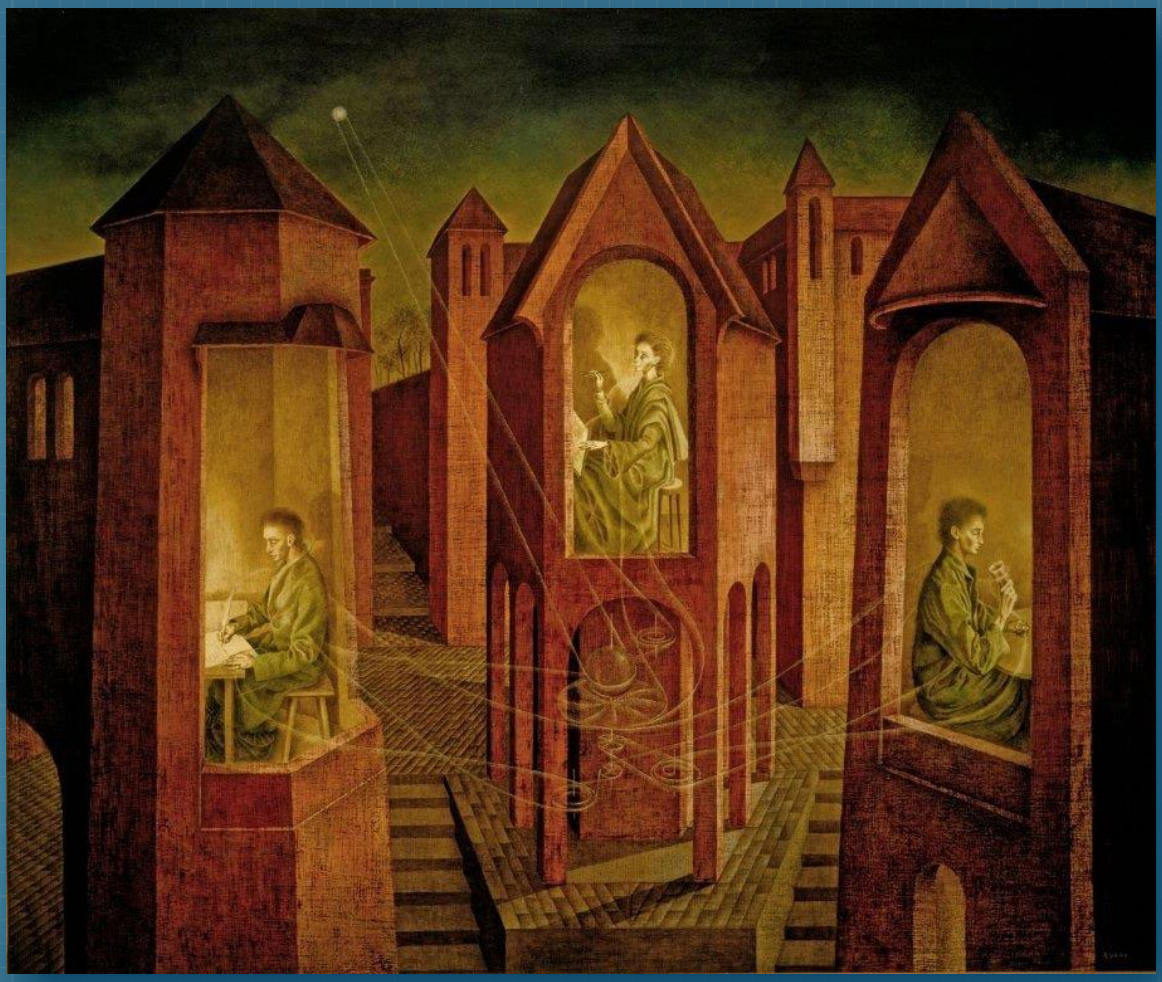
OVERVIEW

# At Your Service?

## The Promise of Services-Led Development



Gaurav Nayyar, Mary Hallward-Driemeier, and Elwyn Davies

WORLD BANK GROUP

## Overview

# At Your Service?

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**This booklet contains the overview, as well as a list of contents, from *At Your Service? The Promise of Services-Led Development,* doi: 10.1596/978-1-4648-1671-0. A PDF of the final book, once published, will be available at https://openknowledge.worldbank.org/ and http://documents.worldbank.org/, and print copies can be ordered at www.amazon.com. Please use the final version of the book for citation, reproduction, and adaptation purposes.**


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# Foreword

Manufacturing-led development has provided the traditional model for creating jobs and prosperity. But in the past three decades a new structural transformation, in which the services sector has grown faster than the manufacturing sector, has been afoot in many developing economies. In 2019, the services sector accounted for an average of 55 percent of GDP and 45 percent of employment in developing economies. Does this simply signal a slowdown in manufacturing? Or could the services sector help low- and middle-income countries catch up with high-income countries while expanding "good" job opportunities? *At Your Service? The Promise of Services-Led Development* assesses the prospects for services-led development. Its findings and their implications lie squarely at the center of the World Bank Group's "better jobs for more people" Jobs and Economic Transformation agenda.

*At Your Service?* shows how the winds of change are blowing. The digital economy is expanding access to markets and opportunities for innovation in the services sector. Services are also becoming increasingly important as enablers for a wide range of sectors, as is best illustrated by the fading border between services and manufacturing. And the choice for policy makers is no longer whether to support services or manufacturing, but how to best leverage the potential of the services sector to deliver productivity growth and jobs.

Analyses of productivity, employment, and enterprises in the services sector are few and far between, at least in part because of the paucity of data due to the sector's exclusion from, or unimportance in, censuses and surveys. By collating and analyzing data from dispersed sources, *At Your Service?* makes a valuable contribution to the evidence base on the topic. The book also shows that government agencies and private sector organizations should prioritize the collection of better data on services, because economic development in their economies depends so much on them.

In assessing where the potential for productivity growth and job creation lies, the authors emphasize the heterogeneity of the "services sector"—shorthand for a diverse range of economic activities that span the full range of production and distribution beyond farms and factories. That the services sector is not monolithic is fundamental to the policy debate that pits "services-led development" against "manufacturing-led development" strategies.

As the global economy recovers from the COVID-19 (coronavirus) pandemic, governments around the world are looking for ideas to strengthen economic dynamism

and speed up job creation. While some services have been hit particularly hard in the current economic crisis, the framework and evidence presented in this book suggest a range of possibilities. There is no easy formula for success, but the book argues that the essential ingredients include expanding *trade* to widen market access, fostering *technology* adoption and *training* workers to upgrade skills, and *targeting* services that provide benefits to the wider economy for public support.

With the rapid adoption of industrial automation in advanced economies and with mounting worries about the slow pace of industrialization in many developing economies, this focus on services is timely. For decades, the services sector has been treated as the residual economy. Now it deserves a seat at the high table. *At Your Service?* will convince policy makers that being complacent about this agenda is no longer an option.

Indermit S. Gill
*Vice President*
*Equitable Growth, Finance, and Institutions*
*World Bank Group*

# 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 economies 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.

This fifth volume in the series, *At Your Service? The Promise of Services-Led Development,* offers a truly fresh exploration of one of the central development questions of our time: As manufacturing's share of GDP and employment recedes across low- and middle-income countries, can services—traditionally thought to be a sector with low productivity growth—offer a new development path promising good jobs and facilitating convergence with the advanced economies? The task is challenging, as most data collection and frameworks for productivity analysis have focused on the manufacturing sector. Nonetheless, the authors of this volume bring together a wealth of evidence and, through original analysis, offer a surprisingly optimistic assessment, albeit one with important caveats. Unpacking the variety of activities classified as *services*, they identify many that increasingly share the growth-generating features thought unique to manufacturing. For instance, the acceleration of digital technologies is bringing new opportunities for scale and innovation. And expanding linkages with other sectors, particularly the servicification of manufacturing, is reinforcing the scope for spillovers. That said, the volume stresses the need for reforms and substantial investments to enable countries to leverage this potential through reducing barriers to services trade, mastering new technologies, raising skill levels, and targeting potential links to related sectors.

This volume is a product of the Equitable Growth, Finance, and Institutions Vice Presidency.

William F. Maloney
Chief Economist
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## Other Titles in the World Bank Productivity Project

*Harvesting Prosperity: Technology and Productivity Growth in Agriculture.* 2020. Keith Fuglie, Madhur Gautam, Aparajita Goyal, and William F. Maloney. Washington, DC: World Bank.

*High-Growth Firms: Facts, Fiction, and Policy Options for Emerging Economies*. 2019. Arti Grover Goswami, Denis Medvedev, and Ellen Olafsen. Washington, DC: World Bank.

*Productivity Revisited: Shifting Paradigms in Analysis and Policy*. 2018. Ana Paula Cusolito and William F. Maloney. Washington, DC: World Bank.

*The Innovation Paradox: Developing-Country Capabilities and the Unrealized Promise of Technological Catch-Up*. 2017. Xavier Cirera and William F. Maloney. Washington, DC: World Bank.

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

# Acknowledgments

This book project was undertaken by a team led by Gaurav Nayyar, Senior Economist, and Mary Hallward-Driemeier, Senior Economic Adviser, in the Equitable Growth, Finance, and Institutions Vice Presidency of the World Bank Group. Other core team members were Elwyn Davies, Reyes Aterido, and Besart Avdiu. Excellent research support was provided by João Bevilaqua T. Basto, Dominic Scarcelli, and Andrea Atencio. The work was carried out under the guidance of Denis Medvedev, Practice Manager, Firms, Entrepreneurship and Innovation, Equitable Growth, Finance, and Institutions Vice Presidency; William Maloney, Chief Economist, Equitable Growth, Finance, and Institutions Vice Presidency; and Caroline Freund, Global Director, Trade, Investment, and Competitiveness.

The following background papers served as important inputs:

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We are also grateful to Alison Cathles, Adriana Conconi, Sonia Plaza, and Katherine Stapleton for their inputs.

The team has benefited enormously from discussions with, and feedback from, Laura Alfaro, Richard Baldwin, Stefan Dercon, Mark Dutz, Michael Ferrantino, Poonam Gupta, Bradford Jensen, Aaditya Mattoo, and Chad Syverson. We are also grateful to Andrew Beath, Luc Christiaensen, Xavier Cirera, Marcio Cruz, Marcela Eslava, Alvaro Gonzalez, Arti Grover, Justin Hill, Leonardo Iacovone, Umut Kilinc, Peter Kusek, Yan Liu, Jose Ernesto Lopez-Cordova, Valerie Mercer-Blackman, Dino Merotto, Theresa Osborne, Carlos Rodriguez Castelan, Federica Saliola, Abhishek Saurav, Jan von der Goltz, and Michael Weber for their comments and suggestions.

Conversations with Kay Atanda, Gerlin Catangui, Alexandru Cojocaru, Ileana Cristina Constantinescu, Bernard Hoekman, Etienne Raffi Kechichian, Martha Martinez Licetti, Maryla Maliszewska, Alen Mulabdic, Karen Muramatsu, Pierre Sauve, Victor Steenbergen, Jonathan Timmis, Trang Thu Tran, Huanjun Zhang, and Juni Tingting Zhu are also deeply appreciated.

We thank our publishing team—Patricia Katayama, Michael Harrup, Cindy Fisher, Debra Malovany, and Orlando Mota—for the design and production of this book; Mary Anderson for her editorial services; and our communications team, led by Elizabeth Price, for their creative energy in promoting the book.

Financial support from the Competitive Industries and Innovation Program (CIIP) and the Facility for Investment Climate Advisory Services (Fias) Trust Funds is gratefully acknowledged.

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# Overview

## Introduction

Few countries have reached high income levels without developing a manufacturing base.[1] Since the 1980s, however, the peak shares of manufacturing in value added and employment across a range of low- and middle-income countries (LMICs) were both lower and occurred at lower levels of per capita income than in their high-income, early-industrializer precursors (Rodrik 2016). Those worried about "premature deindustrialization" have called on governments and the development community to support efforts to expand manufacturing in lower-income countries.

Beyond whether this is even feasible, if the goal is to raise productivity and create more good jobs, is an expansion of manufacturing the right focus? Given that the services sector has typically grown faster than the manufacturing sector across LMICs, on average, since 1990, what are the prospects for *services* to drive development instead?

In the past, manufacturing-led development delivered the twin gains of productivity growth and large-scale job creation for the relatively unskilled. Underlying these were economies of scale, access to large international markets, innovation, and intersectoral linkages, combined with the ability to leverage relatively unskilled labor with capital. Services are labor intensive too, but they often require a simultaneity of production and consumption that precludes accessing larger markets. And their more-limited ability to use capital to leverage labor productivity limits both scale economies and incentives to innovate. Conventional wisdom is therefore pessimistic about the prospects for services-led development. This book seeks to test that conventional wisdom.

There are two guiding questions: First, what is the potential for services to expand "good" job opportunities within LMICs? Much of the discussion here focuses on job creation for low-skilled workers and for these jobs to raise their productivity over time. Second, to what extent can the services sector help lower-income countries catch up with the productivity and income levels of higher-income countries? Much of this discussion focuses on opportunities for productivity growth through scale, innovation, and linkages across sectors.

As a starting point, the prospect for services-led development invites a comparison with the manufacturing sector, but that comparison must take a dynamic perspective. The features of manufacturing that were once thought to be unique contributors to productivity growth and jobs are increasingly shared by the services sector. The acceleration of digital technologies is bringing new opportunities for scale, innovation, and the expansion of linkages between sectors. The "servicification" of manufacturing, in particular, is reinforcing the scope for spillovers.

Moreover, the landscape for manufacturing-led growth today is different from what it was several decades ago. To begin with, China's scale of production as well as greater industrial automation in high-income countries may potentially narrow the paths for lower-income countries to industrialize by reducing the importance of low labor costs in determining competitiveness. For a more detailed discussion of the shifting prospects for manufacturing-led development, see the companion book, *Trouble in the Making? The Future of Manufacturing-Led Development* (Hallward-Driemeier and Nayyar 2018).

For policy makers in LMICs, it should not be a question of whether to support manufacturing *or* services but a recognition that the potential for services to contribute to productivity growth and to jobs is growing—and they should act to take advantage of it.

This book contributes to the literature on services-led development in several ways:

- It meaningfully categorizes the services sector based on the same features that have characterized the manufacturing-led development model—scale, innovation, spillovers, and job creation for low-skilled labor—and analyzes how digital technologies are changing some of the underlying characteristics of services.
- It generates a new set of stylized facts on firm growth and productivity across these categories in the services sector.[2]
- It questions assumptions about the traditional linear path for structural transformation as the line between manufacturing and services becomes increasingly blurred, and it examines the potential for growth opportunities in the services sector without having to rely on a manufacturing base.
- It provides a framework for countries to identify policy priorities that can help leverage the potential of the services sector for jobs and economic transformation.

## Of Goods and Services: Inside the Black Box

The services sector has driven both job creation and catch-up in productivity growth across LMICs over the past two decades. These trends have received little attention because much of the literature as well as the development community has focused on the manufacturing sector.

## Services, Jobs, and Economic Transformation

The industrial sector's[3] share of total employment across LMICs between 1991 and 2018 remained almost unchanged, averaging 20 percent.[4] As a result, the increase in the services sector's share of total employment—from 40 percent to 50 percent—offset almost the entire decline in the agriculture sector's share (figure O.1).

