Productivity has again moved to center stage in two critical academic and policy debates: the slowing of global growth amid spectacular technological advances and developing countries’ frustratingly slow progress in catching up to the frontier. Productivity Revisited brings together the new conceptual advances of “second-wave” productivity analysis that have revolutionized the study of productivity, calling much previous analysis into question, while providing a new set of tools for approaching these debates. The book extends this analysis and, using unique data sets from multiple developing countries, grounds it in the developing-country context. It calls for a greater focus on upgrading firms and facilitating the emergence of productive new establishments. Such an approach requires a supportive environment and various types of human capital—managerial, technical, and actuarial—necessary to cultivate new transformational firms.

The book is the second volume of the World Bank Productivity Project, which seeks to bring frontier thinking on the measurement and determinants of productivity to global policy makers. This volume puts forward an import research agenda, based on a rich set of findings coming from a variety of data sets, embodying both macro- and micro-level data and covering various parts of the globe. It is rather unusual in that it not only describes the results and their implications for policy, but puts forward a framework for integrating the results with the existing literature on firm performance and resource allocation. It is an important piece of work for any scholar interested in productivity issues. It will greatly aid the interpretation of some of the most important current trends, such as the productivity slowdown, increased global value chains and the rise of large firms, and more importantly, how to shape the conversation among economists, business people, and policy makers around the developing world.

Jan De Loecker
Professor of Economics, KU Leuven, Belgium

Productivity Revisited packs an enormous amount of research, data, and insights between its covers. It concisely lays out the challenges posed when productivity lags, the best approaches for measuring it, the mechanisms through which it acts at both the microeconomic and macroeconomic levels, and potential ways in which policy can encourage productivity growth. This volume will serve as a reference for years to come.

Chad Syverson
Eli B. and Harriet B. Williams Professor of Economics, University of Chicago Booth School of Business
Overview

Productivity Revisited
Shifting Paradigms in Analysis and Policy

Ana Paula Cusolito and William F. Maloney
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**Appendix A. Measuring the Productivity Residual: From Theory to Measurement**
Preface

Productivity accounts for half of the differences in GDP per capita across countries. Identifying policies to stimulate it is thus critical to alleviating poverty and fulfilling the rising aspirations of global citizens. Yet productivity growth has slowed globally in recent decades, and the lagging productivity performance in developing countries constitutes a major barrier to convergence with advanced-economy levels of income.

The World Bank Productivity Project seeks to bring frontier thinking on the measurement and determinants of productivity, grounded in the developing-country context, to global policy makers. Each volume in the series explores a different aspect of the topic through dialogue with academics and policy makers and through sponsored empirical work in our client countries. The Productivity Project is an initiative of the Vice Presidency for Equitable Growth, Finance, and Institutions.

The current volume, *Productivity Revisited*, takes stock of recent advances in what it refers to as the “second wave” of productivity analysis, which calls into question much previous research in this area. At the same time, these new approaches provide a new set of tools for navigating the debates surrounding the productivity slowdown and convergence. The work here extends this analysis using international and developing-country data sets and delineates how the findings imply important corresponding shifts in recommendations for productivity policy.

This volume is dedicated to the memory of Jan Walliser (1969–2018), former Vice President of the World Bank Group’s Equitable Growth, Finance, and Institutions Practice Group.

William F. MalONEY
Chief Economist
Equitable Growth, Finance, and Institutions Practice Group
World Bank Group
Other Titles in the World Bank Productivity Project


All books in the World Bank Productivity Project are available free at https://openknowledge.worldbank.org/handle/10986/30560.
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Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
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<tr>
<td>TFP</td>
<td>total factor productivity</td>
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<td>TFPQ</td>
<td>physical total factor productivity</td>
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<td>TFPR</td>
<td>revenue total factor productivity</td>
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Overview: The Elusive Promise of Productivity

The growth of productivity—the efficiency with which societies combine their people, resources, and tools—is the main driver of the development process. The appreciation of the central role of productivity enjoys a long and distinguished pedigree. Paul Krugman’s oft-repeated quip that “productivity isn’t everything, but, in the long run, it is almost everything” (Krugman 1994) echoes the earlier reflections of the medieval Arab social theorist Ibn Khaldun (1332–1406), who argued even more portentously in his *Muqaddimah* (1377) that “civilization and its well-being as well as business prosperity, depend on productivity.”

Sustained increases in productivity are critical not only to the average denizen of civilization but also to lifting those who share least in its benefits. Long-term increases in earnings in industry or agriculture—the source of employment and livelihoods for many of the poor—can be achieved only by increasing worker or farmer productivity. Workers will leave informal self-employment only if earnings in the formal sector merit the shift. Hence, the route to generating good jobs transits directly and inexorably through a sustained agenda to raise productivity. In addition, productivity-driven cost reductions reduce the prices of key products consumed by the poor and thereby increase household purchasing power, helping poorer households get more for less. New technologies reduce the cost and improve the efficiency and efficacy of service delivery in all social spheres. Raising global productivity growth is thus arguably the pivotal element of an integrated strategy to generate jobs—and good jobs—and reduce poverty.

