse, with the economy hobbled by high inflation rates and unremarkable economic growth rates.

In the late 1980s, with a return to civilian rule, Brazil started to revive, thanks to a major opening up of the economy to foreign competition that continued in the 1990s. Then in the 2000s, Brazil experienced phenomenal economic growth, mostly induced by the rise in commodity prices, which helped to sharply reduce poverty and catapult Brazil into middle-income status—now the world's seventh wealthiest economy. Yet despite these achievements, income inequality remains unacceptably high in the country, and the quality of education leaves a lot to be desired.

The nature of Brazil's economic transformation—characterized by bursts of progress interrupted by little or no progress—underscores the importance of understanding the key factors that induce economic growth. As there is no consensus on what those factors are, growth-enhancing policies in developing countries have varied substantially over time and across nations. What can be inferred from the Brazilian experience is that "one-size-fits-all" policies cannot work for all countries and in all periods uniformly. In fact, some of the policies designed to foster economic growth are likely to be effective only under specific circumstances.

To learn more about Brazil's experience, this chapter investigates how much of the growth in labor productivity—a key component of economic growth—reflected growth within sectors versus movements between sectors (known as structural change). We start with an overview of Brazil's institutional

background, highlighting how it changed from an autarchy to a more open economy. We then examine Brazil's experience with structural change since 1950, focusing on trends in GDP and labor in agriculture, manufacturing, and services. In the process, we try to better understand the finding of a major study of 38 countries (29 developing and 9 high-income) by McMillan and Rodrik (2011) that, between 1990 and 2005, Asian countries experienced productivity-enhancing structural changes, whereas African and Latin American countries did not experience the same changes. A direct interpretation of these findings would be that, for the Brazilian case, economic reforms toward openness could have negatively affected economic growth, and that the country was experiencing a reverse structural change. The rationale would be that openness can trap a developing economy and keep it specialized within sectors with comparative advantages, like agriculture and mineral extraction, but with low labor productivity levels. It is indeed remarkable that, for most of the period being analyzed, the Brazilian agriculture sector was able to dominate several world agricultural export markets—thanks to the country's relative abundance of land—but, at the same time, was a low labor productivity sector.

As it turns out, our findings suggest that structural change indeed played an important role in the diversification and growth of the Brazilian economy for the period 1950–1980, being responsible for about 40 percent of increases in labor productivity. However, after that period, most of the increase in productivity came from the within-sector component. In fact, for the whole period between 1950 and 2005, labor productivity grew by 156 percent—or 1.46 percent per year—with about 85 percent of that growth attributable to the within-sector component. That result, in combination with the empirical evidence of the benefits that trade liberalization has on the Brazilian economy in terms of productivity (Muendler 2004; Ferreira and Rossi 2003), allows us to interpret the relative slowdown of Brazilian economic growth from 1995 to 2005 as an upper bound for growth. Without the liberalization process, the most likely scenario for the country's economic performance would have been worse. At the sectoral level, we find that the most dynamic sectors—which did not include manufacturing—were those that were able to attract better-qualified workers in more stable labor contracts. Thus, policies designed to protect the industrial sector do not seem to have been very effective on overall labor productivity growth.

How do we reconcile our results with those of McMillan and Rodrik (2011)? Although their interpretation seems to be appropriate for countries that had not experienced a structural change before trade openness—as is the case for most African countries—for an emerging economy like Brazil,

reintegration into the world economy may have helped its economy instead of harming it. In fact, trade openness is an economic policy that acts in the direction of improving productivity within each sector, as incentives are created to adopt efficient technologies, not only by the export-driven sectors, but also in the manufacturing sector, whose main market in Brazil is domestic (Ferreira and Rossi 2003). We contend that structural changes have become less important to explaining productivity growth in the Brazilian economy than in the past, mainly because Brazil is an emerging economy, with a relatively diversified industrial sector, but with a relatively low level of labor productivity. Thus, for Brazil, policies that could induce overall increases in labor productivity, such as increases in educational quality, will certainly have larger impacts on growth than those strictly concerned with deepening an unfinished structural change.

How Brazil's Economy Opened Up

Import Substitution System and the Beginning of Industrialization

Between 1950 and 2005 in Brazil, the share of workers participating in the agriculture sector dropped from 63 percent to 19 percent (Timmer and de Vries 2009). Throughout the course of a few decades, the population in the country migrated from rural areas to urban areas, and an internal market emerged. Overall, Brazil experienced a structural change during this period. The country underwent an intense and fast process of industrialization and urbanization driven by external constraints and internal market growth.

The process of industrialization began in the 1930s as a consequence of chronic current account deficits (Abreu 2000). As US dollars started to become scarce in Brazil after the Great Depression, there was a shortage of imported consumption goods and production inputs. In fact, the scarcity of those imported goods generated incentives for the Brazilian economy to promote substituting foreign industrial goods with their domestic counterparts. The systematic process of substitution became a policy goal in the postwar era and was named the Import Substitution System (ISS). This process was at the heart of Brazilian industrial policies until the end of the 1970s.

Industrialization may also be viewed against a background of declining income coming from Brazil's traditional exports, which consisted mainly of coffee, cocoa, sugar, and cotton (Baer and Kerstenetzky 1964). This argument views the ISS as a natural response to problems with the national

current account, rather than a conscious state program. But by the 1950s, a set of policies was applied with the explicit objective of protecting Brazilian industries from foreign competition—including creating systems of multiple exchange rates and import licensing. The establishment of "the law of similar" was also significant in that manufacturers who were producing—or even intended to produce—goods similar to the ones being imported could apply for protection.

As a result of such measures, the share of agriculture in the net domestic product declined from 27 percent in 1947 to 22 percent in 1961, while industry increased from 21 percent to 34 percent during the same period (Baer and Kerstenetzky 1964). In addition, there was a strong population migration from rural areas to cities, which explains much of the reduction in poverty observed between 1960 and 1970 (Fields 1977). Earnings became higher in urban areas than in rural areas, as well as higher in the industrial sector than in the land-abundant agriculture sector. As a result, Brazil experienced a shift in its income distribution and a reduction of poverty, led by the transfer of the population from rural to urban areas and from the agriculture sector to the industrial sector. However, given that the industrialization process did not affect the whole population, a rapid industrialization process may have also contributed to increased earnings inequality, as the sectoral wage gap increased (Fishlow 1972; Fields 1977; Langoni 2005).

Together, the labor force migration to urban areas and the expansion of the manufacturing sector directly boosted productivity growth. Another growth-inducing factor was the strong process of vertical integration that had been occurring since the early 1950s (Baer, Fonseca, and Guilhoto 1987). It is worth noting that the efficiency gains from rearrangements in the production chain had happened in both periods: the years of economic autarchy and those after the economy opened up. In fact, vertical integration was an important factor, especially in light of the rising export shares of various industrial sectors.

The end of using the ISS as an instrument for economic policy coincided with the long recession of the 1980s, which began after the two oil crises created large current account deficits and hyperinflation (Abreu 2004a). Within this context, the political support and economic basis for the ISS were no longer available, and a new trade policy was needed for recovering the path of productivity growth.

New Era of Trade Liberalization

In the late 1980s, with the return to civilian rule, Brazil experienced an intense and fast-paced process of unilateral trade liberalization. Until that

time, the Brazilian trade protection system was characterized by four main aspects: (1) the widespread presence of tariffs with redundant plots; (2) the collection of various additional taxes; (3) an extensive use of nontrade barriers (NTBs), such as a list of products with the issuance of a suspended import list prior to authorizations specific to certain products (steel, computers) and annual quotas for the import company; and (4) the existence of 42 special regimes, allowing the exemption or reduction of taxes (Kume, Piani, and Bráz de Souza 2003).