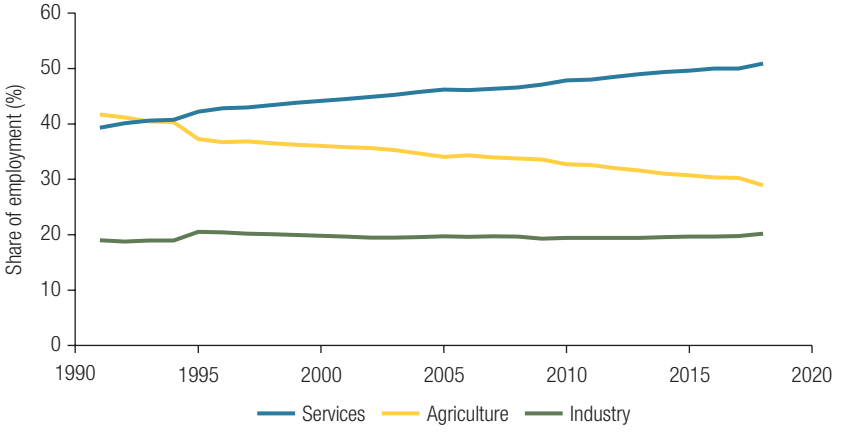
Similar trends held true in the changing sectoral shares of gross domestic product (GDP), and this pattern of structural change has been consistent across regions. Furthermore, apart from the East Asian and Eastern European countries that have benefited the most from export-led manufacturing, labor productivity growth in the services and industrial sectors across LMICs in other regions was roughly comparable between 1995 and 2018 (figure O.2).

What is also striking is that, in LMICs across all regions (except in the Middle East and North Africa), labor productivity growth in services between 1995 and 2018 exceeded that of high-income countries. These narrowing productivity gaps provide encouraging evidence that services growth can contribute to lower-income countries' ability to catch up.[5]

These changing sectoral shares of employment and GDP as well as trends in labor productivity growth underlie the contribution of the services sector to overall productivity growth—which is achievable through either productivity growth "within" sectors or the movement of labor "between" low- and high-productivity sectors.

**FIGURE O.1 Much of the Decline in Agriculture's Share of Total Employment in LMICs Was Offset by Services Growth**

*Average sectoral share in total employment in LMICs, 1991–2018*

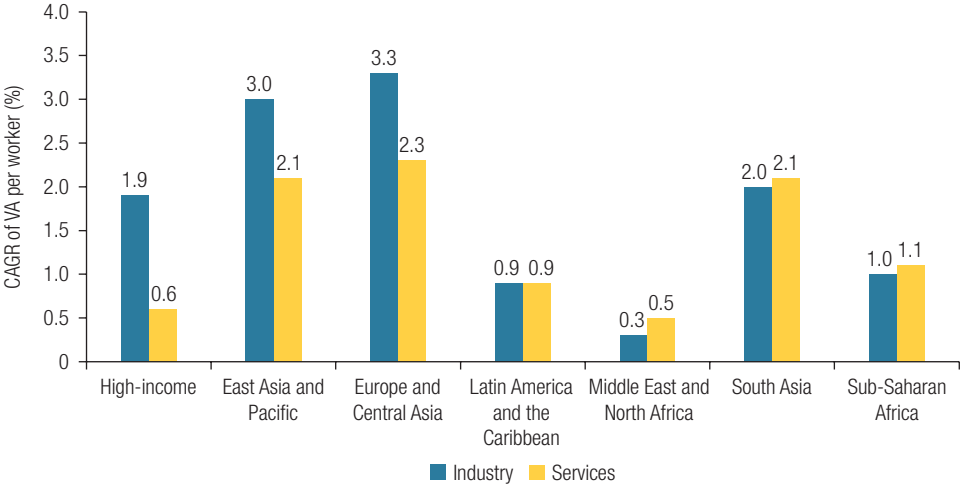



*Source:* World Development Indicators database.

*Note:* Data for the "industry" sector include not only manufacturing but also mining, utilities, and construction. "Low- and middle-income countries" (LMICs), by World Bank income group classifications, had 1994 gross national income of less than US$8,955.

**FIGURE O.2 Labor Productivity Growth of Services in LMICs Has Matched That of Industry across Many Regions and Has Typically Exceeded That of High-Income Countries since the 1990s**

*Growth in value added per worker (CAGR), by region and broad sector, 1995–2018*




*Source*: Calculations based on World Development Indicators database.

*Note*: Value-added (VA) data are in constant prices. "Low- and middle-income countries" (LMICs), by World Bank income group classifications, had 1994 gross national income (GNI) of less than US$8,955. "High-income countries" had GNI exceeding US$8,955 in 1994. Data for the "industry" sector include not only manufacturing but also mining, utilities, and construction. CAGR = compound annual growth rate.

Looking at three broad sectors—agriculture, industry, and services—across a large cross-section of LMICs between 1995 and 2018, the "within-sector" increases explain at least two-thirds of labor productivity growth, on average, in every region of the world (figure O.3).[6] And except in East Asia, productivity growth within the services sector contributes more than productivity growth within industry to aggregate productivity growth.

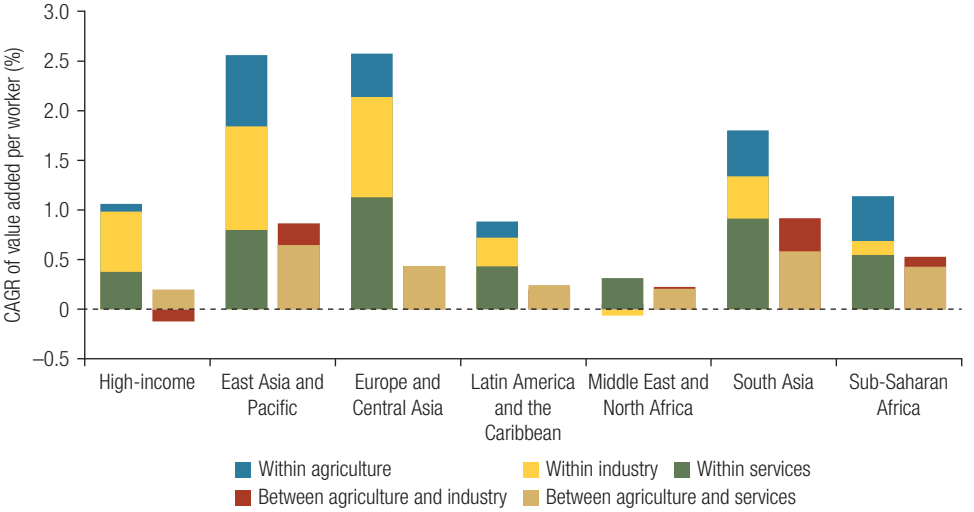
Furthermore, although the percentage contribution of the "between-sector" component did not exceed one-third in any region, the bulk of this contribution came from the increasing share of services in total employment (figure O.3).

The stylized facts described above imply two things: First, industry has played a special, dominant role in East Asia (and, to a smaller extent, in Eastern Europe). LMICs in other regions, on average, have not benefited as much from industry as a central driver of their development. Second, industry does not inherently outperform services.

For many LMICs, therefore, the choice between manufacturing- and services-led development does not have to be of dire importance. The data show that services can

**FIGURE 0.3** **The Percentage Contribution of Services to Aggregate Productivity Growth ("Within" and "Between" Sectors) since the 1990s Has Exceeded That of Industry across LMICs in Most Regions**

*Decomposition of growth in value added per worker (CAGR), by region, 1995–2018*




*Source*: Calculations based on World Development Indicators database.

*Note*: Data for the "industry" sector include not only manufacturing but also mining, construction, and utilities. Data by region include "low- and middle-income countries" (LMICs), which, by World Bank income group classifications, had 1994 gross national income (GNI) of less than US$8,955. "High-income" countries had GNI exceeding US$8,955 in 1994. CAGR = compound annual growth rate. For the underlying methodology of the decomposition analysis, see chapter 1 in the full volume, annex 1B.

deliver productivity growth—and, in several cases, faster growth than industry. What matters for the longer-term potential of services-led development is whether the features of industrialization that enabled scale, innovation, and spillovers alongside job creation for unskilled labor (as in East Asia) are increasingly shared by the services sector.

## The Scope for Scale, Innovation, and Spillovers in Services

### *Key Features of Manufacturing*

Manufacturing-led development, as exemplified by East Asia's success in export-led growth, has highlighted how a sector's key characteristics shaped its potential for driving development through *economies of scale*, *innovation*, and *spillovers*.

First, goods are storable and transferable; hence production can be separated from consumption. This enabled the manufacturing sector to achieve enormous gains from *scale*, particularly when goods are internationally traded and thus able to access demand beyond the domestic market.

Second, the movement of surplus labor from (rural) agriculture to (urban) manufacturing—and above all, the ability of capital to complement labor (Lewis 1954)—was integral to *innovation* dynamics in the manufacturing-led development model.

Third, linkages across manufacturing subsectors enabled *spillovers* whereby manufactured goods—basic metals and machinery and equipment, for example—helped make more-sophisticated goods.

In sum, the production process in the manufacturing sector has typically absorbed large numbers of relatively unskilled workers from agriculture at a substantial productivity premium (McMillan and Rodrik 2011) and subsequently placed that labor on a productivity path that rises up to the global frontier (Rodrik 2012) owing to opportunities for scale, innovation, and spillovers.

### *The Changing Nature of Services*

Traditionally, services have been distinct from manufacturing precisely because they do not share these features (Baumol 1967). First, the simultaneity of production and consumption limited the scale of production and access to larger markets. Haircuts, restaurant meals, banking transactions, and surgeries happen in person.

Second, the inherent role of labor in services made it less amenable to capital accumulation and innovation. Giving hairdressers more pairs of scissors will not enable them to provide more haircuts, and the quality of the haircut depends overwhelmingly on the skill of the person cutting the hair.

Third, spillovers were limited to services like transportation and distribution (that is, wholesale and retail trade) that were closely linked to the production of agricultural commodities and manufactured goods.

However, the advent of digital technologies suggests that these traditional characteristics could be changing for some services. Take information and communication technology (ICT) and business services, for instance. Digital electronic content has made these services more storable, codifiable, and transferable and therefore more scalable. Similarly, innovation through research and development (R&D) since the 1990s has been largely concentrated in ICT multinationals owing to software patents (Branstetter, Glennon, and Jensen 2018). Last but not least, linkages between ICT services and other sectors have increased as data analytics have improved the quality and efficiency of all production processes.

### *A Typology for the Services Sector*

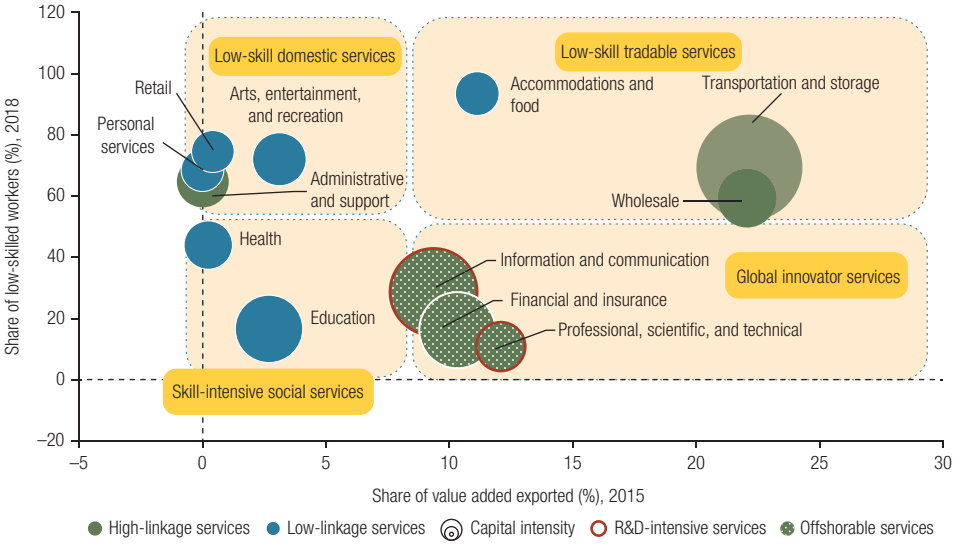
It is therefore important to distinguish between different subsectors to understand the potential for services to contribute to productivity and jobs—and where and how this potential is changing. The variation in scale (trade intensity and offshorability),

innovation that augments low-skilled labor (R&D intensity and capital intensity), spillovers (linkages with other sectors), and skill intensity illustrates that subsectors within services can be analyzed in terms of four groups: *global innovator services*, *low-skill tradable services*, *skill-intensive social services*, and *low-skill domestic services* (figure O.4). The groups sort into two levels of trade and skill intensity (which is also reflected in the group names) but are further differentiated by their relative offshorability, R&D intensity, capital intensity, and intersectoral linkages.

This typology suggests that *global innovator services* (including ICT, finance, and professional services)—which have the maximum scope for scale, innovation, and spillovers—are typically also relatively skill intensive. In contrast, *low-skill domestic services* (such as arts, entertainment, and recreation; retail trade; and personal services) provide little by way of productivity-enhancing potential through scale, innovation, and linkages.

**FIGURE O.4** **The Scope for Scale, Innovation, Spillovers, and Jobs for Low-Skilled Workers Varies across Services Subsectors**

*Services subsectors in the EU-15 and the United States, grouped by trade intensity, R&D intensity, capital intensity, intersectoral linkages, and skill intensity*




*Sources*: Calculations based on Blinder and Krueger 2013; OECD's Trade in Value Added (TiVA), R&D Sources and Methods, and STructural ANalysis (STAN) databases; and US Department of Labor's Occupational Information Network (O*NET) database.

*Note*: Data from latest available year. Bubble size indicates relative gross capital stock per worker. Bubbles shaded with dots refer to sectors with high offshorability (above 75th percentile). Red outlines designate sectors with high research and development (R&D) intensity (above 75th percentile). The data on exports exclude services provided through "commercial presence" such as the establishment of affiliates abroad (mode 3 of services trade in the General Agreement on Trade in Services [GATS]). The share of low-skilled workers in a sector's employment is measured by the share of workers in manual-task-intensive occupations. The indicators on low-skilled workers, exports, and offshorability are based on US data, while those on R&D, linkages, and capital intensity are based on EU-15 data. The EU-15 comprise the 15 pre-2004 European Union (EU) member states: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom (which officially withdrew from the EU in January 2020).

At the same time, *low-skill tradable services* (transportation and warehousing services, accommodation and food services, and wholesale trade) are internationally traded while also creating jobs for unskilled labor. Transportation and wholesale trade services are also highly linked to other sectors. In fact, the export of these services is closely linked to the export of goods and therefore provides few opportunities for international specialization. Accommodation and food services are also not offshorable but are largely exported through tourism-related travel.

### Services Jobs in LMICs Are Concentrated in Low-Skill Services

There is a positive relationship between per capita income and the share of services with higher potential for scale, innovation, and spillovers. These global innovator services (finance, ICT, and professional services) account for 5–10 percent of services employment in lower-income countries compared with 15–20 percent in high-income countries (figure O.5). In contrast, low-skill domestic services (retail; personal services; arts, entertainment, and recreation; and administrative and support services) represent about two-thirds of services employment in lower-income countries compared with about 30 percent in high-income countries.