The Twin Productivity Puzzles

The central role of productivity has gained renewed salience in current policy debates for two reasons. First, the global productivity engine that powered the advanced world to prosperity has slowed (figure O.1), threatening to reduce the rate at which all countries grow and with which global poverty is reduced. The total change in labor productivity growth, in turn, is broadly the result of increases due to accumulation of physical capital (machinery) and changes in total factor productivity (TFP)—the efficiency with which firms transform inputs into output. Most of the slowdown between 1995–2004 and 2005–14—about 0.9 percentage point of the total 1.1 percentage point drop—reflects a
Overview: The Elusive Promise of Productivity

The Elusive Promise of Productivity

reduction in TFP growth. This slowdown is occurring despite spectacular advances in computing power and a host of derivative technologies: the promise of rapid advances through science and technology seems out of sync with observed slower growth in productivity.1 In fact, overall, there is little consensus on what the determinants of the slowdown are, whether they are common to both the advanced economies and developing countries, or to what extent, and how, they can be remedied.

Second, the hoped-for natural convergence of follower countries in the developing world to the global frontier remains elusive, and many countries remain seemingly trapped at low-or middle-income levels. Both dimensions must be resolved to lift global productivity growth rates and reduce poverty.

The Global Productivity Slowdown

There is little consensus as to what has slowed the productivity engine. One school of thought argues that declining economic dynamism—the “churn” in the economy, in the form of job reallocation, firm turnover, and entrepreneurial activity—is responsible for the slump, possibly driven by an increase in regulation or distortions, which are gunking up the growth machinery. Poor regulation and anticompetitive practices are documented to exert a powerful drag on total factor productivity—although to explain the common

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FIGURE 0.1 The Rate of Growth of Output per Worker Has Been Falling in Both Industrialized and Developing Countries for Decades

Source: Conference Board, Total Economy Data Base, 2018.
Note: The figure plots the trend in the unweighted average rate of labor productivity growth across countries for four country groups between 1950 and 2018. Trends are obtained using a Hodrick-Prescott filter with smoothing parameter 100.

There is no consensus as to why the productivity engine has not regained its previous momentum or why followers are so slow in catching up to the leaders.
trends across the diverse member countries of the Organisation for Economic Co-operation and Development would require attributing the slowdown to a type of coordination in driving policies that is not readily apparent. Furthermore, this volume does not find such a decline in churn for a small sample of developing countries. Another view argues that the global financial crisis financially constrained many firms; for those firms that depended more on outside financing, productivity had more trouble bouncing back. Again, the work in this volume confirms that in developing countries finance is generally more constrained, absolutely restricting investments in innovation and productivity. These are, in some sense, manageable issues from a policy point of view: regulation can be improved, and the effects of the crisis should dissipate with time.

However, a more profound concern is that the fundamental fuel of growth, technological progress, may be drying up. While eye-catching advances are appearing almost daily, they do not seem to add up to much in the productivity data, as Robert Solow (1987) noted, raising questions about how truly transformative these advances are. Furthermore, generating even these apparently lesser ideas is growing harder. Since 1950, the number of researchers needed to generate a unit of total factor productivity has steadily increased (Bloom et al. 2017). Some pessimists, like Robert Gordon (2015, 2017), argue that the best fruits of the tree of knowledge have already been picked. The new harvests are shinier, but far less nourishing to the process of growth.

More optimistic observers see the advent of artificial intelligence, DNA sequencing and cell analysis, high-powered computing, and web connectivity, to name a few, as constituting an entirely new set of tools for discovery or “reinventing inventing” that potentially multiply the productivity of the new processes for generating ideas. As Mokyr (2013, 2014) summarizes, “We ain’t seen nothing yet.” Furthermore, both the scope and the efficiency of that effort are increasing. The number of global researchers has doubled since 1995, with the largest share of the increase coming from developing countries. Moreover, information and communication technology facilitates collaboration across great distances. Like the fragmentation of production of goods in global value chains, a new globalization of research effort is evolving in which different research tasks are distributed to countries where they can be done most cheaply.