The first phase of trade liberalization occurred between 1988 and 1989. Tariffs were decreased, even though they were kept higher than initially proposed; the collection of taxes on some imports (such as those created to fund ports' maintenance) was abolished; and special import regimes were partly eliminated.

During the second phase from 1991 to 1993, tariffs fell heavily. Almost all products experienced drastic reductions in tariffs, except for sectors that included information technology, fine chemicals, and automobiles, and others considered high tech. However, it was the elimination of NTBs that caused the greatest impact in terms of openness, especially given that the list of products being suspended from import licenses was extinguished (Abreu 2004b; Kume, Piani, and Bráz de Souza 2003). In addition, special import regimes and import programs for companies were abolished. It was only after the end of NTBs that tariffs became the main instrument of trade protection and directly reflected a degree of protection for each industry.

The third phase occurred in 1994, following monetary stabilization. Import tariffs were set at 0 or 2 percent for products, with greater weight on the price index and the anticipated implementation of the Mercosur Common External Tariff in 1995. Thus, by 1994, tariff rates in Brazil averaged 10.2 percent—a level that is compatible with other developing economies open to international trade (Abreu 2004b; Kume, Piani, and Bráz de Souza 2003).

Overall, the opening up of the Brazilian economy was a mixed bag. One estimate asserts that observed tariff reduction between 1988 and 1994 brought a 6 percent increase in total factor productivity, with a similar impact on labor productivity (Ferreira and Rossi 2003). Nevertheless, those gains were unevenly distributed. In fact, the fall in prices of final goods produced by tradable sectors directly affected by trade liberalization depressed wages paid in those sectors. Sectors producing goods that faced a 10 percent liberalization-induced price decline experienced a 9.4 percent wage decline (Kovak 2011).

Uneven Patterns of Structural Change

So how did policies, such as the ISS and the trade liberalization of the 1990s, accelerate or block the structural change process initiated in Brazil during the postwar period? And how did productivity evolve over time between and within sectors between 1950 and 2005? For our analysis, we use the framework from McMillan and Rodrik (2011), which looks at a sample of developing countries, including Brazil, from 1990 to 2005. It decomposes labor productivity growth into two components: (1) "within," which captures growth within sectors; and (2) "structural change," which captures growth resulting from labor reallocation across sectors that differ in their labor productivity (see the Overview in this book for details on the methodology).[1] For our data, we use both the Groningen data (a collection of aggregate statistics for many countries) and the Pesquisa Nacional por Amostra de Domicílios (PNAD)—the annual Brazilian Household Survey—enabling us to include the informal sector, which accounts for about half of the Brazilian workforce. We aggregate the sectors into eight major groups (see Appendix 7A for details on the data sources).

Our results show that for the whole period, Brazil experienced a classical structural change—that is, higher labor sector productivity went hand in hand with labor movements from less productive to more productive sectors (Figure 7.1a). Moreover, this correlation is the strongest in the first period, 1950–1964 (Figure 7.1b), which we characterize as the "golden age" for structural change. This period benefited from a rapid urbanization process, with a large share of the labor force migrating from rural areas.

However, this good news becomes progressively worse as time passes. This is illustrated in Figures 7.2a–7.2c, which show that for the periods 1965–1979, 1980–1994, and 1995–2005, the fitted line gets closer to a null-slope line for more recent years. Even changing the dataset to use PNAD data from 1993 to 2008, we can see that there is a positive but very weak correlation between sector productivity and changes in employment shares (Figure 7.2d).

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1 Algebraically, the decomposition is:

$$\Delta P_t = \sum_{i=1}^{N} \theta_{i,t-k} \Delta p_{i,t} + \sum_{i=1}^{N} p_{i,t} \Delta \theta_{i,t}$$

where ΔP_t is the change in aggregate labor productivity between period $t-k$ and t. The first term is the "within-sector" component, which is a weighted average of the change in labor productivity in each of the N sectors, with the weight for sector i being the labor share of that sector in period $t-k$, measured by $\theta_{i,t-k}$. The second term is the "structural change" component, which is a weighted average of the change in labor shares in the N sectors, with the weights captured by the labor productivity of the sector in period t.

FIGURE 7.1a Structural change played a positive role for Brazil . . .

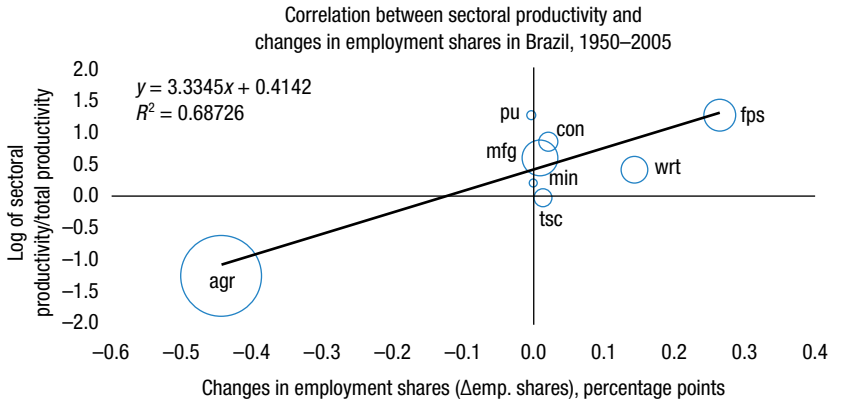
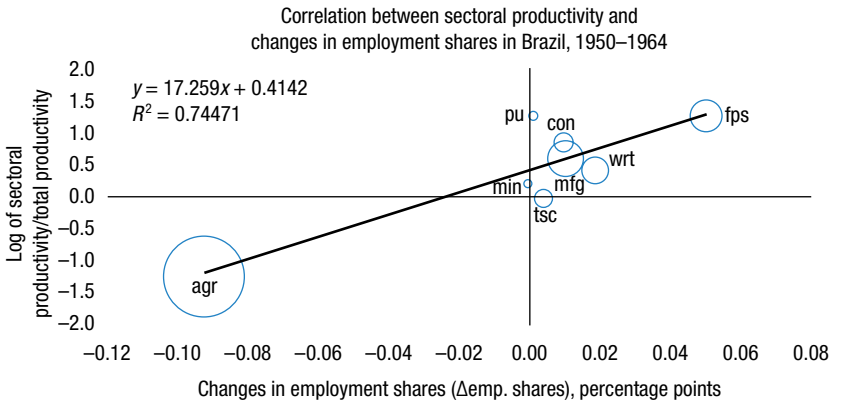


FIGURE 7.1b . . . especially in the golden age, although manufacturing wasn't the main draw



Source: Timmer and de Vries (2009).

Note: The size of the circles represents employment shares in the initial year. The line represents fitted values of a linear regression of changes in sectoral productivity to total productivity by changes in employment shares. agr = agriculture; con = construction; fps = financial and personal services; mfg = manufacturing; min = mining; pu = public utilities; tsc = transport and communications; wrt = wholesale trade.

How big a role has manufacturing played in this structural change story? Interestingly, we note that in all figures, the manufacturing sector is not, as was customarily thought, the highest-productivity sector. This sector also was not the main attractor of the labor force, with its employment share remaining basically constant for the entire period. For all years, the service sectors—including the financial and personal services and the public utilities

FIGURE 7.2a Structural change becomes less important after 1964 . . .