Much of the employment expansion in the services sector across LMICs is also attributable to low-skill services (either tradable or domestic). The share of total employment across LMICs in wholesale and retail trade, accommodation and food services, and transportation services increased from an average of 18 percent in 1991 to 26 percent in 2018—about half of which was attributable to retail or wholesale trade. The share of global innovator services (finance and business) also increased, from about 3 percent of total employment in 1991 to 5 percent in 2018, albeit from a very low base.

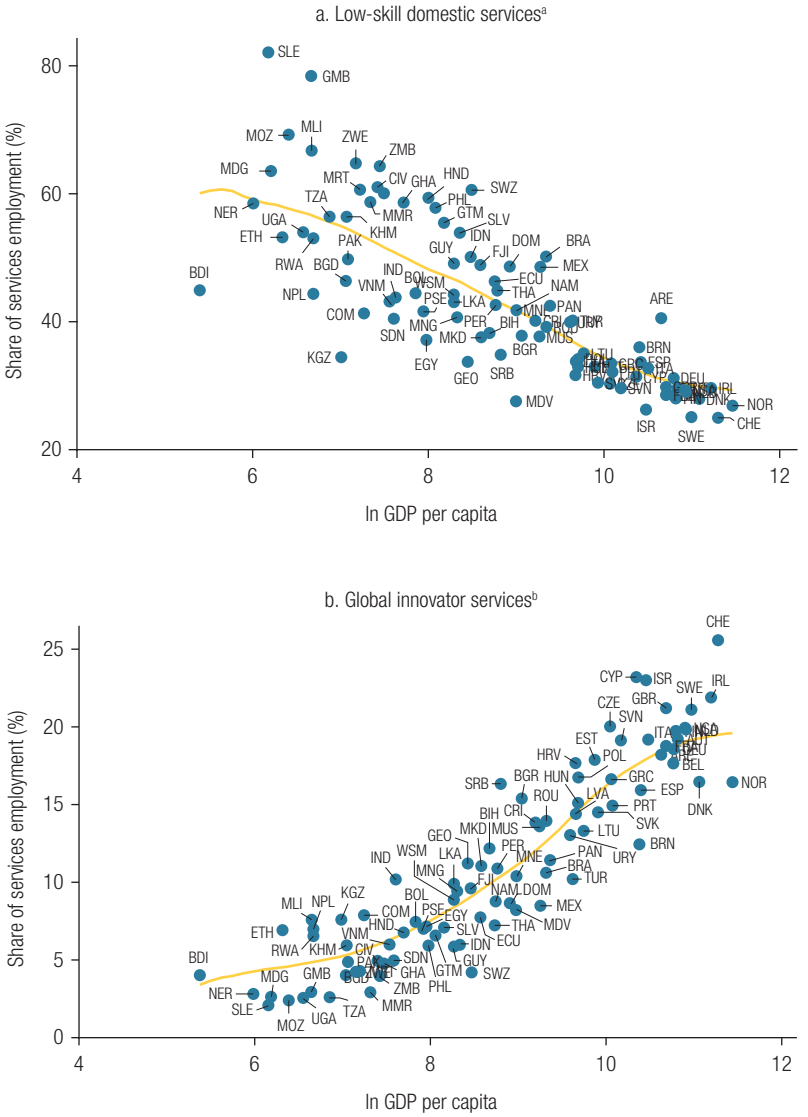
### Informal Economy Workers and Women Benefit from Expansion of Low-Skill Services

Much of the employment creation in low-skill services is also linked to the informal sector, where the entry barriers for workers are minimal. Across LMICs, on average, about three-fourths of workers in the commerce- and hospitality-related services (wholesale and retail trade as well as accommodation and food services) are either self-employed or perform wage labor without contracts.

Women too have particularly benefited from the expansion of low-skill services. The share of female workers in wholesale and retail trade, hotels, and restaurants is currently 45 percent, compared with 38 percent in the manufacturing sector, on average, across LMICs (figure O.6). Female entrepreneurs also tend to be predominantly in retail services.

**FIGURE O.5** **Lower-Income Countries See More Employment in Low-Skill Domestic Services, While Higher-Income Countries See More in Global Innovator Services**

*Share of selected services subsector groups in total services employment, by country income level, most recent year available*



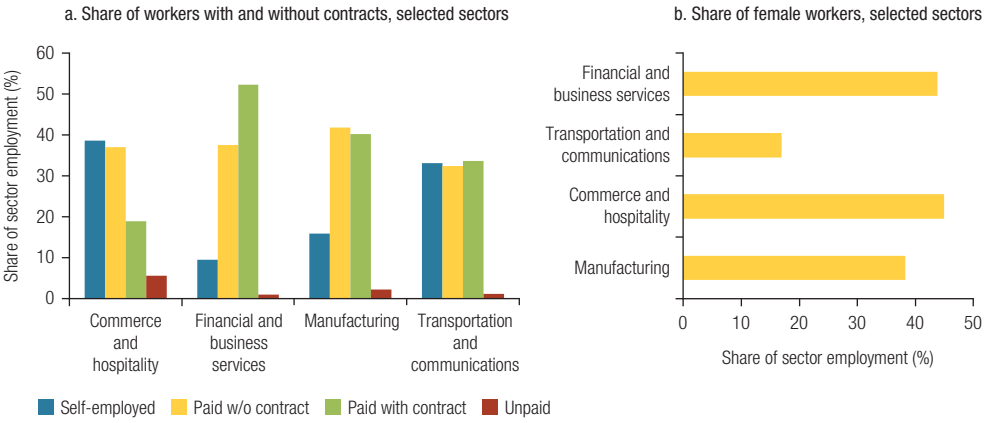

*Sources*: Calculations based on International Labour Organization (ILO) data and World Development Indicators database.

*Note*: Country data are from the most recent year available (between 2011 and 2019), covering 90 countries. Countries are labeled using ISO alpha-3 codes. ln = natural log.

a. Low-skill domestic services include retail; arts, entertainment, and recreation; administrative and support services; and other social, community, and personal services.

b. Global innovator services include finance, information and communication technology (ICT), and a variety of professional, scientific, and technical services.

**FIGURE O.6 Informal Sector Workers and Female Workers in LMICs Account for Substantial Shares of Employment in Low-Skill Commerce- and Hospitality-Related Services**




*Source*: Calculations based on World Bank's International Income Distribution Dataset (I2D2).

*Note*: The I2D2 is a global harmonized household survey database. Country data are from 101 low- and middle-income countries (LMICs), using the most recent available year of data (between 2005 and 2017). LMICs, by World Bank classifications, had gross national income of less than US$8,955 in 1994. The "low-skill" services sectors shown include "commerce and hospitality" (including wholesale and retail trade as well as hotels and restaurants) and "transportation and communications" (the latter including postal and telecommunications services). Although the typology shown in figure O.4 categorizes "communications" as among the global innovator services, the I2D2 data do not separate "communications" from "transportation." In this figure, the high-skill global innovator services are represented by "financial and business services."

Importantly, the movement of people from the farm to jobs in these low-skill services, including in the informal sector, has been poverty-reducing. For many people, these jobs provide a higher and often more stable form of income than the agriculture sector. The longer-term potential of the services sector to drive meaningful structural transformation will depend both on the underlying productivity dynamics of low-skill services and whether the productivity benefits of global innovator services can be spread more widely through linkages with sectors that employ larger numbers of low-skilled workers.

## Productivity and Jobs in Services: Mind the Gaps

### Stylized Facts: Evidence from 20 LMICs

Using a unique dataset on formal sector firms from 20 LMICs across different regions, we establish eight stylized facts that characterize the performance of firms in the services sector (box O.1). These stylized facts emphasize important differences not only between services and manufacturing firms but also within the services sector.

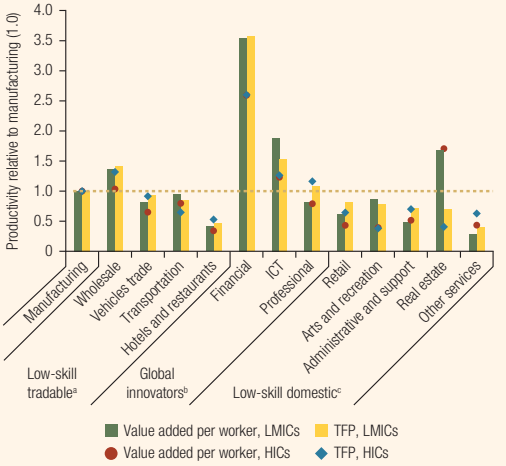
## BOX 0.1

### Stylized Facts: Evidence from 20 Countries on Services Firms and Their Productivity

**No. 1: Not All Services Are Equally (Un)Productive**

There is substantial variation in labor productivity and total factor productivity (TFP) across subsectors. Global innovator services are the most productive. (For example, ICT services are 1.5 times as productive as manufacturing across LMICs.) Low-skill domestic services (especially hospitality and retail) tend to be the least productive.

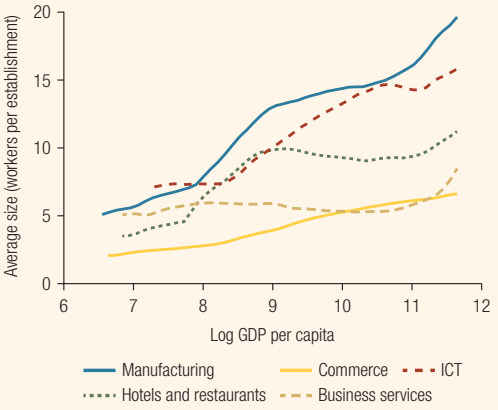
**FIGURE BO.1.1 Labor Productivity and TFP of Services Relative to Manufacturing, Latest Available Year, 2010–17**




*Sources*: Calculations based on administrative firm-level data, supplemented with OECD and Eurostat data.

*Note*: HICs = high-income countries.

**FIGURE BO.1.2 Average Establishment Size in Manufacturing and Selected Services Subsectors, 2000–12**




*Source*: Calculations using data collected by Bento and Restuccia 2020.

**No. 2: Services Establishments Operate at Smaller Scales than Manufacturing Establishments**

Services establishments are, on average, three times smaller than manufacturing establishments in LMICs. This size difference even holds when excluding informal firms. In high-income countries, services establishments tend to be slightly larger but still smaller than manufacturing establishments for most subsectors.

Differences between subsectors exist: for example, financial and telecommunications firms tend to have large establishments, while retail and professional services establishments tend to be small.

*Box continued next page*

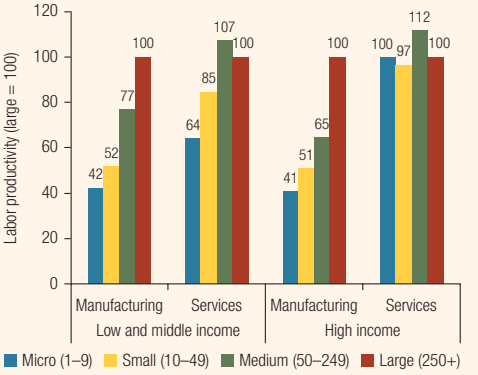
**BOX 0.1**

## Stylized Facts: Evidence from 20 Countries on Services Firms and Their Productivity (Continued)

### No. 3: But Size Matters Less for Productivity

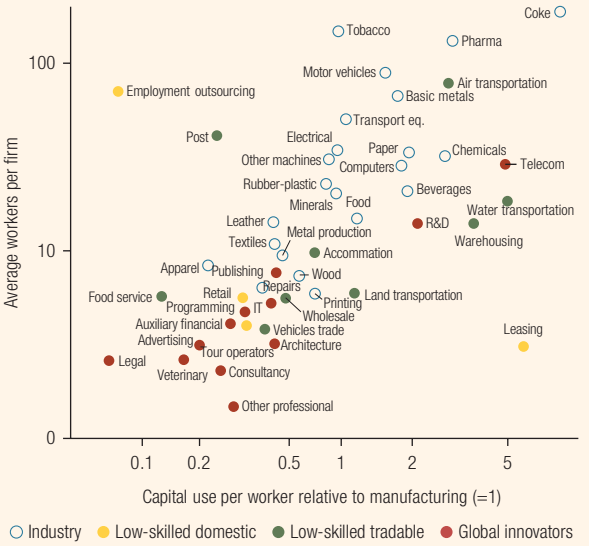
Although larger establishment size in manufacturing is usually associated with higher productivity, this relationship is weaker for services, especially in high-income countries. Small services firms can have productivity levels similar to large firms. This suggests that firm size, measured by employment, is less important in services as a determinant of productivity.

**FIGURE BO.1.3** Labor Productivity of Formal Manufacturing and Services Firms, by Size and Country Income Group, Latest Available Year, 2010–17




*Sources*: Calculations based on administrative firm-level data, supplemented with OECD and Eurostat data.

**FIGURE BO.1.4** Capital per Worker and Average Firm Size of Selected Sectors, by Group, in OECD Countries, 2017




*Sources*: Calculations using the OECD STructural ANalysis (STAN) and Structural Business Statistics databases.

### No. 4: Physical Capital Plays a Small Role

Services tend to be much less intensive than manufacturing in physical capital. In retail services and information technology (IT) services, for example, capital per employee is one-third the physical capital in manufacturing.

Only a few subsectors—most notably telecommunications, warehousing, and some transportation services— see capital intensity levels similar to manufacturing.

*Box continued next page*

**BOX 0.1**

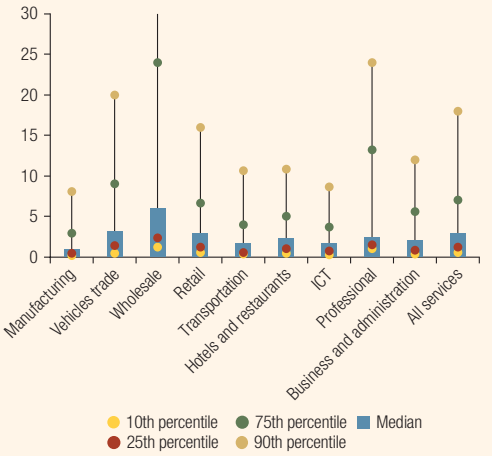
## Stylized Facts: Evidence from 20 Countries on Services Firms and Their Productivity (Continued)

### No. 5: Dispersion in Productivity Is Higher in Services than in Manufacturing

The significant variation in productivity within services subsectors is often greater than in manufacturing. This means that more-productive firms operate concurrently with less-productive firms.

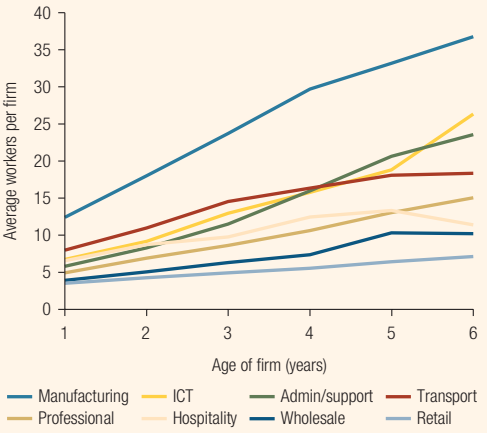
This higher dispersion could be a sign of distortions and resource misallocation, but it can also reflect differences in market power and quality. More detailed data on prices and service quality are crucial to understand the source of dispersion.