Some of the resolution of Solow’s paradox likely resides in measurement issues. Yet careful analysis by Syverson (2016, 2017) suggests that it is unlikely that the missing productivity can be accounted for by mismeasurement of information and communication technologies or web-related products. However, it is also true that in general, diffusion of technologies takes decades and occurs in multifaceted ways, some of them hard to measure—or even detect at first. Some technologies, like artificial intelligence, require substantial complementary investments in nontangible assets that, on the books, statistically depress productivity today but will appear as growth spikes in the future.
Though the pessimist’s viewpoint cannot be discarded out of hand, there is something incongruous about the simultaneous concerns in civilization’s discourse that innovation-driven productivity growth is a thing of the past, on the one hand, and on the other, that progress in robotics and artificial intelligence will displace masses of workers through productivity gains. There is evidence of the latter effect in the hollowing out of assembly jobs in the advanced economies thought to be due to automation. As this volume shows, to date there is little evidence of this effect in the developing world. In fact, robots per capita and the share of the labor force in assembly work seem positively correlated.

In sum, there is no accepted view yet on either the sources of the global productivity slowdown or whether the causes are the same across groups of countries. This volume does not find a pronounced fall in dynamism, increase in industrial concentration, or shift toward lower-productivity services in the follower countries that are considered important in the advanced economies.

The Weakness of Economic Convergence

The lack of impact on developing-country labor markets may point to a second area of concern prompting new work on productivity: the continued failure of economic convergence. The average person in an advanced economy produces in just over nine days what the average person in the lowest-income countries produces in an entire year (Restuccia 2013). Even were productivity to come to a halt in advanced economies, the potential contribution to raising global productivity and reducing poverty by achieving convergence through technological catch-up is immense.

Yet despite early theoretical arguments for a natural force of convergence among the now frontier countries, it has proven statistically elusive. With some important exceptions, the gap has widened, leading to a “Great Divergence” among nations over the past few centuries (see, among others, Pritchett 1997). This lack of convergence prompted an examination of what the previous volume in this series called the innovation paradox. The gains from adopting and using existing technologies, products, processes, and management techniques from abroad are thought to be vast: the radiation of ideas, technologies, products, and processes to developing countries represents a positive externality of truly historic proportions. Yet countries and firms do not seem to exploit these potential gains (Comin and Mestieri 2018). Cirera and Maloney’s (2017) focus on missing complementarities—in financial markets, in firm capabilities, and in the business climate—that lower the return to technology adoption offers one possible piece of this second productivity puzzle, but it is far from an exhaustive explanation.
In sum, there is no consensus on the first puzzle of the global productivity slowdown, and the second puzzle remains a long-standing analytical challenge that goes to the core of the World Bank’s mandate.

**Sources of Productivity Growth**

Productivity growth—both of the countries pushing the frontier and those unevenly catching up—can be broken down mechanically into three margins or components, as shown in figure O.2.

*Upgrading firms (within-firm productivity gains).* At the center of productivity analysis lies the firm, as the main creator of economic value added and productivity gains. The “within” component is related to individual firms becoming more productive: that is, increasing the amount of output they produce with a constant amount of inputs because they have increased their internal capabilities, including managerial skills, workforce skills, innovation capacity, and technology-absorption capability.

*Improving allocation of factors of production across firms (between-firm productivity gains).* Ideally, the most productive firms would attract the most resources, thereby ensuring the greatest possible output. However, myriad distortions—including poorly designed legislation or political patronage that prevents resources from moving from less efficient firms—can have large effects. The between component is associated with the reallocation of factors of production and economic activity toward more efficient firms.

*Improving entry and exit of firms (selection).* Aggregate productivity growth can also result from the entry of high-productivity firms (relative to the industry average) and the exit of low-productivity firms (again, relative to the industry average).

**FIGURE O.2 Drivers of Productivity Growth**

- **Reallocation toward more productive firms**
- **Within-firm performance upgrading**
- **Entry of high-productivity, exit of low-productivity firms**
- **Operating environment: resolving market failures and removing distortions**
- **Human capital and innovative infrastructure: basic skills; entrepreneurial, managerial, and technological capabilities**
- **Innovation shocks**
- **Dynamic effects**
- **Total factor productivity growth**
Examining the factors that affect the entry of higher-quality firms moves into the study of entrepreneurship (discussed later).

**The Productivity Components That Matter Most: New Evidence for Developing Countries**

New evidence prepared for this volume presents interesting findings about the relative importance of each of the three components to productivity growth. Figure O.3 provides decompositions for a sample of developing countries into its distinct components. The results show that the within component is relatively more important than the between component in four of six cases, explaining roughly half or more of efficiency growth in these economies, especially in Ethiopia and China. However, depending on the country, the other components also play important roles. In Chile and Colombia, the entry and exit of firms is the largest contributor. Reallocation is marginally the dominant contributor in India and comes a close second in Colombia.

**Second-Wave Productivity Analysis**

While the literature has not offered a definitive explanation for why the productivity engine has not regained its previous momentum, or why followers are so slow in

**FIGURE O.3 Which Dimension Contributes Most to Productivity Growth?**

catching up to the leaders, it has, over the last 20 years, dramatically increased our understanding of the underlying mechanisms and dynamics. More profoundly, it has revolutionized the conceptual and analytical techniques for analyzing productivity and its determinants.