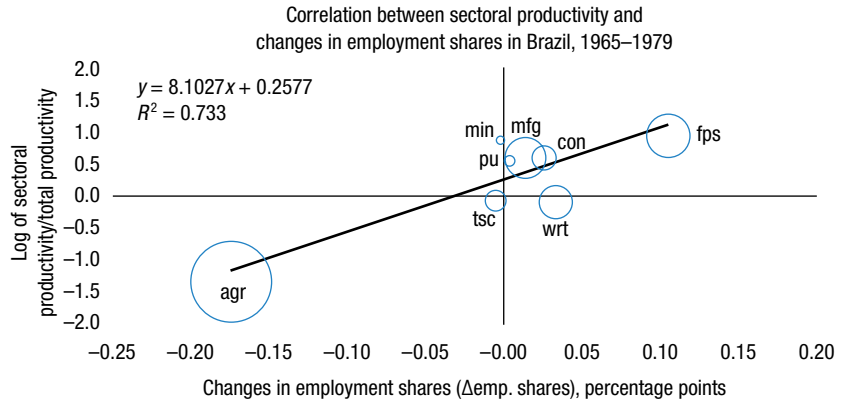
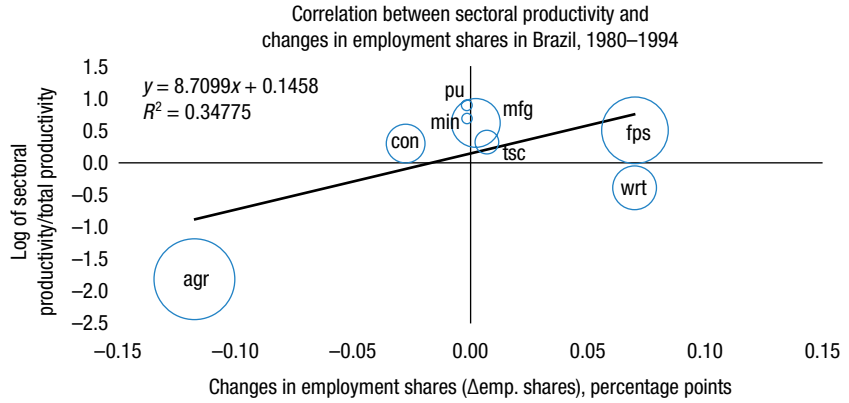


FIGURE 7.2b . . . a lot less so between 1980 and 1994 . . .



Source: Timmer and de Vries (2009); Pesquisa Nacional por Amostra de Domicílios (various years).

Note: The size of the circles represents employment shares in the initial year. The line represents fitted values of a linear regression of changes in sectoral productivity to total productivity by changes in employment shares. agr = agriculture; con = construction; fps = financial and personal services; mfg = manufacturing; min = mining; pu = public utilities; tsc = transport and communications; wrt = wholesale trade.

sector—were the most productive, mostly attracting displaced workers from rural areas.

Next we try to quantify how big a role structural change has played in terms of productivity gains for Brazil since 1950. For Latin American countries during 1990–2005, McMillan and Rodrik (2011) estimate that most of the productivity gains stemmed from the within-sector effect and little came from the

FIGURE 7.2c . . . and even weaker between 1995 and 2005 . . .

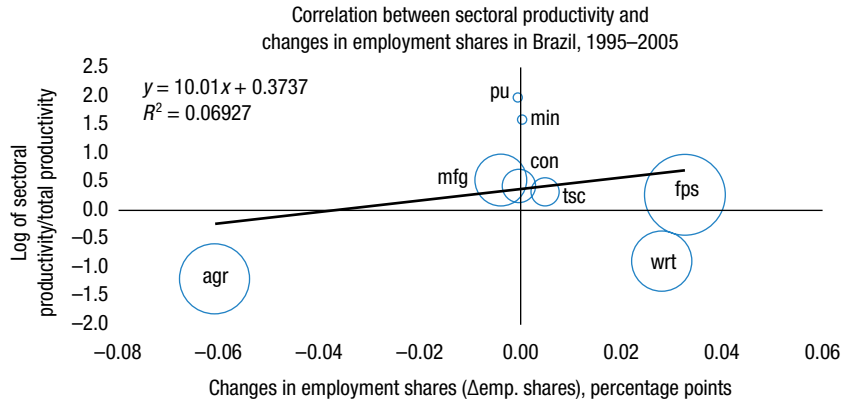
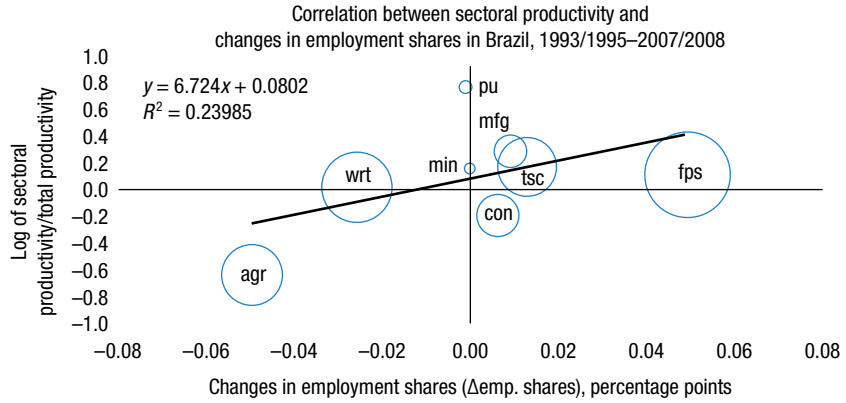


FIGURE 7.2d . . . including through 2008



Source: Timmer and de Vries (2009); Pesquisa Nacional por Amostra de Domicílios (various years).

Note: The size of the circles represents employment shares in the initial year. The line represents fitted values of a linear regression of changes in sectoral productivity to total productivity by changes in employment shares. agr = agriculture; con = construction; fps = financial and personal services; mfg = manufacturing; min = mining; pu = public utilities; tsc = transport and communications; wrt = wholesale trade.

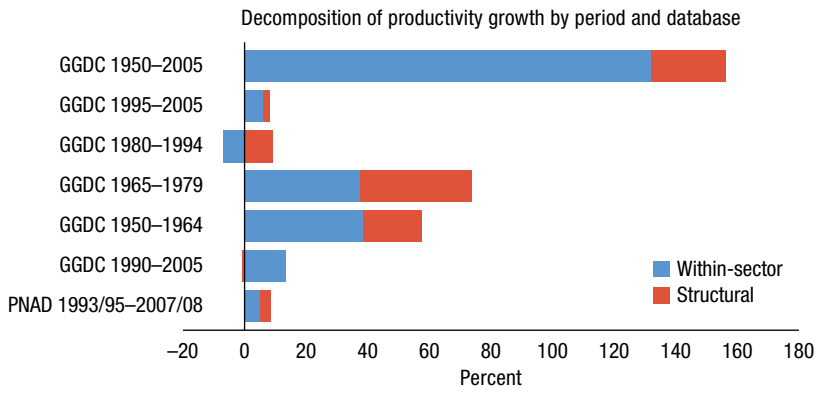
structural change component. Their interpretation of this finding is that the region was experiencing a reverse structural change, during which the labor force migrated from the most to the least productive activities. However, this interpretation is not necessarily true for the Brazilian case. In fact, informality, which is associated with low-productivity jobs, and the percentage of workers who live in rural areas decreased over the period (Appendix Table 7C.1). In

general, half of Brazilian workers do not have formal contracts, and their earnings in real terms were kept constant throughout the period. That said, there has been a huge increase in years of schooling, from six years to more than eight years on average. Moreover, there seems to have been an increase in the participation of women and nonwhite workers in the labor market.

The decline in the structural change effect over time may serve as evidence that policies (like the Brazilian ISS) that protected some specific sectors have lost their effectiveness when compared with the first several post-World War II years. Although the agriculture sector still employs almost 20 percent of the labor force, it is no longer a net supplier of workers. Thus, in more recent years, the most effective policies oriented at promoting economic growth in an emerging economy like Brazil, a country that has already gone through a structural change, seem to be policies oriented at increasing within-sector productivity for all economic sectors.