**FIGURE BO.1.5 Labor Productivity Dispersion in Selected Sectors, Sierra Leone, 2016**




*Source*: Calculations based on firm-level census data.

**FIGURE BO.1.6 Average Number of Employees in Firms' First Six Years, by Sector, in Selected LMICs**




*Source*: Aterido et al. 2021, based on firm-level administrative data.

### No. 6: Firms' Employment Growth Slows Down over Their Life Cycles

Over their lifetimes, services firms tend to grow less than manufacturing firms. For example, while a manufacturing firm in our sample grew in its first six years by an average of 26 employees (a tripling), retail firms in our sample grew by only 3 employees (only a doubling).

Within the services subsectors, firms' employment growth was the highest in ICT and administrative and support services.

*Box continued next page*

**BOX 0.1**

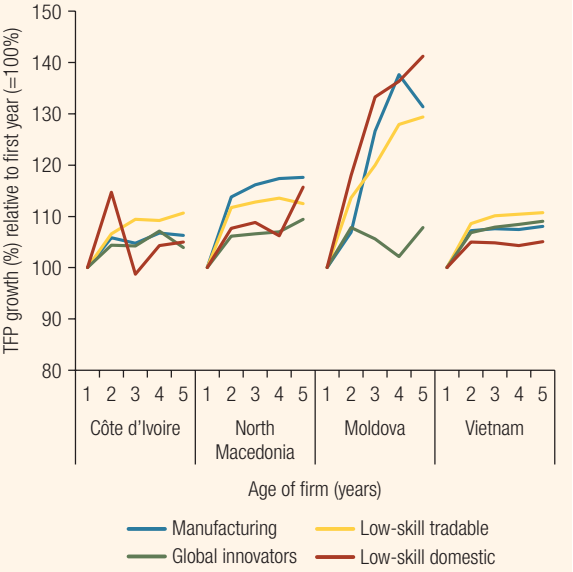
## Stylized Facts: Evidence from 20 Countries on Services Firms and Their Productivity (Continued)

### No. 7: But Firms Do Experience Productivity Growth over Their Life Cycles

The lower expansion in employment does not mean that services firms are not growing in other respects. Productivity growth in the initial years is on par with manufacturing.

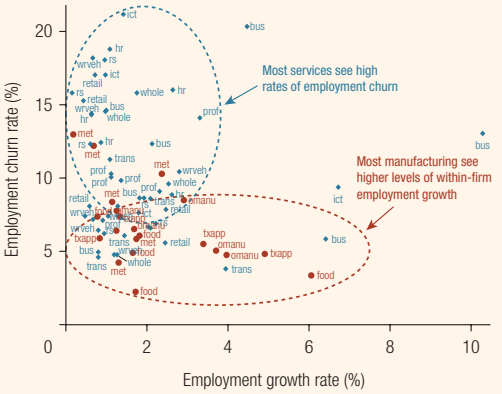
This productivity growth—even if employment is more stagnant—is an indication that services firms do expand sales and potentially upgrade their quality, enabling them to charge higher prices.

**FIGURE BO.1.7** Productivity Growth of Services Firms Relative to Manufacturing Firms in Selected LMICs, by Sector Group




*Source*: Aterido et al. 2021, using firm-level administrative data.

**FIGURE BO.1.8** Patterns of Employment Change in Services Relative to Manufacturing Firms during Firms' Initial Years, Selected LMICs, Latest Available Year, 2010–17




*Source*: Calculations using firm-level panel datasets.

### No. 8: Entry and Exit of Firms Play Bigger Roles in Job Creation and Destruction in Services Than in Manufacturing

The entry and exit of firms drives job creation and destruction in the services sector much more than it does in manufacturing. This means that job dynamics in services are more driven by churn related to entry and exit than by firm growth.

## Implications for Productivity Growth

These stylized facts have implications for how the three channels that have underpinned productivity growth for manufacturing—scale, innovation, and linkages—contribute to productivity growth for services.

**Scale.** The smaller size of services establishments and the weaker relationship between establishment size and productivity point to fewer economies of scale in services than in manufacturing. This nevertheless does not rule out the importance of scale completely. First, although services establishments are, on average, smaller in LMICs than in high-income countries (Fact No. 2), the productivity benefits of sizing up in LMICs tend to be higher, especially in retail, restaurants and accommodations, and ICT. In addition, they might achieve scale in other ways, such as branching or franchising. Digital technologies might also provide new ways of achieving scale.

**Innovation.** The limited role for physical capital in most services subsectors—barring telecommunications, transportation, and warehousing services—suggests that innovation is less likely represented as technology embedded in a machine than in more intangible forms. This could be software, knowledge embedded in intellectual property, or brand value, as well as organizational know-how including operating procedures and managerial practices. The low physical capital requirements also facilitate higher degrees of entry and exit since start-up costs are lower. This raises the potential for innovation through creative destruction when entrant firms invent or adopt more productive technologies.

**Linkages.** Productivity analyses also suggest that linkages play an important role in boosting productivity. Of the services subsectors that tend to be more productive than manufacturing, most comprise firms that sell mainly to other firms rather than to final consumers (for example, ICT, financial, and transportation services).

## Implications for Job Creation

Job quality is strongly correlated with productivity across sectors. The higher-productivity global innovator services, such as ICT and professional services, pay higher wages and often also offer better nonwage benefits than the less-productive sectors. In the latter, especially in low-skill domestic services (such as retail and personal services), jobs are often characterized by low wages and a large informal sector (Hovhannisyan et al. 2021; Nayyar 2011). The relationship between productivity and jobs is strong within sectors as well. Averaged across the countries with suitable firm-level data, a firm in the top productivity decile pays a wage that is from 1.9 times to more than 4.3 times higher than a firm in the bottom decile.

As for gender equity, wage gaps between men and women persist, with women either more likely to work in low-skill services or in low-skill occupations within global innovator services. For example, according to the US Bureau of Labor Statistics wage gaps in the United States are the highest in financial and professional services (39 percent and 29 percent, respectively) and the lowest in low-skill sectors such as food services (15 percent) (BLS 2019).

Services subsectors that are characterized by higher productivity (relative to manufacturing)—most notably those in global innovator services—account for a lower share of jobs in LMICs than in high-income countries, as shown earlier in figure O.5. If LMICs could change the subsectoral composition of their services sectors to that of high-income countries, productivity could increase by up to a third.[7] Without sufficient human capital, however, there are significant limits on how much labor can be absorbed by these high-skill global innovator services.

There are productive opportunities, too, among low-skill services that exhibit productivity growth similar to other services (Fact No. 7), albeit starting at a lower level of productivity (Fact No. 1). Moreover, there is considerable heterogeneity in the productivity of low-skill services between LMICs and high-income countries, which is indicative of the potential for catch-up.

## Will Technology Make the Twain Meet? A Changing Productivity-Jobs Dichotomy in Services

The twin gains of productivity growth and job creation are less prevalent within the same services subsector than they would typically be in manufacturing. The question is whether technological change is likely to accentuate or diminish this dichotomy between productivity growth and job creation across the services sector in the future.

Technological change is bringing new opportunities to exploit *scale economies* and *innovation*, enabled by both the wider diffusion of the ICT revolution and the emergence of artificial intelligence (AI)—including data analytics and machine learning (ML)—as a new general purpose technology (GPT). These changes have meant that many services are becoming (a) less dependent on physical proximity between buyers and sellers, (b) more automatable than before, and (c) increasingly characterized by intangible capital. The next section discusses each of these three trends in turn.

### The Changing Scope for Scale and Innovation in Services

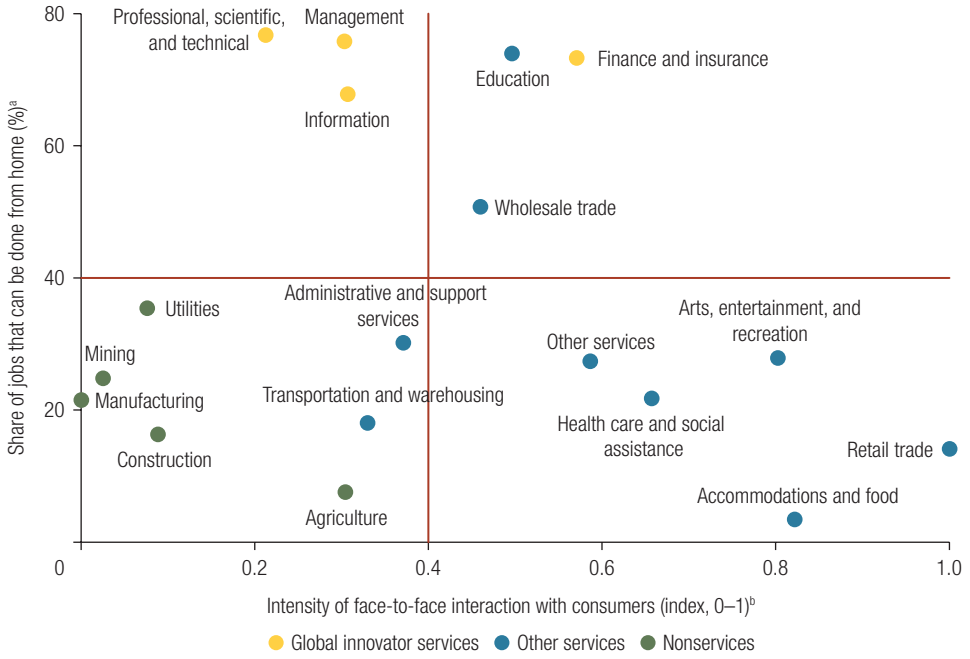
#### *Trend 1: Many Services Have Become Less Dependent on Physical Proximity*

ICT and professional, scientific, and technical services that require little face-to-face interaction with consumers are the most amenable to remote delivery (figure O.7). The rapid expansion of bandwidth and new collaborative digital platforms such as Business Skype, Slack, Trello, and Basecamp have been important enablers. Digital markets have also given rise to a new form of online outsourcing, such as for computer programming and other professional services, whereby low search costs enable clients to contract third-party individuals as freelancers.

Some services that are intensive in face-to-face interactions with consumers are also amenable to digital delivery. For example, lawyers and investment advisers in financial services can connect individually with clients through online platforms, while high

**FIGURE 0.7 While Remote Delivery and Face-to-Face Interactions Expectedly Go Hand-in-Hand, the Two Measures Diverge in Some Industries**

*Share of jobs amenable to home-based work in relation to intensity of face-to-face interactions with consumers, by industry, United States, 2018*




*Sources*: Calculations based on the US Department of Labor's Occupational Information Network (O*NET) database and US Bureau of Labor Statistics (BLS) data.

*Note:* Both measures are scored at the occupation level using surveys (periodically updated, with the last major update in 2014) from the O*NET database, merged with BLS data on the prevalence of each occupation across industries in 2018. Red lines designate the average (mean) value across industries. "Other services" refers to other social, community, and personal services.

a. Dingel and Neiman (2020) estimated the feasibility of working from home based on whether a job involves at least 1 of 15 tasks, such as "daily work outdoors" or the "operation of vehicles, mechanized devices, or equipment."

b. The face-to-face interactions with consumers index, developed by Avdiu and Nayyar (2020), measures the extent to which an occupation involves (a) establishing and maintaining personal relationships; (b) assisting and caring for others; (c) performing for or working directly with the public; and (d) selling to or influencing others.

school teachers and university professors can deliver lectures digitally through web-based applications.

Low-skill services, such as accommodation and food services and retail trade, are the among the most intensive in face-to-face interactions and also remain the least amenable to home-based work. Although "online tools" have better matched market demand and supply in even these services, their delivery remains tied to the physical proximity between producers and consumers.

### *Trend 2: Many Services Are Now Automatable*

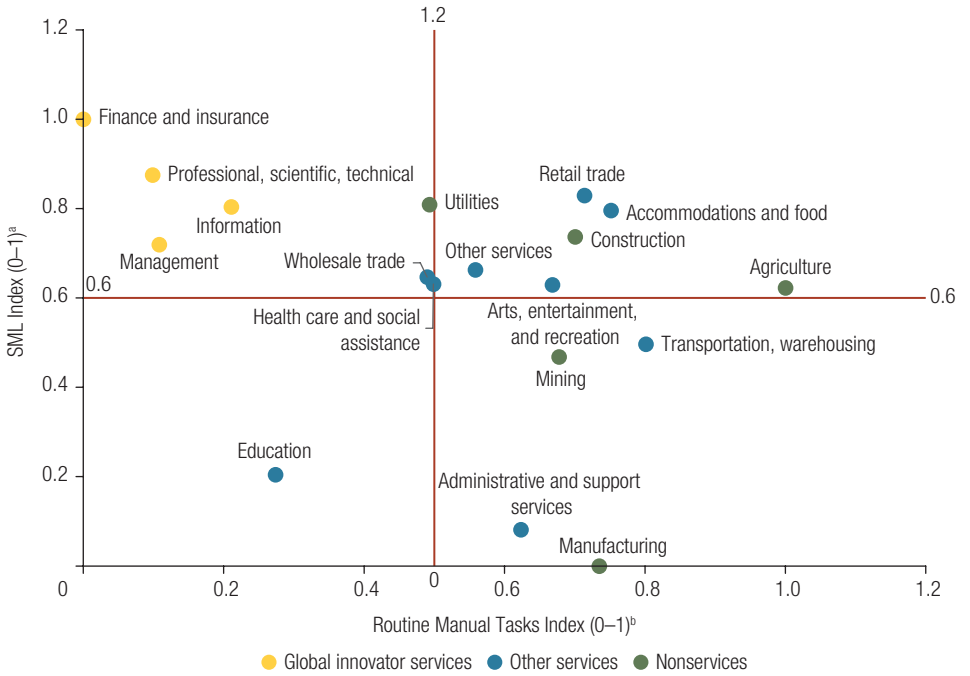
ICT-related automation mainly affected a relatively narrow range of routine tasks that can be entirely codified as a series of precise computer-executed instructions. Services tasks at both

ends of the skill spectrum were therefore the most challenging to automate. On the high-skill end, cognitive tasks (characteristic of many professional, technical, and managerial services) emphasize problem-solving capabilities, creativity, and persuasion. On the low-skill end, manual tasks (characteristic of health care, food preparation and serving jobs, and cleaning work) emphasize situational adaptability, visual and language recognition, and in-person interactions (Autor, Levy, and Murnane 2003).

However, the uptake of AI-enabled image recognition, voice recognition, and machine translation is increasingly relevant for a range of services tasks. In fact, global innovator services (such as ICT; professional, scientific, and technical services; and financial services) have the lowest incidence of routine manual tasks but are among the industries with the most suitability for machine learning (SML) (figure O.8).

**FIGURE O.8 Global Innovator Services May Be Increasingly Subject to Automation through Machine Learning**

*Routine Manual Tasks Index and SML Index scores, by industry, United States, 2018*




*Sources*: Calculations based on the US Department of Labor's Occupational Information Network (O*NET) database and US Bureau of Labor Statistics (BLS) data.