This study pulls together the underlying shifts in paradigm and measurement and terms them the “second wave” of productivity analysis. This new wave has been facilitated by three critical evolutions. First, the access to detailed and high-quality firm-level data has improved greatly in some economies. Second, partly aided by this availability, an academic literature has emerged that critically revisits many established approaches, in particular, the estimation of firm production functions, and from there, the identification and measurement of the drivers of productivity growth. Third, the quantification of human capital or “capabilities” relevant to productivity improvements, in terms of both managerial skills and, more fundamentally, necessary psychological characteristics, has permitted a tentative opening of the black box of the role of entrepreneurship in productivity gains.

This volume employs manufacturing production firm-level data for a variety of developing economies—including Chile; China; Colombia; Ethiopia; India; Indonesia; Malaysia; Mexico; Romania; Taiwan, China; and Thailand—to forward this analytical agenda and ground it in the developing-country reality. The extensive empirical work and conceptual synthesis presented in this volume offers new guidance for productivity analysis and dictates a corresponding shift in how to approach productivity policy in several areas.

1. Employing the new wave of productivity diagnostics and analytics is essential to sound policy design and evaluation.

Many of the approaches commonly used in productivity diagnostics and analysis rest on weak conceptual foundations or use databases that lack key variables. They can lead to identification problems—an inability to distinguish among different potential drivers—and potentially erroneous policy prescriptions, mistakes in the inferences of welfare implications and distributional effects from policy reforms, and in the end, an inability to prioritize the policy reform agenda and make it more effective. To mention a few issues:

- The most commonly used measure of productivity, which is revenue total factor productivity (TFPR, or as more commonly written, just TFP), is a flawed diagnostic of efficiency; hence many analyses relating it to market failures or policy reforms are correspondingly unreliable. TFPR backs out physical quantity measures by deflating firm revenues by industry-level price indexes. However, these measures are contaminated by residual firm-level price effects that capture
firm-specific input costs, product quality, and market power considerations (see figure O.4), all of which may be correlated with policy changes as much as efficiency is. New techniques applied to databases with firm-level prices allow extraction of a true measure of efficiency—physical (or quantity) total factor productivity (TFPQ)—used in the decompositions in figure O.3.

- Productivity analysis that does not account for market structure and power may lead to false inferences about the impact of structural reforms and the channels through which they work. As an example, the evidence from Chile and India presented in this volume shows that the impact of trade liberalization on productivity can vary greatly depending on the structure of input and output markets. More generally, the study of productivity and market structure needs to be treated in an integrated fashion, as De Loecker (2017) stresses.

- The commonly used metric of dispersion of TFPR proposed by Hsieh and Klenow (2009) is not a reliable measure of distortions in an economy or barriers to an efficient reallocation of factor resources between firms and sectors. Conceptually, it depends on assumptions that are shown to be unsupported by the data. Moreover, dispersion can be driven by technological and quality differences, investment risk, adjustment costs, and markups. New evidence presented in this volume shows that half of dispersion can be explained by markups and technological differences and thus is not related to misallocation at all (figure O.5). Empirically, inferences about misallocation of factors of production prove highly sensitive to how data are processed, rendering cross-country comparisons unreliable. Indeed, just using the raw U.S. data to calculate dispersion instead of the Census-cleaned data reverses the relationship between the calculated “gains from reallocation” and GDP (figure O.6).

- This said, distortions affecting allocation may have larger effects than captured by methodologies that just look at the allocation of current factors of production.

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**FIGURE O.4  Decomposing Firm Performance**

![Diagram](Note: K = capital, L = labor, M = materials; TFP = total factor productivity.)
FIGURE 0.5  Between One-Quarter and One-Half of the Dispersion in the Average Revenue Product of Capital Can Potentially Be Explained by Heterogeneity in Firm-Level Technologies

Source: David et al. 2018.
Note: The figure presents a decomposition of the contribution of different determinants of the dispersion of the average revenue product of capital using the methodology of David and Venkateswaran (2017).

FIGURE 0.6  Is Dispersion Correlated with Higher GDP? Without Common Data Cleaning Methods, It Is Impossible to Know

Source: Elaboration based on World Bank studies and Rotemberg and White (2017) results.
Note: The figure plots the relationship between the level of per capita GDP and TFP gains from equalizing TFPR within industries for selected countries. In panel a, the bullet for the United States is based on Census-cleaned data. In panel b, it is based on raw data. TFP = total factor productivity; TFPR = revenue total factor productivity.
if these distortions affect dynamic decisions, such as whether or not to invest in physical capital and technology. That is, existing firms will not upgrade if oppressive state-owned enterprises limit their room for expansion; new more productive firms will not enter if bureaucratic or regulatory barriers are prohibitive. Recent research also suggests that impacts of distortions on productivity are higher in developing countries because they disproportionally affect more productive firms. Put together, the panels in figure 0.7 show that in both manufacturing and services, the higher productivity elasticities found in follower countries in fact limit the growth and ultimate size of firms. Hence, while previous inference of the likely contribution of misallocation to income differentials across countries is flawed, the heretofore unexamined impact distortions through dynamic channels may be quite large.