This interpretation is endorsed by our empirical evidence. We find that for the entire period from 1950 to 2005, labor productivity increased by 156 percent—corresponding to an annual increase of 1.46 percent—of which the within-sector component contributed 84 percent and the structural change component, 16 percent (Figure 7.3). At the subperiod level, we see that the within-sector component was typically higher than the structural change component, with the only exception being the period 1980–1994, in which the within-sector

FIGURE 7.3 Within-sector changes swamp structural changes



Source: Pesquisa Nacional por Amostra de Domicílios (various years); Timmer and de Vries (2009); Groningen Growth and Development Centre (various years).

Note: GGDC = Groningen Growth and Development Centre; PNAD = Pesquisa Nacional por Amostra de Domicílios. The bars correspond to growth rates for the whole period indicated. The main reasons for the differences between results using GGDC and PNAD data are differences in the initial and final years of the periods and differences in methodologies. For the latter component, we note that while GGDC data are based on national accounts and projections, PNAD is a household survey, so it does not provide a direct measure of productivity. We use individual earnings as a proxy for productivity in PNAD.

TABLE 7.1 Within-sector changes swamp structural changes

Labor productivity annual growth rates (%)			
Datasets and periods	Overall	Within-sector change	Structural change
GGDC 1950–2005	1.46	1.23	0.23
GGDC 1995–2005	0.79	0.59	0.20
GGDC 1980–1994	0.15	–0.46	0.61
GGDC 1965–1979	3.75	1.90	1.85
GGDC 1950–1964	3.08	2.05	1.02
GGDC 1990–2005	0.78	0.83	–0.06
PNAD 1993/95–2007/08	0.54	0.31	0.23

Source: Pesquisa Nacional por Amostra de Domicílios (various years); Timmer and de Vries (2009); Groningen Growth and Development Centre (various years).

Note: GGDC = Groningen Growth and Development Centre; PNAD = Pesquisa Nacional por Amostra de Domicílios.

component turned negative (Table 7.1). In fact, the period 1980–1994, which includes the end of the autarchic regime, was the worst period in terms of productivity growth. Only after the consolidation of the trade liberalization process did the Brazilian economy recover its productivity growth—with most of the growth between 1995 and 2005 resulting from higher within-sector productivity.

As for the 1990–2005 period, which is the one analyzed by McMillan and Rodrik (2011), we find that there was a very small and negative structural change. Overall labor productivity increased by 12 percent—for an annual increase of 0.78 percent—with all of the observed positive changes coming from the within-sector component. One possible explanation is that the economy became more exposed to international competition during this period. Indeed, Muendler (2004) verifies a modest, but positive, impact of trade liberalization on eliminating inefficient firms and increasing productivity.

Also PNAD data for 1993–2008 show annual growth rates in labor productivity were 0.54 percent, of which structural change accounted for 0.23 percentage points (or 43 percent of overall increase in labor productivity), while the within-sector component accounted for 0.31 percentage points (or 57 percent of overall increase in labor productivity). PNAD microdata also provide answers to the following important question: What were the main forces driving productivity between 1993 and 2008? A closer look at the economic sectors tells us that workers in the agriculture and mining sectors encountered the highest increases in earnings (up 17.68 and 37.42 percentage points, respectively), while those in the public utilities sector faced the greatest losses (down 20.65 percentage points) (Table 7.2a).

One possible explanation for this phenomenon is related to sectoral employment shares. As agriculture experienced a sharp decrease in its employment

TABLE 7.2a Agriculture and mining rose most in earnings . . .

Average monthly earnings by sector (in 2008 reais), 1993–1995 and 2007–2008			
Sectors	1993–1995	2007–2008	Percentage change
Agriculture, forestry, and fishing	508.586	598.487	17.68
Mining and quarrying	1,120.166	1,539.344	37.42
Manufacturing	1,135.916	1,029.030	–9.41
Construction	794.869	819.726	3.13
Wholesale and retail trade, hotels, and restaurants	974.233	978.760	0.46
Public utilities	2,052.403	1,628.540	–20.65
Transport, storage, and communications	1,278.819	1,202.321	–5.98
Financial and personal services	1,073.234	1,199.739	11.79

TABLE 7.2b . . . but changes in earnings don't correlate with changes in employment share

Employment shares by economic sector and period (percentage), 1993–1995 and 2007–2008			
Sectors	1993–1995	2007–2008	Percentage point change
Agriculture, forestry, and fishing	16.4	11.4	–4.98
Mining and quarrying	0.5	0.5	–0.02
Manufacturing	15.3	16.6	1.28
Construction	7.9	8.5	0.60
Wholesale and retail trade, hotels, and restaurants	21.9	19.4	–2.59
Public utilities	0.7	0.6	–0.11
Transport, storage, and communications	4.7	5.6	0.89
Financial and personal services	32.5	37.4	4.94

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

shares (down 5 percentage points), it is plausible that productivity within the sector increased, as globalization facilitated technology transfer and contributed to efficiency gains in agricultural production (McMillan and Rodrik 2011). But for other sectors, we see no obvious relationship between earnings and employment share changes (Table 7.2b). For example, public utilities, which faced a substantial loss in earnings, did not suffer any change in terms of employment shares throughout the period. Moreover, financial and personal services, which took third place in earnings growth, thanks to a 12 percentage point increase, also saw its employment shares rise by about 5 percentage points.

Sectors (like mining and agriculture) that have typically adopted more of the labor-saving technologies are those for which a growth in earnings coexists with a negative growth in employment share. The correlation between changes in earnings and employment share for all sectors is weakly negative at around 12 percent. Besides technology adoption, market rigidities caused by labor legislation contribute to this phenomenon.

TABLE 7.3 More education corresponds to higher earnings

Average years of schooling by sector, 1993–1995 and 2007–2008			
Sectors	1993–1995	2007–2008	Percentage change
Agriculture, forestry, and fishing	2.376	3.797	59.81
Mining and quarrying	4.789	8.262	72.52
Manufacturing	6.426	8.430	31.19
Construction	4.224	5.923	40.22
Wholesale and retail trade, hotels, and restaurants	6.544	8.721	33.27
Public utilities	8.610	9.585	11.32
Transport, storage, and communications	6.433	8.364	30.02
Financial and personal services	7.884	9.934	26.00

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

Another potential explanation for the changes in sectoral earnings is education. In all sectors, workers have acquired more years of schooling than had been obtained 20 years ago (Table 7.3). However, we note that for the sectors whose increase in years of schooling was below overall growth (36 percent), earnings either fell or did not grow—except for financial and personal services. The top-two performers in earnings—agriculture and mining—also enjoyed substantial increases in the levels of schooling received by their labor force (60 percent and 73 percent, respectively). Positive selection into these sectors is thus the most likely explanation for our findings.

Moreover, the interpretation of positive selection into agriculture and mining, and negative selection into some other sectors, is corroborated by changes in sectoral informality (Table 7.4). The few sectors that saw an increase in informality—manufacturing, public utilities, and transport, storage, and communications—also sustained lower earnings and education increases that were below the national average. Here a possible explanation is that informality can be understood as a barrier to creating longer capital–work relationships. Thus, sectors with higher levels of informality also have larger turnover rates, and their workers accumulate less experience or specific human capital. We also find that the main explanation for the decrease in informality between 1993 and 2008 is the movement of the labor force from sectors with lower rates of formality to those with higher rates, and not an overall reduction in the informality across all sectors (Appendix 7E).