*Note*: The two indexes are scored at the occupation level using surveys (periodically updated, with the last major update in 2014) from the O*NET database, merged with BLS data on the prevalence of each occupation across industries in 2018. Red lines designate the average (mean) value across industries. "Other services" refers to other social, community, and personal services.

a. The Suitability for Machine Learning (SML) Index—developed by Brynjolfsson, Mitchell, and Rock (2018)—represents the evaluation of 23 distinct task properties on a 5-point scale varying from "strongly disagree" to "strongly agree."

b. The Routine Manual Tasks Index—developed by Oldenski (2012)—represents the importance of tasks related to (a) "handling objects," (b) "operating machines other than vehicles," and (c) "general physical activities."

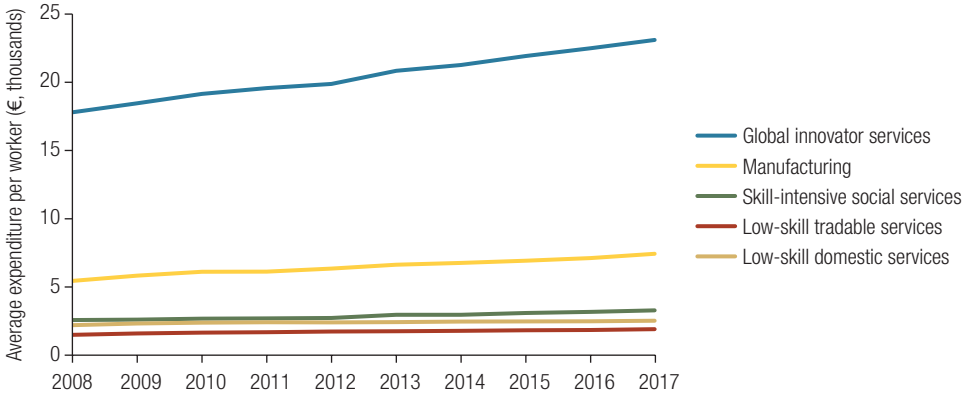
### *Trend 3: Many Services Are Increasingly Characterized by Intangible Capital*

The accumulation of physical capital has played a much smaller role in the production process among services firms than in manufacturing. However, innovation in the services sector was typically buoyed by intangible capital that derived from company competencies such as marketing and branding, firm-specific training, business process engineering, and organizational practices.

The diffusion of digital technologies has been associated with a rise in other types of intangible capital, such as computer-related software and data as well as innovative properties such as R&D and design (Brynjolfsson, Rock, and Syverson 2021). Firms' expenditure per worker on computer software and databases is highest in the global innovator services—ICT, finance, and professional services. These services subsectors also experienced the most discernible increase in this intensity of intangible capital between 2000 and 2017 (figure O.9). The increase in intangible capital associated with greater investments in data-related processes will further emphasize the importance of company competencies because these require firms to create new business processes, develop managerial skills, train workers, patch software, and build a strong company brand.

**FIGURE O.9** **The Intensity of Investments in Software and Data Increased Most Discernibly among Firms in Global Innovator Services**

*Average expenditure per worker (€, thousands) on computer software and databases in OECD countries, by sector, 2008–17*




*Source*: Calculations based on OECD's STructural ANalysis (STAN) database.

*Note:* The data cover 23 Organisation for Economic Co-operation and Development (OECD) countries: Canada, the Republic of Korea, and 21 European countries. "Global innovator services" include information and communication technology, finance, and professional, scientific, and technical services; "low-skill tradable services" include transportation, wholesale trade, and accommodation and food services; "low-skill domestic services" include retail, real estate, administrative and support, arts and entertainment, and other social, community, and personal services; "skill-intensive social services" include education and health services.

## Implications for Productivity Growth and Job Creation

### *Global Innovator Services: Promising for Export-Led Growth but Still Skill-Biased*

The emergence of online outsourcing through digital platforms has created greater exporting opportunities among global innovator services. The Oxford Internet Institute's iLabour Project estimates that the number of online gig workers in software development services who completed projects on the four largest English-language labor platforms—Fiverr, Freelancer, Guru, and PeoplePerHour—increased fourfold, from 10 million to 40 million, between June 2017 and October 2020. Online outsourcing has expanded where jobs can be done, with about half of all such freelancers based in Bangladesh, India, and Pakistan alone.

The advent of machine translation could further expand the global supply of online freelancers to include LMICs where English is not the preferred language for business transactions (Baldwin 2019).[8] At the same time, some are concerned that ML and AI adoption in high-income countries affects the export competitiveness of LMICs in the market for offshore business services by making labor a smaller share of overall costs. (For example, sales and customer interaction, such as through call centers, are potentially a good fit for automation by voice recognition software.) Yet there is little evidence of any reshoring so far.

Global innovator services remain skill-biased. However, the dichotomy between productivity growth and low skill intensity is narrowed through indirect job creation attributable to linkages with other sectors. For example, for every US$1,000 of ready-made garment exports from Bangladesh, about US$160 can be attributed to unskilled-labor value added in gross exports. For the same value of business services exports from the Philippines, less than US$90 can be ascribed to unskilled-labor value added. When a sector's inputs to economywide production are included, the contribution of unskilled-labor value added for every US$1,000 of exports remains unchanged for apparel in Bangladesh but increases to US$130 for business services in the Philippines.[9]

### *Low-Skill (Tradable and Domestic) Services: Promising for Scale and Innovation, with Robust Prospects for Low-Skilled Labor*

The productivity-jobs dichotomy within low-skill services is narrowing owing to increased opportunities for scale and innovation. Although the delivery of these services remains tied to specific locations, digital platforms have reduced the need for proximity in matching demand and supply. Take the examples of *ridesharing apps* such as Uber, Ola, and Grab that enable access to larger markets; *travel apps* such as Booking, Expedia, and MakeMyTrip that have boosted the demand for accommodation and transportation services; or *streaming platforms* such as YouTube and Netflix that enable the scaling up of arts and entertainment services.

Although the inherent role of labor remains important for most low-skill services, there is evidence of efficiency gains from the automation of general business functions.

For example, small retail enterprises that use basic business software-related apps to facilitate inventory management and accounting can improve their productivity. Furthermore, investments in intangible capital associated with ICT diffusion have enabled firms to scale the same production process in multiple locations near consumers. This is exemplified by restaurant chains that use software, databases, and management practices to determine optimal staffing, food purchases, and menu selection.

Job prospects in *low-skill services* also remain robust. The adoption of websites and email by firms across LMICs has not been labor-replacing in wholesale trade, retail trade, and hotels and restaurants (Cusolito and Patiño Peña 2020). Moreover, digital platforms have created new jobs in the gig economy despite displacing labor in less-efficient incumbent service providers. For example, new jobs created through ridesharing apps have reduced the demand for traditional taxi services.

This rise in automation and intangible capital has also not increased the demand for skills. With restaurant chains, for example, data analytics helps predict meals, how to tweak the menu offerings, and how to speed up customer turnaround, but it does not change the skill requirements for the cooks or wait staff. Digital technologies can also substitute for skills. For example, Uber drivers do not need map-reading skills (because the app does it for them) or numeracy skills (because all payments are done through credit cards on the platform).

### *Skill-Intensive Social Services: Opportunities for Scale and Innovation, but Still Skill-Biased*

Among the skill-intensive social services, increasing opportunities for scale through e-learning and telemedicine have reduced the need for proximity between buyers and sellers. There is also scope for greater innovation through investments in ICT-related automation where, for example, e-records enable easier access to information and reduce paperwork.

The same holds true for labor-augmenting intangible capital such as software, big-data analytics, and branding that have enabled hospitals and schools to scale production over many locations. This franchising model can also be exported through foreign direct investment (FDI) that establishes affiliates abroad. Jobs for unskilled labor remain limited in these services, and indirect job creation in other sectors is constrained by the paucity of linkages.

## Services before Manufacturing? Look before You Leap

Leading manufacturing firms in high-income countries and large emerging economies with a sizable industrial base have moved up the value chain by diversifying out of "production" per se into services such as R&D, design, branding, and

marketing—which increasingly account for much of the value added in a product's supply chain. In fact, these firms are therefore increasingly servitized in terms of their revenue streams and composition of employment, while production tasks are offshored to lower-cost locations. The question is the extent to which hitherto less industrialized countries can capitalize on growth opportunities in the services sector without a sufficiently large manufacturing base.

## Services without a Manufacturing Core

The scope for growth in the services sector beyond links to the manufacturing sector depends on the size of two channels: The first is the growth in *final demand*, particularly the ability to export directly as a way to serve larger markets. The second is the growth in *domestic demand* from sectors other than manufacturing—that is, the role of services as inputs into agriculture, mining, construction, utilities, and other services.

### *Final Demand: Expanding Services Exports*

**Exports of global innovator services.** The share of high-income countries in world exports of global innovator services remained high between 2005 and 2017, although it declined over time. The decline in this share was most pronounced in professional, scientific, and technical services, falling from 90 percent in 2005 to 75 percent in 2017.

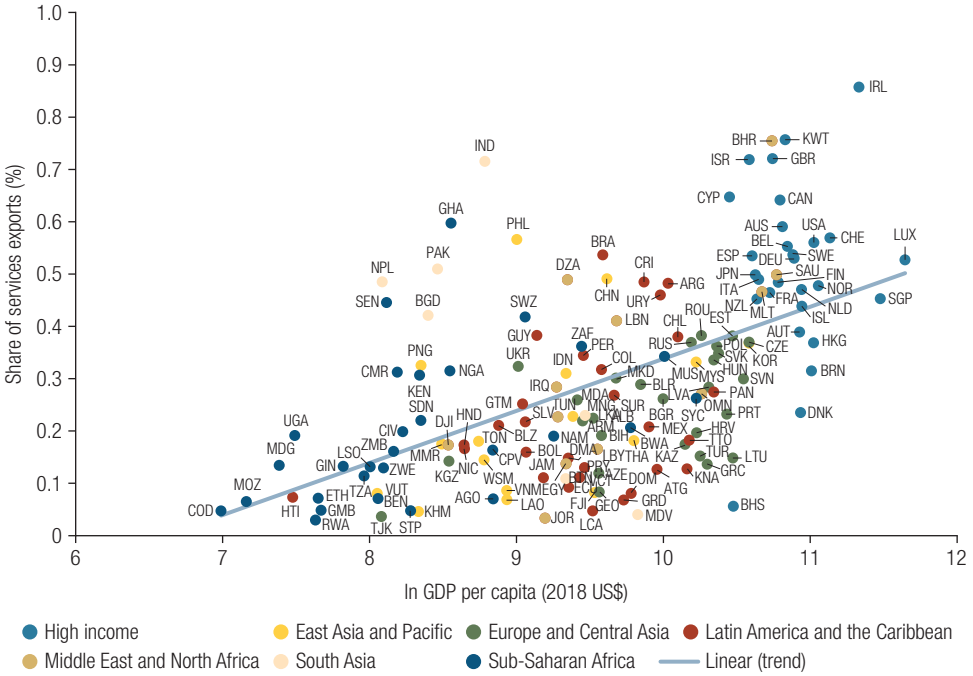
The resulting increase in the share of global innovator services exported from LMICs, however, remains concentrated among the top 10 LMIC exporter countries, which accounted for more than three-fourths of LMICs' total exports of such services. As a result, only some LMICs have successfully diversified their export baskets by specializing in offshore business services: computer programming, software development, BPO, accounting, and architectural and engineering services.

In 2017, global innovator services accounted for more than half of all services exports in Costa Rica, Ghana, India, Pakistan, and the Philippines—a share considerably higher than the average for their levels of per capita income (figure O.10). BPO services have been pivotal in the evolution of the Philippines from an agriculture-based economy where manufacturing has played only a limited role. Similarly, Costa Rica was a pioneer in attracting offshore BPO services to Latin America, drawing on its proximity to the United States' central time zone and its largely bilingual population. And Ghana has emerged as the top BPO hub in Africa. India's success in exporting software and other ICT services is much cited, but Bangladesh and Pakistan have also benefited from a large pool of relatively low-cost English-speaking workers, including online freelancers.

**Exports of low-skill tradable services.** International specialization in tourism-related services has enabled LMICs to gain ground in exports of transportation services and accommodations and food services.[10] The share of LMICs in world exports of

**FIGURE O.10** **Global Innovator Services Make Up Larger Shares of Total Services Exports in High-Income Countries**

*Share of global innovators in countries' services exports in relation to per capita income, 2017*




*Sources*: Calculations based on World Trade Organization's Trade in Services data by Mode of Supply (TiSMoS) database; World Development Indicators database.

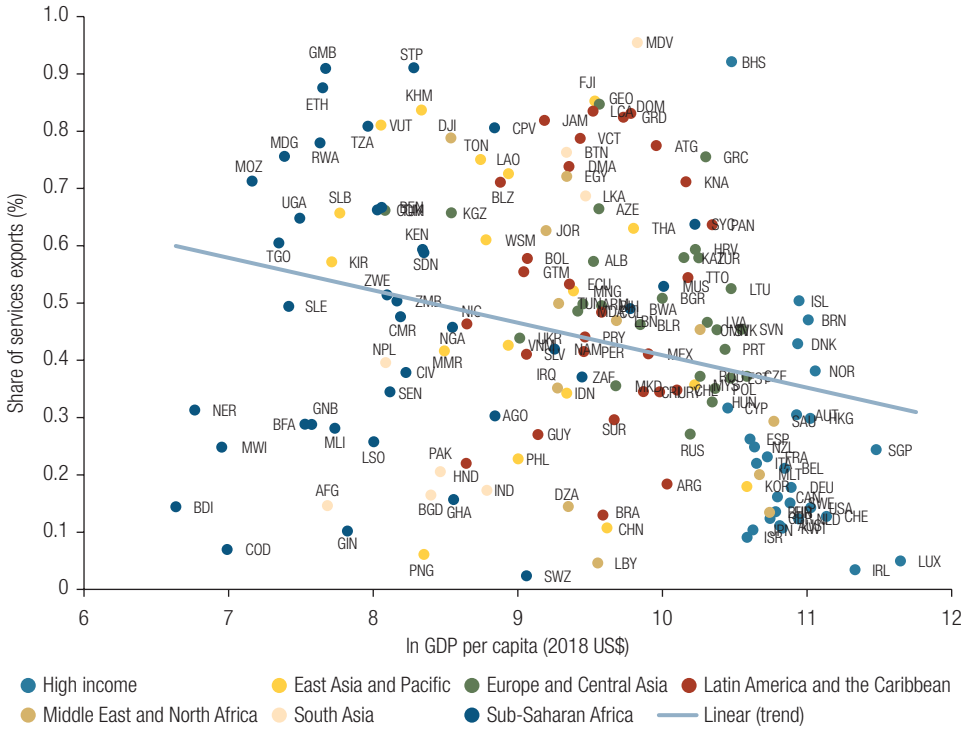
*Note*: Data cover 162 countries across all regions. Global innovator services—including information and communication technology (ICT); professional, scientific, and technical services; and financial and insurance services—employ mostly high-skilled workers, are highly traded internationally, and are the services most amenable to offshoring. Countries are labeled using ISO alpha-3 codes. Country income groups are defined by World Bank Group classification according to levels of gross national income in 1994. ln = natural log.

these services increased from 34 percent in 2005 to 39 percent in 2017. And although the top 10 LMIC exporters accounted for about half of LMICs' total exports of these services in 2017, such specialization has enabled several lower-income countries to diversify their exports away from volatile primary sectors (figure O.11).

