VoxDevLit

Industrial Development

Vol 22, Issue 1
18 February, 2026

VoxDevLits are wiki-inspired literature reviews that aim to summarise the evidence base on narrowly defined topics related to development economics. Each Lit is written by a community of scholars working on the specific topic addressed in the review. They are intended for both policymakers and researchers. We aim to describe what we have learned from research and to highlight the important questions for which evidence is lacking. The Lits are living documents that will be updated approximately once per year. All published versions will be available on the VoxDev website so that scholars can cite the reviews with confidence that the version cited will be accessible in the future.

We are extremely grateful to Camille Guillou and Caleigh Wong for their outstanding support as research assistants on this project.

Please contact us at engage@voxdev.org if you have any questions or feedback.

CEPR IGC PEDL STEG

Contents

Citation: Francesco Amodio, Markus Poschke, Bruno Caprettini, Jaedo Choi, Hanwei Huang, Yu-Hsiang Lei, Tristan Reed, Rodimiro Rodrigo, Luis Felipe Sáenz, Marco Sanfilippo, Matthew Schwartzman, Gustavo de Souza, Michael Sposi, Verena Wiedemann, "Industrial Development" VoxDevLit, 22(1), February 2026

Contents

Summary

Policy Summary: Industrialisation, Services, and Development

Industrialisation has historically been central to economic development, driving productivity growth, structural transformation, and the creation of stable wage employment for workers with limited formal education. Yet the conditions under which industrialisation delivered broad-based prosperity in the past have changed. Automation, the reshaping of global trade patterns, and the rising importance of services mean that industrial growth today is less likely to generate large numbers of jobs automatically.

This VoxDevLit synthesises evidence on industrial development, drawing on historical experience while focusing primarily on recent evidence and lessons relevant for contemporary policy.

1. Historical experiences reveal why industrialisation was central, and why context matters

Historical evidence from early and late industrialisers points to a common pattern: industrialisation played a central role in economic take-off and sustained growth, while absorbing large numbers of workers into stable wage employment. Manufacturing combined tradability, scale, and the ability to adopt existing technologies, allowing countries to grow beyond domestic demand.

At the same time, historical experience highlights the importance of global and local context. Early and late industrialisers followed different paths, with important implications for employment.

- Early industrialisers experienced gradual transitions, with gradual growth of manufacturing output and employment.
- Late industrialisers often achieved faster growth by borrowing technologies, resulting in more compressed transitions.
- In many late starters, manufacturing value added expanded faster than manufacturing employment.

These patterns explain both the historical success of manufacturing as an engine of growth and the limits to replicating that experience today. At the same time, they highlight the potential of state-led industrial strategies in shaping these outcomes. Successful late industrialisers such as South Korea and, more recently, China combined exposure to global markets with active industrial policies that supported firm scale, export orientation, and technology adoption.

Policy implication: Patterns of industrialisation have always depended on timing, technology, global context, and the policies shaping firm expansion and technology upgrading.

2. Contemporary conditions make employment-intensive industrialisation harder to replicate

The global environment facing today's developing economies differs sharply from that of earlier industrialisers. Several forces weaken the employment-generating potential of manufacturing.

- Automation has raised productivity but reduced labour demand in many manufacturing activities. This has led to declining manufacturing employment across the globe.
- Global manufacturing markets are highly competitive, capital-intensive, and dominated by large firms.
- Renewed economic nationalism and trade policy uncertainty have made export-led strategies less predictable.

These developments risk exacerbating patterns of 'jobless' or 'premature' industrialisation. In many countries, manufacturing growth contributes to output and exports but is increasingly decoupled from the creation of good jobs, while services expand earlier than in past development episodes.

Policy implication: Manufacturing-led growth strategies remain relevant for productivity and exports, but may deliver smaller employment gains.

3. Services are becoming central to productivity growth and employment

As the scope for employment-intensive industrialisation narrows, services play an increasingly important role in structural transformation. Recent evidence challenges the view of services as inherently low-productivity or non-tradable.

- Some services, such as logistics, business services, ICT, and finance, are tradable and scalable.
- Productivity gaps across countries are often largest in these sectors, suggesting scope for catch-up.
- Services already absorb a large share of employment in many developing economies.

Recent evidence also shows that some non-tradable services can generate sizable local employment spillovers, even when they are not themselves engines of productivity growth. However, this is not automatic. Many service activities in lower-income countries remain informal, fragmented, and low productivity.

Policy implication: Development strategies should treat productive services as a core component of growth and employment creation, alongside manufacturing.

4. Key takeaways for policymakers

- Historical experience explains why industrialisation once delivered both growth and mass employment, and how policy shaped the conditions under which this occurred.
- In a context of automation and increasingly fragmented global trade, potential employment gains from expanding manufacturing may be more limited. Employment outcomes depend on technology choices, firm scale, labour market institutions, and complementary policies.
- Parts of the service sector now share features once associated with manufacturing, including tradability and scope for productivity catch-up, while other services can support job creation through local multiplier effects.
- Service-sector policy should prioritise productivity growth and firm scale in tradable activities such as logistics, business services, and ICT.

1. Introduction

Few forces in history have reshaped human prosperity as profoundly as industrialisation. From the early Industrial Revolution to the rapid growth episodes of East Asia, the expansion of modern industry has long stood at the centre of development. What makes industrialisation so distinctive is not only its ability to raise productivity, but also its unique capacity to generate shared prosperity. Expanding firms that create blue-collar employment can draw large numbers of workers with limited formal education into stable, more productive jobs, transforming livelihoods and communities in the process.

Industrialisation also carries two other properties that help explain why it has historically acted as the 'engine of growth'. First, because manufacturing produces tradable goods, the scope for industrial expansion is not constrained by the size of the domestic market: global demand provides opportunities even for small countries. Second, manufacturing technologies are highly mobile and can be imitated, borrowed, and adopted by latecomers. This diffusion of industrial know-how created the possibility of catch-up growth, giving rise to the idea of manufacturing as an 'escalator' sector for development.

These historical features make today an important moment to take stock. Evidence from the past two centuries has taught us a great deal about why industry has been such a powerful driver of growth and convergence. But the conditions facing developing economies are changing: countries that are late to industrialise face headwinds from strong global competition and globally declining manufacturing prices. Automation threatens to erode the very employment intensity that once gave industry its inclusive character. Combined with a backlash against globalisation and rising economic nationalism, these developments are making the export-led model of industrialisation less certain. At the same time, services are rising in relative importance and, in some cases, even taking on some of the tradability, scalability, and spillover potential once unique to manufacturing.

This VoxDevLit seeks to assess what we know about industrialisation's role in development, drawing lessons from history while re-evaluating them in light of contemporary challenges. Industrialisation may no longer be the automatic escalator it once seemed, but understanding its enduring logic – and its evolving limits – remains central to the understanding of economic growth.

2. Structural Transformation: Key Facts and Canonical Theories

2.1 The Origins of Modern Economic Growth

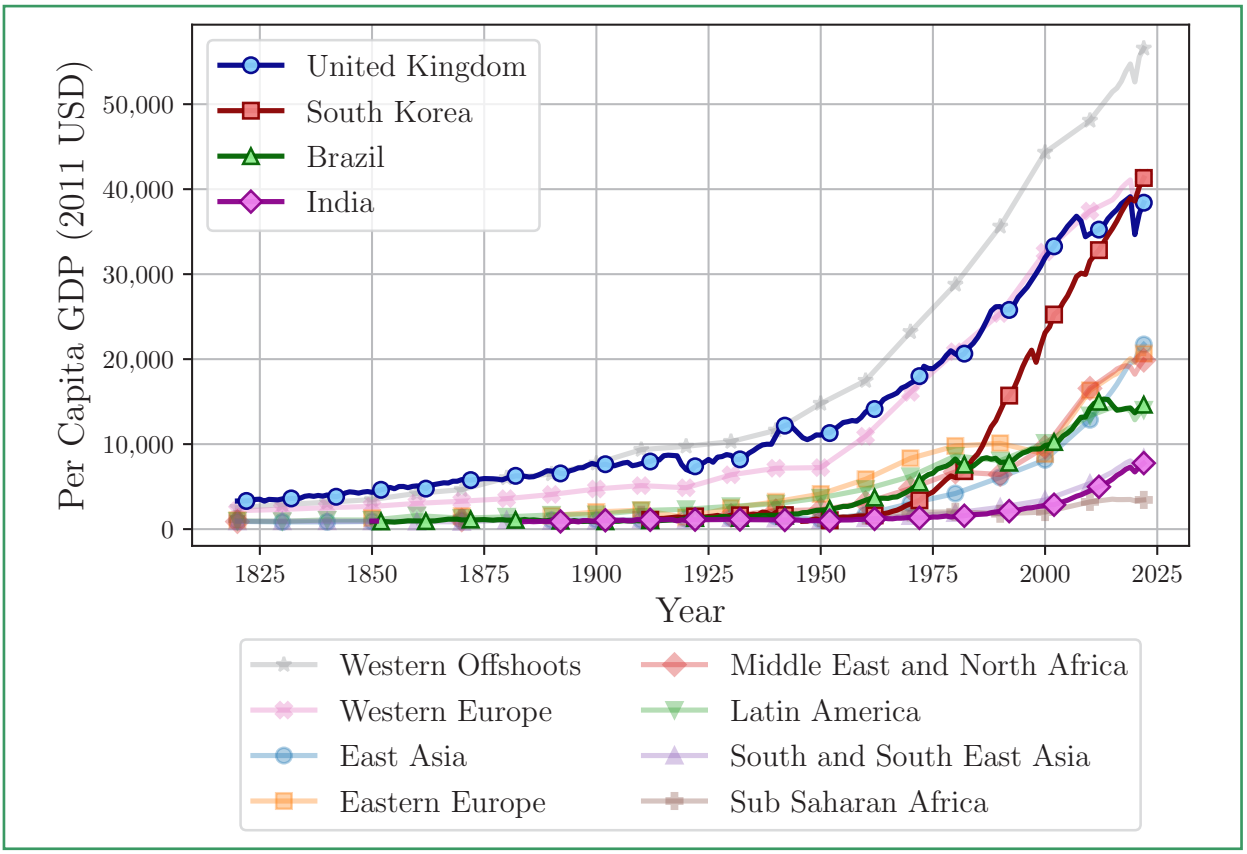
Figure 1 tells a story familiar to every student of economic development. From the invention of agriculture during the Neolithic Revolution until the 18th century, human societies lived under a regime that bore out the predictions of the gloomy pair of Thomas Malthus and David Ricardo: material living standards stagnated everywhere, with each generation replicating the conditions of the last. Grandparents and grandchildren tilled the same plots and shared the same hope for their offspring. Life, in Hobbes's famous phrase, was "nasty, brutish, and short". Then, in one place, everything changed.

Industrial Development

The Industrial Revolution, which originated in the UK, took root between the 17th and 18th centuries, with per capita income growing at roughly 0.4% annually (Clark 2005).[1] Modest by modern standards, this growth was nonetheless extraordinary in a world where previously, population expansion had always erased productivity gains. It marked a watershed in prosperity on a scale unanticipated even by the brightest minds of the Enlightenment. For the first time, technological progress was accompanied by sustained increases in living standards.

The British economy became progressively more efficient, eliminating what we would now call 'distortions' – the structural obstacles and constraints that prevent resources from being allocated to their most productive uses (Wrigley 1990). By 1800, subsistence farming had largely disappeared: agriculture was organised into capitalist enterprises that hired labour and sold their product on competitive markets (Wrigley 1985). Trade expanded rapidly, first through re-exports of New World goods, then through woollen draperies, and finally through cotton textiles (Davis 1954, 1962). Cotton, which was marginal in the early 18th century, became the leading growth engine by mid-century (Crafts 1986), although productivity improvements extended across manufacturing (Temin 1997). As the frontier of industrialisation, Britain could not imitate; it had to innovate, supported by a supply of skilled mechanics and the cumulative advances of local invention (Mokyr 1992).

Figure 1 Gross domestic product (GDP) per capita across the world, 1820-2022.



Source: Maddison Project Database 2023.

1 Clark (2001) identifies 1770 as a turning point, marked by the introduction of the spinning jenny and the water frame.

While the facts of the Industrial Revolution are widely agreed upon, its causes remain debated. Several mechanisms have been proposed: relative prices favoured labour-saving technologies (Allen 2009); imperial trade, including slave trade, networks enhanced profitability (Williams 1944, Inikori 2002, Derenoncourt 2025); secure property rights encouraged investment (North and Weingast 1989); and cultural shifts promoted behaviours conducive to capital accumulation (McCloskey 2010). Each of these accounts has plausibility, but none appears sufficient on its own. Perhaps the transition required a confluence of conditions, and it also owed something to chance.

Crucially, the growth process initiated in Britain did not remain confined to its borders. As Figure 1 shows, it spread rapidly to the Western Offshoots – English-speaking economies in North America and Australasia – and later to parts of continental Europe. By the end of the 19th century, per capita GDP in these pioneers of industrialisation had surpassed $5,000 (2011 USD), while much of Asia, Africa, and Latin America remained near subsistence, with annual incomes of only a few hundred dollars.[2] By the end of World War II, the differences in living standards across the planet were staggering: an average Briton enjoyed an income eleven times greater than that of his African neighbour. The income gaps described by Adam Smith in *The Wealth of Nations*, once thought immense, appear almost trivial compared to the disparities the Industrial Revolution set in motion.

2.2 Structural Transformation

The transformations that occurred in Britain and the Western offshoots were not limited to growth. The structure of these economies also changed as they grew. In landmark early empirical studies of economic development, Simon Kuznets emphasised the centrality of sectoral reallocation – particularly the decline of agricultural employment – as a key correlate of rising per capita income (Kuznets 1966).

This transformation can be observed not only in Great Britain, but also in countries that started growth later. Figure 2 shows the share of employment in agriculture for a selected group of countries: Great Britain, South Korea, Brazil, and India. The left panel plots agricultural employment against calendar time; the right panel plots it against income per capita.[3]

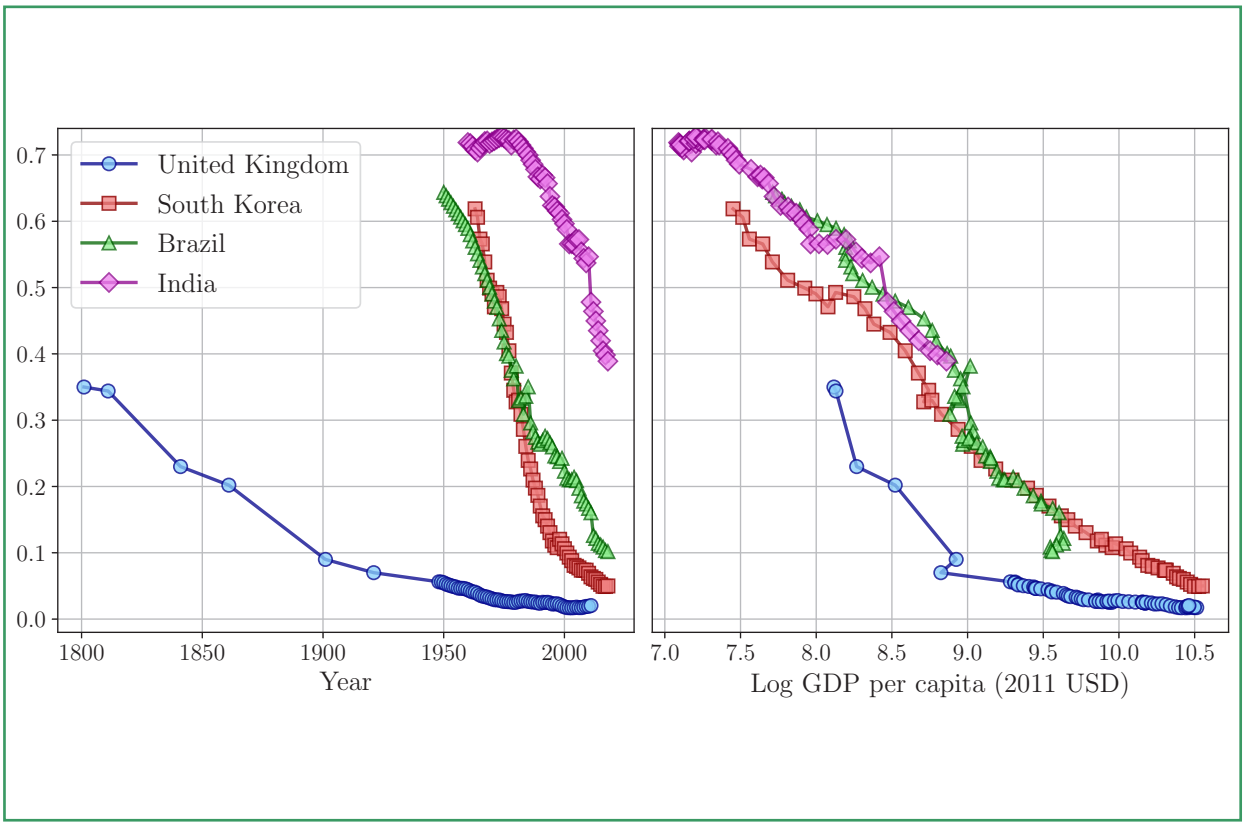
The left panel highlights sharp differences in timing. Britain, as an early starter, had already reduced its agricultural employment share to below 30% by the mid-nineteenth century. By the 1960s, agricultural employment in Britain had fallen below 6%. The other countries began their transition later, so that in 1960, agricultural employment was still around 60% in South Korea and Brazil, and around 70% in India. The distinction between *early* and *late* starters is central in the literature, as we will discuss later on.

2 Unless otherwise indicated, GDP per capita data comes from the Maddison Project Database, 2023 release: https://www.rug.nl/ggdc/historicaldevelopment/maddison/releases/maddison-project-database-2023?lang=en.

3 The data is drawn from the Groningen Growth and Development Centre 10-Sector Database (2014 release), extended backwards with Kuznets (1966, 1971) and forwards with the Economic Transformation Database (2021 release). These are available at https://www.rug.nl/ggdc/structuralchange/previous-sector-database/10-sector -2014?lang=en and at https://www.rug.nl/ggdc/structuralchange/etd/?lang=en, respectively.

When the same data is viewed against income (right panel), the trajectories align: agricultural employment falls systematically as per capita GDP rises. Most of the cross-country differences in agricultural employment we see today thus reflect differences across different stages of development. In this sense, today's poorest economies, where 70–80% of workers remain in agriculture, resemble the now-rich economies in their own pre-industrial stages.

Figure 2 Employment shares in agriculture in four countries across time and income.

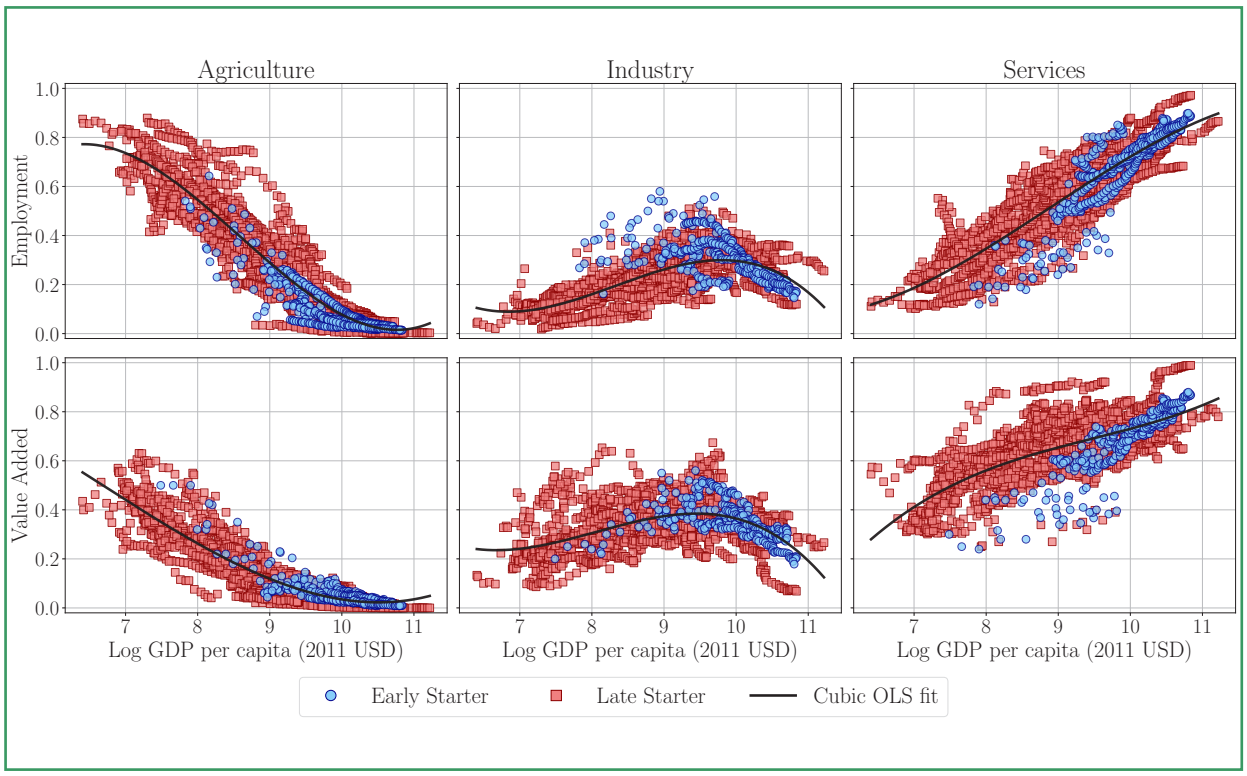


Sources: Income per capita from Maddison Project Database (2023); agricultural shares from Groningen Growth and Development Centre 10-Sector Database (2014), Kuznets (1966, 1971) and Economic Transformation Database (2021).