How does trade liberalization fit in? Our results suggest that opening up the economy was not the reason for any movements in the employment shares of the manufacturing and agriculture sectors (Figure 7.4). While employment shares in agriculture decreased between 1950 and 2005, manufacturing kept

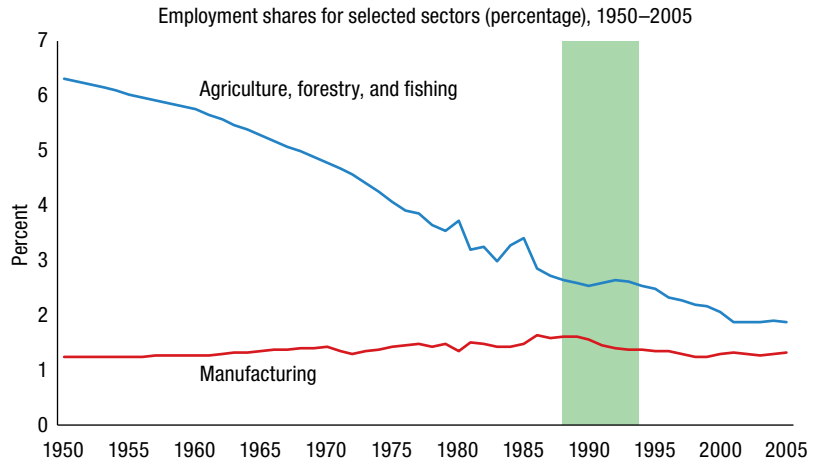
TABLE 7.4 Manufacturing, public utilities, and transport saw a rise in informality

Proportion of formal contract workers by sector (percentage), 1993–1995 and 2007–2008			
Sectors	1993–1995	2007–2008	Difference (in percentage points)
Agriculture, forestry, and fishing	19.9	25.2	5.30
Mining and quarrying	54.5	76.1	21.60
Manufacturing	75.2	70.3	–4.90
Construction	31.2	32.9	1.70
Wholesale and retail trade, hotels, and restaurants	40.9	54.9	14.00
Public utilities	95.1	85.6	–9.50
Transport, storage, and communications	64.3	59.0	–5.30
Financial and personal services	62.6	62.0	–0.60

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

its shares at about 14 percent of employed workers. This suggests that, regardless of the choice of policy, there was a natural trend of the labor force moving out of the agriculture sector, which has never been fully absorbed into the manufacturing sector. Therefore, after the rapid industrialization process that was consolidated by the 1960s, the most effective way policies could affect productive growth in Brazil did not seem to be selecting winning sectors, such

FIGURE 7.4 Trade liberalization didn't seem to alter major sectoral trends



Source: Timmer and de Vries (2009).

Note: The green rectangle represents the period of trade liberalization.

as the industrial sector, but instead creating the right incentives for economic agents to invest in efficient technologies and allow workers to accumulate human capital.

We reconcile our findings with the results for Latin American countries in McMillan and Rodrik (2011) by emphasizing that in an emerging economy like Brazil, structural changes have become much less important to explaining productivity growth than in the past. One possible explanation is that the country has already become industrialized, and the economy's surplus labor force that historically migrated from agriculture has found destinations other than manufacturing where future earnings appeared higher. This indicates that productivity growth has spilled over to other sectors, mainly as a result of increases in the human capital of individual workers.

A Post-structural Change Era

From the early 1950s to the mid-2000s, it is clear that Brazil has been going through a major process of structural change, with employment shares shifting from the least productive to the most productive sectors—accounting for about 16 percent of labor productivity growth—and the rest of the growth coming from within sectors. However, by breaking this period down into shorter segments, we have shown that structural change was mostly important until the 1980s, as it contributed about 40 percent of the gains in productivity. By then, Brazil had increased the participation of industry (defined here as the manufacturing and construction sectors) as a whole in overall GDP to about 36 percent (Table 7.5a), and thus the scope for continuous and long-term structural change had lost momentum.

In fact, we argue that policies that tried to invert this natural trend—that is, expanding manufacturing and reducing agriculture—were unsuccessful, and the early years of the 1980s of slow economic growth can serve as evidence of those efforts. Indeed, both manufacturing and industry as a whole have fallen as a share of GDP since the late 1970s—although in terms of employment, manufacturing's share rose slightly from 13 percent in 1950–1964 to 15 percent in 1980–1994, before slipping back to 13 percent in 1995–2005, with industry following a similar trend (Table 7.5b).

The key to promoting productivity growth in the Brazilian economy after the 1980s seems to have been investing in within-sector productivity growth. Indeed, more efficient firms and technologies—and workers with higher levels of schooling—explain a large part of Brazil's economic gains in the 2000s.

Table 7.5a GDP shares for manufacturing and construction peaked in the late 1970s . . .

	Gross domestic product share by sector of economic activity (percentage)								
Period	Agriculture, forestry, and fishing	Mining and quarrying	Manufacturing	Public utilities	Construction	Wholesale and retail trade, hotels, and restaurants	Transport, storage, and communications	Finance, insurance, real estate, and business services	Community, social, and personal services
1950–2005	8	2	23	3	9	7	5	20	23
1950–1964	15	1	25	3	8	9	3	15	22
1965–1979	8	1	26	2	10	8	4	20	22
1980–1994	7	2	23	2	9	7	5	24	21
1995–2005	8	2	22	3	8	7	5	17	26

Table 7.5b . . . but their employment shares peaked in the mid-1990s

	Employment share by sector of economic activity (percentage)								
Period	Agriculture, forestry, and fishing	Mining and quarrying	Manufacturing	Public utilities	Construction	Wholesale and retail trade, hotels, and restaurants	Transport, storage, and communications	Finance, insurance, real estate, and business services	Community, social, and personal services
1950–2005	34	0	14	1	6	15	4	6	22
1950–1964	59	1	13	1	4	8	3	2	10
1965–1979	44	0	14	1	6	11	3	5	16
1980–1994	29	1	15	1	7	15	3	7	23
1995–2005	21	0	13	0	6	20	4	7	29

Source: Groningen Growth and Development Centre 10-sector database, June 2007, http://www.ggdc.net/ (Timmer and de Vries 2009).

This movement toward efficiency began in the late 1980s with the democratic regime and reached its peak during the late 1990s. Also, our analysis suggests that the trade liberalization of the 1990s did not have an impact on structural change, but was probably the major reason for productivity increases within sectors. One channel for these productivity gains may well have been the "competitive push" (Muendler 2004). Induced by a more competitive market after openness, firms were pushed to innovate more, undertaking cost-reducing innovations and increasing production.

During the 2000s, policy makers were able to focus more on another key by-product of the country's rapid process of urbanization and industrialization: high levels of income inequality. Thus, policies oriented at mitigating economic inequalities were implemented—such as those based on conditional cash transfers—sometimes at the expense of efficiency. It is well documented that during the industrialization period, income inequality increased, as growth benefits were unevenly distributed (Langoni 2005), but that the re-integration into international markets, after a long period of economic isolationism, was very important in terms of inequality reduction (Gonzaga, Menezes-Filho, and Terra 2006).

Today, Brazilian policy makers seem too focused on the short term, which translates into little serious follow-through on improving economic efficiency. But the lessons from the past, especially those from the 1980s, should serve as a warning. We learned that protecting national companies from foreign competition could nullify an important channel that boosts productivity growth and reduces income inequality (Gonzaga, Menezes-Filho, and Terra 2006). For that reason, the recent setback in trade liberalization—a rise in tariffs for cars, electronics, and other manufactured goods—may no longer be justified as a growth-enhancing policy. Moreover, if the policy goal is to increase welfare, then policy makers should pursue this goal in all sectors through investments in universal policies, such as improving the quality of education.

Appendix 7A: Data

Our data come from two sources: Groningen Data, which comprises data from the GGDC (Timmer and de Vries 2009), and the PNAD.

Groningen Data is a collection of annual aggregate statistics from several countries. It reports macro and sectoral variables used in national account systems. For Brazil, it covers the period from 1950 to 2005. Its main advantage is its time coverage, but its main weakness is that it does not include the informal sector, which is about half of the Brazilian workforce. Finally, Groningen

Data provides us with the number of employees and the gross value-added of each economic sector from 1950 to 2005.