Among low-income countries (as defined by gross national income in 1994), the share of transportation services and accommodation and food services in services exports in Bhutan, Cambodia, the Arab Republic of Egypt, Kenya, Rwanda, Sri Lanka, Tanzania, and Uganda—at two-thirds or more in 2017—was considerably higher than the average for their level of per capita income. Among middle-income countries, Jordan and Thailand similarly stand out. The share of these tourism-related services in total services exports was also expectedly high (at more than three-fourths), relative to levels of per capita income, for island economies across regions and income levels in 2017. These economies ranged from The

**FIGURE 0.11 Low-Skill Tradable Services Make Up Larger Shares of Total Services Exports in Lower-Income Countries**

*Share of accommodation and food and transportation services in countries' services exports in relation to per capita income, 2017*




*Sources*: Calculations based on World Trade Organization's Trade in Services data by Mode of Supply (TiSMoS) database; World Development Indicators database.

*Note*: Data cover 162 countries across all regions. Low-skill tradable services—including accommodation and food services and transportation services—employ mostly low-skilled workers and are tradable internationally, particularly through tourism-related travel. Countries are labeled using ISO alpha-3 codes. Income groups are by World Group classification according to 1994 gross national income. ln = natural log.

Bahamas and Jamaica in the Caribbean, Cabo Verde in Africa, and Maldives in South Asia to Fiji and Vanuatu in the Pacific.

**Exports leveraging skill-intensive social services and low-skill domestic services.** Skill-intensive social services and low-skill domestic services are less amenable to international specialization, but this does not imply the absence of all exporting opportunities. The top 20 exporters of health services through consumption abroad (mode 3 trade) in 2017 included Costa Rica, India, Jordan, Malaysia, Mexico, Thailand, and Turkey.[11] These LMICs are emerging as medical tourism hubs, offering treatment on a par with high-income countries but at substantially lower prices.

Low-skill domestic services, characterized by the highest share of migrant workers in high-income countries, are exported through the movement of people across national boundaries to provide services in the consumer's country (mode 4 trade).

### *Intermediate Demand: Selling to Other Sectors Domestically*

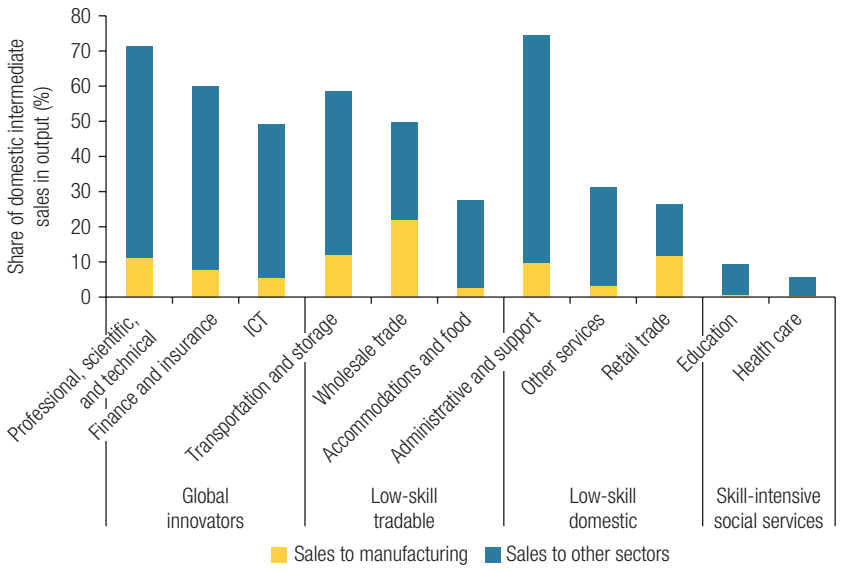
Growth opportunities independent of a country's manufacturing base will be reinforced to the extent that domestic intermediate sales to the manufacturing sector do not account for a disproportionate share of rising demand from other sectors. Internationally traded services among the global innovators and low-skill tradables are also the most likely services subsectors to serve intermediate demand from other sectors of the economy domestically (figure O.12).[12]

**Wholesale and retail trade and transportation services.** Growth in wholesale and retail trade output between 2000 and 2014 was higher in countries where growth in intermediate sales from those services to the manufacturing sector was also higher. However, growth in the share of these intermediate sales to manufacturing between 2000 and 2014 was not associated with a higher rate of growth of wholesale and retail trade output across countries (figure O.13).

In other words, selling more to the manufacturing sector than to other sectors—agriculture, mining, construction, utilities, and other services—did not result in higher growth rates for wholesale and retail trade. This finding suggests that intermediate sales

**FIGURE O.12 Global Innovator and Low-Skill Tradable Services Are More Likely Than Other Subsector Groups to Serve Domestic Intermediate Demand**

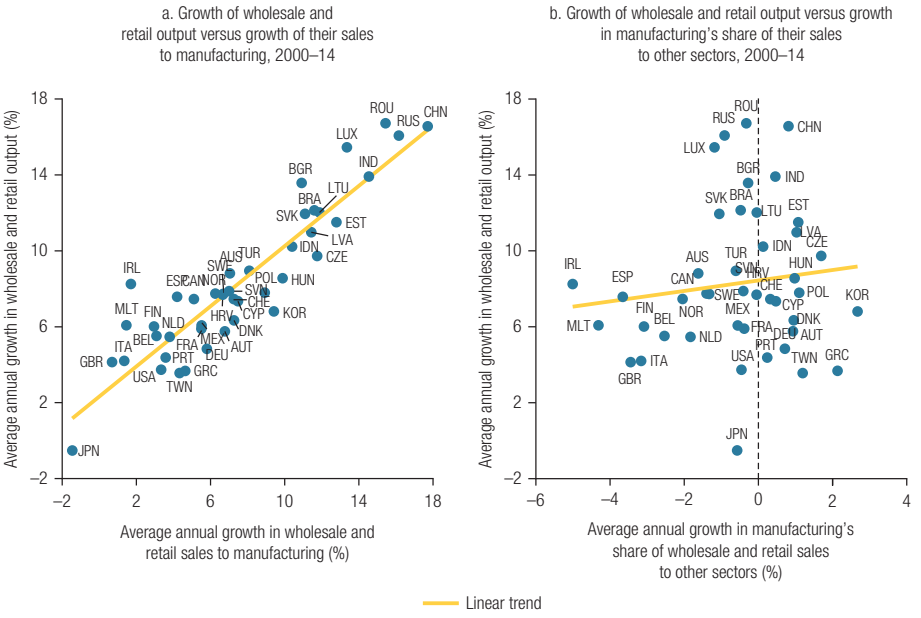
*Average share of domestic intermediate sales in total output across 40 countries, selected services subsectors by group, 2014*




*Source*: Calculations based on the World Input-Output Database.

*Note:* The dataset comprises primarily high-income countries as well as some large low- and middle-income countries (LMICs)—Brazil, China, India, Indonesia, the Republic of Korea, Mexico, and Turkey—and smaller European LMICs (Bulgaria, Croatia, and Romania). Countries represent all regions except Sub-Saharan Africa and the Middle East and North Africa. "Other services" refers to arts, entertainment, and recreation services as well as other social, community and personal services. ICT = Information and communication technology.

**FIGURE O.13 The Growth of Intermediate Sales to Manufacturing Matters for the Growth of Wholesale and Retail Trade Services, but Not Disproportionately So**




*Source*: Calculations based on the World Input-Output Database.

*Note*: Average annual growth is plotted for 40 countries across global regions and income groups, labeled using ISO alpha-3 codes.

from wholesale and retail trade to other sectors matters too. The same holds true for transportation services.

**Global innovator services.** In contrast, global innovator services may depend disproportionately more on demand from the manufacturing sector than from other sectors (figure O.14). At the same time, numerous examples show that sales to other sectors have also made sizable contributions to the growth of these global innovator services. For example, Chile used its mineral resources to diversify into the provision of sophisticated engineering and scientific research services (Fernandez-Stark, Bamber, and Gereffi 2010). And Uruguay now exports advanced information technology (IT) services for the livestock industry (Fernandez-Stark, Bamber, and Gereffi 2014).

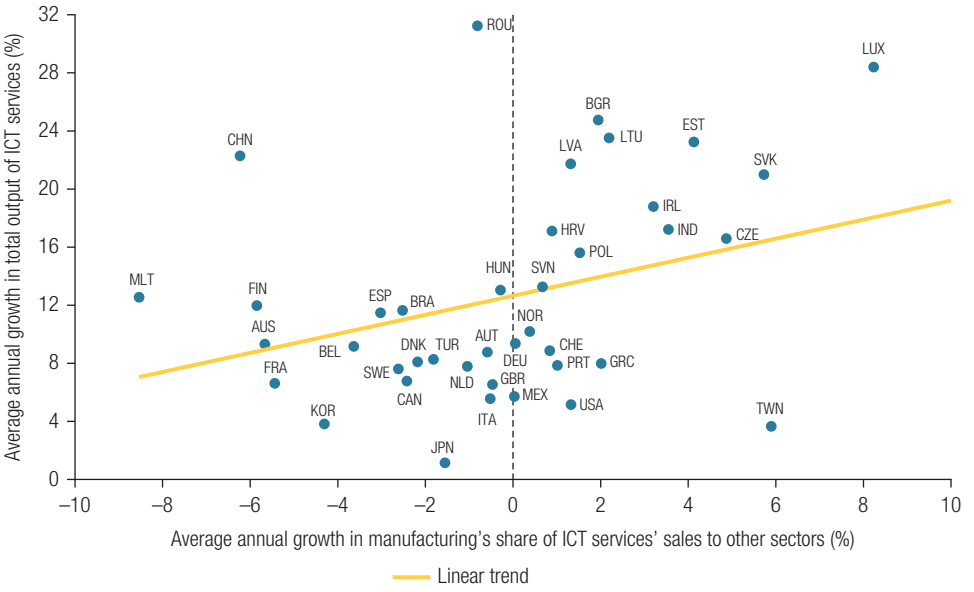
## Services as "Upstream" Enablers and "Downstream" Complements for Manufacturing

### *Embodied Services: Upstream Enablers*

The increasing servicification of manufacturing has expanded the role of services as upstream enablers for the production of manufactured goods. In 2015, about one-third of the value of gross manufactures' exports among Organisation for Economic

**FIGURE O.14** **ICT Services' Total Output Growth Is Associated with Growth in Its Share of Intermediate Sales to Manufacturing**

*Growth in ICT services output in relation to growth in share of its intermediate sales to the manufacturing sector, 2000–14*




*Source*: Calculations based on the World Input-Output Database.

*Note*: Average annual growth is plotted for 40 countries across global regions and income groups, labeled using ISO alpha-3 codes. ICT = information and communication technology.

Co-operation and Development (OECD) countries was attributable to the value added of "embodied" services—services inputs included in the value of manufactured goods—with distribution (wholesale and retail) and business services making the largest contributions. The corresponding share among low- and middle-income economies was about 29 percent (figure O.15).

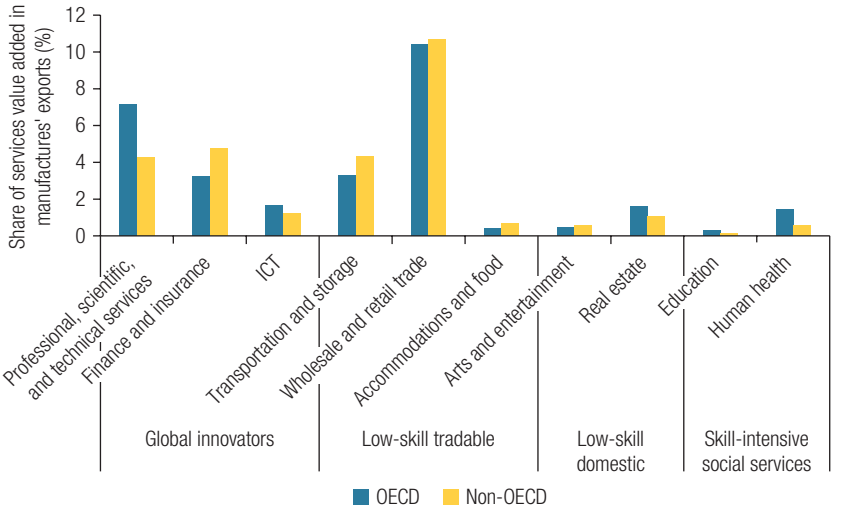
A substantial body of evidence across LMICs in different regions shows that services embodied in manufactured goods have a significant impact on manufacturing productivity, largely because of reforms that have liberalized key enabling services, often facilitating their import through FDI (Alfaro and Eslava 2020; Arnold et al. 2015; Arnold, Javorcik, and Mattoo 2011; Arnold, Mattoo, and Narciso 2008; Bas 2014). These complementarities will be further strengthened through "smart" production processes whereby ICT services, as the predominant producers and users of data, will play a crucial role in boosting manufacturing competitiveness.

### *Embedded Services: Downstream Complements*

Manufacturers also increasingly sell downstream services—such as sales and after-sales services (advertising, warranties, and repair)—that are bundled with goods for their customers, owing to both supply- and demand-side factors.

**FIGURE O.15 About One-Third of the Value of Gross Manufactures' Exports Is Attributable to Services Inputs**

*Services value added in exports of manufactured goods, OECD and non-OECD economies, by services subsector, 2015*




*Source*: Calculations based on the Trade in Value Added (TiVA) database of the Organisation for Economic Co-operation and Development (OECD).

*Note*: "Non-OECD economies" include Argentina; Brazil; Brunei Darussalam; Bulgaria; Cambodia; China; Colombia; Costa Rica; Croatia; Cyprus; Hong Kong SAR, China; India; Indonesia; Kazakhstan; Malaysia; Malta; Morocco; Peru; the Philippines; Romania; the Russian Federation; Saudi Arabia; Singapore; South Africa; Taiwan, China; Thailand; Tunisia; and Vietnam. ICT = information and communication technology.

On the supply side, there are economies of scope in production. For example, a cell phone is a good, but it is tied to the use of telecommunications services, which allows the user to install apps with purchased content that can give rise to additional service transactions such as streaming movies or music. The combination of Apple's iTunes with the iPod provides a relevant example, whereby the company profited from pairing the music device with a service that allowed consumers to buy music instantly and remotely (Amit and Zott 2012).

On the demand side, consumer preferences for bundling can enable a firm to differentiate its product from those of its competitors. Financial services such as credit and insurance offered by manufacturers of consumer durables are a case in point. These production- and consumption-driven motivations often occur together, as in the case of traditional consumer durables that increasingly come with an assortment of after-sales services such as advertising, warranties, and repair (Grover and Mattoo 2020).

## Boosting Productivity to Keep Up the Good Work: Policy Imperatives

### Trade, Technology, Training, and Targeting (the 4Ts)

Technological advancement and the expanding role of services as enabling sectors point toward the possibilities for expanding the opportunities for development through services. The policy areas discussed here would build on that momentum along four dimensions: trade, technology, training, and targeting—the 4Ts.