The movement out of agriculture has a counterpart that is central to economic transformation: industrialisation. In the early stages of development, activity shifts towards manufacturing, construction, mining, and utilities, jointly referred to as industry. At higher levels of income services become the dominant sector.

These patterns, often referred to as the 'Kuznets facts' (Kuznets 1953, 1966, Chenery 1960) and documented extensively in Herrendorf et al. (2014), are clearly visible in Figure 3. Following the lessons from Figure 2, this plots employment and value-added shares in agriculture, industry, and services not against time, but against log GDP per capita, with cubic OLS fits. This clearly reveals the main features of the structural transformation: a steady decline in agriculture, a hump-shaped path for industry, and a long rise in services. These are thus clearly visible not only in the time series of successful transformers, but also in the cross-section of countries.

Figure 3 Employment and value-added shares over development in a panel of early and late starters.



Sources: Income per capita from Maddison Project Database (2023); sectoral shares from Groningen Growth and Development Centre 10-Sector Database (2014), Kuznets (1966, 1971) and Economic Transformation Database (2021).

2.3 Early Theories of Structural Transformation

The theoretical literature considering closed economy settings has proposed two main hypotheses to explain the reallocation of economic activity across sectors. Both mechanisms have productivity growth – which also drives the growth in income per capita – as their ultimate underlying force, implying that structural change arises from and together with economic growth.

The first set of mechanisms, initially formalised by Kongsamut et al. (2001), focuses on *income effects* or the "food problem" (Schultz 1953). This captures the fact that, as incomes rise, expenditure patterns change. Households increase their spending on food less than proportionally and devote more resources to manufactures and services. With further growth, consumption shifts further into services. Earlier work effectively assumed that this channel was mostly present in early stages of the structural transformation, limiting its overall quantitative importance. More recent research by Boppart (2014), Comin et al. (2021) and Alder et al. (2022) suggests that the role of income effects in structural transformation can endure into later stages of structural transformation.[4]

4 This work introduced non-homothetic preference specifications that generate Engel curves consistent with the empirical consumption expenditure patterns.

A second set of mechanisms builds on Baumol's (1967) observation that productivity growth is uneven across sectors. As productivity grows more quickly in agriculture and manufacturing compared to services – the classic examples for slow productivity growth in services being haircuts or the live performance of symphonies – the relative cost of services rises, in a phenomenon known as "Baumol's cost disease".[5] Ngai and Pissarides (2007) formalised how, if sectoral outputs are complements, this mechanism induces a shift of inputs into the sector exhibiting slower productivity growth. To fix ideas, consider the effects of faster productivity growth in manufacturing compared to services. This makes manufacturing goods cheaper compared to services. When consumers strongly prefer balanced consumption across sectors, their consumption of manufacturing goods increases, but by so little that – thanks to productivity growth – it can be satisfied with lower employment in manufacturing, and thus leads to a reallocation of employment from manufacturing to services. This mechanism can explain both the decline of agriculture and the rise of services: faster productivity growth in agriculture than manufacturing and services leads to structural change out of agriculture, and faster productivity growth in manufacturing compared to services leads to a further move of labour into services. A similar mechanism operates when there are differences in the capital intensity or factor substitutability across sectors (Acemoglu and Guerrieri 2008, Sáenz 2022, Alvarez-Cuadrado et al. 2017, Chen 2020, Storesletten et al. 2019).

In the words of Alvarez-Cuadrado and Poschke (2011), the transition away from agriculture is simultaneously governed by forces "pushing" workers out of agriculture (income effects) and forces "pulling" workers into industry and services (relative productivity changes). Historically, both types of forces have operated, with different forces dominating at different times and locations.

Faster productivity growth in manufacturing compared to services has long led to a focus of policymakers on this sector (even if, as explained above, exactly this growth difference can lead the sector to shrink!). This was reinforced recently, after Rodrik (2013) showed that manufacturing appears to feature unconditional convergence in productivity across countries at a rate of 2–3% annually, even when aggregate GDP per worker does not. This suggests that industrialisation might provide an 'escalator' for growth: lower-income countries could catch up simply by moving resources into manufacturing.

However, the evidence that manufacturing as a whole exhibits unconditional convergence is contested. Herrendorf et al. (2025) derive comparable measures of sectoral productivity for a broad sample of developed and developing countries for the period 1990–2018. They find no evidence for unconditional convergence in manufacturing productivity when self-employment and informal enterprises in poor countries are accounted for. Convergence patterns in manufacturing thus appear to differ between the larger and formal firms captured in the UNIDO data used by Rodrik and the sector as a whole. Country studies point in the same direction (Diao et al. 2025, Kruse et al. 2022).

Finally, recent work shows a more nuanced role of the service sector. Duarte and Restuccia (2010) find that productivity gaps across countries are largest and most persistent in tradable services. Using new measures of sectoral prices, Inklaar et al. (2024) find productivity gaps only in tradable sectors, including not only goods-producing sectors, but also service sectors, namely retail and wholesale trade, transportation, finance and business services.[6] In this sense, the escalator function once tied to industry may now extend to parts of services as well, as we discuss at length in Section 5.

5 For a recent quantitative assessment, see Duernecker et al. (2024).

6 Kinfemichael and Morshed (2019) and Kinfemichael (2019) document unconditional convergence in services since the 1990s, driven by growing tradability and global diffusion of service technologies.

2.4 Early vs Late Starters

Figure 2 above illustrates that when discussing economic development, the distinction between early and late starters turns out to be particularly useful. Much of the global inequality observed in the post-World War II world reflects comparisons made at the same point in calendar time, despite countries being at very different stages of development.

To highlight the diversity of development paths, consider the four countries in Figure 2, each representative of broader groups of countries. Britain, the pioneer, expanded the stock of knowledge through innovation. South Korea, a late starter, borrowed technologies and compressed industrialisation into a few decades. Brazil industrialised but failed to sustain convergence. India, more recently, may be leapfrogging manufacturing, moving directly from agriculture into services.

South Korea is a striking example of growth outside the West. From a largely agrarian economy at the outbreak of the Korean War in 1953, it underwent a rapid process of industrialisation. By 2022, its GDP per capita had converged to that of the UK. The Korean development path mirrors the pattern observed in early industrialisers – a shift from stagnation to sustained growth – but the speed of transition was compressed into just four decades. As a late starter, South Korea benefited from what Gerschenkron (1962) termed the "advantages of backwardness", or, as emphasised by Amsden (1989), the capacity to industrialise by borrowing existing technologies. This mechanism was later formalised by Parente and Prescott (2002): late developers can adopt frontier technologies and grow faster by inheriting a larger stock of usable knowledge.

These patterns suggest that late entry into industrialisation carries the potential for rapid catch-up. But timing alone is not sufficient. Brazil offers a contrasting case. Its industrialisation began early in the twentieth century, and by mid-century, scholars such as Evans (1995) and Gereffi (1990) viewed Brazil and South Korea as parallel examples of late development – one oriented inward with protective industrial policy, the other outward with export-led strategies. Yet Brazil, and Latin America more broadly, failed to sustain growth rates consistent with convergence. The advantages of backwardness, while real, are conditional. As we will discuss in detail below, they depend not only on access to technology but on the institutional and structural capacity to absorb and deploy it effectively.

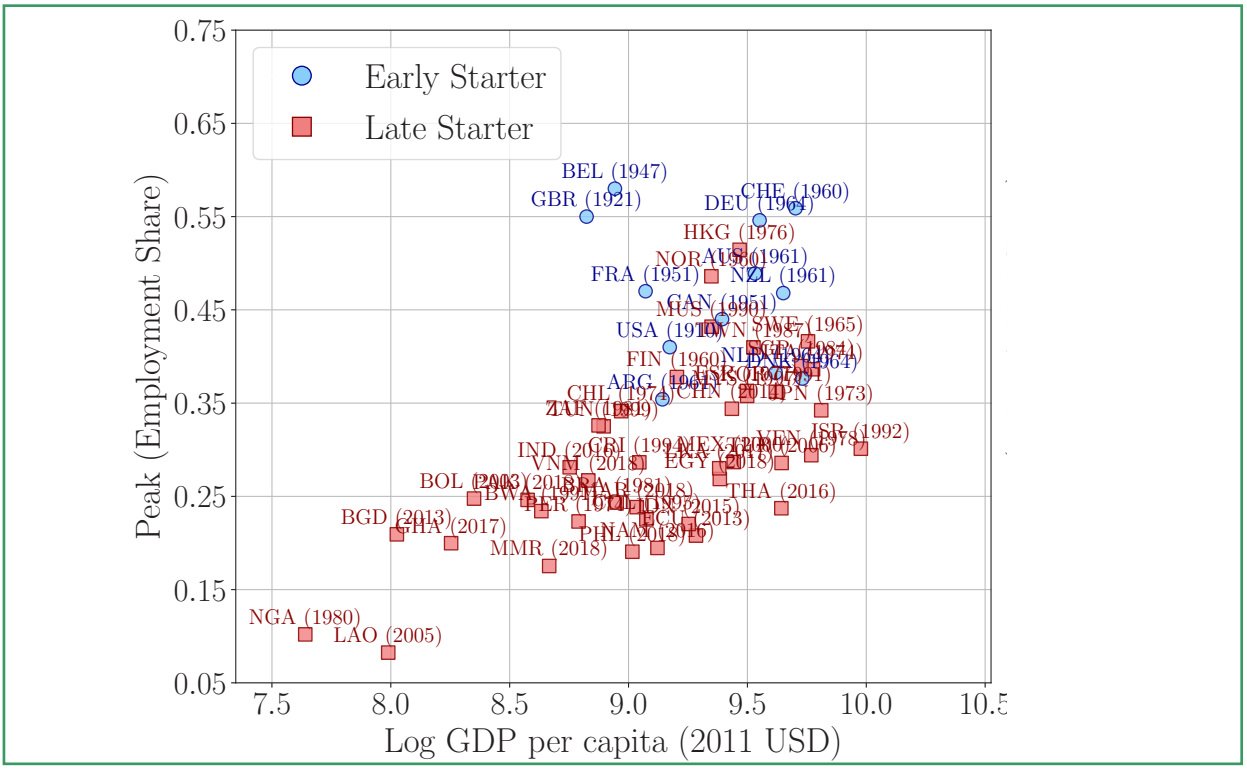
India also presents a more recent and still unfolding case that brings forth a nascent challenge. Over the past three decades, the Indian economy has undergone a remarkable transformation, in line with other South Asian economies. Whether India will follow a path closer to Korea's, or instead face the kind of growth slowdown that has constrained Brazil and much of Latin America, remains an open question. As Fan et al. (2023) document, India's trajectory may reflect a new path for late starters in which transitions out of agriculture bypass manufacturing altogether. In this context, even the term industrialisation may be outdated.

Let's return to Figure 3 for a more systematic view. This reveals that for most sectors, the trajectories of early starts (in blue) and late starters (in red) overlap, with one exception: industrial employment.[7] Early starters typically reached higher peaks, while late starters often show

7 The precise threshold for distinguishing early and late starters is arbitrary. Here, we classify countries that crossed the threshold of income per capita of $4,000 (2011 USD) before 1900 as early starters. This cutoff

increases in industrial value added without proportional gains in jobs. This is what has been referred to as 'jobless' industrialisation among late starters, whereby although the industrial sector achieves value-added shares that are comparable to those of early starters, it fails to generate similar employment gains. Rodrik (2016) documented a related pattern, and dubbed it "premature deindustrialisation". This is captured in Figure 4.[8] It shows that some late starters reach their peak levels of industrial employment at substantially lower income levels than early starters, but that these peaks tend to be lower. For instance, peak industrial employment shares in the US or in Western European economies were around 40–50%. Japan already saw lower peaks, at around 35%. Peak industrial employment shares are again lower in countries that started their structural transformation even later, at around 30% in Mexico or India, and less than 25% in Bangladesh, Ghana, or Thailand. China's peak share of around 35% stands out among these later industrialisers, but is nevertheless clearly below those of countries that transformed earlier. In sum, late starters industrialised more quickly, but also in ways that are less employment-intensive than their predecessors.

Figure 4 Industrial employment peaks and corresponding income per capita, with peak dates in parentheses.



Sources: Income per capita from Maddison Project Database (2023); employment share in industry at its peak calculated from data from Groningen Growth and Development Centre 10-Sector Database (2014), Kuznets (1966, 1971) and Economic Transformation Database (2021).

is consistent with treating the Western offshoots as early starters.

8 The figure only includes countries where the industrial employment share has already passed its peak. In some cases, peaks are quite far in the past, with industrial employment declining slowly after peaking.

What explains the pattern of premature and jobless industrialisation observed among late starters? Several explanations have been put forward. First, modern firms in these economies tend to adopt more capital-intensive technologies than in the past, as they catch up with the global technology frontier. While this may raise output and value added, it limits the creation of large-scale employment and erodes the traditional cost advantage of abundant low-wage labour (Rodrik 2022, Diao et al. 2025). Second, the fate of industrialising in a world of declining manufacturing prices due to the more advanced state of the global structural transformation, combined with trade and globalisation, undermined the comparative advantage of late starters, leading to falling employment and output shares (Rodrik 2016). Third, regulatory and size-dependent distortions – such as minimum wages and payroll taxes – constrain the expansion of high-productivity firms and limit job creation (Alfaro et al. 2025). Fourth, unlike in earlier episodes of industrialisation, rising incomes in today's developing economies – even at relatively low income levels – may be sufficient to sustain demand for informal self-employment, both in manufacturing and in services. This can lead growth to manifest through the expansion of informal activities rather than through the creation of a broad base of secure wage employment. Finally, weak labour market competition, often manifested in employer concentration, low wages, and poor working conditions, further curtails the ability of industrial growth to generate widespread job opportunities. We will explore these mechanisms in greater detail in the remainder of this review.

2.5 Taking Stock

The evidence assembled here suggests a central regularity in the process of modern economic growth: while the calendar timing of industrialisation varies, countries experience patterns of structural transformation across agriculture, industry, and services that are similar when conditioned on income. Early starters followed gradual transitions, with labour moving steadily from agriculture into industry and productivity rising in tandem with employment.

Late starters, by contrast, experience compressed transitions. They often display faster income growth and accelerated sectoral shifts, benefiting from the stock of knowledge accumulated abroad. Yet these gains come with potential penalties. Industrialisation may arrive too late to generate large-scale employment, with services expanding before manufacturing matures and industry contributing more to value added than to jobs. Thus, lateness confers both the possibility of rapid convergence and the risk of missing the window for employment-intensive industrial growth.

A second key insight is that the distinctive role of industry in development stems not only from structural reallocation but also from its potential convergence properties. Some studies suggest that manufacturing productivity converges across countries, but more recent work cautions that unconditional convergence may hold only among large, formal manufacturing firms.

Finally, as service activities become more tradable and technology diffuses globally, parts of the service sector may increasingly share these convergence dynamics. Whether this represents a new 'escalator' for late developers, or whether services replicate the same conditionality seen in manufacturing, remains an open question.

Taken together, these stylised facts highlight how (sectoral) productivity growth patterns, timing, institutions, technology, and the integration into the global economy shape each country's structural transformation. In the following sections, we review some of these aspects in more detail.

3. Trade and Industrial Policy

3.1 Export-Led Growth

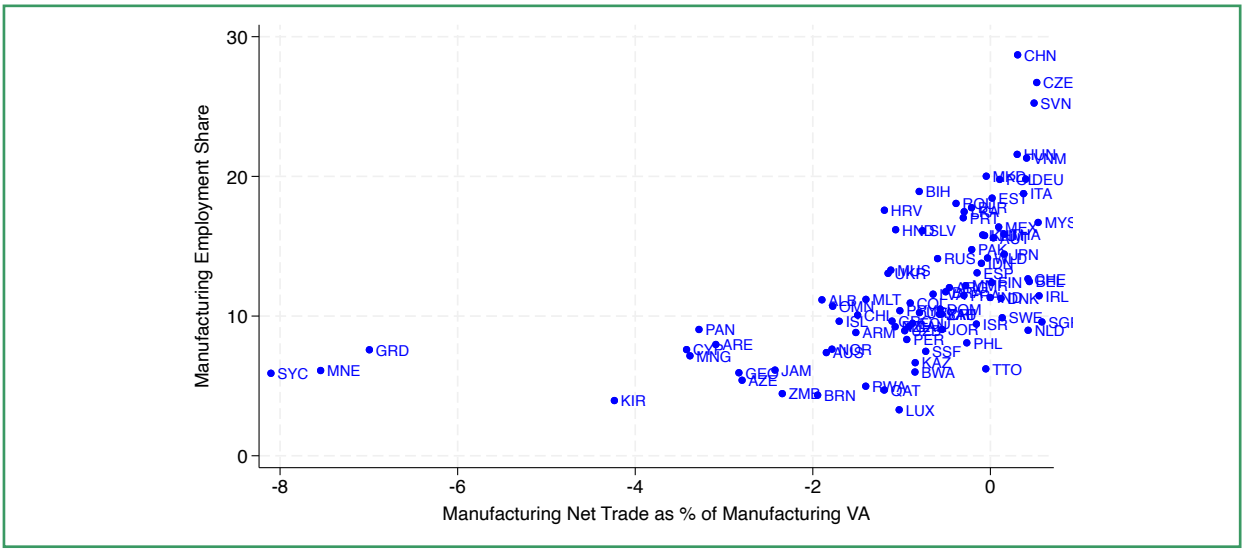
International trade has been central to some of the most salient and recent experiences of structural transformation. This section reviews the theoretical and empirical literature linking trade and industrialisation, drawing on both macroeconomic and microeconomic perspectives.