The PNAD is the annual Brazilian Household Survey, collected by the Instituto Brasileiro de Geografia e Estatística (Brazilian Census Bureau). The PNAD covers the whole country, with the exception of some rural areas. It is the largest and most important household survey in Brazil, interviewing more than 75,000 households every year, which corresponds to about 300,000 individuals. We have used several PNAD waves, beginning with 1993 and ending with 2008.

The main advantage of using the PNAD is that we have information at the individual level about several demographic and labor characteristics for individual workers, including gender, years of schooling, tenure, weekly hours worked, and some other variables. For example, by using the PNAD, we are able to shed some light on the role that informality played recently. The main weakness of this type of data is its limited time coverage. Also, we have no direct measure of labor productivity; therefore, we have to use earnings and hourly wages as proxies.

We aggregate sectors into eight major groups, or sectors: agriculture, forestry, and fishing; mining and quarrying; manufacturing; construction; wholesale and retail trade, hotels, and restaurants; public utilities; transport, storage, and communications; and financial and personal services.

Appendix 7B: Methodology

For the Groningen Data, we define productivity in sector i at time t as the logarithm of the share of the gross value added per capita in the overall economy. Mathematically, we have,

$$P_{t,i,GR} = \ln\left(\frac{VA_{t,i,GR}}{L_{t,i,GR}} \Big/ \frac{VA_{t,GR}}{L_{t,GR}}\right) = \ln\left(\frac{VA_{t,i,GR}}{L_{t,i,GR}}\right) - \ln\left(\frac{VA_{t,GR}}{L_{t,GR}}\right)$$
$$= \ln\left(\frac{VA_{t,i,GR}}{VA_{t,GR}}\right) - \ln\left(\frac{L_{t,GR}}{L_{t,i,GR}}\right) \qquad \text{(B.1)}$$

where "ln" is the natural logarithm operator, P refers to the productivity level, t denotes the year, i denotes the economic sector, GR means Groningen Growth and Development Centre, VA means gross value-added, L means number of workers employed, such that $VA_{GR} = \sum_{j=1}^{9} VA_{j,GR}$ and $L_{GR} = \sum_{j=1}^{9} L_{j,GR}$.

For the PNAD, we do not observe the productivity of each sector. Therefore, we assume that productivity can be approximated by wages paid in

each sector. Thus, our measure of productivity of an individual worker m will be the logarithm of his or her hourly wage. In other words,

$$P_{m,t,i,PNAD} = \ln(HourlyWage_{m,t,i,PNAD}). \tag{B.2}$$

Although equation (B.2) may not be an accurate measure of productivity, in equilibrium we expect that labor productivity equals wages. In this sense, we expect that a strong correlation between productivity and hourly wages should at least exist.[2]

Given our measures of productivity, we can implement McMillan and Rodrik's (2011) decomposition of time changes in productivity, ΔP_t, through two terms: "structural" and "within."

$$\Delta P_t = \sum_{i=9} \theta_{t,i} \Delta P_{t,i} + \sum_{i=9} P_{t,i} \Delta \theta_{t,i}, \tag{B.3}$$

where $P_{t,i}$ denotes the sectoral labor productivity level and $\theta_{t,i}$ is the share of employment in sector i. The Δ operator designates time changes in productivity or employment shares between t-1 and t.

Equation (B.3) allows us to decompose the productivity change into two terms: the first one is the "within effect," in which we keep constant the initial labor share and measure variation coming from sectoral labor productivity. The second term, defined as "structural change," captures changes in labor shares across sectors, once we keep the final productivity level of each sector constant.

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2 Calculating productivity using Groningen Data and the PNAD for 1995–2005 (excepting 2000 and 2001), we found a 55 percent Pearson correlation coefficient. Regressing the productivity coefficient calculated from equation (B.1) by productivity calculated from equation (B.2), we found a coefficient of 2.25 and a standard deviation of 0.031. This presents some evidence that both measures of productivity we use in this chapter are positively correlated.

Appendix 7C: Overall Descriptive Statistics

Table 7C.1 Key characteristics of Brazil's labor force

Key characteristics	1993–1995	1996–1997	1998–1999	2002–2003	2004–2006	2007–2008
Formal contract employees	0.505	0.500	0.496	0.511	0.526	0.552
Employed	0.920	0.906	0.882	0.883	0.891	0.908
Earnings	963.53	1,064.34	1,020.95	917.06	932.89	1,022.51
White	0.567	0.570	0.563	0.547	0.525	0.509
Male	0.644	0.630	0.620	0.603	0.594	0.589
Age	34.085	34.367	34.641	35.168	35.472	36.054
Weekly hours	43.528	43.528	43.327	43.170	42.683	42.146
Rural area	0.161	0.157	0.158	0.118	0.127	0.120
Tenure	84.240	85.857	86.439	86.297	86.961	88.633
Experience (years)	21.275	21.121	21.538	21.687	21.755	21.915
Schooling years	6.098	6.437	6.726	7.504	7.924	8.309
North region	0.045	0.045	0.047	0.056	0.072	0.072
South region	0.161	0.162	0.162	0.159	0.157	0.157
Southeast region	0.480	0.476	0.471	0.468	0.459	0.456
Central-West region	0.072	0.074	0.076	0.076	0.077	0.078
Northeast region	0.243	0.243	0.244	0.240	0.236	0.236

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

Note: "Formal contract employees" is the proportion of the employed labor force under formal labor contracts. "Employed" is the proportion of the labor force that is employed. "Earnings" are monthly earnings measured in 2008 reais. "White," "Male," "Rural area," and regional dummies are proportions of the labor force. "Age" and "Schooling years" are averages of the labor force. "Weekly hours" and "Experience" are for employed labor force. "Tenure" is average job tenure, or average duration of current job for employed workers, and is measured in months.

Appendix 7D: Other Descriptive Statistics by Sectors

Table 7D.1 Percentage of whites by sector

Sectors	1993–1995	2007–2008	Difference (percentage points)
Agriculture, forestry, and fishing	44.5	38.8	–5.70
Mining and quarrying	42.8	42.8	0.00
Manufacturing	64.5	56.6	–7.90
Construction	47.7	39.8	–7.90
Wholesale and retail trade, hotels, and restaurants	62.0	55.4	–6.60
Public utilities	61.9	53.8	–8.10
Transport, storage, and communications	59.8	53.3	–6.50
Financial and personal services	59.2	54.3	–4.91

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

Table 7D.2 Percentage of males by sector

Sectors	1993–1995	2007–2008	Difference (percentage points)
Agriculture, forestry, and fishing	89.7	89.6	–0.10
Mining and quarrying	93.6	90.9	–2.70
Manufacturing	74.1	65.7	–8.40
Construction	97.7	97.4	–0.30
Wholesale and retail trade, hotels, and restaurants	64.5	63.4	–1.10
Public utilities	85.3	80.1	–5.20
Transport, storage, and communications	89.8	86.1	–3.70
Financial and personal services	37.7	36.7	–1.02

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

Table 7D.3 Average age by sector

Sectors	1993–1995	2007–2008	Growth (%)
Agriculture, forestry, and fishing	38.726	41.053	6.01
Mining and quarrying	34.369	37.101	7.95
Manufacturing	32.362	35.052	8.31
Construction	34.991	37.977	8.53
Wholesale and retail trade, hotels, and restaurants	33.705	34.566	2.55
Public utilities	38.072	38.359	0.75
Transport, storage, and communications	36.163	37.299	3.14
Financial and personal services	34.314	37.257	8.58