**Trade.** With technology reducing the need for physical proximity between producers and consumers, lowering services trade barriers—to make what is increasingly tradable *more* traded—could enable greater scale economies. This has an international dimension, but expanded "trade" can also happen domestically. The reduced need for proximity allows businesses to reach customers beyond those in their immediate vicinity, but regulatory barriers and standards can restrict market contestability behind, and not just at, the border.

**Technology.** Expanded access to digital technologies is a necessary precondition to realize any of the trends changing the nature of services (remote delivery, automation, intangible capital, and intersectoral linkages). This is not simply a matter of improving the ICT infrastructure but also about supporting the adoption and use of digital technologies—and updating the regulatory framework to address new features of data and digital business models. The inclusion of AI, MI, and big-data analytics in this framework can help raise quality in a wider set of activities and also emphasizes catch-up through the wide diffusion of computerization and the internet.

**Training.** Improving training and skills development for workers and managers can address the demand for new skills resulting from the increase in intangible capital associated with ICTs.

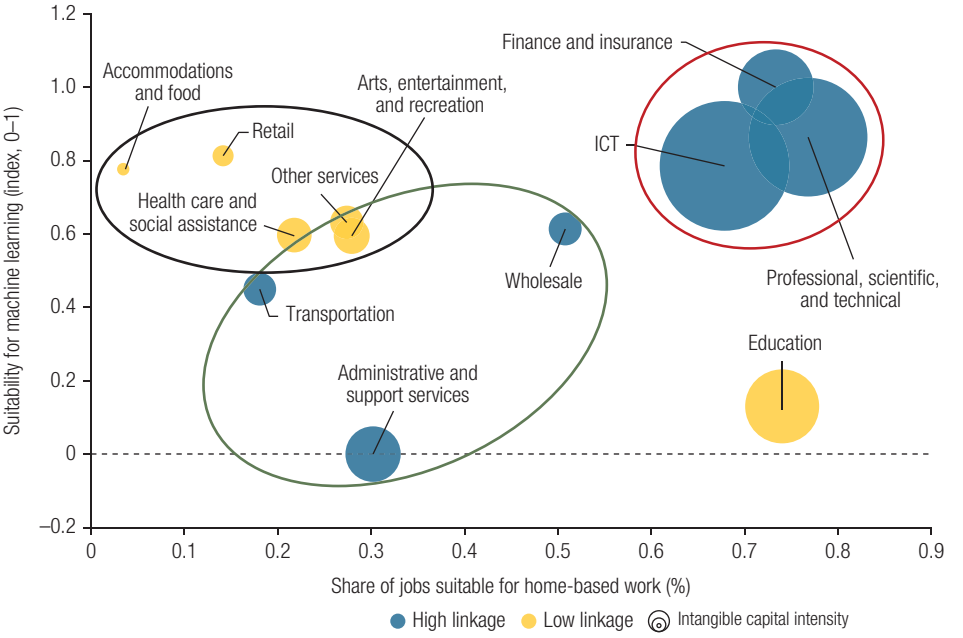
**Targeting.** Recognizing the potential for more linkages between enabling services and other sectors, a case can be made to target the growth of these enabling services to widen the benefits of both productivity and jobs through these multiplier effects.

### Mapping the 4Ts Policy Agenda to the Changing Nature of Services

The relevance of each of the 4Ts also needs to be matched with how demands for them are changing based on the differential impacts across services subsectors of the following trends described earlier: remote delivery, automation, intangible capital, and forward linkages across sectors (figure O.16). Amenability to home-based work (x-axis) shows potential for scale; suitability for machine learning (y-axis) shows potential for more technology adoption; software and R&D per worker (bubble size) shows potential for the greater accumulation of intangible capital; and forward linkages (bubble color) shows sectors where targeted support could deliver larger multiplier effects.

**FIGURE O.16** **Reduced Need for Proximity, Suitability for Automation, Intangible Capital, and Forward Linkages Are Changing the Scope for Scale, Innovation, and Spillovers across Services Subsectors**

*Share of jobs amenable to home-based work, suitability for machine learning, expenditure per worker on R&D and software, and share of intermediate sales in output across services subsectors, 2017–18*




*Sources*: Calculations based on Brynjolfsson, Hui, and Liu 2019; Dingel and Neiman 2020; OECD.Stat, https://stats.oecd.org/; World Input-Output Database; and World Bank's Export Value Added Database (EVAD).

*Note*: Bubble *size* indicates the relative expenditure per worker on software and research and development (R&D); and bubble *color*, the relative share of intermediate sales to other sectors in total output. The dark bubble color also designates subsectors with the largest increases in these forward linkages since the 1990s. "Other services" refers to other social, community, and personal services. ICT = information and communication technology.

Table O.1 links these sets of trends to what they are likely to imply for priorities in the 4Ts agenda. Categorizing the impacts of these "future trends" as "high," "medium," or "low" (in the left half), the table illustrates various combinations of the trends (in the right half) to develop how clusters of policies can work together to enable different subsectors to benefit from the trends they face. This mapping helps reinforce how policy priorities in the 4Ts can vary across services subsectors: those affected by all four trends have an interest in the full 4Ts policy agenda, whereas those with scope to address only one or two trends will benefit most from the policies that focus on those trends.

Several of the subsectors cluster in ways similar to the initial categorization of services. However, the difference between the ability for remote delivery (what could

**Table O.1 Mapping the Impacts of Trends—Reduced Proximity, Increased Automation, Intangible Capital, and Forward Linkages—by Services Subsectors Can Inform the Priorities in the 4Ts Agenda**

| Impact of future trends | | | | Priority within 4Ts agenda | | | | |
|---|---|---|---|---|---|---|---|---|
| **Reduced proximity** (scope for home-based work) | **Potential for automation** (suitability for machine learning,[a] data analytics) | **Intangible capital** (expenditure per worker on software and R&D) | **Intersectoral linkages** (share of forward linkages in total output) | **Trade** (if H/M in reduced proximity) | **Technology** (if H/M in increased automation) | **Training** (if H/M in intangible capital) | **Targeting** (if H/M in sectoral linkages) | **Subsectors likely affected in this combination of policy priorities** |
| High | High | High | High | Yes | Yes | Yes | Yes | ICT, finance, and professional services |
| High | Medium | Medium | Low[c] | Yes | Yes | Yes | No | Education services |
| Medium[b] | High | Low | Low[c] | Yes | Yes | Yes | No | Health services[d] |
| Medium[b] | Medium | Low | High | Yes | Yes | No | Yes | Transportation, wholesale trade, and administrative and support services |
| Low | High | Low | Low | No | Yes | No | No | Accommodations and food; retail trade; arts, entertainment, and recreation; and other services |

*Note*: H/M = high or medium. ICT = information and communication technology.

a. Most services subsectors have similar scores on the suitability for machine learning (SML) index, which reinforces the relative evenness of SML scores across occupations (Brynjolfsson, Mitchell, and Rock 2018). In figure O.16, administrative and support services and education stand out as being notably lower on the SML index than all other services subsectors. Here, however, these subsectors are classified as "medium" instead of "low" because the manufacturing sector has a distinctly lower SML score (as shown in the full volume, chapter 3).

b. Some portions can be done remotely (through platforms that facilitate matching and telemedicine), but final delivery has more of a need for proximity.

c. Linkages will be there in the longer run with more-educated, healthier workers.

d. Health services is already a high-skill sector, and so training is relevant despite the "low" level of intangible capital. This categorization might reflect the fact that health-related R&D is either captured in pharmaceutical manufacturing or in universities (included under education services).

be traded internationally through mode 1, cross-border supply) and overall international tradedness aligns somewhat differently. For example, accommodation and food services join low-skill domestic services; administrative and support activities join low-skill tradable services; and education is far more suited than health services to remote delivery if needed).

### *Global Innovator Services: All 4Ts Are Needed*

Given their amenability to remote delivery, high SML, high levels of intangible capital per worker, and high incidence of forward linkages to other sectors, a strong performance on each of the 4Ts is needed for countries to leverage the potential of ICT; finance; and professional, scientific, and technical services. This will require some catch-up.

On "trade," for example, professional services are currently among the most protected. Sixty-three of the 73 countries for which data are available (in Borchert et al. 2019) have trade restrictions on professional services, exceeding the average for all sectors. However, these restrictions declined across all countries between 2008 and 2016. This means that among services where needs for physical proximity are less important than before, lower restrictions can enhance trade in what is increasingly tradable. Similarly, on "training," the paucity of digital and advanced technical skills is already a constraint to expanding employment in the global innovator services.

### *Skill-Intensive Social Services: Technology, Training, and Trade Are Needed*

Given a reduced need for physical proximity, moderately high levels of intangible capital, ML-related automation, and few intersectoral linkages, education and health services are subsectors where technology adoption and training, and at least some trading, deserve emphasis.

Regarding "training," management capabilities will become an increasingly important complement to the skills needed to be a surgeon or professor as hospitals and universities embrace new business models of telemedicine, e-learning, and franchising. As for "technology," these new business models will emphasize the digitalization of records, communications, and market transactions.

### *Low-Skill Tradable Services: Technology, Trade, and Targeting Are Needed*

Transportation, wholesale trade, and administrative and support services are characterized by relatively low levels of intangible capital but require only moderate physical proximity between producers and consumers. They are also characterized by moderately high suitability to AI-related automation and high forward linkages with other sectors. Therefore, three of the Ts—technology, targeting, and trade—matter most to leverage the potential of these services subsectors.

Regarding "trade," for example, there are indeed regulations designed to protect subsectors from competition—such as in air transportation, where regulations in many countries reflect national interests in maintaining national airlines. Similarly, on "targeting," transportation services that experienced the largest increase in forward linkages already share strong linkages with the manufacturing sector.[13]

### *Low-Skill Domestic Services: Technology Is Needed*

In accommodation and food services; retail trade; arts, entertainment, and recreational services; and other social, community, and personal services, physical proximity between producers and consumers remains important. These subsectors also have few intersectoral linkages and hitherto little intangible capital. At the same time, they are highly exposed to ML (such as through platforms that facilitate matching, e-commerce that reduces the need for physical retail space, and automated checkouts). Therefore, under this scenario, only the dimension of technology adoption must be high to support the potential for greater productivity.

The extent of unexploited potential here is underscored by the low use of even very basic digital technologies. The share of firms that have a website or that use email to communicate with suppliers or customers is relatively low among these services subsectors. Similarly, retail and hospitality services rank the lowest in management practices.[14]

The lack of technology adoption may also be driven, at least in part, by restrictions on "big box stores" or foreign retail chains. For example, large emerging markets such as Argentina, India, Indonesia, Malaysia, Thailand, and Vietnam are among the countries with the highest restrictions in retail services (in Borchert at al. 2019) and have made little progress in reducing these restrictions since 2008.

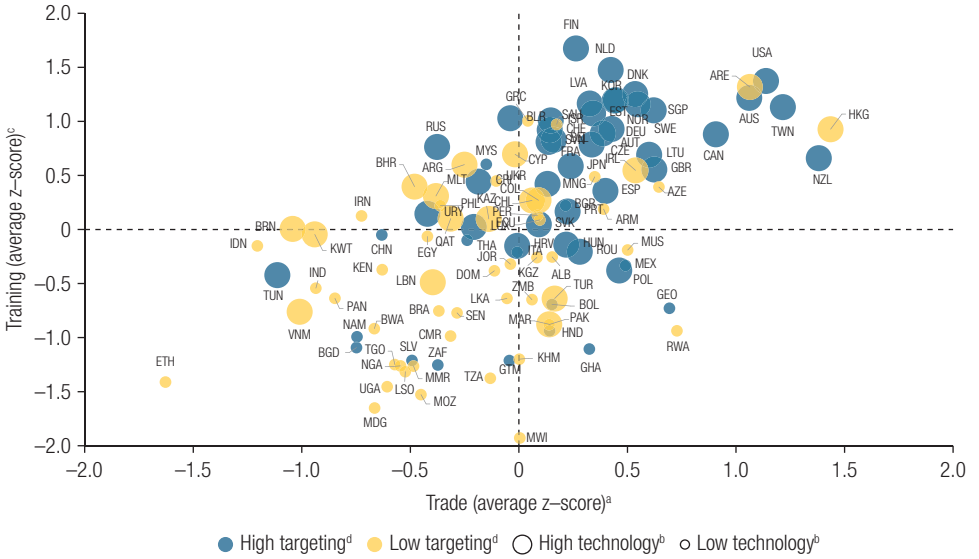
## Where Countries Stand in the 4Ts Space

An illustration of how countries perform across the 4Ts provides a typology that highlights how their relative reform priorities may vary. Figure O.17—in which the axes represent the summary measures of countries' trade and training landscape, while the sizes and colors of country markers, respectively, indicate the technology and targeting landscape—highlights how these 4Ts vary across countries.

This variation in the 4Ts across countries today is striking and brings out several complementarities across all four dimensions. These can be insightful in helping countries understand their relative performance, on which dimensions they may be falling behind, and where they are performing better. Four patterns stand out:

**FIGURE 0.17** **Mapping Countries' Performance on Trade, Technology, Training, and Targeting (the 4Ts) Helps Identify Reform Priorities**

*Country distribution in the space of trade, technology, training, and targeting, most recent year available*




*Sources*: Calculations based on the World Bank's Services Trade Restrictiveness Index, Doing Business data, Enterprise Surveys, World Development Indicators, and Export Value Added Database (EVAD); Ferracane and Van der Marel 2020; World Economic Forum's digital skills index; Centre for Economic Performance's World Management Surveys; International Labor Organization's employment data; International Telecommunications Union's global and regional ICT data.

*Note*: The x- and y-axes represent the summary measures of countries' trade[a] and training[c] landscapes, respectively. Bubble size indicates the summary measure of technology indicators,[b] and colors indicate the summary measure of targeting.[d] The trade, training, technology, and targeting summary measures are derived from the relevant indicators and converted to z-scores to normalize their scales and are then averaged. Economies are labeled using ISO alpha-3 codes. The training and trade indexes are categorized as "high" or "low" based on the median z-score value (that is, whether they are above or below 0 on the y- or x-axes). The technology and targeting indexes are similarly categorized as "high" or "low" and shown, respectively, by the size (large versus small) and color (blue versus yellow) of the markers. ICT = information and communication technology.

a. Tradability (x-axis) refers to a country's preparedness to engage in international trade in services and combines measures of services trade restrictions, ease of doing business, and restrictions on cross-border data flows.

b. Technology (large or small bubble size) refers to a country's capabilities to support technology diffusion and innovation and combines the extent of internet use among the wider population as well as measures of website use and email use in firms.

c. Training (y-axis) refers to a country's capabilities to respond to the rising demand for skills and combines measures of tertiary education enrollment, digital skills, and management practices in firms.

d. Targeting (blue for high, yellow for low) combines two measures: (a) the share of forward linkages in the output of ICT, professional, and financial services multiplied by the share of these services in total employment; and (b) the share of forward linkages in the output of wholesale/retail and transportation services multiplied by the share of manufacturing in GDP.