3.1.1 Macro Perspectives

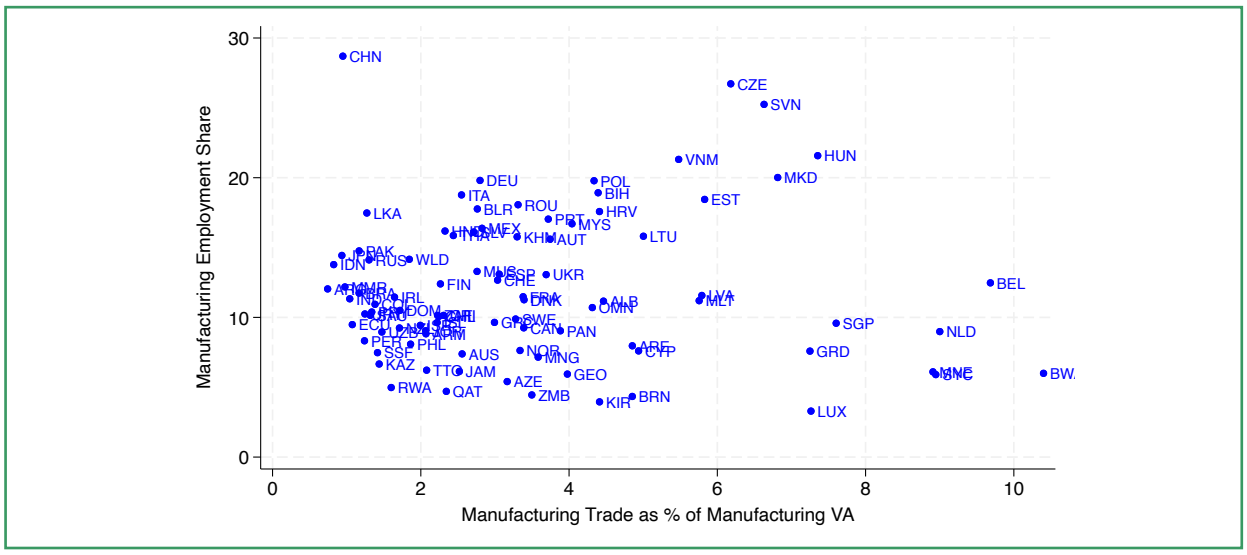
The argument that trade spurs manufacturing growth often draws on evidence from East Asia. Consider the cases of Japan, Korea, China, and Vietnam. In each of these cases, the evolution of a country's share of world exports over time closely tracks its manufacturing share of GDP. Japan's share in world exports rose sharply after WWII, peaking in the 1980s in tandem with the peak of its manufacturing share. South Korea, one of the Asian Tiger economies, followed a similar pattern beginning in the 1960s and 1970s: both its export share and its manufacturing share rose in lockstep until reaching a plateau in the 1990s. China's export share then surged in the 1990s and 2000s, while Vietnam's take-off began in the 2010s, with manufacturing's share of GDP rising in parallel.

More generally, Figure 5 depicts the cross-country relationship between manufacturing employment shares and two measures of manufacturing trade in 2020. Panel A displays a positive correlation between manufacturing employment shares and net manufacturing trade, measured as a country's manufacturing exports *minus* imports relative to manufacturing value added. This suggests a relationship between a country's comparative advantage and its sectoral structure. In contrast, Panel B shows that there is no clear relationship between manufacturing employment shares and openness to manufacturing trade, measured as gross manufacturing trade over GDP (defined as the *sum* of a country's manufacturing exports and imports relative to its manufacturing value added).

Figure 5 Manufacturing Employment Share vs. Trade.



Panel A



Panel B

Source: World Bank Open Data; ILOSTAT.

In what follows, we will review the main theories of structural change in an open economy, and discuss whether or not these empirical patterns are consistent with their core predictions.

We already saw in Section 2 the role that income effects and asymmetric productivity growth across sectors play in theoretical models of structural change in a closed economy. The pioneering work of Matsuyama (2009) formalises a third key mechanism operating in open economies: asymmetric productivity growth across sectors and across countries induces changes in comparative advantage, thereby shaping patterns of sectoral specialisation. Specifically, a country that experiences faster productivity growth in manufacturing gains comparative advantage in that sector, resulting in greater manufacturing net exports and a larger manufacturing employment share. Panel A of Figure 5 is in line with this prediction. Note that this mechanism runs counter to the predictions of the Baumol effect in a closed economy, where complementarities in demand across sectors can imply that faster productivity growth in manufacturing reduces its relative price so much that manufacturing's employment share decreases.

Evolving comparative advantage is not the only way trade affects economic structure in an open economy. First, even holding productivity constant, as barriers to trade decline, the incentives for specialisation increase as underlying comparative advantage becomes increasingly revealed (Sposi 2015).[9] If a country, for example, has a comparative advantage in manufacturing, then it will increasingly devote resources to the manufacturing sector as frictions to trade dissipate. Second, as declining trade costs lift real incomes, sectoral demand shifts towards sectors with higher income elasticities, i.e. services. Third, global reductions in trade costs occurred more rapidly in manufacturing. As the global efficiency of exchanging manufactured goods improves, the relative price of manufacturing declines, driving down the share of manufacturing in final demand everywhere. As a result, the relationship between manufacturing employment and openness to manufacturing trade, or gross manufacturing trade over GDP, is ambiguous. This is consistent with Panel B of Figure 5.

9 Declining manufacturing trade costs have been attributed to trade policy liberalisation through the WTO and previously the GATT, as well as to improved efficiency in shipping due to containerisation and improved inventory management.

Uy et al. (2013) quantitatively assess the role of increased openness and asymmetric sectoral productivity growth in South Korea's structural transformation between 1971 and 2005. Using a three-sector, two-country model that incorporates income and relative price effects as well as Ricardian comparative advantage, they show that greater openness and faster productivity growth – especially in manufacturing – were crucial to explaining the rise in Korea's manufacturing share during the 1970s and 1980s, as well as the concurrent decline in agriculture and expansion of services. Their counterfactual analysis suggests that, in the absence of trade, the same productivity trends would not have produced the observed increase in manufacturing employment.

In addition to the role of international trade itself, another strand of the literature has examined how aggregate trade imbalances affect structural change.[10] Sposi (2012) argues that South Korea's rising manufacturing share in GDP can be partly explained by its evolving trade balance, which shifted from persistent deficits in the 1960s to surpluses in the 1990s. During the early stages of industrialisation, South Korea financed investment through external borrowing, importing manufactured goods to support its rapid capital accumulation. As the country subsequently emerged as a global manufacturing powerhouse, it transitioned into a net creditor, exporting manufactured goods and repaying its foreign liabilities. In related work, Kehoe et al. (2018) analyse whether the widening US trade deficit contributed to the decline in US manufacturing employment since 1992 and find that it accounts for roughly 15% of the observed reduction.

Analysing these forces for a larger set of countries, Smitkova (2024) decomposes cross-country changes in manufacturing shares over time into the contributions of sectoral expenditure patterns, trade specialisation, and aggregate trade imbalances. Her results suggest that trade specialisation and imbalances together explain about one-third of the average change in manufacturing's share.

Finally, some studies explore the reverse channel – from structural change to trade dynamics. Lewis et al. (2022) show that the global shift in expenditure from highly tradable goods towards less tradable services has dampened growth in the ratio of world trade to GDP. Their estimates suggest that since 1970, the global shift towards services has substantially dampened the growth of world trade: structural change has offset about half of the increase in the trade-to-GDP ratio that would have resulted from declining trade costs alone.

3.1.2 Micro Perspectives

A large recent literature analyses the effects of trade openness on individual manufacturing firms. Atkin and Khandelwal (2020), Atkin et al. (2025), and Verhoogen (2023) provide excellent overviews that closely relate to the themes addressed here. Their central lesson is that, at the micro level, the impact of trade openness on firms depends crucially on firm heterogeneity and domestic frictions. A central lesson from the literature is that only a small subset of firms participate in export markets, and these tend to be larger, more productive, and better connected. Melitz (2003) formalised this selection mechanism, and subsequent empirical evidence has documented it in many settings. For example, Bernard et al. (2007) show for the US that exporters are larger and more productive than non-exporters. Clerides et al. (1998) document similar patterns in Colombia, Mexico, and Morocco. In developing countries, where information frictions

10 Trade imbalances reflect international lending and borrowing, which arises from differences across countries in demographic and productivity trends, financial institutions and the supply of assets, as well as public and private saving rates.

and weak institutions are more pronounced, recent surveys emphasise that liberalisation often benefits incumbents rather than fostering broad-based entry (Atkin and Khandelwal 2020, Atkin et al. 2025). Yet it can decrease informality: McCaig and Pavcnik (2018) show that the US-Vietnam Bilateral Trade Agreement boosted formal-sector firms by expanding export opportunities, which in turn drew workers out of informal microenterprises and raised overall productivity.

Importantly, the literature highlights that the most relevant effects of trade take time to materialise: exporting and import competition can shape technology adoption, quality upgrading, and skill formation, with long-run consequences for development (Goldberg and Ruta 2025). As Verhoogen (2023) stresses, upgrading is multifaceted – encompassing product quality, process technology, and organisational capabilities – and many firms in developing countries struggle to realise these gains even when exposed to global markets.

Global value chains (GVCs) and enhanced access to inputs provide another key channel through which trade generates dynamic effects. Amiti and Konings (2007) show for Indonesia that input tariff liberalisation significantly raised firm productivity by lowering costs of imported intermediates. Goldberg et al. (2010) find that access to imported inputs in India allowed firms to upgrade product quality and innovate. Yet, as Goldberg and Pavcnik (2016) emphasise, many firms remain constrained by weak contracting institutions and policy distortions, which limit the full diffusion of input-driven productivity gains. Verhoogen (2023) highlights that input-side factors, such as access to skilled labour and imported intermediates, interact with firms' internal organisational capabilities, suggesting that integration into GVCs yields uneven upgrading outcomes depending on domestic absorptive capacity.

Beyond the direct impact on exporters, trade can generate spillovers along supply chains. Linarello (2018) shows that tariff cuts on Chilean downstream industries increased productivity among upstream input suppliers, suggesting that trade gains propagate through production networks. Alfaro-Ureña et al. (2022) similarly find that Costa Rican firms that begin supplying multinationals experience persistent increases in employment, sales, and productivity, with benefits extending to their non-MNC clients. Amodio et al. (2025a) provide related evidence from Uruguay's beef export boom to China, showing that exporters' domestic suppliers, especially in services, experienced sizable gains in sales, employment, and wages. Yet these positive effects are not universal: de Souza et al. (2025) document that Brazilian tariff cuts reduced technology transfers from foreign firms to local suppliers, as multinationals shifted towards direct exporting rather than licensing. Taken together, this evidence suggests that whether exporting benefits diffuse up the value chain depends critically on the structure of global value chains, the incentives for technology transfer, and the internal capabilities of firms to absorb and implement new knowledge.

Another barrier to taking advantage of exporting opportunities is access to finance. Exporting requires upfront investments and trade finance, which are often out of reach for small or young firms. Manova (2013) shows that credit constraints restrict the export participation of financially vulnerable firms across countries, while Chor and Manova (2012) find that financial conditions shape the pattern of exports during crises. Khandelwal (2025) reviews this evidence and highlights that credit policies and insurance schemes tend to expand exports at the intensive margin, helping incumbent exporters scale up, but rarely generate widespread entry. This mechanism helps explain why trade reforms in many LMICs raise aggregate exports without expanding the set of exporting firms. The potential for technology adoption and investments may also be limited by financial frictions. We turn to this issue below.

Labour market frictions further condition the effects of trade on industrial development. Even when firms have opportunities to expand, labour mobility barriers and informality constrain reallocation of workers to more productive firms. Topalova (2010) finds that Indian districts more exposed to tariff cuts experienced slower poverty reduction, partly because workers could not easily move into expanding sectors. Dix-Carneiro (2014) documents high adjustment costs in Brazil, where workers displaced by trade shocks took years to reallocate, often at lower wages. Dix-Carneiro et al. (2025) show that the informal sector frequently acts as a buffer in LMICs, absorbing displaced workers but at lower income levels. These findings underscore that the aggregate gains from trade depend not only on openness but also on how domestic markets mediate firm and worker adjustment.

3.2 Industrial Policy

The joint growth of manufacturing and exports in East Asia occurred in a setting where governments in the region actively intervened to shape their paths of industrialisation.

This observation sparked discussions among economists and policymakers about drivers of their industrialisation and implications of such policies. Some scholars emphasised state-led interventions as central to the region's success, while others argued that market-oriented reforms and trade liberalisation were more significant. Amsden (1989), Wade (1990), and Rodrik (1995) viewed government intervention as crucial for the growth of South Korea and Taiwan. On the other hand, Krueger (1974, 1997) argued the role of trade liberalisation, highlighting risks of government failures and rent-seeking.

3.2.1 The Case of South Korea

One of the common features of the industrial policies in both South Korea and Taiwan was the promotion of new technology adoption from advanced economies and the scaling up of production through exports. Technology adoption and export promotion have contributed to productivity growth and reductions in trade barriers in manufacturing, two key forces underlying the structural change patterns (see Section 3.1.1). These technologies, often characterised by mass production and increasing returns to scale, had already reached a mature stage in the global product cycle in Western economies. After acquiring them, East Asian manufacturers absorbed the technologies through reverse engineering and expanded production for export, leveraging cheap labour. With domestic markets too small to sustain large-scale production, exporting became the main driver of industrial expansion. This process enabled East Asian countries not only to expand overall manufacturing but also to move up the product cycle. Their initial exports consisted largely of non-durable goods such as textiles, but as industrialisation advanced, they shifted towards durable goods – including automobiles, electronics, machinery, and ships – that were more skill-intensive and technologically sophisticated.

These two promoted activities, technology adoption and exporting, were complementary to each other, in line with the theory and evidence summarised in Section 3.1.2. Productivity gains from new technologies increased firms' chance of exporting, and participation in export markets strengthened firms' incentives to pursue further technological improvements.

Given South Korea's rapid industrialisation and exceptional growth, often described as a miracle (Lucas 1993), its large-scale industrial policy – the Heavy and Chemical Industry (HCI) Drive – has received considerable attention in recent literature. Launched in the 1970s, the policy targeted heavy manufacturing sectors such as chemicals, electronics, machinery, transportation equipment, and shipbuilding via subsidised, government-guaranteed foreign credit allocated selectively to approved firms. It was abruptly terminated in 1979 following the president's assassination and the subsequent change in administration. Despite its short implementation window of about seven years, South Korea has remained a major exporter in these sectors to this day.

Recent research has documented persistent effects of the HCI Drive policy. Using historical sectoral data, Lane (2025) shows that sectors directly targeted by the policy expanded significantly during the intervention and continued to grow even after it ended. He also finds spillover effects, with non-targeted sectors benefiting indirectly through input-output linkages. Exploiting the place-based nature of the HCI Drive policy and historical firm-level data, Choi and Levchenko (2025) provide complementary evidence of persistent firm-level effects lasting nearly 30 years after the policy ended. They build a dynamic trade model with learning-by-doing and identify the key parameter governing the magnitude of learning from reduced-form estimates. Using the calibrated model, they find welfare gains of about 3–4%. Using repeated cross-sectional plant-level data, Kim et al. (2021) also document persistent effects on plants in targeted region-sectors. However, they highlight an important downside: increased resource misallocation. They find that resources disproportionately flowed to large plants owned by business groups that were the primary beneficiaries of the policy.

While implementing the HCI Drive policy, the South Korean government actively promoted the adoption of new technologies. Choi and Shim (2024a, b) digitise firm-level technology adoption data and document a surge in technology transfer from advanced economies. This was true also in Taiwan, where the government supported technology transfers through the Industrial Technology Research Institute during the 1980s, which later laid the foundation for TSMC, now the global giant of the semiconductor industry. Similarly, Giorcelli and Li (2021) show that technology and know-how transfers from the Soviet Union to China had long-lasting impacts in the steel industry, but only when accompanied by worker training. Exploiting exogenous variation in the timing of transfers due to unexpected delays, they conclude that deeper absorption of technology transfers is critical for long-lasting effects.

Another important policy in South Korea was export promotion, implemented through a range of government tools. One such policy was input tariff exemptions for goods destined for export. Using an open economy neoclassical growth model, Connolly and Yi (2015) show that this tariff exemption can explain 17% of South Korea's catch-up in manufacturing value added per worker relative to G7 countries. The government also established the Korea Trade-Investment Promotion Agency (KOTRA) in 1962, which connected local firms with foreign buyers through trade fairs and market research, reducing information frictions in foreign markets.[11] Taiwan also created its own export-promotion agency, the China External Trade Development Council, which similarly organised trade fair participation and conducted market research.

11 Using the rotation schedule of KOTRA managers across different countries, Barteska and Lee (2023) identify bureaucratic ability through fixed effects and find that a one standard deviation increase in manager ability raised exports by 37%, highlighting the role of bureaucratic ability and the importance of such agencies in promoting exports.

Betts et al. (2017) quantify the role of Korea's trade policies using a multi-sector general equilibrium model calibrated to sectoral tariffs and export subsidies. They show that tariff liberalisation accelerated industrialisation, while the removal of export subsidies worked in the opposite direction, with the two effects largely offsetting each other. They conclude that industrialisation was, instead, primarily driven by international specialisation and income effects resulting from relatively rapid productivity growth in the Korean industrial sector.

Replicating East Asia's success is far from straightforward. Industrial policy often targets specific sectors, aiming to exploit productivity spillovers or to offset financial frictions. The difficulty is that policymakers cannot know ex ante whether a sector's current weakness reflects barriers or a genuine lack of potential. Another challenge lies in implementation. Even well-designed policies may fail if bureaucrats do not implement them as intended, due to weak monitoring, corruption, or rent seeking.[12] In such cases, subsidies may be diverted to politically connected but inefficient firms, undermining the policy's goals and sometimes worsening allocative efficiency. One way to mitigate this issue is to evaluate firms or sectors based on their export performance. This can serve as a more objective selection criterion, as it reflects competitiveness in global markets and is less likely to be distorted by domestic factors such as lobbying or market power. Reed (2024) discusses a broad set of policy tools that policymakers in developing countries can use to address these challenges.

3.2.2 Rationales for Industrial Policy

Recently, many theoretical studies have examined the theoretical underpinnings of industrial policy and their optimal design.[13] The textbook justifications for industrial policy broadly fall into three categories: distortions, external economies of scale, and coordination failures. Appropriately designed subsidies or taxes can in principle improve welfare by correcting these market failures.

A first strand of the literature focuses on distortions. Lashkaripour and Lugovskyy (2023) study optimal trade and industrial policies aiming to address sectoral misallocation arising from industry differences in scale economies and markups. They find that unilateral trade or industrial policies are largely ineffective in correcting misallocation, whereas internationally coordinated industrial policies embedded in deep trade agreements are far more effective. Itskhoki and Moll (2019) analyse optimal policy in a Ramsey growth model with financial frictions and show that the optimal policy should initially be pro-business, suppressing wages in the early stages of transition, to promote entrepreneurial wealth accumulation and relax financial constraints over time. In a multi-sector setting, it is optimal to tilt resources towards sectors with a latent comparative advantage (which may be hard to identify in practice) and towards tradables. Liu (2019) develops a model of production networks with market imperfections and derives a sufficient statistic for the social value of targeting specific sectors. In his framework, targeting upstream industries can generate positive aggregate effects because distortions in these sectors propagate and compound through backward demand linkages. He finds that South Korea tended to target more upstream sectors, consistent with the model predictions.

12 See Juhász and Lane (2024) for surveys on government implementation capacity.

13 See Harrison and Rodríguez-Clare (2010) for a comprehensive review of both empirical evidence and theoretical rationales.

A second line of work emphasises external economies of scale. Bartelme et al. (2025) quantitatively assess the welfare effects of policy interventions under Marshallian externalities – local productivity spillovers operating through labour pooling, input sharing, and knowledge diffusion. They develop a novel empirical strategy to estimate elasticities of external economies of scale, and, while finding sizable externalities, conclude that the welfare gains from industrial policy are limited. Kline and Moretti (2014) study the long-term effects of the Tennessee Valley Authority, one of the largest place-based policies in US history, and provide evidence consistent with agglomeration in manufacturing. They find that the policy boosted national manufacturing productivity by 0.3%, and cost-benefit analysis shows that these productivity gains outweighed programme costs. Moneke (2020) and Cerrato and Filippucci (2025) study regional development programmes and infrastructure investments in Ethiopia and Italy, respectively, documenting the presence of local agglomeration.

Finally, a third body of research focuses on coordination failures, which occur when private returns to an activity depend on the actions of other agents. Such failures often lead to multiple equilibria. Buera et al. (2021) show that such failures interact with idiosyncratic distortions in the adoption of modern technologies. Fixed costs of adoption, measured in units of final goods, decline as more firms adopt, creating complementarities in firms' decisions. These complementarities amplify the negative effects of idiosyncratic distortions. Extending this framework to a multi-region open-economy setting, Choi and Shim (2024b) apply it to South Korea's HCI Drive policy and find that, without policy interventions, the country would have converged to a less-industrialised steady state. Their results highlight that complementarities between export promotion and technology-adoption subsidies were central to South Korea's successful industrialisation.

A fundamental challenge in this literature is that, when multiple equilibria exist, only one equilibrium is observed in the data, determined by an unobservable equilibrium selection rule. This makes it difficult to disentangle whether policy interventions work by shifting fundamentals directly or by facilitating coordination. Garg (2025) introduces a novel method, drawing on tools from industrial organisation and algebraic geometry, to identify and compute all possible equilibria, including those not realised in the data. Applying this approach to industrial zone development in India, she finds that 38% of the total effects arise from increasing the probability of escaping a low-industrialisation equilibrium, while the remaining 62% reflect improvements in fundamentals. While most existing coordination-failure models are static, recent work incorporates dynamics. Alvarez et al. (2023) study a dynamic model of peer-to-peer payment-app adoption, a technology whose benefits rise with the number of adopters. They derive the optimal policy in this dynamic environment with multiple equilibria.