- Entrepreneurs cannot be assumed to be similar in human capital, including basic numeracy, managerial and technical skills, or psychological traits. Traditionally, economics has shied away from opening the black box of the entrepreneur—the individual who on the ground actually combines factors of production or decides to launch a firm. However, the recent research on management quality and on culture, and an emerging psychological literature on the characteristics of successful entrepreneurs, suggest that these dimensions are almost in a definitional sense central to understanding productivity differences.

2. Productivity policy needs to be comprehensive and integrate all three components of productivity growth.

Aggregate physical total factor productivity (efficiency) growth can be decomposed into three components or margins: the reallocation of resources from low-productivity firms to high-productivity firms (the “between” component); increases in productivity
within existing firms due to technology adoption, innovation, and better managerial skills (the “within” component); and entry of high-productivity and exit of low-productivity firms (the “selection” component).

The new productivity decompositions presented in this volume confirm that productivity growth occurs across all three components (margins). However, the within-firm margin is relatively more important than the reallocation of the between-firm margin in four out of six country cases, explaining roughly half or more of efficiency growth in these economies. Thus, the evidence suggests reweighting the policy focus toward firm upgrading.

This said, all three components are inextricably linked. On the one hand, barriers to reallocation of resources driven by distortions—such as trade barriers, poor regulation, or overbearing state-owned-enterprises that impede reallocation—can discourage innovation by existing firms and entry by potentially innovative firms. Thus, policy needs to go beyond standard static analysis and take into consideration dynamic effects. On the other hand, without innovative firms introducing new products and processes, even the cleanest economic system will cease to reap gains from reallocation, making a focus on how firms upgrade and where new firms come from as important as a focus on eliminating distortions.

3. Policy needs to work on improving both the operating environment and human capital and firm capabilities, two essential and complementary ingredients that cut across all three components.

Driving productivity across all three components (margins) in a complementary way are both the operating environment and a range of types of human capital: numeracy, personality, managerial and organization skills, and technological capabilities, as well as firm organizational capabilities. Though policy approaches often weigh one significantly more than the other, productivity growth requires progress on both fronts.

**Operating environment.** Recent work confirms that competition policy and the reduction of distortions work on productivity through the reallocation channel by facilitating the transfer of resources to more productive firms, through the within-firm channel by stimulating incumbents to invest in productivity-enhancing innovation, and through the entry and exit channel by facilitating the entry of more productive firms and the exit of less productive ones. Hence, opening markets to international trade, exposing state-owned industries to competition, and reducing their ability to prevent the emergence of competitors are over the long term of central importance—subject to the caveat above that the actual impact of these policies may depend substantially on market structure.

**Human capital.** However, though the overall system may be crystalline—undistorted and with all market failures resolved—if there are no entrepreneurs with the necessary human capital to take advantage of it, there will be no growth. The centrality of this
point and the need for better measurement of human capital is highlighted in the World Bank’s recently launched Human Capital Project, which seeks to better measure and demonstrate the critical contribution to development of a wide range of skills for workers. This volume highlights the importance of also enhancing the human capital of the people who employ and manage them.

This volume documents that the vast majority of the self-employed in the developing world have limited numeracy and literacy skills, which leads to the unproductive churning seen in much of the developing world.

Panel a of figure 0.8 shows the share of the workforces around the world that are self-employed, suggesting, at first, that, in fact, as predicted, the share of self-employed or employers increases with distance from the technological frontier. However, panel b reveals the reverse pattern, focusing only on those firms that have at least one

**FIGURE 0.8 Despite Higher Opportunities from Technological Adoption, Productive Entrepreneurship Is Not Higher in Developing Countries**

Sources: Elaborations using the latest available year of the World Bank’s International Income Distribution Data Set (I2D2) and Maloney and Rubio 2018 (all panels); Organisation for Economic Co-operation and Development data (panel d).