- Trade and training are correlated; most countries are in the upper-right or lower-left quadrants.
- Most high-tech countries (big markers) are above 0 on the y-axis; countries with higher training (human capital) tend to have high technology. Among the countries in the upper-right quadrant, only four (Azerbaijan, Bulgaria, Mongolia, and Lithuania) are low in technology.

- Most countries with high targeting (extensive services' forward linkages, indicated by blue markers) are to the right of 0 on the x-axis; countries that are more open to trade in services are more likely to have a higher potential for linkages.
- Most of the small yellow markers are in the bottom-left quadrant and designate countries that need to work on all 4Ts; most of the large blue markers are in (or near) the upper-right quadrant and are strong in all areas.

Based on these patterns, there are commonalities across countries in each of the four quadrants:

- *Strong in all 4Ts (upper-right quadrant).* Many countries in the high-trade, high-training quadrant also have large blue markers—indicating they are strong on all four dimensions. Many of these are high-income countries.
- *Low in trade and training (lower-left quadrant).* The low-trade, low-training quadrant includes several low-income countries, especially in Africa. But it also includes many middle-income countries, several of which (Brazil, India, Indonesia, and Vietnam) may rely at least partly on their large economies and populations both for scale and for a reasonable number (if not share) of skilled workers. China is in the lower-left quadrant less for its skills than for its restrictions on services trade and its data localization requirements.
- *High in training and technology, low in trade (upper-left quadrant).* Countries in this quadrant are high in skills-related training but low in services trade openness. These are largely middle-income countries in Eastern Europe and Central Asia (Belarus, Kazakhstan, the Russian Federation, and Ukraine); Latin America (Argentina and Uruguay); and East Asia (Malaysia and the Philippines). They are also relatively strong in technology (two-thirds having large markers).
- *High in trade, variable in targeting, low in training and technology (lower-right quadrant).* Countries in this quadrant are low in skills-related training but high in services trade openness, spanning many regions and income levels. They are also relatively weak in technology adoption (several having smaller markers). Mauritius and Rwanda stand out for their relative openness to trade in services, including on openness to flows of data. Rwanda has, for example, invested heavily in its ICT sector and will need more digital capabilities in terms of skills to be able to take greater advantage of this.

## How to Improve the 4Ts

### *Trade: Minimizing Barriers, Weighing Trade-Offs*

Reform of domestic regulations rather than tariffs is at the heart of expanding services tradability. However, the scope of relevant regulatory reform should recognize

that services subsectors vary in terms of how they are traded—whether through cross-border supply (mode 1), commercial presence in another country (mode 3), or the movement of consumers or producers (modes 2 and 4).

For instance, addressing domestic regulations that restrict foreign entry and competition (mode 3) is central to expanding trade opportunities in distribution (wholesale and retail trade), transportation, and telecommunications services. Similarly, recognizing the credentials of foreign service providers across a range of professional, scientific, and technical services (mode 4) has been politically sensitive but also an area where objective standards are possible in determining qualifications.

Unilateral liberalization of regulatory barriers that limit services imports can bring gains: allowing more FDI in services could increase productivity through greater competition, investment, and knowledge spillovers (Fernandes, Rocha, and Ruta, forthcoming; World Bank 2020).[15] Trade agreements offer the opportunity for reciprocal reforms. About two-thirds of all preferential trade agreements (PTAs) filed with the World Trade Organization (WTO) through 2017 covered the services sector. Across these PTAs, provisions that liberalize public procurement contracts are more widespread (50 percent) than those that address labor regulations (10 percent) (Hofmann, Osnago, and Ruta 2019).

Finally, allowing for the flow of data across borders will be an increasingly important complement to enabling digital trade in services, but regulations that balance potential trade-offs associated with privacy will be needed to generate sufficient trust in the system.

### *Technology: Enabling Wider Adoption of Digital Technologies*

Technology adoption in the services sector, much like any other sector, requires an enabling environment that encompasses the appropriate infrastructure, regulatory frameworks, and firms' management capabilities (Cirera and Maloney 2017). Given the relevance of digital technologies in enabling services firms to achieve scale and innovation, expanding broadband internet access and regulatory frameworks that govern the use of data-driven business models will be increasingly important.

Beyond the enabling environment, innovation policies require the right mix of instruments where services often form a "blind spot" (Cirera et al. 2021). For example, grants that facilitate the acquisition of technologies embedded in physical capital are more suitable for manufacturers. In contrast, incubators and accelerators can enable young firms in the services sector to scale up quickly owing to lower fixed costs.

### *Training: Strengthening Firms' and Workers' Capabilities*

For higher-skill services tasks, university education and skill development programs must become more responsive to changing industry demands, including for ICT-related skills such as software programming and coding or complementary engineering skills that are often in short supply across LMICs. The use of private providers and incentive contracts (whereby participant placement is a partial condition for payment) can help align incentives. Having private sector actors involved in setting curricula can also help reflect the types of skills future employers will seek.

At the same time, not everyone using a computer needs to know how to code. What matters for a far larger share of the population are foundational cognitive skills (literacy and numeracy) as well as "soft" skills that foster adaptability, problem solving, and initiative. These socioemotional skills deserve emphasis from an early age in schools and through lifelong learning, including on the job (World Bank 2019). They are particularly relevant in lower-skill services tasks where the inherent role of labor remains crucial.

Finally, the adoption of structured management practices—less prevalent in the services sector than in manufacturing—can be enhanced by either providing training and other business advisory services directly or by issuing vouchers and awards.

### *Targeting: Supporting Upstream Enabling Services*

Although sector-specific interventions may be riskier than in the past because of rapid changes in technology and increasing uncertainty in the global economic landscape, targeting remains an important tool to boost productivity when faced with budget constraints and limits to government capacity. The case is particularly strong for enabling services that can have cascading benefits across all sectors downstream.

As for implementation, an "industrial policy" that targets sectors must move away from a standard list of incentives to instead emphasize improvement of government-industry information flows, encouragement of experimentation and evaluation, and the use of technology itself to support monitoring and real-time adjustments.

What is perhaps most important for effective targeting is to take a value chain approach because the line between sectors—especially between services and manufacturing—is increasingly blurred. For hitherto less industrialized countries, such as in Sub-Saharan Africa, future success in labor-intensive manufacturing cannot be separated from the quality of certain enabling services such as transportation, logistics, and distribution. These linkages mean that "picking"

manufacturing sectors without the relevant complementary services sectors might not be effective.

## Conclusion: In the Service of Development?

The services sector can increasingly drive economic transformation through greater opportunities for *scale* (remote delivery and franchising); *innovation* (labor-augmenting digital technologies and intangible capital); and *spillovers* (inputs into all sectors). Countries do not have to industrialize to exploit these transformative opportunities—such as by leveraging either export markets or links to domestic sectors other than manufacturing.

The big challenge for services-led development is that productivity gains and jobs for unskilled labor may not come within the same services subsector. But this dichotomy is narrowing. Global innovator services that pay high wages and are characterized by scale and innovation can benefit low-skilled labor through their linkages with other sectors. At the same time, low-skill services that absorb much of the surplus labor in LMICs can benefit from enhanced opportunities for accessing larger markets, benefiting from data analytics, and scaling up based on intangible capital.

In the manufacturing sector, this dichotomy might, in fact, be widening. It will likely continue to deliver on productivity, scale, trade, and innovation—just not with the same number of jobs. Furthermore, if export-led manufacturing will likely contribute less to inclusive growth than it did in East Asia, enabling services are an increasingly important cog in the wheel of any multisector growth strategy that can approximate its success.

That brings us to the 4Ts agenda that can help leverage the potential of the services sector for jobs and economic transformation. Expanding *trade* in services is central to expanding scale. Expanding the use of digital *technologies* can further improve scale and widen the scope for intangible capital to raise quality and efficiency. *Training* will enable more workers to move to higher-skill jobs and reinforce the ability to absorb technologies. And *targeting* the enabling services can expand the gains from spillovers, hence raising productivity and creating more jobs. Identifying policy priorities that improve performance across these 4Ts can help ensure that services-led development is indeed in the service of development.

## Spotlight: A Data Agenda for the Services Sector

If what gets measured gets studied, it is all the more important to expand the availability and quality of data on services. To understand the performance of the services sector, it is crucial to measure the output it produces; the inputs it uses; its productivity (how efficiently firms use their inputs to produce outputs); and the extent to which it is traded. While capturing these metrics is far from straightforward, even for the manufacturing sector, the measurement challenge is greater for the services sector in several ways:

- *Measuring output.* Services outputs often cannot be measured in tangible quantities and may be highly customized. Revenue-based measures of output capture both the market power of firms as well as the quality of the service, but data on prices and quality are often lacking or incomplete. Measuring the output of nonmarket services (such as education and health) and financial services (where even sales are difficult to define) poses additional challenges.
- *Measuring inputs.* Physical capital plays a small role in most services sectors, unlike in manufacturing firms. Intangible forms of capital and human capital are more important in services—but both are also more difficult to measure.
- *Estimating productivity.* This requires combining inputs and outputs into one measure, most commonly either labor productivity (value added per worker) or total factor productivity (TFP), which accounts for capital. The difficulty in separating prices and quantities often precludes the use of quantity-based productivity measures (such as TFPQ), meaning that productivity measures become intertwined with both market power and quality differences.
- *Measuring trade in services.* Services do not cross borders as goods do and thus mostly go unnoticed in customs records. Services trade often relies on providers (such as through temporary migration) or consumers (as through tourism) to cross a border or on firms to establish a foreign presence (in the case of FDI). This makes trade inherently harder to measure and requires the use of multiple data sources.

Adding to these measurement challenges is the fading border between manufacturing and services. Services are not provided only by firms that provide services as their primary activity but also by manufacturing firms, and these services are often embedded in the physical products. To the extent that these services are not measured separately and subsumed in manufacturing value added, their importance is underestimated.

*Spotlight continued next page*

"Free" digital services pose yet another difficulty. Many digital services, such as search engines and social media, are provided for free (or at a low cost) and therefore lack an easily measured market price. Therefore, the value of these services either remains unmeasured or is measured through the value of advertising, which usually provides the vast share of revenue. However, the latter does not necessarily capture the full benefits that consumers gain from using these services.

Statistical agencies have made considerable progress in better capturing output, inputs, and international trade in the services sector. Yet substantial challenges remain in measuring the performance of the services sector, especially in LMICs. This book identifies the following priorities to overcome some of these challenges:

- *Better capture the heterogeneity of the services sector.* Services are not a monolith, but production, employment, and trade data that are comparable across countries and over time are often unavailable, even at a broad subsectoral level.
- *Improve the coverage of the services sector in firm-level data.* Not all business censuses include services to the same extent as manufacturing, and they do not always track firms over time. Aspects important to understanding services productivity—such as the use of intangible capital, quality and price measurement, transactions with other firms, and information on trade—are often missing.
- *Recognize that the border between manufacturing and services is increasingly blurred.* Most data sources characterize all the activities of a firm under a single sector. Yet the analysis of firms that are increasingly multisectoral must distinguish between services and manufacturing activities at the firm level in terms of revenues, input purchases, and occupations.

## Annex OA Framework of the Volume

**TABLE OA.1 Sectors' Key Characteristics and Their Implications for Productivity and Jobs in Light of Changing Trends and Policy Choices**

| Aspect and sector | | Market size and location (What is produced for whom?) | Ability to leverage labor with capital and technology (How do firms operate?) | Linkages (With whom do firms operate?) | |
|---|---|---|---|---|---|
| Key characteristics | Manufacturing | Storable, transferable, tradable goods so production can be separated from consumption | Amenable to mechanization | Inputs into other manufactured goods | Chapters 1 and 2 |
| | Analog services (pre-ICT) | Simultaneity of production and consumption | Inherent role for labor | Important enablers for goods-producing sectors | |
| Implications of characteristics for | Productivity | SCALE | INNOVATION | SPILLOVERS | |
| | Jobs (number, skill mix) | Number of jobs | Skill mix demanded | Multipliers that boost job creation and skill mix | |
| | | Chapter 3 | | Chapter 4 | |
| Trends | Digital technology and increased linkages | Digitalization reduces need for proximity and expand trade | Digitalization expands automation and intangible capital | Increasing demand for services across all sectors—including the servicification of manufacturing | |
| Policy priorities (the 4Ts) | | Trade | Technology / Training | Targeting | Chapter 5 |

*Note*: The first set of arrows indicates relationships between the underlying characteristics that distinguish services from manufacturing (market size, labor-augmenting capital and technology, and intersectoral linkages) and their implications for particular aspects of productivity growth (scale, innovation, and spillovers). The second set of arrows indicates the mapping of each forward-looking trend (reduced proximity, automation, intangible capital, and linkages) to the "4Ts" agenda. ICT = information and communication technology.

## Notes

1. Those that have done so, however, achieved their high income levels through either natural-resource extraction or the exploitation of specific locational or other advantages. In the latter case, for example, Singapore's location in key shipping lanes and its deep natural port made it an important transshipment point. In addition, a few small economies have adopted specific tax or financial regulations to attract large numbers of multinationals, but much of the wealth reflects accounting practices rather than wealth-generating activities in the country.
2. This complements the stylized facts on productivity based on manufacturing sector firms in an earlier volume in this series, *Productivity Revisited: Shifting Paradigms in Analysis and Policy* (Cusolito and Maloney 2019).
3. Although our interest is in comparing manufacturing with services and agriculture, the data across many countries are at the level of "industry," which encompasses not only manufacturing but also mining, construction, and utilities. Throughout this volume, the term "industrialization" refers only to manufacturing, except when specified otherwise.
4. In almost all countries, the absolute size of the industrial sector increased, just more slowly than the services sector.
5. Kinfemichael and Morshed (2019) provide evidence of unconditional convergence of productivity to the frontier: countries starting from lower labor productivity in the services sector grew faster between 1975 and 2012 than those with higher initial labor productivity in that sector.
6. In this part of the discussion, "industry" is broadly defined, including not only manufacturing but also mining, construction, and utilities.
7. This estimate is calculated using International Labour Organization (ILO) employment data and firm-level productivity data.
8. After eBay implemented an in-house ML system that statistically learns how to translate different languages—called eBay Machine Translation (eMT)—its US exports to Spanish-speaking Latin American countries increased by 17.5–20.9 percent (Brynjolfsson, Hui, and Liu 2019).
9. Calculations of unskilled-labor value added are based on the World Bank's Labor Content of Exports Database.
10. The export of freight transportation and wholesale trade is closely linked to the export of goods and therefore is less amenable to international specialization, with the exception of transit hubs, such as Dubai in the United Arab Emirates and Panama.
11. The General Agreement on Trade in Services (GATS), a treaty of the World Trade Organization, breaks down services trade into four "modes": (1) "cross-border supply," including digital delivery; (2) "consumption abroad," including services provided to foreign tourists or students; (3) "commercial presence" (or FDI), such as through establishing local subsidiaries or affiliate companies; and (4) "movement of natural persons," when delivery involves the travel of the service provider to the consumer's country.
12. Administrative and support services in the low-skill domestic category are an exception in that sales to other sectors account for large share of its output.
13. Calculations of linkages are based on the World Bank's Export Value Added Database (EVAD).
14. Calculations on technology use and level of management practices are based on World Bank Enterprise Surveys.
15. The export of services through consumption abroad (mode 2), such as tourism-related travel, can also be enhanced through unilateral liberalization.

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