3.2.3 Measuring the Impact of Industrial Policy

Although empirical studies often find relatively large effects of industrial policy, quantitative research based on macroeconomic and trade models tend to find smaller and somewhat modest gains. One issue is the so-called 'missing intercept' problem. Empirical designs typically identify *relative* effects – how outcomes change for more targeted sectors or places relative to their less or no targeted counterparts – and these are typically uninformative of *absolute* effects, which take into account indirect effects, including general equilibrium effects. For instance, if some firms receive subsidies, they may crowd out non-subsidised firms through domestic competition, or these subsidised firms can have positive indirect effects on others through production networks. Empirical studies often address this by including controls or fixed effects that absorb such indirect effects, so their estimates should be read as conditional on holding these indirect channels constant. For example, Rotemberg (2019) includes a theory-based

variable that controls for indirect effects in which subsidies to small firms might crowd out competitors within a sector while simultaneously reducing costs through input-output linkages. Similarly, Lane (2025) includes controls for input-output linkages, both built on the production network framework of Acemoglu et al. (2012). Choi and Levchenko (2025) control for indirect effects of firm-level subsidies through input-output and spatial trade linkages by incorporating market access controls in the spirit of Donaldson and Hornbeck (2016).

In contrast, quantitative macroeconomic models explicitly incorporate indirect and general equilibrium channels, combining welfare effects for winners and losers from policy interventions. Because the gains of winners are typically partially offset by the losses of others, these models tend to imply more moderate gains from policy interventions. However, quantitative approaches face challenges in calibrating structural parameters. Recent frontier work integrates structural modelling with causal identification, making it possible to analyse the general equilibrium effects of scaling up policy interventions from small-scale random experiments while maintaining strong causal identification (Buera et al. 2023).

3.3 The Limits of Export-Led Growth

While the East Asian experience suggests that export-led growth strategies can be powerful drivers of industrialisation and economic development, recent studies highlight a more nuanced and complex relationship between exporting and development. While growth of exports, manufacturing employment and incomes evolved together in the East Asian Tigers, expanding manufacturing exports has not always had only the desired positive effects.

First, export-led strategies are often justified on the grounds that exporting promotes human capital accumulation by raising the returns to skills and education. In fact, a large literature finds that exporting is associated with higher wages and skill premia (see Goldberg and Pavcnik 2007). However, Atkin (2016) shows that during Mexico's 1986–2000 trade reforms, local expansions in export-manufacturing industries led to increased school dropouts, with roughly one student leaving school for every 25 jobs created, as new export jobs raised the opportunity cost of schooling more than its returns.

Second, policymakers often aim to improve countries' capabilities, defined as the ability to produce more complex goods, by opening up to trade. Yet Atkin et al. (2025) show that this is not always the case. They develop a model in which goods differ in complexity and countries differ in capabilities, with these capabilities shaped by patterns of specialisation. Because foreign competition is tougher in more complex goods, developing countries tend to specialise in less complex ones, which dampens capability growth. In particular, they show that China's rise reduced capability growth in some African countries by pushing them towards specialisation in less complex goods.

Finally, only a selective group of firms with sufficient capabilities are able to export when opportunities arise. Larger export opportunities therefore tend to concentrate economic activity in the hands of a few large firms. These firms may then exert market power or build political connections with policymakers, potentially distorting resource allocation. Choi et al. (2025) document that in South Korea, the manufacturing concentration ratio of top firms rose sharply following the HCI Drive policy and continued to increase through the 2010s. They show that improvements in productivity and export demand among top firms, rather than firm-level

distortions, drove this rise in concentration, boosting aggregate real income with only limited effects on markups and markdowns. While the South Korean case suggests positive effects of rising concentration, this outcome may not generalise to other low-income countries. Depending on country-specific institutions and distortions, increased concentration due to exports may have negative impacts on allocative efficiency.

3.4 Policy Implications

Taken together, the evidence reviewed in this section shows that the export-led industrialisation experiences of East Asia were not driven by trade integration alone, but by its interaction with productivity growth, technology adoption, and firm upgrading in manufacturing. A growing body of micro-level evidence suggests that government interventions – particularly those facilitating export participation and the adoption of advanced technologies – can play a constructive role in shaping these dynamics. When export-oriented industrial policies are **well designed**, targeting the right sectors and addressing binding constraints to exporting, upgrading, and scale, they can support industrialisation and contribute to sustained economic development.

Looking ahead, a central challenge for both research and policy is to clarify the conditions under which such interventions are most effective. This requires better identification of the frictions that constrain firms' responses to trade opportunities, as well as the activities and sectors where policy support is most likely to generate dynamic gains. It also calls for greater attention to implementation: how export-oriented policies are administered, monitored, and adapted over time. Understanding the institutional and political processes that shape policy execution is essential for translating policy intent into durable economic outcomes. Addressing these issues remains an important agenda for future research.

3.5 The Rise of China

China's rise in the global economy provides the most consequential contemporary example of export-led industrialisation shaped by active state intervention. Unlike earlier East Asian industrialisers, China's integration into global markets occurred at unprecedented scale and under late-starter conditions, combining labour-intensive export growth and extensive use of place-based and sectoral policies. As such, China offers a unifying case for the mechanisms discussed in Section 3: the interaction between trade liberalisation and firm upgrading, the role of industrial policy in shaping specialisation and scale, and the evolving limits of export-led growth as capital deepening and technological upgrading progress over time.

This section traces China's development from its early integration into international trade to its emergence as a global industrial powerhouse, highlighting how export expansion, place-based industrial policies, and firm upgrading interacted over time. The discussion emphasises both the sources of China's rapid industrial growth and the tensions that emerged as the economy scaled up and deepened its technological capabilities.

3.5.1 Early Industrialisation

China's first steps towards industrialisation (1840–1949) took place under highly adverse conditions. Following military defeats in the Opium Wars and related conflicts, China was compelled to sign a series of unequal treaties with foreign powers that granted extensive commercial and legal privileges. These treaties led to the forced opening of treaty ports – coastal cities opened to foreign trade – which constrained China's policy autonomy but also fostered coastal industrial development and deeper integration of domestic markets, leaving durable regional legacies (Brandt et al. 2014, Keller et al. 2017, Jia 2014). Efforts at 'Self-Strengthening' during the late Qing dynasty, though motivated by military needs, created important industrial spillovers (Bo et al. 2023). The defeat in the Sino-Japanese War (1894–95) further legitimised modern enterprises and spurred the rise of private firms.

By the early 20th century, a golden age of industry emerged, fuelled by institutional modernisation inspired by foreign settlements (Ma 2008) and the state's efforts during the interwar years to build a modern economic system (Chang 1967). Trade disruptions during World War I temporarily sheltered local industries such as textiles, but shortages of machinery and finance constrained growth (Liu 2020).

With the founding of the People's Republic in 1949, China shifted to a Soviet-style centrally planned economy. The state embarked on a massive industrial 'Big Push', relying on Soviet technology and know-how to build heavy industry through the "156 Projects" (Giorcelli and Li 2021). Embargoes by Western countries reinforced China's move towards near-autarky. While this strategy created a heavy-industry base of state-owned enterprises (SOEs), it also produced severe distortions, including a catastrophic misallocation of resources during the Great Leap Forward (Li and Yang 2005). By the 1970s, the economy was dominated by inefficient SOEs, with institutional rigidities that later became the primary targets of reform (Khandelwal et al. 2013, Bai et al. 2017).

3.5.2 Global Integration

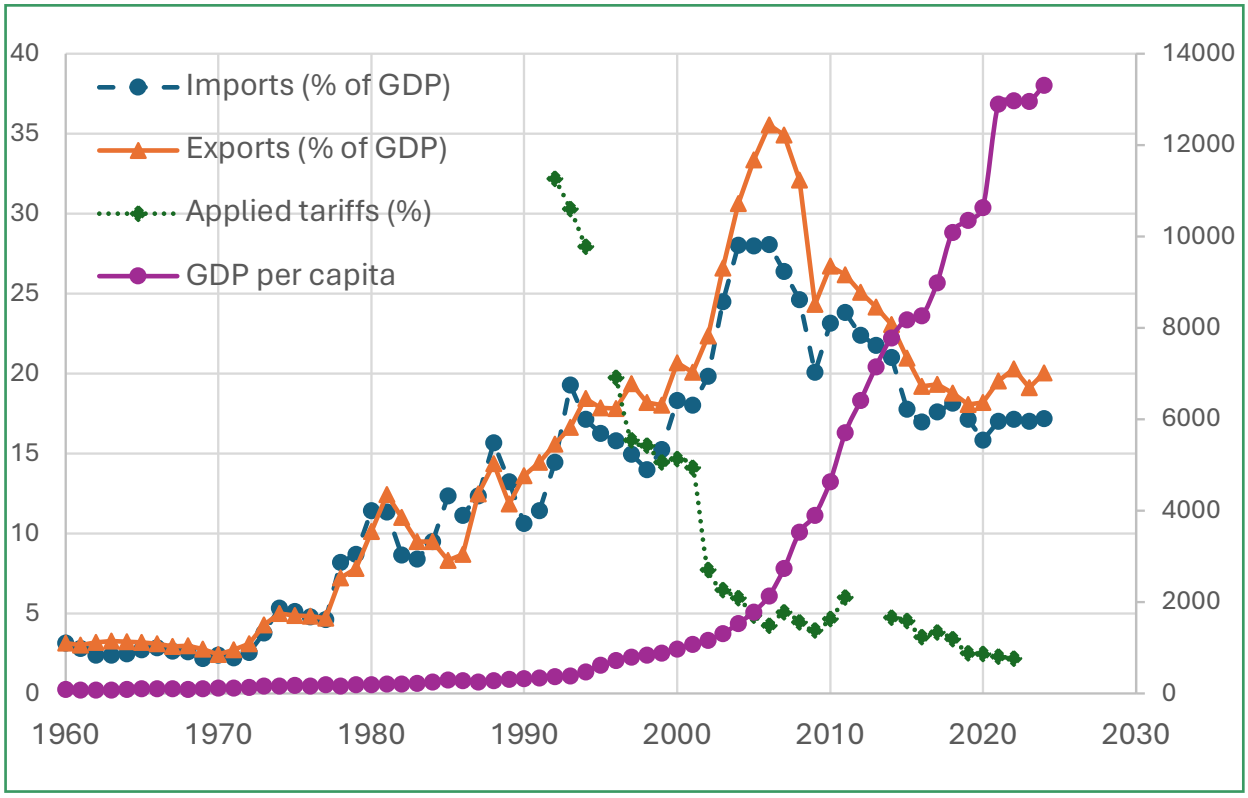
The lifting of Western embargoes in the 1970s marked China's tentative re-entry into global markets. The decisive turning point came in 1978, when reforms initiated a gradual opening of the economy. While tariffs remained high in the 1980s, they fell sharply in the 1990s as China sought accession to the WTO, which it joined in 2001. WTO membership catalysed unprecedented trade expansion, fuelled by lower trade costs, improved productivity, capital deepening, and greater access to imported intermediates (Huang et al. 2024, Brandt and Lim 2024). Figure 6 illustrates this integration process, showing the evolution of imports, exports, and tariff rates over time.

The US normalised trade relations with China in 1980 and made them permanent in 1999, a shift that greatly reduced trade policy uncertainty and accelerated China's trade expansion (Handley and Limão 2017, Alessandria et al. 2025). The simultaneous reduction in both import and export tariffs enhanced firm productivity, intensified domestic competition, and pushed markups downward (Yu 2015, Brandt et al. 2017).

A key aspect of the productivity growth and capital deepening was the dual-track approach, which preserved state control over SOEs while permitting private firms to flourish. However, this coexistence of market and state systems introduced institutional frictions, notably credit misallocation favouring SOEs that constrained private sector growth. Despite these inefficiencies, resource reallocation from low-productivity state sectors to high-productivity private firms boosted productivity, while high savings rates and FDI fuelled capital accumulation (Song et al. 2011).

Further reforms also dismantled key institutional barriers. SOEs lost their monopoly on trading rights (Bai et al. 2017), quotas were phased out (Khandelwal et al. 2013), and new trade agreements were signed (Li et al. 2016). These steps, combined with surging global demand, entrenched China's role in world trade.

Figure 6 China's Integration with the Global Economy.



Sources: World Bank Open Data. Notes: Imports and exports include both goods and services; applied tariff rates are weighted averages across all traded products; GDP per capita is in current USD.

3.5.3 Place-Based Policies and Transportation Infrastructure

China's liberalisation went far beyond tariff reductions. A central innovation was the introduction of processing trade in 1978, which allowed firms to import inputs duty-free, assemble or process them domestically, and then re-export the finished goods. This system enabled China to integrate quickly into global supply chains, particularly in labour-intensive industries such as electronics, textiles, and toys. Because it required little working capital, processing trade thrived in an economy constrained by financial frictions (Manova and Yu 2016). At its peak in the 1990s and 2000s, it accounted for more than half of China's exports (Feenstra and Wei 2010). However, processing firms were typically less productive and captured less value than 'ordinary' exporters (Dai et al. 2016, Yu 2015). As domestic capital markets developed and firms became more sophisticated, the share of processing trade gradually declined.

Industrial and place-based policies reinforced trade growth. Starting in 1979, special economic zones proliferated, offering firms tax breaks, reduced duties, cheaper land, and easier access to credit. These policies increased investment and raised wages, output, and productivity, while encouraging firm entry (Wang 2013, Lu et al. 2019). At the same time, the state targeted strategic

industries, such as shipbuilding and renewable energy with a broad toolkit of subsidies, R&D incentives, and consolidation policies. Evidence shows these interventions boosted innovation, productivity, and exports, though effectiveness varied across instruments (Banares-Sanchez et al. 2024, Barwick et al. 2025).

Critical to China's industrial ascent was its massive investment in infrastructure, made possible by the state's ability to mobilise resources at scale – through public finance, state-owned enterprises, and coordinated planning. Over the past four decades, the country has built world-class ports, highways, railways, and airports, drastically reducing trade costs and enabling firms to integrate into global production networks (Fan et al. 2023, Huang et al. 2025).

3.5.4 Institutions and Governance

China's industrial policies have been embedded in a distinctive institutional framework. Unlike electoral democracies, Chinese officials are accountable to higher party-state authorities rather than voters. Career advancement is tied to a "regional tournament" system in which local leaders compete on measurable economic outcomes, historically GDP growth (Li and Zhou 2005, Xu 2011, Li et al. 2019, Qian et al. 2006). This system incentivised officials to actively support firms – by attracting foreign direct investment, expanding trade, or building economic zones – aligning political goals with corporate interests (Ang 2020, Bai et al. 2019, Jia et al. 2015, Lei 2021). Recent research adds nuance to this view: Chen (2025) shows that GDP growth targets – central to cadre evaluation – create strong incentives for local officials to induce firm-level production responses precisely at the threshold where targets are met, leading to spikes in output, inventories, energy use, and pollution, and thus driving real activity but also risking misallocation and overproduction.

Local governments played a central role by controlling access to land, capital, and subsidies. For example, Wuhu's support for Chery Automobile – with land, credit, and infrastructure – enabled the firm to become a leading exporter (Bai et al. 2019).

Policy design followed an "experimentation under hierarchy" model (Heilmann 2008). Top-down pilot programmes tested centrally driven initiatives, though they often suffered from political bias and limited replicability (Wang and Yang 2025). Bottom-up innovations, in contrast, emerged from local experimentation, particularly in politically peripheral areas, and proved more effective for productivity growth (Chen et al. 2025). The interaction between these two pathways created a dynamic feedback loop, balancing central strategy with local adaptation (Fang et al. 2025).

3.5.5 Taking Stock

China's ascent has been powered by a distinctive nexus of policy and institutions – a blend of trade liberalisation, industrial and place-based interventions, massive infrastructure investment, and a bureaucratic system structured around strong growth incentives. Like earlier East Asian tigers, China relied on export-led growth and technology adoption, but its sheer scale and adaptive institutions set it apart.

Looking forward, China faces a more challenging environment, with heightened trade frictions and geopolitical tensions. Sustaining growth will require deepening trade integration, diversifying export markets, and reorienting bureaucratic incentives to help firms navigate rising economic nationalism in the US and other high-income countries.

Although China's governance model is not fully transferable, other emerging economies can draw valuable lessons from both its successes and its pitfalls. The "regional tournament" system, which rewarded local officials for rapid economic expansion, has also encouraged the pursuit of measurable short-term targets at the expense of unmeasured externalities, such as pollution (Zheng et al. 2014, Carattini et al. 2025) and inequality (Han et al. 2012). Frequent official turnover has further fostered short-termism, fuelling local deficits through debt-funded projects (Song and Xiong 2024).

Yet China's policy experimentation under hierarchy offers an alternative model for balancing innovation with control. By encouraging local governments to pilot new reforms within a framework of central oversight, China has institutionalised a process for testing and scaling policy innovations while mitigating systemic risk (Wang and Yang 2025, Chen et al. 2025, Fang et al. 2025). While local short-term pressures persist, centralised long-term planning has ensured strategic continuity in areas such as infrastructure and sectoral upgrading. Other economies – facing distinct institutional constraints – can adapt this experimental, iterative approach to their own contexts. The key lesson lies not in replicating China's system, but in crafting mechanisms that combine local learning with long-term vision, enabling sustained structural transformation and inclusive growth.

4. The Present and Future of Industrialisation

The previous two sections have summarised evidence on past structural transformation experiences. In this section, we review a set of factors that are shaping current and future paths of industrialisation, and that may make them different from the experiences of advanced economies. These include differences in the global technological environment and other explanations of premature deindustrialisation, growing protectionism, automation, and the interaction between industrialisation and the size structure of firms.

4.1 Premature Deindustrialisation

In Section 2, we discussed the differences between the industrialisation paths of late and early industrialisers. Late industrialisers tend to reach lower manufacturing employment shares at the peak of their industrial hump, and these peaks occur at lower levels of income per capita – a phenomenon commonly referred to as premature deindustrialisation. Moreover, for late starters, increases in industrial value added are not accompanied by proportional gains in jobs, which makes industrialisation jobless.

Rodrik (2016) argues that more rapid productivity growth in manufacturing than in the rest of the economy, in combination with trade and globalisation, can explain premature deindustrialisation. As developing countries liberalised trade, those lacking a strong manufacturing advantage faced import competition and falling global manufacturing prices, driven by growth in manufacturing productivity in advanced economies. They thus imported deindustrialisation from advanced economies, limiting their scope for industrial employment, and resulting in premature deindustrialisation. While Rodrik (2016) posits that international trade may be an important contributing factor, he leaves the question open, as addressing it requires quantitative analysis.

Sposi et al. (2025) analyse the role of trade in premature deindustrialisation using a dynamic open-economy model with differences in productivity growth across sectors. They show that these differences lead to premature deindustrialisation, which is further amplified by trade. Fundamentally, premature deindustrialisation reflects faster technological progress in manufacturing than in services. International trade magnifies this process by transmitting global technological change through relative prices and accelerating the decline in the relative price of manufacturing. At the same time, declining trade costs reveal underlying comparative advantages and reinforce specialisation. Over time, this results in fewer countries reaching high manufacturing peaks, as a small set of exporters supply goods to the rest of the world. Importantly, their framework also captures another feature that they document in the data, industry polarisation: the variance in the manufacturing share of value-added across countries has increased over time.

Huneeus and Rogerson (2023) quantitatively explore sector-biased productivity growth in a closed-economy model, highlighting the importance of heterogeneous agricultural productivity paths across countries. Their model incorporates the theoretical mechanisms discussed in Section 2.3. Then, productivity growth in agriculture leads to flow of workers out of agriculture and into manufacturing, and productivity growth in non-agriculture leads to flows of workers out of manufacturing and into services. Jointly, empirically reasonable sectoral productivity growth patterns generate hump-shaped manufacturing employment shares. Their analysis ascribes premature deindustrialisation to relatively sluggish agricultural productivity growth in late starters. As a result, the labour released from agriculture is more likely to move into services rather than manufacturing in these economies, implying that they reach lower peak manufacturing shares, at lower levels of income per capita.