*Note: EAP = East Asia and Pacific; ECA = Eastern Europe and Central Asia; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; OECD = Organisation for Economic Co-operation and Development; SAR = South Asia; SSA = Sub-Saharan Africa.*
employee (call them entrepreneurs), as a measure of the firm having some minimal dynamism or potential to grow into a sophisticated firm. It is the member countries of the Organisation for Economic Co-operation and Development that have the highest rate of dynamic entrepreneurship. Panel c further shows that the labor market share of self-employment by individuals who are likely to be able to recognize serious technological opportunities and act upon them—those with some tertiary education—also increases with development. This partly reflects lower levels of tertiary education, which, in itself, reduces the pool of possible dynamic entrepreneurs, but also suggests that the very high levels of total self-employment are a function of low levels of education. However, panel d shows that even among individuals with tertiary education, dynamic entrepreneurship increases with development, arguably reflecting the lack of incentives in the system, or the dearth of more specialized human capital in developing countries, despite the very high expected returns. This suggests that even this more educated pool is not seizing technological arbitrage opportunities as would be expected.

In sum, the share of capable entrepreneurs reflects exactly the opposite of what technological gaps would predict, and the great mass of observed self-employment in developing countries is likely to represent “unproductive” churning.

At a higher level, if the managers inside firms or incipient start-ups lack the managerial capabilities to recognize or respond to new technological opportunities or domestic and foreign competition, there will be no impetus to upgrade their firms or enter the market, and no arbitraging of the technology gap between the advanced economies and follower countries. The evidence presented here and elsewhere on immigrants makes this case. Some kind of human capital—whether world experience, business training, risk appetite, or tolerance or openness to seeing the viability of a project—permitted them to thrive in the same imperfect business climate and institutional setup in which locals did not. Attracting foreign direct investment is an initial way of transferring technology and driving reallocation, but over the longer term, the enhancement of human capital along several dimensions—managerial capabilities, technological literacy, and capabilities in evaluating risks—becomes central for both within-firm performance upgrading and new firm entry.

The two factors, operating environment and human capital, interact importantly. On the one hand, the volume shows that even among the educated in developing countries, entrepreneurship rates are extremely low given the potential arbitrage of technologies to the developing world, perhaps reflecting the absence of these higher-order skills, but also perhaps reflecting a difficult operating environment that makes it unprofitable to start a business. On the other hand, recent work and evidence here suggest that the response to policies to increase competition, such as trade liberalization, depends on firms’ ability to develop a strategy to meet the competition—the capability to diversify into other products or upgrade to a different market. This, in turn, depends on higher-level firm capabilities that rest on core managerial competencies that developing countries lack.
4. Beyond efficiency: Policy needs to adopt a broader view of value creation in the modern firm.

The firm is the main creator of value added and the ultimate driver of growth. However, the work in this volume confirms and extends recent findings that firm performance or profitability depends on a broader set of firm drivers than efficiency.

**Raising product quality.** The prices of many products—women’s shoes, cars, or even fruit—can vary vastly, and much of that variation reflects differences in quality. Raising quality may actually lower efficiency—because more labor or more expensive inputs are required to produce higher quality—but increase product differentiation and raise overall profits. These findings again suggest the need to model the demand side carefully when analyzing productivity. There is also a role for standard firm-upgrading policies, such as extension services, but also a specific focus on meeting international quality standards and then specialized research and development.

**Expanding product demand.** Relatedly, evidence from developing countries presented in this volume confirms recent advanced-economy findings that for firm profitability and growth, efficiency concerns are important at market entry, but over the life cycle of firms, cultivating a demand base is more important. As shown in figure O.9, while this is true for Malaysia, Mexico, and the United States, for Colombia, TFPQ does not increase strongly over the age of the firm. Rather, the firm’s growth across the life

**FIGURE O.9  Demand Is More Important than TFPQ at Mature Stages: Colombia**

![Graphs showing Demand Is More Important than TFPQ at Mature Stages: Colombia](image)


Note: The data include year and sector fixed effects. TFPQ = physical total factor productivity.
cycle is driven more by increased demand for its products. Part of this likely arises from an increase in the quality of the product. Comparable evidence from Malaysia suggests that the rise in average wage in panel d is driven mostly by a shift in the skill mix toward better educated workers.

Thus, the findings suggest the need to reweight business support services toward helping firms build a large customer base and raise quality. Policies to support firm growth should therefore focus on scaling up demand, mainly through innovative solutions that reduce buyer-seller transaction costs due to searching, matching, and informational frictions. Examples of those policies include digital platform development or connection, business intermediation, and links to global value chains. Reducing matching costs has been highlighted as a major objective of export promotion agencies to facilitate access to foreign markets.

Clearly, market power raises markups and profitability, although, as the volume discusses, the long-term implications for technology adoption and growth are theoretically ambiguous and empirically vary by context.

5. Creating experimental societies: Productivity policy needs to encourage risk taking and experimentation.

Increasing productivity is fundamentally about placing bets under uncertainty—that a new product will become popular, that a new technology will provide a competitive edge, that an idea incarnated in a new firm is a good one and will generate enough business to survive and grow. Societies that take risks grow faster. As one example, figure O.10 shows that countries with more variance in their rate of quality growth show faster growth in quality.