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

Table 7D.4 Average tenure (months) by sector

Sectors	1993–1995	2007–2008	Growth (%)
Agriculture, forestry, and fishing	143.173	153.497	7.21
Mining and quarrying	75.710	89.546	18.27
Manufacturing	63.700	74.521	16.99
Construction	73.617	93.171	26.56
Wholesale and retail trade, hotels, and restaurants	66.480	69.139	4.00
Public utilities	134.968	111.872	–17.11
Transport, storage, and communications	82.348	79.057	–4.00
Financial and personal services	78.143	88.610	13.39

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

Table 7D.5 Average experience (years) by sector

Sectors	1993–1995	2007–2008	Growth (%)
Agriculture, forestry, and fishing	28.028	29.663	5.83
Mining and quarrying	21.893	22.484	2.70
Manufacturing	18.981	20.544	8.23
Construction	22.638	24.495	8.20
Wholesale and retail trade, hotels, and restaurants	20.143	19.789	–1.76
Public utilities	23.585	23.100	–2.06
Transport, storage, and communications	22.681	22.722	0.18
Financial and personal services	19.506	21.527	10.36

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

Table 7D.6 Percentage of workers in the North region by sector

Sectors	1993–1995	2007–2008	Difference (percentage points)
Agriculture, forestry, and fishing	2.9	8.7	5.80
Mining and quarrying	5.6	9.1	3.50
Manufacturing	3.1	5.9	2.80
Construction	4.2	8.2	4.00
Wholesale and retail trade, hotels, and restaurants	5.2	7.7	2.50
Public utilities	5.5	7.6	2.10
Transport, storage, and communications	4.4	6.6	2.20
Financial and personal services	5.0	7.1	2.05

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

Table 7D.7 Percentage of workers in the South region by sector

Sectors	1993–1995	2007–2008	Difference (percentage points)
Agriculture, forestry, and fishing	17.1	15.5	–1.60
Mining and quarrying	10.0	09.2	–0.80
Manufacturing	21.2	20.7	–0.50
Construction	15.1	15.0	–0.10
Wholesale and retail trade, hotels, and restaurants	15.7	16.5	0.80
Public utilities	17.0	19.2	2.20
Transport, storage, and communications	15.2	15.8	0.60
Financial and personal services	14.9	14.9	–0.02

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

Table 7D.8 Percentage of workers in the Southeast region by sector

Sectors	1993–1995	2007–2008	Difference (percentage points)
Agriculture, forestry, and fishing	29.8	26.9	–2.90
Mining and quarrying	44.4	48.2	3.80
Manufacturing	58.0	52.6	–5.40
Construction	50.2	44.7	–5.50
Wholesale and retail trade, hotels, and restaurants	48.7	44.9	–3.80
Public utilities	46.8	47.9	1.10
Transport, storage, and communications	54.8	50.6	–4.20
Financial and personal services	50.5	47.4	–3.11

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

Table 7D.9 Percentage of workers in the Central-West region by sector

Sectors	1993–1995	2007–2008	Difference (percentage points)
Agriculture, forestry, and fishing	8.4	8.2	–0.20
Mining and quarrying	11.5	6.8	–4.70
Manufacturing	3.7	5.5	1.80
Construction	7.4	8.5	1.10
Wholesale and retail trade, hotels, and restaurants	7.3	8.1	0.80
Public utilities	8.5	7.2	–1.30
Transport, storage, and communications	6.6	7.0	0.40
Financial and personal services	8.0	8.6	0.58

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

Table 7D.10 Percentage of workers in the Northeast region by sector

Sectors	1993–1995	2007–2008	Difference (percentage points)
Agriculture, forestry, and fishing	41.8	40.8	–1.00
Mining and quarrying	28.5	26.8	–1.70
Manufacturing	14.0	15.4	1.40
Construction	23.1	23.8	0.70
Wholesale and retail trade, hotels, and restaurants	23.1	22.8	–0.30
Public utilities,	22.1	18.2	–3.90
Transport, storage, and communications	19.0	19.9	0.90
Financial and personal services	21.6	22.1	0.56

Source: Pesquisa Nacional por Amostra de Domicílios (various years).

Appendix 7E: Decomposition of Informality

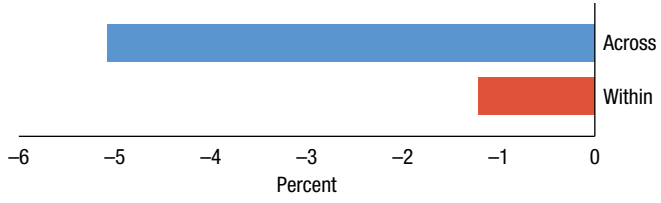
Here we decompose the informality growth (variation in the percentage of informal contract workers) by the following equation:

$$\Delta I_t = I_t - I_\tau = \sum_j^9 \Delta I_{jt} E_j + \sum_j^9 \Delta E_{jt} i_j. \qquad \text{(E.1)}$$

where E_{jt} is the share of industry j's employment by total employment at time t, i_{jt} is the share of informal workers by total employment in industry j, $E_j = 0.5(E_{jt} + E_{j\tau})$, and $i_j = 0.5(i_{jt} + i_{j\tau})$. The first term of the decomposition is the "within effect" and represents changes in informality in each sector, keeping employment shares constant. The second term is the "between effect" and denotes changes in informality resulting from the migration of workers across sectors, keeping the rate of informality of each sector constant.

Figure 7E.1 presents the decomposition for the period 1993–2008. The figure suggests that the greatest decrease in informality observed in the period is caused by the movement of the labor force to the direction of sectors with higher rates of formality.

Figure 7E.1 Decomposition of informality growth, 1993/1995–2007/2008



Source: Pesquisa Nacional por Amostra de Domicílios (various years).

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Contributors

Adedeji Adeyinka was the head of the Demographic and Social Statistics unit at the National Bureau of Statistics of Nigeria until his retirement. He has a professional Diploma in Statistics from the University of Ibadan, Nigeria. He also attended the International Statistical Education Centre (ISEC) in Kalkata, India where he graduated with a Diploma in Computer and Statistics.

Reshad N. Ahsan (rahsan@unimelb.edu.au) is a lecturer in Economics at the University of Melbourne. His primary areas of research are international trade and development economics. His recent research has been at the interface of trade, labor, and development. His past work has focused on the impact of trade liberalization on unemployment and labor bargaining power in India as well as the impact of trade on firm productivity. He holds a PhD in Economics from Syracuse University.

Sergio Firpo (firpo@insper.edu.br) is an associate professor of Economics at the São Paulo School of Economics of the Getulio Vargas Foundation (FGV) in Brazil. His main research interests are microeconometrics, policy evaluation, labor economics, development economics and empirical political economy. He is a member of the Standing Committee of the Latin American Chapter of the Econometric Society and was the editor of the *Brazilian Review of Econometrics*. He received his PhD in Economics from the University of California at Berkeley.

Rémi Jedwab (jedwab@gwu.edu) is an associate professor of Economics and International Affairs at the Department of Economics and the Elliott School of International Affairs of George Washington University. His main field of research is development economics, urban economics, and public economics. Some of the issues he has studied include urbanization and structural transformation, the economic effects of transportation infrastructure, and agricultural and economic development in Africa south of the Sahara. He is a co-founder of the World Bank-GWU Research Conference on Urbanization and Poverty Reduction and the Washington Area Development Economics Symposium. He received his PhD in Economics from the Paris School of Economics.

Keith Jefferis (keith@econsult.co.bw) is a development macroeconomist and financial sector specialist. He is Managing Director of Econsult Botswana (Pty) Ltd, and is a former Deputy Governor of the Bank of Botswana. His current activities include work on a range of macroeconomic, financial and other development policy issues in Botswana and elsewhere in Africa south of the Sahara. He received his bachelor's degree from the University of Bristol. He holds a master's degree from the University of London and a PhD from the Open University in the UK.