Fujiwara and Matsuyama (2024) attribute premature deindustrialisation to heterogeneous technology gaps across sectors and countries. When technology gaps generate longer adoption lags in services than in agriculture, while agriculture still experiences faster productivity growth than other sectors, poorer countries fall further behind in agriculture than in services. As a result, they reach their manufacturing peaks later in time than richer economies, but at lower productivity levels – hence prematurely. Moreover, if adoption lags in manufacturing are modest, late industrialisers also exhibit lower peak manufacturing shares than early industrialisers. Under these conditions, the model captures three defining features of premature deindustrialisation: later peaks in time, earlier peaks in income per capita, and lower maximum manufacturing shares.

4.2 The Protectionist Threat

In Section 3, we discussed the role of international trade for industrial development. In fact, openness to trade – including imports of modern inputs and exports of goods and services – has been a pathway to development for many industries, not just manufacturing. At the macroeconomic level, Spence (2008) identified 13 national success stories, i.e. economies that since 1950 have grown at an average rate of 7% a year or more for 25 years or longer. These successes include manufacturing exporters like the East Asian Tigers, commodity exporters like Botswana and Oman, and services exporters like Malta. Exports in one sector can stimulate growth in others, as beef exports boosted services in Uruguay (Amodio et al. 2025a). Static models of gains-from-trade alone cannot explain these growth stories (Costinot and Rodríguez-Clare 2014). Dynamic models are needed, in which openness enables adoption of productive technologies. One such model is that openness provides firms with a larger market size, allowing economies of scale (Goldberg and Reed 2023a).

Though global trade still grows in real terms, recent policy initiatives raise questions about its future (Goldberg and Reed 2023b). On the demand side, some now question whether high-income countries should buy exports from developing countries. This view links foreign trade surpluses to domestic trade deficits and decline (Klein and Pettis 2020, Obstfeld 2024). In the US and UK, growing inequality has coincided with calls for protection, especially in import-competing areas (Bonomi et al. 2021, Choi et al. 2024). This popular backlash, however, was not an inevitable outcome of globalisation. In Germany and France, for instance, inequality has not increased (Milanovic 2016).

On the supply side, industrial policies in low- and middle-income countries restrict exports of industrial raw materials and some food crops, motivated by security or in order to lower domestic commodity costs (OECD 2025). These policies threaten access to intermediate inputs crucial for exports (Amiti and Konings 2007, Fernandes 2007), though in the medium-term there may be adaptation and substitution away from these inputs (Alfaro et al. 2025). Export restrictions on advanced technology, despite the attention they receive, are much more limited. A January 2025 US rule limiting computer chip exports to 150+ countries was rescinded, now focusing mainly on one country.

Three facts clarify the threat of protectionism for industrial development, with different impacts across agriculture, industry, and services.

4.2.1 Protectionism is rising, but only in a few markets

Though the US has now raised tariffs on many countries, its global import share is just 15% today, down from 20% in the 2000s. Neighbours like Canada, Mexico and Haiti are highly dependent, but it counts for less than a fifth of most other countries' exports. This suggests existing relationships can be used to develop other markets rather than reducing total exports, especially as other economies grow.

Another trade barrier has been in the EU, which now protects against trade in goods linked to deforestation or carbon intensity. Yet these policies are limited to a small number of commodity products: the Carbon Border Adjustment Mechanism targets just six (i.e. iron and steel, aluminium, cement, fertiliser, hydrogen, and electricity) and the Deforestation Regulation targets just seven (i.e. cattle, cocoa, coffee, oil palm, rubber, soya, and wood). These policies do not affect most export opportunities in manufacturing or services, suggesting a limited impact outside commodity sectors.

With declining demand from the US and EU, the biggest export growth opportunity is in middle-income countries that are growing faster than high-income countries, or so-called South-South trade. This story played out in the 2001–2014 period, as commodity demand in East Asia drove rapid growth in commodity exporters, especially in Africa, though this did not drive industrial development in Africa, potentially due to competition from East Asia itself in value-added manufacturing. Yet as East Asian countries' costs rise and move into still higher-value exports, opportunities could open for other regions, as has happened in textiles and apparel. New regional trade agreements like the Africa Continental Free Trade Agreement and the Regional Comprehensive Economic Partnership, which lower trade barriers but do not materially discipline industrial policies, create more opportunities to experiment with new exports in local markets.

A challenge for South-South trade is that many Southern countries export similar goods, limiting trade gains. Heterogeneous growth paths, coupled with the development of new industries across Southern economies, are needed to generate distinct comparative advantages and reduce reliance on the North.

4.2.2 Protectionism against China creates opportunities for other countries

China's rise as a competitive exporter has been a major theme of recent decades. This rise has been driven by a combination of savings, openness, and industrial policy, with subsidies that are phased out after industries mature (Barwick et al. 2025, Fang et al. 2025). Mature industries remain competitive given domestic scale, supply chains, and research and development.

Protectionism focused on China specifically opens space for bystander countries with fewer advantages. Evidence shows that other countries' exports often substitute Chinese imports rather than complement them (Fajgelbaum et al. 2024). Consistently, the late 2010s US-China tariff war coincided with trade growth and increased exports from Mexico and Vietnam to the US, both in terms of locally manufactured substitute goods and transshipments (Alfaro and Chor 2023, Iyoha et al. 2024). McKinsey Global Institute (2025) finds that European exporters are best positioned to fill gaps, though these opportunities could be exploited by other regions.

4.2.3 Export restrictions on commodities in lower-income countries

Protectionism in low- and middle-income countries mainly uses export restrictions, a second-best industrial policy intended to promote learning-by-doing in commodity-using industries by lowering their input costs. Countries with limited fiscal space may prefer this over direct subsidies, the first best tool to promote learning-by-doing. Since industrial development depends on many factors other than input costs, including access to markets, human capital, and regulation, there is good reason for scepticism that commodity export bans alone can promote development. Regardless, countries are increasingly experimenting.

For example, Indonesia's 2014 nickel ore export moratorium triggered foreign investment in processing, raising processed nickel exports that are inputs to steel and batteries. Early evidence shows increased domestic value added and downstream entry as a result, though many entrants are small and potentially unproductive, and there remains dependence on imported steel (Kee and Xie 2025). Further study is needed, and perhaps more time, to identify whether there has been an aggregate impact on productivity, wages, and employment.

4.2.4 Policy implications

Trade shocks stress emerging economies but are not insurmountable. Opportunities to grow agribusiness, industry, and services exports continue to exist. Further, as middle classes grow, they can serve as an alternative source of demand (Goldberg and Reed 2023a).

The export promotion toolkit, which can be implemented cheaply and does not violate international trade rules, remains highly relevant as countries develop new markets (Reed 2024). Experimentation with market interventions like subsidies, export restrictions, and local content requirements, could theoretically yield gains if they address market failures, but more research is needed to test this hypothesis.

4.3 Automation and Jobless Industrialisation

Industry in advanced economies has been transformed over the last decades by mechanisation and the adoption of robots. Industrial robot adoption remains much lower among firms in low- and middle-income countries than in rich countries, but adoption rates are rising. The diffusion of industrial robots raises the possibility that productivity gains from industrialisation may no longer translate into broad-based job creation, reinforcing concerns about 'jobless industrialisation'. Understanding whether automation primarily destroys jobs, reshapes the task composition of work, or alters countries' integration into global value chains is therefore crucial for assessing its implications for structural transformation and inequality.

This section reviews the emerging evidence on automation in low- and middle-income countries, focusing on three interrelated questions. First, how does robot adoption affect employment, wages, and occupational structure in developing economies, both directly and through trade and production networks? Second, what economic forces are driving the recent acceleration in automation, and how do these forces differ from those emphasised in advanced economies? Third, to what extent are industrial robots an appropriate technology for labour-abundant countries, and what frictions limit the realisation of productivity gains? The discussion concludes by drawing out the policy implications of these findings.

4.3.1 Automation in the Developing World

The effects of robot adoption in emerging markets are similar to those identified in rich countries. Rather than creating massive unemployment, robots have induced a reallocation of workers across occupations and sectors. Evidence also shows that the impacts of industrial robots can reach countries with little or no adoption through global value chains and trade links.

In 2020, high-income countries accounted for roughly 60% of the global stock of industrial robots, China for about 30%, and other low- and middle-income countries for the remaining 10%. In advanced economies, the stock of industrial robots more than doubled between 2000 and 2020, increasing by approximately 125% (IFR 2020). Evidence from these economies indicates that robot adoption tends to displace low-skill, routine workers, while its effects on aggregate employment are more mixed. In the US, Acemoglu and Restrepo (2020) estimate the negative impacts of robot exposure on employment and wages in commuting zones, concentrated among routine jobs with lower skills. The cross-country evidence in Graetz and Michaels (2018) similarly points to displacement of lower-skill workers, even as robots contribute meaningfully to productivity growth – illustrating the trade-off between efficiency gains and distributional costs.

In emerging countries – excluding China – the diffusion of industrial robots has accelerated notably since the late 2000s, with their share of the global robot stock rising from 2% in 2000 to 10% in 2020. Despite this growth, the predominant labour market effect appears to be reallocation of workers across occupations rather than rising unemployment, and in certain cases even employment gains. In Thailand, Jongwanich et al. (2022) find shifts in employment between skilled and unskilled jobs. For Brazil, Rodrigo (2022) shows that automation induced a reallocation of workers across occupations, moving from production to support activities even within the

same firms. de Souza and Li (2025) highlight that these effects are concentrated among low-skill workers. For Mexico, Faber (2020) documents no statistically significant effect of domestic robots, but a robust negative effect of automation in an advanced-economy trade partner (notably the US) that transmits through the global value chain, depressing employment and relative wages in more integrated Mexican sectors and regions.

China stands out among emerging economies for its dramatic rise in robot adoption. Its share of the global industrial robot stock increased from less than 1% in 2000 to 30% in 2020, catching up with advanced economies in terms of robot density – i.e. the number of robots per 10,000 employees (IFR 2020). Giuntella et al. (2024) document that this expansion was accompanied by reductions in employment and hourly earnings, concentrated among the less educated. The effect was larger for male, prime-age, and older workers.

Still, by 2020, nearly 140 developing countries had a robot density below one robot per 10,000 employees, 84% of them with no record of installed robots (IFR 2020), partly because cheap labour discourages investments in labour-saving technology (see Section 4.3.3). While these nations might be exempt from the direct effects of robots, they might still be indirectly exposed to the effects of automation technology through changes in trade patterns with more technologically advanced trade partners (Krenz et al. 2021, Cilekoglu et al. 2024).

Kugler et al. (2020) and Calì and Presidente (2025) analyse the effects of automation in two developing countries – Colombia and Indonesia – where robot adoption has been minimal. Kugler et al. (2020) show that Colombian workers in industries more exposed to US robot adoption experience lower cumulative earnings and longer job tenures. They further find that workers who switch firms within the same industry largely avoid earnings losses, whereas those who change industries or locations suffer the largest income declines. In contrast, Calì and Presidente (2025) document positive labour market and plant-level employment effects from robot adoption in Indonesia. They attribute these gains to industrial automation having diminishing productivity returns, suggesting that robots can be employment-enhancing at early stages of industrialisation when untapped automation possibilities abound and the productivity gains from adoption are the largest.

4.3.2 Drivers of Automation

In this section, we examine three forces driving the surge in robot adoption: falling robot prices, rising wages of low-skilled workers, and population aging. Together, these forces push firms to automate tasks once done by workers by making capital cheaper relative to labour.

Falling prices have been the main driver of industrial robot adoption. Over the past 20 years, robots of all types have become more affordable. Adachi et al. (2024), tracking unit prices in Japan, show that, since the 1980s, welding robots have become 60% cheaper, while robots in other applications cost from 20% to 40% less. Because Japan is one of the world's largest exporters, these price declines have fuelled adoption worldwide. Adachi (2025) shows that cheaper robots in Japan lead to higher adoption of them in the US, causing lower employment. Ayyagari et al. (2025) shows that the sudden yen depreciation in the first half of 2010s also led to an increase in robot adoption in the US.

These studies find that robot adoption is highly elastic to robot prices. Adachi et al. (2024) finds an elasticity of 1.5% for Japan, while de Souza and Li (2025) estimate an elasticity of 7% for Brazil. In the US, Ayyagari et al. (2025) find that a 10% yen depreciation raises the probability of robot adoption by 2.3 percentage points.[14]

Across several studies, industrial robots have been shown to replace low-skilled workers. Firms face a trade-off: they can produce a given task using either robots or low-skilled production workers. Therefore, if the wage of low-skilled workers increases, firms may increase their use of robots. Dechezleprêtre et al. (2025) show that an increase in the wage of low-skilled workers increases automation by up to 5%. They also show that this effect has implications for policies. The German Hartz labour market reforms, which tightened unemployment benefits and expanded low-wage employment opportunities, increased labour force participation among low-skilled workers and led to a decrease in automation. In India, using granular firm-level data on machinery and computer investment, Gauthier (2025) shows that firms intensive in routine tasks invest more in machinery and computers following minimum wage hikes.

Population aging is another key force behind automation. Japan, one of the main producers of industrial robots, illustrates this phenomenon well. Between 1980 and 2000, the share of Japanese aged over 65 rose from 9% to 17%. In the same period, robot adoption jumped from near zero to five per thousand workers – the highest rate worldwide (Adachi et al. 2024). The surge in retirees created a shortage of production workers, which in turn led to robot adoption (Deng et al. 2023).

Acemoglu and Restrepo (2021) shows that the link between aging and robot adoption extends well beyond Japan. In a cross-country panel, they show that countries that aged faster also adopted more robots, produced more automation-related patents, and exported more automation technologies. Their model explains the rationale behind this pattern: as aging makes middle-aged workers relatively scarce, their wages rise, prompting firms to substitute costly labour with industrial robots.

This substitution of middle-aged workers with robots has important implications for growth. As countries age, labour force participation and worker productivity decrease. Yet, as Acemoglu and Restrepo (2017) shows, robots offset these losses by replacing scarce middle-aged workers, allowing economies to keep growing despite shrinking workforces.

These forces also carry important implications for developing countries: robot adoption there is likely to rise. Like advanced economies, developing countries face aging populations, and as they grow, the wages of low-skilled workers tend to increase. Combined with the steady decline in robot prices from technological progress, these trends point to a future where developing countries adopt industrial robots at accelerating rates.

14 This trend is not unique to industrial robots. Using Brazilian import data, de Souza and Li (2025) show that over the past 20 years the prices of capital goods have fallen broadly, with labour-substituting machines becoming **49%** cheaper and labour-complementary machines **42%** cheaper.

4.3.3 Industrial Robots and Appropriate Technology

In developing countries, low-skilled labour is abundant while capital is scarce. The adoption of robots in these countries creates a mismatch: industrial robots rely on the scarce factor (capital) and replace the abundant one (labour). This mismatch has long been recognised in growth theory. When technologies are designed in advanced economies to reflect their factor endowments, they may be ill suited for developing economies, where labour-intensive technologies would be more productive (Acemoglu and Zilibotti 2001, Basu and Weil 1998). Because R&D is concentrated in advanced economies, developing countries often end up adopting technologies that are not well aligned with their relative factor abundance, which depresses the productivity benefits they can reap.

This tension plays out at the firm level as well. When firms adopt a new technology such as robots, they face a skills and organisational mismatch that must be resolved before productivity gains can materialise. The adoption of robots depreciates the existing organisational capital, forcing companies to invest in training and reorganisation until finding the new skill mix to effectively operate the new technology. Rodrigo (2022) provides evidence from Brazil illustrating this process: robot adoption triggered major labour reallocation within firms, shifting workers from production to support roles. Such reorganisation was costly and gradual enough to explain the slow emergence of productivity gains. The study also shows that this process is slower in labour markets with high firing costs.

If capital-intensive technologies such as robots are often inappropriate for developing countries, why do firms adopt them? de Souza (2022) develops a model that answers this question. In his framework, firms face a trade-off between two characteristics of a technology: its factor bias and its productivity level. Consider industrial robots. Their capital-intensive nature makes them poorly aligned with the input mix typical of developing economies, which discourages adoption. Yet, if robots have sufficiently large productivity, firms may still choose to adopt them despite the mismatch. The result, at the aggregate level, is that robots raise productivity but also shift factor demand, reducing the need for low-skilled labour while increasing the return to capital. Firms in developing countries thus become more productive than they would be without these technologies, but remain less productive than firms in advanced economies where the technologies are truly appropriate.

4.3.4 Policy Implications

If the realisation of the productivity gains associated to automation technology depends on firms' capacity to adjust their organisation, then subsidies for retraining, providing managerial capacities, as well as unemployment benefits and adjusting the labour regulation towards more flexible systems that facilitate labour mobility, might be more effective policies than tax cuts or other type of incentives for technology adoption.

As for the problem of appropriate technology, there are two possible policy solutions. One is to subsidise the development of local technologies. However, recent evidence suggests that such programmes often fail to address the problem because firms in developing countries tend to use these subsidies to imitate foreign technologies (de Souza 2023, König et al. 2022).

The other possible policy solution, emphasised by de Souza and Li (2025), is to subsidise technologies that complement labour rather than replace it. In a model calibrated to Brazil, they distinguish between labour-replacing technologies, such as robots, and labour-complementing technologies, such as tools. Their results show that subsidising tools raises welfare by promoting redistribution.

4.4 Firm Size Distribution

Industrialisation also goes along with changes in the size of firms in an economy. The distribution of firm sizes and the organisation of production differ markedly between rich and poor countries. The average size of firms is much higher in richer countries (Poschke 2018, Bento and Restuccia 2017, 2021) and, by reflection, the share of self-employed workers is much lower (Gollin 2008, Donovan et al. 2023). In the US, more than 80% of employment is in firms with 10 or more employees, while it is only 15% in low-income countries (Gottlieb et al. 2025). Because larger firms pay higher wages, this also affects inequality. Recent evidence shows that workers' individual income and business size are more tightly correlated in less developed countries compared with advanced economies, even conditional on individual characteristics and sector of employment (Eslava et al. 2023).

The most recent findings from Ethiopia and Tanzania highlight a sharp dichotomy between large industrial firms that exhibit strong productivity performance but generate few jobs, and small manufacturing firms that absorb labour without corresponding productivity gains (Diao et al. 2025). The empirical likelihood that informal microenterprises become larger and pay higher wages is also low (Eslava et al. 2024). A possible explanation for these findings is that larger firms nowadays use less labour-intensive production technology than in the past, while smaller firms produce local non-tradable goods – e.g. food stands, customised garment making – whose demand increases with local income. This implies, however, a tighter link between the number of jobs at modern industrial firms and employment at smaller informal firms. Indeed, recent evidence from Ethiopia shows that when the number of industrial jobs increases, employment at small informal firms also rises, challenging the dichotomous view presented above (Amodio et al. 2025b).

The literature seeking to explain the relative scarcity of large firms in poor countries points to a range of frictions and distortions, including entry costs (Moscoso Boedo and Mukoyama 2012, Poschke 2010), labour market regulation (Hopenhayn and Rogerson 1993, Poschke 2009, Ulyssea 2010), financial frictions (Buera et al. 2011, Midrigan and Xu 2014), delegation frictions (Akcigit et al. 2021, Grobovšek 2020, Guner et al. 2018), and generic wedges (Bartelsman et al. 2013, Hsieh and Klenow 2009, Restuccia and Rogerson 2008). Others have argued that small firm sizes may be an optimal reaction to a different environment, for example in terms of the level of capital (Gollin 2008) or of technology (Poschke 2018). High levels of churn in labour markets in poor countries also affect employers' incentives to create formal jobs (Donovan et al. 2023, Poschke 2025).

More recent literature highlights the role of labour market structure and limited competition in shaping employment outcomes (e.g. Amodio and de Roux 2024, Felix 2022, Sharma 2024). When industrial jobs are concentrated among a few dominant firms, these firms can internalise the aggregate impact of their own labour demand, reducing job opportunities, suppressing wages, and offering worse working conditions relative to a perfectly competitive benchmark. This helps explain why self-employment remains relatively attractive to unskilled workers in poor countries (Blattman and Dercon 2018). At the same time, the availability of self-employment as a readily accessible outside option increases workers' responsiveness to wage changes and can mitigate the wage-setting power of large firms. By the same token, however, policies that seek to expand wage employment by reducing reliance on self-employment may inadvertently strengthen employer market power, making such policies less effective than intended (Amodio et al. 2025c, Amodio et al. 2025d).