The volume provides a simple framework of entrepreneurship as experimentation that integrates both considerations of the operating environment and a variety of types of human capital (figure O.11). To enhance the operating environment, minimizing government policies that exacerbate risk, such as erratic fiscal or exchange rate policies, is a clear first step. So is the establishment of institutions, such as universities or public research institutions that underwrite exploration and technological transfer, financial sectors to diversify risk, and government institutions to enhance and protect the value of profitable ideas, such as research and development subsidies or patents.

On the human capital side, dynamic entrepreneurship requires individuals who, psychologically, are open to new ideas, can tolerate risk, and are driven to achieve results. Furthermore, these entrepreneurs need the particular human capital and exposure to the technological frontier to identify new products and new techniques to...
improve efficiency or quality and new markets to enter, and to evaluate and then manage the corresponding risks. They need to develop the capabilities to incorporate information and adjust plans accordingly: that is, to learn.

6. Raising government productivity is critical to raising overall productivity.

Government plays a key role in what can be called the national productivity system (figure O.12) by setting the right framework of economic incentives, eliminating distortions, and resolving a broad set of potential market failures or distortions across areas ranging from infrastructure to innovation to education. Like firms, governments make policy under uncertainty, in this case, about which market failures or distortions are most important to address and what the likely impact of any policy is likely to be. Also, like firms, governments differ in the productivity and quality of output. This “output” can be measured along at least four dimensions: the rationale and design of policy, the efficacy of implementation, the coherence of policies across the actors in the national productivity system, and policy consistency and predictability over time.

In the same way that the volume documents that firms in follower countries tend to have lower efficiency and produce lower-quality products, it presents evidence that the same is true of public organizations, also with important consequences: bureaucratic effectiveness declines with distance from the frontier precisely as the number of

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**Figure O.10 Faster Quality Growth Is Riskier Quality Growth**

Source: Krishna, Levchenko, and Maloney 2018.  
Note: For countries with more than 50 products, the figure plots the country average of standardized export (HS-10) unit values growth rates against the variance of those growth rates. Slope = 0.67 (t-statistic = 7.83). HS-10 = 10-digit level of disaggregation in the Harmonized System (HS) of industrial classification.
FIGURE 0.11 Determinants of Entrepreneurial Experimentation and Productive Entrepreneurial Activity

Opportunities

- Global arrival of new technologies
- Technological gap with frontier countries

Environment

Potential return
- Enabling business environment
- Availability of complementary factors and markets

Cost of experimentation
- Information
- Barriers and institutions
- Financing and risk management
- Cost of failure
  - Bankruptcy
  - Social stigma
  - Difficulty returning to salaried work

Alternatives with a more attractive risk-return profile

Capabilities of entrepreneurs

Personality, culture, and genetics
- Drive (need for achievement, conscientiousness)
- Risk attitude and patience (self-efficacy, locus of control)
- Ability to identify opportunities (openness, innovativeness)

Human capital
- Basic human capital
- Management capabilities
- Technological capability
- Actuarial and learning capabilities
missing markets, distortions, and market failures that need to be redressed become larger (figure O.13). Thus, on the one hand, given finite resources, including the government’s attention span (or bandwidth) and capacity, governments need to identify some rough ranking of the policy space to prioritize productivity policies based on the likelihood that they will have a large impact. On the other hand, increasingly the productivity of government allows taking on more of these tasks, and doing them better and in more coordinated ways, and thus improving the operational context and human capital essential to driving productivity growth.

Second-wave analytics are critical for ordering policy priorities. The limited productivity of the public sector dictates improving the ability of governments to identify truly critical failures in the National Productivity System, and then designing and implementing feasible policies to remedy them. In undertaking this task, policy makers need to quantify the importance of a given market failure or distortion and weigh it against others. The second-wave analysis discussed in this volume has increased the uncertainty around the impacts of some traditionally recommended policies and made the analysis to identify critical policy areas more demanding. As this volume details, this analysis also requires a “second generation” of more detailed firm-level data on prices, marginal costs, intangible assets, quality, and management. Hence an effort at the global and country level to collect such data is necessary.

Governments need to engage in disciplined experimentation. As with the rest of society, in the absence of all the desired information on diagnostics and policies,
governments must also become more experimental in searching for the appropriate solutions. Such experimentation requires nimbleness in adjusting to lessons learned and flexibility in measuring performance, including a tolerance for failure. Continuous well-designed evaluation of implemented policies, both as rapid follow up and as sophisticated program evaluation, is a central feature of every relevant government strategy to deal with a problem, as it both reveals information on what interventions work and develops a performance and accountability mindset. It also requires anticorruption policies to permit distinguishing corruption from simply a well-placed but unfortunate bet and thereby freeing functionaries to take risks. This, along with a recent literature stressing the importance of giving well-intentioned and capable bureaucrats the autonomy to experiment (Rasul and Rogger 2018), points to new paths to rejuvenating the developmental state.