Brian McCaig (bmccaig@wlu.ca) is an assistant professor of Economics at Wilfrid Laurier University. His research explores how households, workers, and firms respond to globalization in low-income countries, with a focus on Viet Nam. He earned a PhD in Economics from the University of Toronto.

Margaret McMillan (m.mcmillan@cgiar.org) is a senior research fellow in the Development Strategy and Governance (DSG) division of the International Food Policy Research Institute. From 2009–2011 she was the director of DSG. She is also a professor of Economics at Tufts University and a research associate in the National Bureau of Economic Research's program on International Trade and Investment. She is the recipient of numerous awards for her research and in 2005, she was named the William and Flora Hewlett Foundation Fellow at the Radcliffe Institute for Advanced Study. She holds a PhD in Economics from Columbia University, a master's degree in Public Administration from Princeton University and a bachelor's in Mathematics and Economics from Boston University.

Devashish Mitra (dmitra@maxwell.syr.edu) is professor of Economics and the Cramer Professor of Global Affairs at the Maxwell School of Citizenship and Public Affairs at Syracuse University. He is a fellow of the Center for Economic Studies (CESifo) network and of the Institute of Labor Economics (IZA). He is also a research professor at the Ifo Institute in Munich. He is Coeditor of E*conomics and Politics and the Indian Growth and Development Review*. He is also on the editorial boards of the *Review of International Economics, ISRN Economics* and *Economies.* His research areas are international trade, political economy and development economics. His current research interests are at the interface of trade and labor. He holds a PhD in Economics from Columbia University.

Robert Darko Osei (rdosei@yahoo.co.uk) is a senior economist at the Institute of Statistical, Social and Economic Research in Accra, Ghana. His research areas include capital flows and growth, poverty and macroeconomics. He earned his master of science degree from the University of Warwick and his PhD from Nottingham University both in the UK.

Nina Pavcnik (Nina.Pavcnik@dartmouth.edu) is the Niehaus Family Professor of International Studies and Professor of Economics at Dartmouth College. Her research interests are at the intersection of international trade, economic development, and industrial organization, with a particular focus on how households, workers, and firms respond to globalization. She is a research associate at the National Bureau of Economic Research, a research affiliate at the Centre for Economic and Policy Research, and a senior fellow at the Bureau for Research and Economic Analysis of Development. She currently serves as a Coeditor of the *Journal of International Economics*, associate editor of the *American Economic Review* and editor of the *World Bank Economic Review*, and is a member of the World Bank Research Committee. She received a bachelor's degree in Economics from Yale University and earned a PhD in Economics from Princeton University.

Renan Pieri (renanpieri@yahoo.com.br) is an academic coordinator at Sinapse—Centro Aplicado de Inteligência, Inovação e Gestão Educacional, in São Paulo (Brazil). He is a professor at Mackenzie Presbiterian University. His main research interests are policy evaluation, economics of education, empirical political economy, development economics, applied law and economics, and labor economics. He is a PhD candidate of Economics at the São Paulo School of Economics of the Getulio Vargas Foundation (FGV) in Brazil.

Danielle Resnick (d.resnick@cgiar.org) is a senior research fellow in the Development Strategy and Governance division at the International Food Policy Research Institute. Her work focuses on party politics, electoral behavior, and the political economy of development in urban and rural areas. In addition to a number of journal articles, she is the author of *Urban Poverty and Party Populism in African Democracies* (Cambridge University Press, 2013), coeditor of *Democratic Trajectories in Africa: Unraveling the Impact of Foreign Aid* (Oxford University Press, 2013), and coeditor of *African Youth and the Persistence of Marginalization: Employment, Politics, and Prospects for Change* (Routledge, 2015). She received her PhD in political science from Cornell University.

Dani Rodrik (dani_rodrik@harvard.edu) is the Ford Foundation Professor of International Political Economy at Harvard's John F. Kennedy School of Government. He rejoined the Kennedy School in July 2015 after two years at the Institute for Advanced Study as the Albert O. Hirschman Professor in the School of Social Science. He also holds a visiting appointment at the London School of Economics as Centennial Professor (2013-2016). His research covers globalization, economic growth and development, and political economy. He is affiliated with the National Bureau of Economic Research, Centre for Economic Policy Research (London), and the Center for Global Development among other research organizations. He is the recipient of numerous awards, including the inaugural Albert O. Hirschman Prize of the Social Science Research Council, and honorary doctorates from universities in Europe and Latin America. He currently serves as Vice-President of the International Economic Association. His most recent book is *Economics Rules: The Rights and Wrongs of the Dismal Science* (W.W. Norton, 2015). His articles have been published in the *American Economic Review, Quarterly Journal of Economics, Journal of Political Economy, Journal of Economic Growth, Journal of International Economics, Journal of Development Economics,* and other academic journals. He holds a bachelor's degree from Harvard College, and a master's degree in Public Administration and a PhD in Economics from Princeton University.

Sheu Salau (ssalau@worldbank.org) is an agricultural economist at the World Bank office in Nigeria and a co-task team leader for the Nigeria West Africa Agricultural Productivity Project (WAAPP). Before joining the World Bank in 2012, he worked at the International Food Policy Research Institute from 2008–2012. His research is on the effect of agricultural commercialization

on fertilizer use intensification and nonfarm employment with theoretical foundations from Boserup and Agricultural Transformation theories. He has a master's degree in Agricultural Economics from the University of Ibadan in Nigeria and is completing his PhD in Agricultural Economics and Farm Management at the University of Ilorin in Nigeria.

Claudia Sepúlveda (csepulveda@worldbank.org) is lead economist in the Development Economics Vice Presidency at the World Bank. She has held positions in various units of the World Bank (Latin America and the Caribbean region and the Development Research Group) working on trade, labor, and fiscal issues. She was also a member of the World Development Report 1997 on "The State in a Changing World" and is the coauthor of the book *Post-Crisis Growth and Development: A Development Agenda for the G-20*. She was a leader of the Jobs Knowledge Platform, an interactive website facilitating the exchange of data, research findings and opinion on how to expand job opportunities in developing countries. She holds degrees in Economics from the Universidad de Chile and the University of California at Los Angeles.

James Thurlow (J.Thurlow@cgiar.org) is a senior research fellow at the International Food Policy Research Institute and formerly a Research Fellow at the United Nations University-World Institute for Development Economics Research (UNU-WIDER). His research analyzes the interactions between policies, economic growth, and poverty, primarily using computable general equilibrium and micro-simulation modeling. He has worked with governments and researchers throughout Africa south of the Sahara and Asia. He holds a bachelor's degree, master of science, and PhD from the University of Natal in South Africa.

Íñigo Verduzco-Gallo was a senior research analyst at the International Food Policy Research Institute. He is currently a project manager at Lateritet, a data, research and technical advisory firm dedicated to social and economic development located in Rwanda. His research focuses on the role of structural transformation in economic development and its links to trade, employment, and food security policies in developing countries. He has also worked as a consultant for the World Bank and as a trader/analyst for the Central Bank of Mexico. He holds a master's degree in Public Administration in International Development from Harvard's Kennedy School of Government and a Licenciatura in Economics from the Instituto Tecnológico Autónomo de México (ITAM).

Dietrich Vollrath (devollrath@uh.edu) is an associate professor of Economics at the University of Houston. His research focuses on long-run growth and development, the transition of economies out of agriculture and into industry, the determinants of agricultural productivity, and the impact of rapid urbanization on growth. In addition to his original research, he has coauthored an undergraduate textbook on economic growth. He holds a PhD from Brown University.

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INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
IFPRI

1201 Eye Street, NW, Washington, DC 20005 USA
T. +1-202-862-5600 | F. +1-202-467-4439 | Email: ifpri@cgiar.org

www.ifpri.org

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