A crucial aspect of employment at large firms is that it also entails higher skills and white-collar occupations such as managers, accountants, purchasing agents, and clerks. For this reason, recent papers have focused on skill supply or lack thereof in explaining differences in the firm size distribution and development across countries. Engbom et al. (2025) show that differences in aggregate skills entirely account for the lower share of white-collar workers in poorer vs richer countries. In addition, Gottlieb et al. (2025) show that the skill intensity of larger firms is higher in poorer countries, where the skill premium and cost of middle management are relatively higher (Hjort et al. 2022). Cox (2025) shows that the 1996 higher education reform in Brazil that deregulated private colleges increased the prevalence and employment share of large firms. These studies suggest that education policies that expand the supply of skills can be powerful tools for promoting firm expansion in low-income countries.

Finally, some recent studies prompt us to reconsider the very same way we define the boundaries of firms and the separation between capital and labour within firms in developing countries. Surveying manufacturing firms in Uganda, Bassi et al. (2022) find that small firms in informal clusters are connected through an active rental market for machines that allows them to mechanise production. Crucially, when moving from a management-based (workers under the same management), to a machine-based (workers using the same machine) definition, the share of firms with more than 10 employees increases from 5% to 33%. At the same time, however, Bassi et al. (2023) show that somewhat larger firms in this context lack vertical specialisation between employees and entrepreneurs, and are little more than a collection of self-employed individuals sharing the same space. To conclude, McCasland et al. (2024) provide experimental evidence that workers supply both labour and capital to their employers, with important implications for the measurement of labour and capital compensation and returns, and their dispersions across firms.

5. Service-Led Growth

5.1 Services and Development

We already saw in Section 2 that the share of economic activity devoted to services rises continuously with aggregate income. Several theories can explain this fact, including those based on income effects and relative price mechanisms. As consumers grow richer, they devote a growing share of consumption expenditures towards services rather than agricultural or manufactured goods (Kongsamut et al. 2001, Herrendorf et al. 2014, Boppart 2014, Comin et al. 2021, Fan et al. 2023). Agriculture and manufacturing experience faster productivity advances than services, so that as production in these sectors becomes more efficient, they 'shed' labour and other economic resources towards the service sector (Baumol 1967, Ngai and Pissarides 2007, Acemoglu and Guerrieri 2008). Other explanations include rising marketisation – services are only counted in economic statistics when they are provided by the market and not by household members (Ngai and Petrongolo 2017) – and the growth of specialised human capital, which is tailored towards service provision (Buera and Kaboski 2012).

All of these explanations imply that a maturing economy will see a rising service share, but it is not clear what the implications are for productivity growth. The pessimistic view, famously argued by Baumol (1967), is that a rising service share spells a productivity slowdown: it is hard to imagine the haircut industry advancing at the same rate as the automotive industry. But more recent work finds that the service sector can share several of the features that were long thought to make manufacturing an engine of growth. For example, many services are tradable across space, making them a potential export (Breinlich and Criscuolo 2011), and even non-tradable services can scale up production by replicating service processes across many locations (Hsieh and Rossi-Hansberg 2023). Some service industries make significant investments in R&D (Nayyar et al. 2021), and many of them, like IT, have strong sectoral linkages that can improve the productivity of other sectors (Manelici and Pantea 2021).

Much of the existing research on productivity in services has focused on high-income economies, because services were not thought to be a central sector up until later stages of the income ladder. But the trend towards premature deindustrialisation has placed a spotlight on services in lower-income economies. Whether or not this trend should be concerning to policymakers is an open question. Some analyses based on development accounting methods have measured significant growth in overall service productivity in India and China (Fan et al. 2023, Chen et al. 2023). These studies employ a macro-level approach that uses a model to infer changes in service productivity from sectoral employment shifts while accounting for some of the other explanations above, such as shifting consumer demand and rising productivity in agriculture and manufacturing. Essentially, the accounting approach argues that if service employment increased more than can be explained by reasonable estimates of productivity growth in agriculture and manufacturing, then this is a sign of rising service productivity. On the more cautious side, Rodrik and Sandhu (2025) argue for vigorous policy interventions to raise productivity in specific service industries and provide an overview of 20 such interventions. While many of the interventions were successful, not all of them were subject to formal evaluations from rigorous microeconometric techniques.

Our aim in the rest of this section is to summarise a broader set of research on productivity in services, most of which uses administrative microdata to assess the causes and consequences of growth in the service sector. A limitation of administrative data, however, is that it typically contains information only on the formal sector of the economy, while the service sector contains a large share of the informal economy. Research on these informal service providers must typically rely on survey data, which are typically not representative at fine geographical levels, especially outside of large urban areas.

Another challenge is that the service sector is broad and varied. Any activity that cannot be categorised as agriculture, resource extraction, or manufacturing is classified as a service - from cleaning to healthcare to banking. In this review, we divide our detailed discussion of the evidence into two broad service categories: *production services*, which share many characteristics with manufacturing despite their less tangible nature, and *consumption services*, which are less akin to manufacturing and make up the majority of the service sector in low- and middle-income economies. Within each category of services, we review the literature on three key lines of questioning: first, how demand for these services materialises; second, what we know about productivity growth; and third, the implication of growth in these service industries for the distribution of income in low- and middle- income economies.

5.2 Production (Business) Services

5.2.1 The demand for production services

What generates the demand for production services in the context of low- and middle-income countries? In contexts with a stagnant industrial sector, demand for business services might be low, but an increase in market access can trigger demand for upstream services. Avdiu et al. (2025) find that improvements in the road sector in Turkey allowing manufacturing firms to grow larger ended up in a higher demand for business services activities nearby. Similarly, Amodio et al. (2025a) show that an export boom in one specific industry (beef production in Uruguay) benefitted firms upstream, many of which offer business services (e.g. transportation, ICT, real estate).

Historically, some of the key industries in the services sector (e.g. financial or transportation) have been under state control and more restricted to (foreign) competition. Furthermore, higher barriers to trade in services are currently in place. According to the OECD Services Trade Restrictiveness Index (STRI), the average level of restriction of non-OECD countries is 1.5 times larger than the OECD countries. Early evidence on service liberalisation policies offer an ideal context to study the rise of producer services (and their implications) in a quasi-experimental setting. For instance, early episodes related to the removal of restrictions in the services sector have been found beneficial for manufacturing firms, especially those more reliant on such services (Arnold et al. 2011, Arnold et al. 2016, Bas 2014, Fernandes and Paumov 2012). Demand increases as new or better services are introduced, or just because the entry of additional providers reduces prices. As a consequence, countries can alter their comparative advantage in favour of those manufacturing sectors that are intensive in business services, as shown by Liu et al. (2020).

In many cases, firms can only access a limited amount of business services, and at lower quality relative to the frontier. Industrial policy can incentivise the demand for specific types of business services. For instance, Manelici and Pantea (2021) analyse a policy that supports the IT sector in Romania and find that this has indirectly supported downstream firms that were more intensive in IT usage to start with.

Finally, firms might have incomplete information on the returns to specific services and/or their availability. An example of this is consultancy services. In an experiment in India, Bloom et al. (2013) provide local firms with support from an international consultancy regarding their management practices. They report that large firms either do not believe that established management practices affect their performance, or do not have information about the availability of less established ones. A related issue is how to facilitate the adoption of such business services, especially in smaller firms, and whether business services should be incorporated through outsourcing or internal strategies. Two experimental works suggest policy avenues. Anderson and McKenzie (2022) show that for smaller firms (subsidised) insourcing or outsourcing are more impactful than introducing services through internal training. In a sample of Colombian small firms, Lacovone et al. (2022) showed instead that group-based consulting can be an effective model for delivering producer services.

5.2.2 Productivity growth and production services

There are different channels through which production services can support productivity growth, both directly and (especially) indirectly, through linkages with other sectors. Most of the available evidence is related to the effect of some specific types of business services provision on the productivity of firms downstream. Introducing new or more sophisticated services (e.g. ICT) can contribute to enhancing market opportunities and the knowledge capital of a firm. For instance, Hjort and Poulsen (2019) show that the arrival of high-speed internet cables in Africa had an effect on local employment, as access to ICT services promoted firm entry, R&D and productivity growth.

Consulting services aimed at improving management practices affect operational efficiency, as emphasised by a now large body of evidence, including from small firms in low-income countries (refer to McKenzie et al. 2025). This happens through several mechanisms, which mostly occur through filling knowledge gaps in adoption of (standard and non-standard) organisational routines, and learning by doing.

Stronger competition in the provision of production services also allows downstream firms to reduce production costs. For instance, Bas (2020) studies India's liberalisation of communication and energy services, and shows that this affected firms' productivity through an increase in innovation activities, which the author relates to an increase in profitability due to the lower prices of upstream inputs.

While evidence convincingly shows productivity spillovers downstream, little is known about the drivers of productivity growth for firms in the production services sector itself. There is some evidence that providers of business services are especially reliant on (soft and hard) infrastructures, such as high-speed internet. Hence, the provision of such infrastructures can improve the availability of key business services and affect their performance, with overall benefits to productivity growth. For instance, Mensah and Traore (2024) use the staggered entry of high-speed internet in Africa to show that it has contributed to attracting new foreign investors, and especially those offering advanced business services. Relatedly, D'Andrea and Limodio (2024) show evidence of credit expansion in Africa due to access to fast internet and attribute this better performance to the possibility of adopting technologies that lower transaction costs, enable smoother interbank coordination, and increase liquidity efficiency within banking networks.

Finally, there is very little evidence on the role of the distribution and retail sector, despite the sector representing a large share of firms' costs, and its market structure having important consequences on the size and the distribution of welfare. For instance, Peter and Ruane (2022) show that, across Indian firms, distribution costs account for a substantial share of revenues (about half the size of labour costs), and that low TFP in the distribution sector amplifies welfare losses by constraining firms' ability to reach markets. Understanding the sources of inefficiency in distribution, while also accounting for the trade-offs in sector organisation (as in Grant and Startz 2022), is a promising avenue for research, particularly in countries where remoteness remains a central challenge (Atkin and Donaldson 2015).

5.2.3 Distributional effects

While the development of production services may be a source of growth, it may also accentuate inequality in at least two ways. The first are agglomeration economies: since business services are more likely to cluster geographically, their development may reinforce regional differences. For instance, the work by Kirui et al. (2026) - using finely disaggregated administrative data for

Kenya – shows that formal employment in production sectors is largely concentrated in main cities and metropolitan areas, and almost absent in small cities and rural areas. Chatterjee et al (2025) show that high-skill service employment exhibits a higher regional concentration than other sectors, including other services, manufacturing, or agriculture. This is consistent with models of urban agglomerations driving urban premia, which in high income countries were driven by the boom of IT-related business services (Eckert et al. 2022). Second, production services generally employ more highly educated workers (Chen et al. 2023), and their development is likely to widen income disparities across workers. For a sample of thirteen African countries, Baccini et al. (2023) report that while the services sector generally employs the largest share of better educated workers, it is exactly in producer services (along with health and education) that skilled workers in more complex occupations are concentrated.

5.3 Consumer Services

5.3.1 The demand for consumer services

Classic theories attribute consumer service sector growth primarily to productivity improvements in agriculture and manufacturing, which in turn free up resources and generate downstream demand through rising incomes. Recent microeconomic evidence offers some nuance as to how these dynamics unfold at the local level. For example, exploiting plausibly exogenous shocks to industrial employment in India, Parvathaneni and Yang (2024) document the downstream effects of industrial expansion on the service sector. Wage growth and increased household income from industrial jobs translate into heightened demand for local services.

In addition to income gains from industrial wage employment, commodity booms (Gollin et al. 2016, Bernstein et al. 2022, Toews and Vézina 2022, Amodio et al. 2025a) and remittances (Dinkelman et al. 2024) have also been associated with expansions in service sector enterprises and employment. In Malawi, the inflow of capital sent home by migrants contributed to investments in physical and human capital and a resulting structural transformation towards non-agricultural sectors, mostly services (Dinkelman et al. 2024). Relying on data from over 116 locations up until 2010, Gollin et al. (2016) document how the export of natural resources can spur urbanisation and the emergence of so-called consumption cities that are centred around services. Baccini et al. (2023) show that, regardless of its underlying drivers, urbanisation more broadly is strongly associated with a shift towards service sector employment.

Even in the absence of rising local incomes, rural-urban migration can stimulate service sector growth by expanding local demand, coupled with an increase in labour supply. Using evidence from Brazil, Imbert and Ulyssea (2024) show that while most rural migrants initially enter informal employment, the resulting increase in labour supply supports firm growth and, in the longer term, facilitates formalisation within the local service sector.

A common concern surrounding consumer services is that their often non-tradable nature may impose constraints on the size of the market firms can access. This demand constraint might limit potential gains from economies of scale (Rodrik 2016). However, recent access to granular data on the geography of consumer spending and service provision has introduced several nuances to our understanding of how local consumer demand really is and the demand constraints firms face.

First, demand for consumer services can be shaped by consumers rather than goods moving across space, at least temporarily. A common example of this is tourism (Faber and Gaubert 2019). More broadly, mobile phone and credit card data reveal that a substantial share of consumer service spending by rural residents occurs in urban areas (Andersen et al. 2023, Blanchard et al. 2025). Blanchard et al. (2025)'s estimates based on mobile phone data for Kenya, Tanzania, and Nigeria suggest that 10–15% of all customers in urban service establishments are non-local visitors. This suggests that the effective demand for urban services depends not only on local population density and income, but also on patterns of intra-urban mobility and rural-urban travel. This is also reflected in the role ownership of complementary assets, such as refrigerators and personal vehicles, plays in shaping the demand for consumer services, in particular retail (Lagakos 2018, Schwartzman 2025).

Second, there is growing evidence that consumer services can themselves become engines of local demand. Schwartzman (2025) and McCullough (2025), studying Brazil and Tanzania respectively, show that employment growth in modern consumer services can generate positive income effects that reinforce local demand, setting off a virtuous cycle of expansion.

The root of these income effects is the productivity gap between modern consumer services, mostly formal firms employing wage labour, and traditional services, mostly informal firms that rely on self-employment. Because of this productivity gap, the shift of workers into the modern sector generates income gains that translate into demand shifts, pulling even more workers into the modern sector.

Finally, digital platforms for accommodation services and transportation, and e-commerce for retail are reshaping the matching of service providers (or in the case of e-commerce, sometimes directly producers) and customers (Nayyar et al. 2021).

5.3.2 Productivity growth and consumer services

As noted in the introduction, growth in consumer services can stem not only from rising incomes, but also from productivity improvements within the sector itself. Fan et al. (2023) estimate that service-led growth accounted for roughly one-third of the increase in welfare in India between 1987 and 2011. Similarly, Schwartzman (2025) finds that a large share of the service sector expansion in Brazil during 2000–2010 can be attributed to the adoption of modern service sector technologies. Identifying the role of specific technologies, like payment systems, logistics, and studying their implications for aggregate and distributional effects of service-led growth is a promising area for future research.

Of all consumer service subsectors, retail is arguably the one in which our understanding of productivity drivers has advanced the most in recent years. Centralised distribution systems, such as those employed by Walmart, have been shown to generate substantial efficiency gains. Importantly, retail chains not only innovate internally but also induce productivity improvements among upstream suppliers (Javorcik and Li 2013, Iacovone et al. 2015). By providing its suppliers with access to larger markets, Walmart's entry in Mexico resulted in aggregate productivity enhancing reallocation and higher rates of innovation (Iacovone et al. 2015). In both the US (Jia 2008) and Mexico (Atkin et al. 2018), Walmart's entry displaced local retailers. Atkin et al. (2018) document that at least on the metric of aggregate welfare, the adverse employment effects were offset by consumer welfare gains arising from lower prices and increased product variety.

In a similar vein, Faber and Gaubert (2019) show that aside from expanding market access for businesses in the tourism sector and their upstream suppliers, tourism in Mexico generated local agglomeration economies. Such spillovers can, for example, arise if tourism revenues loosen local business constraints or access to other business services and networks is facilitated. At a local level, agglomeration economies offset negative effects due to rising costs for local manufacturing. However, at a national level the gains from such agglomeration forces in tourist destinations are muted due reallocation of economic activity towards them and away from other parts of the country.

While cross-border trade in consumer service outputs is limited to specific subsectors like tourism, inputs of consumer services are very often highly tradable. Srhoj and Mikulić (2025) use firm-to-firm transaction data to trace input flows in Croatia's tourism sector, estimating that 54% of inputs, capturing both direct and indirect linkages, originate from imports. Qualitatively, Das Nair et al. (2018) show that regional supermarket chains in Southern Africa rely heavily on imports from South Africa. While tourism and retail thus have the potential to drive productivity in upstream sectors, integration of domestic suppliers in their supply chain is a precondition for local spillovers. At the same time, e-commerce platforms increasingly allow even small retailers to source diverse product varieties, including internationally, that better match local consumer preferences (Argente et al. 2025).

Refining the methodological toolbox of how we assess the productivity of consumer service firms is another promising route towards enhancing our understanding of where and how productivity gains and innovation arise. De la Parra and Shenoy (2024) argue that standard one-stage production models, commonly used in manufacturing, can be misleading when applied to retail, where the output is better conceptualised as a successful match between products and consumers. They propose an alternative framework that estimates productivity along three distinct dimensions: the ability to attract customers, the efficiency of sourcing and inventory management, and the selection of product mix and suppliers.

5.3.3 Distributional impact

While service-led growth in consumer services can generate welfare gains across the income distribution, these gains are often concentrated among higher-income urban households. Fan et al. (2023) find that the welfare effects from productivity improvements in services largely benefitted the top income deciles in urban areas. In contrast, welfare gains among rural households over the same period were largely driven by productivity increases in agriculture. Atkin et al. (2018) document that households in the richest income group experienced 50% higher welfare gains than households in the poorest income group as a result of Walmart's entry in Mexico.

Further, a large share of employment in consumer services occurs in informal work arrangements. However, recent studies provide evidence that service sector growth is not confined to the informal sector only, but can indeed be an important driver of formal sector employment growth (Imbert and Ulyssea 2024, Schwartzman 2025, Kirui et al. 2026). Imbert and Ulyssea (2024) provide an example for a case where a reduction in input cost allowed more firms to transition into formality. Documenting recent trends in formal sector employment between 2015 and 2024 in Kenya, Kirui et al. (2026) find that consumer service firms account for almost all newly created jobs in small towns and rural areas. This underscores the importance of consumer services for development policies focused on regions outside major urban centres. Questions surrounding which policy environments or interventions can improve employment conditions and enhance firm productivity in consumer services leave ample room for further research.

5.4 Policy Implications

The evidence outlined in this section points towards an important role for productivity and virtuous cycles in generating growth through services. Beyond its contribution to aggregate output and productivity, the service sector now accounts for roughly half of global employment (International Labour Organization, ILOSTAT, via World Bank (2025) - processed by Our World in Data), implying that it warrants more attention from policy makers and researchers alike.

Policymakers face the challenge of fostering formal service jobs that offer higher wages, greater stability, and better working conditions than informal alternatives. Another concern is how service-led growth can be shaped to deliver more equitable welfare gains across income groups and geographic areas. Services liberalisation also remains on the agenda: the sector is still more protected than manufacturing, both in traditional trade and in the rapidly expanding domain of digital trade, which is likely to be the engine of future economic growth. In addition, some countries maintain strong control over key domestic services or restrict the entry of foreign competitors.

Attention must also turn to the drivers of productivity growth in production and consumer services, especially those that extend beyond physical infrastructure. Finally, the rise of AI and large language models poses new uncertainties for service-led growth, raising the possibility that many production services will be automated with only limited employment impacts.

References

Acemoglu, D, V M Carvalho, A Ozdaglar, and A Tahbaz-Salehi (2012), "The network origins of aggregate fluctuations," *Econometrica*, 80(5): 1977–2016.

Acemoglu, D, and V Guerrieri (2008), "Capital deepening and nonbalanced economic growth," *Journal of Political Economy*, 116(3): 467–498.

Acemoglu, D, and P Restrepo (2017), "Secular stagnation? The effect of aging on economic growth in the age of automation," *American Economic Review*, 107(5): 174–179.

Acemoglu, D, and P Restrepo (2020), "Robots and jobs: Evidence from US labor markets," *Journal of Political Economy*, 128, 2188–2244.