On the other side of the table, the experimentation also needs to be balanced against the need for consistency of policy over time for firms. Frequent policy reversals or changes in priorities with alternations of administrations adds to firms’ uncertainty about the operational environment and discourages investments that could enhance productivity. Furthermore, productivity systems frequently show evidence of undisciplined experimentation over many years that leads to fragmentation of programs and duplication of mandates in many different ministries, without evaluation of the efficacy of the programs or their best location within the system.

FIGURE O.13 More Developed Countries Have More Effective Bureaucracies

Note: WWGI = World Bank Worldwide Governance Indicators.
Both consistency over time and the third dimension—coherence of policies across the National Productivity System—can be partly mitigated by overarching productivity councils that span administrations, have legitimacy and weight within the public debate, and oversee the overall functioning of the various parts of the system. In the realm of innovation policy, the World Bank’s Public Expenditure Reviews for Science, Technology, and Innovation offer a first step by generating a map of government programs and documenting the flow of resources among them. These can be enhanced to take a broader view of government productivity programs that can incorporate all three margins of productivity growth and other dimensions more explicitly. Not only would they reveal the implicit costs of tax write-offs or subsidies for research and development in existing firms, but they could map the competitive structure that those firms face, or the degree of regulatory uncertainty in the system.

Industrial policies need to be integrated into broader productivity policy. While much of the global productivity discussion in this volume focuses on improving managerial, technological, or innovation capabilities or removing distortions across the productivity system, industry-specific externalities—local industry-level knowledge spillovers, input-output links, and labor pooling, for instance—feature prominently in the literature on growth and trade and have been used to justify government support for particular sectors.

Such policies can be thought of in the context of policy ranking by the degree of certainty surrounding the market failure and the likelihood of implementing policy that can make a positive difference. Such targeted policies are arguably not more prone to poor execution than, for example, infrastructure or education; the real problem is that such industry-related externalities have proved extremely difficult to document and quantify, let alone permit a ranking of goods by their potential for productivity growth. Furthermore, the vast heterogeneity in levels of productivity and quality documented in this volume within identical products across different contexts raises concern that these within-product differences portend differences in magnitudes of spillovers in different contexts as well. That is, just because a good might have externalities does not imply that it automatically will; rather, how a good is produced is potentially more important than what is produced. This volume offers a framework for understanding the roots of this heterogeneity and how to address it.

Concluding Remarks

In sum, the tremendous effort behind advancing the second wave of productivity analysis suggests that Ibn Kaldun’s assertion of productivity’s centrality to societal progress is widely shared. This volume has extended this new literature, anchored it in the reality of the developing world, and sketched out how it implies a
corresponding shift in policy approach. To date, however, the impact of the new analysis has been less to definitively answer central questions in productivity growth than to reopen many debates. Settling those debates will require greater investment in industrial surveys that collect not only firm-level prices, but also measures of quality, market power, investments in intangible assets, and technology and managerial capabilities across all sectors of the economy, including services. Similarly, efforts to understand the drivers of productive entrepreneurship must continue. This volume pulls together the first set of analytical and policy lessons from second-wave thinking to date, but also aspires to lay out the broad outlines of this ambitious analytical agenda going forward.

Note

1. This slowdown was characterized by a decline in labor productivity growth rates from 2.7 percent during the 1999–2006 period to 1.5 percent in 2015, and from 0.9 percent to −0.3 percent for total factor productivity for the same periods.

References


Overview: The Elusive Promise of Productivity


Productivity has again moved to center stage in two critical academic and policy debates: the slowing of global growth amid spectacular technological advances and developing countries’ frustratingly slow progress in catching up to the frontier. *Productivity Revisited* brings together the new conceptual advances of “second-wave” productivity analysis that have revolutionized the study of productivity, calling much previous analysis into question, while providing a new set of tools for approaching these debates. The book extends this analysis and, using unique data sets from multiple developing countries, grounds it in the developing-country context. It calls for a greater focus on upgrading firms and facilitating the emergence of productive new establishments. Such an approach requires a supportive environment and various types of human capital—managerial, technical, and actuarial—necessary to cultivate new transformational firms.

The book is the second volume of the World Bank Productivity Project, which seeks to bring frontier thinking on the measurement and determinants of productivity to global policy makers.

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*Productivity Revisited* packs an enormous amount of research, data, and insights between its covers. It concisely lays out the challenges posed when productivity lags, the best approaches for measuring it, the mechanisms through which it acts at both the microeconomic and macroeconomic levels, and potential ways in which policy can encourage productivity growth. This volume will serve as a reference for years to come.

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