Acemoglu, D, and P Restrepo (2021), "Demographics and automation," *Review of Economic Studies,* 89(1): 1–44.

Acemoglu, D, and F Zilibotti (2001), "Productivity differences," *Quarterly Journal of Economics*, 116(2): 563–606.

Adachi, D (2025), "Elasticity of substitution between robots and workers: Theory and evidence from Japanese robot price data," *Journal of Monetary Economics*, 152: 103782.

Adachi, D, D Kawaguchi, and Y Saito (2024), "Robots and employment: Evidence from Japan, 1978–2017," *Journal of Labour Economics*, 42: 591–634.

Akcigit, U, H Alp, and M Peters (2021), "Lack of selection and limits to delegation: Firm dynamics in developing countries," *American Economic Review*, 111(1): 231–275.

Alder, S, T Boppart, and A Müller (2022), "A theory of structural change that can fit the data," *American Economic Journal: Macroeconomics,* 14(2): 160–206.

Alessandria, G, S Y Khan, A Khederlarian, K J Ruhl, and J B Steinberg (2025), "Trade policy dynamics: Evidence from 60 years of US–China trade," *Journal of Political Economy*, 133(3): 713–749.

Alfaro, L, and D Chor (2023), "Global supply chains: The looming 'great reallocation'," NBER Working Paper, 31661.

Alfaro, L, M Eslava, M Mestier, and L Sáenz (2025), "Jobless industrialization," Unpublished manuscript.

Alfaro, L, H Fadinger, J S Schymik, and Virananda (2025), "Trade and industrial policy in supply chains: Directed technological change in rare earths," NBER Working Paper, 33877.

Alfaro-Ureña, A, B Faber, C Gaubert, I Manelici, and J P Vasquez (2022), "Responsible sourcing? Theory and evidence from Costa Rica," NBER Working Paper, 30683.

Allen, R C (2009), The British industrial revolution in global perspective, Cambridge University Press.

Alvarez-Cuadrado, F, and M Poschke (2011), "Structural change out of agriculture: Labor push versus labor pull," *American Economic Journal: Macroeconomics*, 3(3): 127–158.

Alvarez-Cuadrado, F, N Van Long, and M Poschke (2017), "Capital–labor substitution, structural change, and growth," *Theoretical Economics*, 12(3): 1229–1266.

Amiti, M, and J Konings (2007), "Trade liberalization, intermediate inputs, and productivity: Evidence from Indonesia," *American Economic Review*, 97(5): 1611–1638.

Amodio, F, E Benveniste, H Pham, and M Sanfilippo (2025), "The local (informal) multiplier of industrial jobs," Unpublished manuscript.

Amodio, F, E Brancati, P Brummund, N de Roux, and M Di Maio (2025), "Labor market power and self-employment around the world," Unpublished manuscript.

Amodio, F, G Chiovelli, and S Frache (2025), "Beefing up the service sector: Commodity export booms and production network spillovers," CEPR Discussion Paper, 20078.

Amodio, F, and N De Roux (2024), "Measuring labor market power in developing countries: Evidence from Colombian plants," *Journal of Labor Economics,* 42(4): 949–977.

Amodio, F, P Medina, and M Morlacco (2025), "Labor market power, self-employment, and development," *American Economic Review,* 115(9): 3014–3057.

Amsden, A (1989), Asia's next giant: South Korea and late industrialization, Oxford University Press.

Andersen, A, K Huber, N Johannesen, L Straub, and E T Vestergaard (2025), "Disaggregated economic accounts," *Quarterly Journal of Economics*.

Anderson, S J, and D McKenzie (2022), "Improving business practices and the boundary of the entrepreneur: A randomized experiment comparing training, consulting, insourcing, and outsourcing," *Journal of Political Economy*, 130(1): 157–209.

Ang, Y Y (2020), China's gilded age: The paradox of economic boom and vast corruption, Cambridge University Press.

Argente, D, E Méndez, and D Van Patten (2025), "Cross-border product adoption: Individual imports, migrant networks, and domestic retailers," Unpublished manuscript.

Arnold, J M, B Javorcik, M Lipscomb, and A Mattoo (2016), "Services reform and manufacturing performance: Evidence from India," *Economic Journal,* 126(590): 1–39.

Arnold, J M, B S Javorcik, and A Mattoo (2011), "Does services liberalization benefit manufacturing firms? Evidence from the Czech Republic," *Journal of International Economics,* 85(1): 136–146.

Atkin, D (2016), "Endogenous skill acquisition and export manufacturing in Mexico," *American Economic Review*, 106(8): 2046–2085.

Atkin, D, A Costinot, and M Fukui (2025), "Globalization and the ladder of development: Pushed to the top or held at the bottom?" *Review of Economic Studies*.

Atkin, D, and D Donaldson (2015), "Who's getting globalized? The size and implications of international trade costs," NBER Working Paper, 21439.

Atkin, D, B Faber, and M Gonzalez-Navarro (2018), "Retail globalization and household welfare: Evidence from Mexico," *Journal of Political Economy*, 126(1): 1–73.

Atkin, D, and A Khandelwal (2020), "How distortions alter the impacts of international trade in developing countries," *Annual Review of Economics,* 12(1): 213–238.

Atkin, D, and A Khandelwal (2025), "International trade," VoxDevLit, 4(2).

Atkin, D, A K Khandelwal, and A Osman (2017), "Exporting and firm performance: Evidence from a randomized experiment," *Quarterly Journal of Economics,* 132(2): 551–615.

Avdiu, B, B Demir, U Kilinc, T Michalski, and G Nayyar (2025), "Manufacturing-led services growth and structural change," Unpublished manuscript.

Ayyagari, M, V Maksimovic, and A Weinberger (2025), "Automation under constraints: Exchange rates, interest rates, and firm investment," Unpublished manuscript.

Baccini, L, M Fiorini, B Hoekman, and M Sanfilippo (2023), "Services, jobs, and economic development in Africa," *World Bank Research Observer,* 38(1): 147–178.

Bai, C, C T Hsieh, and Z Song (2019), "Special deals with Chinese characteristics," NBER Macroeconomics Annual, 34.

Bai, S, K Krishna, and H Ma (2017), "How you export matters: Export mode, learning, and productivity in China," *Journal of International Economics*, 102: 122–137.

Banares-Sanchez, I, R Burgess, D Laszlo, P Simpson, and J Van Reenen (2024), "Chinese innovation, green industrial policy, and the rise of solar energy," Unpublished manuscript.

Bartelme, D, A Costinot, D Donaldson, and A Rodriguez-Clare (2025), "The textbook case for industrial policy: Theory meets data," *Journal of Political Economy,* 133(5): 1527–1573.

Bartelsman, E, J Haltiwanger, and S Scarpetta (2013), "Cross-country differences in productivity: The role of allocation and selection," *American Economic Review*, 103(1).

Barteska, P, and J E Lee (2023), "Bureaucrats and the Korean export miracle," Unpublished manuscript.

Barwick, P J, M Kalouptsidi, and N B Zahur (2025), "Industrial policy implementation: Empirical evidence from China's shipbuilding industry," *Review of Economic Studies*, 92(6): 3611–3648.

Barwick, P J, H S Kwon, S Li, and N B Zahur (2025), "Drive down the cost: Learning by doing and government policies in the global EV battery industry," NBER Working Paper, 33378.

Bas, M (2014), "Does services liberalization affect manufacturing firms' export performance? Evidence from India," *Journal of Comparative Economics*, 42(3): 569–589.

Bas, M (2020), "The effect of communication and energy services reform on manufacturing firms' innovation," *Journal of Comparative Economics,* 48(2): 339–362.

Bassi, V, L H Li, A Peter, T Porzio, R Sen, and E Tugume (2023), "Self-employment within the firm," NBER Working Paper, 31740.

Bassi, V, R Muoio, T Porzio, R Sen, and E Tugume (2022), "Achieving scale collectively," *Econometrica*, 90(6): 2937–2978.

Basu, S, and D N Weil (1998), "Appropriate technology and growth," *Quarterly Journal of Economics*, 113, 1025–1054.

Baumol, W J (1967), "Macroeconomics of unbalanced growth: The anatomy of urban crisis," *American Economic Review,* 57(3): 415–426.

Bento, P, and D Restuccia (2017), "Misallocation, establishment size, and productivity," *Review of Economic Dynamics*, 9(3): 267–303.

Bento, P, and D Restuccia (2021), "On average establishment size across sectors and countries," *Journal of Monetary Economics,* 117: 220–242.

Bernard, A B, J B Jensen, S J Redding, and P K Schott (2007), "Firms in international trade," *Journal of Economic Perspectives*, 21(3): 105–130.

Bernstein, S, E Colonnelli, D Malacrino, and T McQuade (2022), "Who creates new firms when local opportunities arise?" *Journal of Financial Economics,* 143(1): 107–130.

Betts, C, R Giri, and R Verma (2017), "Trade, reform, and structural transformation in South Korea," *IMF Economic Review*, 65(4).

Blanchard, P, D Gollin, M Kirchberger, and M Peters (2025), "High-frequency human mobility in three African countries," CEPR Discussion Paper.

Blattman, C, and S Dercon (2018), "The impacts of industrial and entrepreneurial work on income and health: Experimental evidence from Ethiopia," *American Economic Journal: Applied Economics*, 10(3): 1–38.

Bloom, N, B Eifert, A Mahajan, D McKenzie, and J Roberts (2013), "Does management matter? Evidence from India," *Quarterly Journal of Economics,* 128(1): 1–51.

Bo, S, C Liu, and Y Zhou (2023), "Military investment and the rise of industrial clusters: Evidence from China's self-strengthening movement," *Journal of Development Economics*, 161.

Bolt, J, and J Luiten van Zanden (2024), "Maddison Project Database 2023," Dataverse.

Bonomi, G, N Gennaioli, and G Tabellini (2021), "Identity, beliefs, and political conflict," *Quarterly Journal of Economics,* 136(4): 2371–2411.

Boppart, T (2014), "Structural change and the Kaldor facts in a growth model with relative price effects and non-Gorman preferences," *Econometrica*, 82(6): 2167–2196.

Brandt, L, and K Lim (2024), "Opening up in the 21st century: A quantitative accounting of Chinese export growth," *Journal of International Economics,* 150.

Brandt, L, D Ma, and T G Rawski (2014), "From divergence to convergence: Reevaluating the history behind China's economic boom," *Journal of Economic Literature*, 52(1): 45–123.

Brandt, L, J Van Biesebroeck, L Wang, and Y Zhang (2017), "WTO accession and performance of Chinese manufacturing firms," *American Economic Review*, 107(9): 2784–2820.

Breinlich, H, and C Criscuolo (2011), "International trade in services: A portrait of importers and exporters," *Journal of International Economics*, 84(2): 188–206.

Buera, F J, H Hopenhayn, Y Shin, and N Trachter (2021), "Big push in distorted economies," NBER Working Paper, 28561.

Buera, F J, J P Kaboski, and Y Shin (2011), "Finance and development: A tale of two sectors," *American Economic Review,* 101(5): 1964–2002.

Buera, F J, J P Kaboski, and R M Townsend (2023), "From micro to macro development," *Journal of Economic Literature*, 61(2): 471–503.

Buera, F J, and E Oberfield (2020), "The global diffusion of ideas," *Econometrica*, 88(1): 83–114.

Buera, F, and J Kaboski (2012), "The rise of the service economy," *American Economic Review,* 102(6): 2540–2569.

Calì, M, and G Presidente (2025), "Robots for economic development," *Labour Economics,* 96: 102731.

Carattini, S, H Huang, F Pisch, and T P Singh (2025), "Trade and the scopes of pollution: Evidence from China's world market integration," CESifo Working Paper, 12119.

Cerrato, A, and F Filippucci (2025), "How big is the big push? The macroeconomic effects of a large-scale regional development program," Unpublished manuscript.

Chang, J K (1967), "Industrial development of mainland China 1912–1949," *Journal of Economic Histo*ry, 27(1): 56–81.

Chatterjee, S, E Giannone, K Kino, and L Looser (2025), "Unequal global convergence," Unpublished manuscript.

Chen, C (2020), "Technology adoption, capital deepening, and international productivity differences," *Journal of Development Economics,* 143: 102388.

Chen, H, B Li, and X Zhu (2025), "Bottom-up institutional change and growth in China," Unpublished manuscript.

Chen, K (2025), "Growth at the margin: Political incentives and firm behavior in China," Unpublished manuscript.

Chen, X, G Pei, Z Song, and F Zilibotti (2023), "Tertiarization like China," *Annual Review of Economics,* 15(1): 485–512.

Chenery, H (1960), "Patterns of industrial growth," *American Economic Review,* 50(4): 624–654.

Choi, J, I Kuziemko, E Washington, and G Wright (2024), "Local economic and political effects of trade deals: Evidence from NAFTA," *American Economic Review*, 114(6): 1540–1575.

Choi, J, and A A Levchenko (2025), "The long-term effects of industrial policy," *Journal of Monetary Economics,* 152, 103779.

Choi, J, A A Levchenko, D Ruzic, S Or, and Y Shim (2025), "Superstars or supervillains? Large firms in the South Korean growth miracle," NBER Working Paper, 32648.

Choi, J, and Y Shim (2024a), "From adoption to innovation: State-dependent technology policy in developing countries," *IMF Working Paper*, 24/154.

Choi, J, and Y Shim (2024b), "Industrialization and the big push: Theory and evidence from South Korea," Unpublished manuscript.

Chor, D, and K Manova (2012), "Off the cliff and back? Credit conditions and international trade during the global financial crisis," *Journal of International Economics*, 87(1): 117–133.

Cilekoglu, A A, R Moreno, and R Ramos (2024), "The impact of robot adoption on global sourcing," *Research Policy*, 53(3): 104953.

Clark, G (2001), "The secret history of the industrial revolution," Unpublished manuscript.

Clark, G (2005), "The condition of the working class in England, 1209–2004," *Journal of Political Economy*, 113(6): 1307–1340.

Clerides, S K, S Lach, and J R Tybout (1998), "Is learning by exporting important? Microdynamic evidence from Colombia, Mexico, and Morocco," *Quarterly Journal of Economics,* 113(3): 903–947.

Comin, D, D Lashkari, and M Mestieri (2021), "Structural change with long-run income and price effects," *Econometrica*, 89(1): 311–374.

Connolly, M, and K-M Yi (2015), "How much of South Korea's growth miracle can be explained by trade policy?" *American Economic Journal: Macroeconomics*, 7(4).

Costinot, A, and A Rodríguez-Clare (2014), "Trade theory with numbers: Quantifying the consequences of globalization," in *Handbook of International Economics,* 4: 197–261.

Cox, A (2025), "The role of human capital and institutions in economic growth," Unpublished manuscript.

Crafts, N (1986), *British economic growth during the industrial revolution*, Clarendon Press.

Dai, M, M Maitra, and M Yu (2016), "Unexceptional exporter performance in China? The role of processing trade," *Journal of Development Economics*, 121.

D'Andrea, A, and N Limodio (2024), "High-speed internet, financial technology and banking," *Management Science*, 70(2): 671–1342.

Das Nair, R, S Chisoro, and F Ziba (2018), "Supermarkets' procurement strategies and implications for local suppliers in South Africa, Botswana, Zambia and Zimbabwe," *Development Southern Africa*, 35(3): 334–350.

Davis, R (1954), "English foreign trade, 1660–1700," *Economic History Review,* 7(2): 150–166.

Davis, R (1962), "English foreign trade, 1700–1774," *Economic History Review,* 15(2): 285–303.

de la Parra, B, and A Shenoy (2024), "Measuring and estimating retail productivity," International Growth Centre Working Paper.

De Souza, G (2022), "The labor market consequences of appropriate technology," Federal Reserve Bank of Chicago Working Paper, 2022-53.

De Souza, G (2023), "R&D subsidy and import substitution: Growing in the shadow of protection," Federal Reserve Bank of Chicago Working Paper, 2023-37.

De Souza, G, R Gaetani, and M Mestieri (2025), "More trade, less diffusion: Technology transfers and the dynamic effects of import liberalization," Federal Reserve Bank of Chicago Working Paper, 2024-20.

De Souza, G, and H Li (2025), "Robots, tools, and jobs: Evidence from Brazilian labor markets," Federal Reserve Bank of Chicago Working Paper, 2023-42.

Dechezleprêtre, A, D Hémous, and C Zanella (2025), "Induced automation innovation: Evidence from firm-level patent data," *Journal of Political Economy*, 133, 1975–2028.

Deng, L, M Fujio, X Lin, and R Ota (2023), "Labor shortage and early robotization in Japan," *Economics Letters,* 233: 111404.

Derenoncourt, E (2025), "Atlantic slavery's impact on European and British economic development," *Journal of Historical Political Economy*, 5(1), 1–19.

Diao, X, M Ellis, M McMillan, and D Rodrik (2025), "Africa's manufacturing puzzle: Evidence from Tanzanian and Ethiopian firms," *World Bank Economic Review,* 39(2): 308–340.

Dinkelman, T, G Kumchulesi, and M Mariotti (2024), "Labor migration, capital accumulation, and the structure of rural labor markets," *Review of Economics and Statistics*, 1–46.

Dinkelman, T, and M Mariotti (2016), "The long-run effects of labor migration on human capital formation in communities of origin," *American Economic Journal: Applied Economics*, 8(4), 1–35.

Dix-Carneiro, R (2014), "Trade liberalization and labor market dynamics," *Econometrica*, 82(3): 825–885.

Dix-Carneiro, R, P K Goldberg, C Meghir, and G Ulyssea (2025), "Trade and domestic distortions: The case of informality," *Econometrica*.

Donaldson, D, and R Hornbeck (2016), "Railroads and American economic growth: A 'market access' approach," *Quarterly Journal of Economics*, 131(2): 799–858.

Donovan, K, W J Lu, and T Schoellman (2023), "Labor market dynamics and development," *Quarterly Journal of Economics*, 138(4): 2287–2325.

Duarte, M, and D Restuccia (2010), "The role of the structural transformation in aggregate productivity," *Quarterly Journal of Economics*, 125(1): 129–173.

Duernecker, G, B Herrendorf, and Á Valentinyi (2024), "Structural change within the services sector and the future of cost disease," *Journal of the European Economic Association*, 22(1): 428–473.

Eckert, F, S Ganapati, and C Walsh (2022), "Urban-biased growth: A macroeconomic analysis," NBER Working Paper, 30515.

Engbom, N, H Malmberg, T Porzio, F Rossi, and T Schoellman (2025), "Economic development according to Chandler," NBER Working Paper, 34483.

Eslava, M, M Meléndez, L Tenjo, and N Urdaneta (2023), "Business size, development, and inequality in Latin America," World Bank Policy Research Working Paper, 10584.

Eslava, M, M Meléndez, G Ulyssea, N Urdaneta, and I Flores (2024), *Firms and inequality in Latin America*, IDB Working Paper, 1567.

Evans, P B (1995), *Embedded autonomy: States and industrial transformation,* Princeton University Press.

Faber, B, and C Gaubert (2019), "Tourism and economic development: Evidence from Mexico's coastline," *American Economic Review*, 109(6): 2245–2293.

Faber, M (2020), "Robots and reshoring: Evidence from Mexican labor markets," *Journal of International Economics,* 127: 103384.

Fajgelbaum, P, P K Goldberg, P Kennedy, A Khandelwal, and D Taglioni (2024), "The US–China trade war and global reallocations," *American Economic Review: Insights*, 6(2): 295–312.

Fan, T, M Peters, and F Zilibotti (2023), "Growing like India: The unequal effects of service-led growth," *Econometrica*, 91(4): 1457–1494.

Fang, H, M Li, and G Lu (2025), "Decoding China's industrial policies," NBER Working Paper, 33814.

Feenstra, R C, and S Wei (2010), *China's growing role in world trade*, University of Chicago Press.

Felix, M (2022), "Trade, labor market concentration, and wages," Unpublished manuscript.

Felix, M, and M B Wong (2024), "The reallocation effects of domestic outsourcing," Cowles Foundation Discussion Paper, 2416.

Fernandes, A M (2007), "Trade policy, trade volumes, and plant-level productivity in Colombian manufacturing industries," *Journal of International Economics*, 71(1): 52–71.

Fernandes, A M, and C Paunov (2012), "Foreign direct investment in services and manufacturing productivity: Evidence for Chile," *Journal of Development Economics*, 97(2): 305–321.

Fujiwara, I, and K Matsuyama (2024), "A technology-gap model of 'premature' deindustrialization," *American Economic Review,* 114(11): 3714–3745.

Garg, T (2025), "Can industrial policy overcome coordination failures? Theory and evidence," Unpublished manuscript.

Gauthier, J-F (2025), "Effect of Minimum Wages on Automation and Offshoring Decisions of Firms: Evidence from India," Unpublished manuscript.

Gereffi, G (1990), "Paths of industrialization: An overview," in G Gereffi and D L Wyman (eds.), *Manufacturing miracles: Paths of industrialization in Latin America and East Asia,* Princeton University Press.

Gerschenkron, A (1962), *Economic backwardness in historical perspective*, Belknap Press.

Giorcelli, M, and B Li (2021), "Technology transfer and early industrial development: Evidence from the Sino-Soviet alliance," NBER Working Paper, 29455.

Giuntella, O, Y Lu, and T Wang (2024), "How do workers and households adjust to robots? Evidence from China," *Economic Journal,* 135(666): 637–652.

Goldberg, P K, A K Khandelwal, N Pavcnik, and P Topalova (2010), "Multiproduct firms and product turnover in the developing world: Evidence from India," *Review of Economics and Statistics,* 92(4): 1042–1049.

Goldberg, P K, and N Pavcnik (2007), "Distributional effects of globalization in developing countries," *Journal of Economic Literature*, 45(1): 39–82.

Goldberg, P K, and N Pavcnik (2016), "The effects of trade policy," in *Handbook of Commercial Policy*, 1: 161–206.

Goldberg, P K, and T Reed (2023), "Is the global economy deglobalizing? If so, why? And what is next?" *Brookings Papers on Economic Activity*: 347–423.

Goldberg, P K, and T Reed (2023), "Presidential address: Demand-side constraints in development: The role of market size, trade, and (in)equality," *Econometrica*, 91(6): 1915–1950.

Goldberg, P K, and M Ruta (2025), "The changing nature of international trade and its implications for development," NBER Working Paper, 34283.

Gollin, D (2008), "Nobody's business but my own: Self-employment and small enterprise in economic development," *Journal of Monetary Economics,* 55(2): 219–233.

Gollin, D, R Jedwab, and D Vollrath (2016), "Urbanization with and without industrialization," *Journal of Economic Growth*, 21(1): 35–70.

Gollin, D, D Lagakos, and M E Waugh (2013), "The agriculture productivity gap," *Quarterly Journal of Economics,* 129(2): 939–993.

Gottlieb, C, M Poschke, and M Tueting (2025), "Skill supply, firm size, and economic development," World Bank World Development Report Background Paper.

Graetz, G, and G Michaels (2018), "Robots at work," *Review of Economics and Statistics,* 100(5): 753–768.

Grant, M, and M Startz (2022), "Cutting out the middleman: The structure of chains of intermediation," NBER Working Paper, 30109.

Grobovšek, J (2020), "Managerial delegation, law enforcement, and aggregate productivity," *Review of Economic Studies*, 87(5): 2256–2289.

Guner, N, A Parkhomenko, and G Ventura (2018), "Managers and productivity differences," *Review of Economic Dynamics*, 29: 256–282.

Han, J, R Liu, and J Zhang (2012), "Globalization and wage inequality: Evidence from urban China," *Journal of International Economics*, 87(2): 288–297.

Handley, K, and N Limão (2017), "Policy uncertainty, trade, and welfare: Theory and evidence for China and the United States," *American Economic Review*, 107(9): 2731–2783.

Harris, J R, and M P Todaro (1970), "Migration, unemployment and development: A two-sector analysis," *American Economic Review*, 60(1): 126–142.

Harrison, A, and A Rodríguez-Clare (2010), "Trade, foreign investment, and industrial policy for developing countries," in *Handbook of Development Economics*, 5: 4039–4214.

Heilmann, S (2008), "From local experiments to national policy: The origins of China's distinctive policy process," *China Journal*, 59: 1–30.

Herrendorf, B, R Rogerson, and Á Valentinyi (forthcoming), "Unconditional convergence in manufacturing: A reassessment," *American Economic Review: Insights*.

Herrendorf, B, R Rogerson, and Á Valentinyi (2014), "Growth and structural transformation," in P Aghion and S N Durlauf (eds.), *Handbook of Economic Growth*, 2: 855–941.

Hjort, J, H Malmberg, and T Schoellman (2022), "The missing middle managers: Labor costs, firm structure, and development," NBER Working Paper, 30592.

Hjort, J, and J Poulsen (2019), "The arrival of fast internet and employment in Africa," *American Economic Review,* 109(3): 1032–1079.

Hopenhayn, H, and R Rogerson (1993), "Job turnover and policy evaluation: A general equilibrium analysis," *Journal of Political Economy*, 101(5): 915–938.

Hsieh, C T, and P J Klenow (2009), "Misallocation and manufacturing TFP in China and India," *Quarterly Journal of Economics,* 124(4): 1403–1448.

Hsieh, C-T, and E Rossi-Hansberg (2023), "The industrial revolution in services," *Journal of Political Economy: Macroeconomics*, 1(1): 3–42.

Huang, H, J Ju, and V Yue (2024), "Accounting for the evolution of China's production and trade patterns," NBER Working Paper, 32415.

Huang, H, Y Lei, and Y-H Lei (2025), "Dam good for trade," Unpublished manuscript.

Huneeus, F, and R Rogerson (2023), "Heterogeneous paths of industrialization," *Review of Economic Studies*, 91(3): 1746–1774.

International Federation of Robotics (2020), "World robotics 2020."

Imbert, C, and G Ulyssea (2024), "Rural migrants and urban informality: Evidence from Brazil," Unpublished manuscript.

Inikori, J E (2002), *Africans and the industrial revolution in England: A study in international trade and economic development*, Cambridge University Press.

Inklaar, R, R Marapin, and K Gräler (2024), "Tradability and sectoral productivity differences across countries," *IMF Economic Review*.

Itskhoki, O, and B Moll (2019), "Optimal development policies with financial frictions," *Econometrica*, 87(1): 139–173.

Iyoha, E, E Malesky, J Wen, S J Wu, and B Feng (2024), "Exports in disguise? Trade rerouting during the US–China trade war," HBS Working Paper, 24-072.

Javorcik, B, and Y Li (2013), "Do the biggest aisles serve a brighter future? Global retail chains and their implications for Romania," *Journal of International Economics*, 90(2): 348–363.

Jia, P (2008), "What happens when Wal-Mart comes to town: An empirical analysis of the discount retailing industry," *Econometrica*, 76(6): 1263–1316.

Jia, R (2014), "The legacies of forced freedom: China's treaty ports," *Review of Economics and Statistics*, 96(4): 596–608.

Jia, R, M Kudamatsu, and D Seim (2015), "Political selection in China: Complementary roles of connections and performance," *Journal of the European Economic Association*, 13(4).

Jongwanich, J, A Kohpaiboon, and A Obashi (2022), "Technological advancement, import penetration, and labour markets: Evidence from Thailand," *World Development,* 151: 105746.

Juhász, R, and N Lane (2024), "The political economy of industrial policy," Journal of Economic Perspectives, 38(4): 27–54.

Kee, H L, and E Xie (2025), "Nickel, steel and cars: Export ban and domestic value-added in Indonesia," Unpublished manuscript.

Kehoe, T J, K J Ruhl, and J B Steinberg (2018), "Global imbalances and structural change in the United States," *Journal of Political Economy,* 126(2).

Keller, W, J Andres Santiago, and C H Shiue (2017), "China's domestic trade during the treaty-port era," *Explorations in Economic History,* 63: 26–43.

Khandelwal, A (2025), "Trade and development in a fracturing world," NBER Working Paper, 34333.

Khandelwal, A K, P K Schott, and S-J Wei (2013), "Trade liberalization and embedded institutional reform: Evidence from Chinese exporters," *American Economic Review,* 103(6): 2169–2202.

Kim, M, M Lee, and Y Shin (2021), "The plant-level view of an industrial policy: The Korean heavy industry drive of 1973," NBER Working Paper, 29252.

Kinfemichael, B (2019), "The rise of services and convergence in labor productivity among countries," *Applied Economics Letters*, 26(21): 1749–1755.

Kinfemichael, B, and A M Morshed (2019), "Unconditional convergence of labor productivity in the service sector," *Journal of Macroeconomics*, 59: 217–229.

Kirui, B K, P W Chacha, L Heath Milsom, and V Wiedemann (2026), "Growing services: Firm dynamics beyond the city," Unpublished manuscript.

Klein, M C, and M Pettis (2020), *Trade wars are class wars: How rising inequality distorts the global economy and threatens international peace*, Yale University Press.

Kline, P, and E Moretti (2014), "Local economic development, agglomeration economies, and the big push: 100 years of evidence from the Tennessee Valley Authority," *Quarterly Journal of Economics*, 129(1): 275–331.

Kongsamut, P, S Rebelo, and D Xie (2001), "Beyond balanced growth," *Review of Economic Studies*, 68(4): 869–882.

König, M, K Storesletten, Z Song, and F Zilibotti (2022), "From imitation to innovation: Where is all that Chinese R&D going?" *Econometrica*, 90(4): 1615–1654.

Krenz, A, K Prettner, and H Strulik (2021), "Robots, reshoring, and the lot of low-skilled workers," *European Economic Review*, 136: 103744.

Krueger, A O (1974), "The political economy of the rent-seeking society," *American Economic Review*, 64(3): 291–303.

Krueger, A O (1997), "Trade policy and economic development: How we learn," NBER Working Paper, 5896.

Kruse, H, E Mensah, K Sen, and G de Vries (2022), "A manufacturing (re)naissance? Industrialization in the developing world," *IMF Economic Review*, 71(2): 439–473.

Kruse, H, E Mensah, K Sen, and G H de Vries (2021), "Economic transformation database," Dataverse.

Kugler, A D, M Kugler, L Ripani, and R Rodrigo (2020), "U.S. robots and their impacts in the tropics: Evidence from Colombian labor markets," NBER Working Paper, 28034.

Kuznets, S (1953), Shares of upper income groups in income and savings, NBER.

Kuznets, S (1966), *Modern economic growth: Rate, structure and spread*, Yale University Press.

Kuznets, S (1971), *Economic growth of nations*, Oxford University Press.

Lacovone, L, B Javorcik, W Keller, and J Tybout (2015), "Supplier responses to Walmart's invasion in Mexico," *Journal of International Economics,* 95(1): 1–15.

Lacovone, L, W Maloney, and D McKenzie (2022), "Improving management with individual and group-based consulting: Results from a randomized experiment in Colombia," *Review of Economic Studies*, 89(1): 346–371.

Lagakos, D (2016), "Explaining cross-country productivity differences in retail trade," *Journal of Political Economy*, 124(2): 579–620.

Lane, N (2025), "Manufacturing revolutions: Industrial policy and industrialization in South Korea," *Quarterly Journal of Economics,* 140(3): 1683–1741.

Lashkaripour, A, and V Lugovskyy (2023), "Profits, scale economies, and the gains from trade and industrial policy," *American Economic Review*, 113(10): 2759–2808.

Lei, Y-H (2021), "Quid pro quo? Government–firm relationships in China," *Journal of Public Economics*, 199: 104427.

Lewis, L T, R Monarch, M Sposi, and J Zhang (2022), "Structural change and global trade," *Journal of the European Economic Association,* 20(1): 476–512.

Lewis, W A (1954), "Economic development with unlimited supplies of labour," *Manchester School,* 22(2): 139–191.

Li, H, and L-A Zhou (2005), "Political turnover and economic performance: The incentive role of personnel control in China," *Journal of Public Economics*, 89(9–10): 1743–1762.

Li, T, L Qiu, and Y Xue (2016), "Understanding China's foreign trade policy: A literature review," *Frontiers of Economics in China,* 11(3): 410.

Li, W, and D T Yang (2005), "The Great Leap Forward: Anatomy of a central planning disaster," *Journal of Political Economy*, 113(4): 840–877.

Li, X, C Liu, X Weng, and L-A Zhou (2019), "Target setting in tournaments: Theory and evidence from China," *Economic Journal*, 129(623): 2888–2915.

Linarello, A (2018), "Direct and indirect effects of trade liberalization: Evidence from Chile," *Journal of Development Economics,* 134: 160–175.

Liu, C (2020), "The effects of World War I on the Chinese textile industry: Was the world's trouble China's opportunity?" *Journal of Economic History*, 80(1).

Liu, E (2019), "Industrial policies in production networks," *Quarterly Journal of Economics,* 134(4): 1883–1948.

Liu, X, A Mattoo, Z Wang, and S-J Wei (2020), "Services development and comparative advantage in manufacturing," *Journal of Development Economics*, 144: 102438.

Lu, Y, J Wang, and X Zhu (2019), "Place-based policies, creation, and agglomeration economies: Evidence from China's economic zone program," *American Economic Journal: Economic Policy*, 11(3): 325–360.

Lucas, R E (1993), "Making a miracle," *Econometrica*, 61(2): 251–272.

Lucas, R E (2018), "What was the industrial revolution?" *Journal of Human Capital,* 12(2): 182–203.

Ma, D (2008), "Economic growth in the lower Yangzi region of China in 1911–1937: A quantitative and historical analysis," *Journal of Economic History,* 68(2): 355–392.

Manelici, I, and S Pantea (2021), "Industrial policy at work: Evidence from Romania's income tax break for workers in IT," *European Economic Review*, 133: 103674.

Manova, K (2013), "Credit constraints, heterogeneous firms, and international trade," *Review of Economic Studies*, 80(2): 711–744.

Manova, K, and Z Yu (2016), "How firms export: Processing vs. ordinary trade with financial frictions," *Journal of International Economics*, 100: 120–137.

Matsuyama, K (1992), "Agricultural productivity, comparative advantage, and economic growth," *Journal of Economic Theory,* 58(2): 317–334.

Matsuyama, K (2009), "Structural change in an interdependent world: A global view of manufacturing decline," *Journal of the European Economic Association,* 7(2–3): 478–486.

McCaig, B, and N Pavcnik (2018), "Export markets and labor allocation in a low-income country," *American Economic Review*, 108(7): 1899–1941.

McCasland, J, M Hardy, and J Zhang (2024), "Returns to capital for whom? Experimental evidence from small firm owners and workers in Ghana," Unpublished manuscript.

McCloskey, D N (2010), *Bourgeois dignity: Why economics can't explain the modern world*, University of Chicago Press.

McCullough, E B (2025), "Structural transformation without industrialization? Evidence from Tanzanian consumers," *American Journal of Agricultural Economics,* 107(2): 411–439.

McKenzie, D, C Woodruff, K Bjorvatn, M Bruhn, J Cai, J Gonzalez-Uribe, S Quinn, T Sonobe, and M Valdivia (2025), "Training entrepreneurs," VoxDevLit, 1(4).

McKinsey Global Institute (2025), "The great trade rearrangement."

Melitz, M J (2003), "The impact of trade on intra-industry reallocations and aggregate industry productivity," *Econometrica*, 71(6): 1695–1725.

Mensah, T, and N Traorè (2024), "Infrastructure quality and FDI inflows: Evidence from the arrival of high-speed internet in Africa," World Bank Policy Research Working Paper, 9946.

Midrigan, V, and D Y Xu (2014), "Finance and misallocation: Evidence from plant-level data," *American Economic Review*, 104(2): 422–458.

Milanovic, B (2016), *Global inequality: A new approach for the age of globalization*, Harvard University Press.

Mokyr, J (1992), *The lever of riches: Technological creativity and economic progress*, Oxford University Press.

Moneke, E (2020), "Infrastructure and structural transformation: Evidence from Ethiopia," Unpublished manuscript.

Moscoso Boedo, H J, and T Mukoyama (2012), "Evaluating the effects of entry regulations and firing costs on international income differences," *Journal of Economic Growth*, 17(2): 143–170.

Murphy, K M, A Shleifer, and R Vishny (1989), "Income distribution, market size, and industrialization," *Quarterly Journal of Economics*, 104(3): 537–564.

Nayyar, G, M Hallward-Driemeier, and E Davies (2021), "At your service? The promise of services-led development," World Bank.

Ngai, L R, and B Petrongolo (2017), "Gender gaps and the rise of the service economy," *American Economic Journal: Macroeconomics,* 9(4): 1–44.

Ngai, L R, and C A Pissarides (2007), "Structural change in a multisector model of growth," *American Economic Review*, 97(1): 429–443.

North, D C, and B R Weingast (1989), "Constitutions and commitment: The evolution of institutions governing public choice in seventeenth-century England," *Journal of Economic History,* 49(4): 803–832.

Nurkse, R (1953), *Problems of capital formation in underdeveloped countries*, Oxford University Press.

Obstfeld, M (2024), "Misconceptions about US trade deficits muddy the economic policy debate," Peterson Institute for International Economics Policy Brief, 24–7.

OECD (2025), "Export restrictions on critical raw materials."

Parente, S L, and E C Prescott (2002), *Barriers to riches*, MIT Press.

Parvathaneni, A, and D Yang (2024), "War mobilization and economic development: World War II and structural transformation in India," NBER Working Paper, 33246.

Peter, A, and C Ruane (2022), "Distribution costs," IMF Working Paper, 22/7.

Poschke, M (2009), "Employment protection, firm selection, and growth," *Journal of Monetary Economics*, 56(8): 1074–1085.

Poschke, M (2010), "The regulation of entry and aggregate productivity," *Economic Journal,* 120(549): 1175–1200.

Poschke, M (2018), "The firm size distribution across countries and skill-biased change in entrepreneurial technology," *American Economic Journal: Macroeconomics*, 10(3): 1–41.

Poschke, M (2025), "Wage employment, unemployment and self-employment across countries," *Journal of Monetary Economics*, 149: 103684.

Qian, Y, G Roland, and C Xu (2006), "Coordination and experimentation in M-form and U-form organizations," *Journal of Political Economy*, 114(2): 366–402.

Reed, T (2024), "Export-led industrial policy for developing countries: Is there a way to pick winners?" *Journal of Economic Perspectives*, 38(4): 3–26.

Restuccia, D, and R Rogerson (2008), "Policy distortions and aggregate productivity with heterogeneous establishments," *Review of Economic Dynamics*, 11(4): 707–720.

Rodrigo, R (2022), "Robot adoption, organizational capital, and the productivity paradox," Unpublished manuscript.

Rodrik, D (1995), "Getting interventions right: How South Korea and Taiwan grew rich," *Economic Policy*, 10(20): 53–107.

Rodrik, D (2013), "Unconditional convergence in manufacturing," *Quarterly Journal of Economics*, 128(1): 165–204.

Rodrik, D (2016), "Premature deindustrialization," *Journal of Economic Growth,* 21(1): 1–33.

Rodrik, D (2022), "An industrial policy for good jobs," Brookings Institution Policy Proposal.

Rodrik, D, and R Sandhu (2025), "Servicing development: Productive upgrading of labor-absorbing services in developing economies," *Global Policy*, 16(2): 306–318.

Rotemberg, M (2019), "Equilibrium effects of firm subsidies," *American Economic Review,* 109(10): 3475–3513.

Sáenz, L F (2022), "Time-varying capital intensities and the hump-shaped evolution of economic activity in manufacturing," *Journal of Macroeconomics*, 73: 103429.

Schultz, T W (1953), *Economic organization of agriculture*, McGraw-Hill.

Schwartzman, M (2025), "From street markets to shopping malls: The transformation of the service sector," STEG Working Paper, 116.

Sharma, G (2025), "Collusion among employers in India," Unpublished manuscript.

Smitkova, L (2024), *Dissecting structural change in an open economy*, University of Oxford.

Song, Z, K Storesletten, and F Zilibotti (2011), "Growing like China," *American Economic Review*, 101(1): 196–233.

Song, Z, and W Xiong (2024), "The Mandarin model of growth," Unpublished manuscript.

Spence, M (2008), "The growth report: Strategies for sustained growth and inclusive development," Commission on Growth and Development.

Sposi, M (2012), "Evolving comparative advantage, structural change, and the composition of trade," Unpublished manuscript.

Sposi, M (2015), "Trade barriers and the relative price of tradables," *Journal of International Economics,* 96(2): 398–411.

Sposi, M, K-M Yi, and J Zhang (2025), "Deindustrialization and industry polarization," NBER Working Paper, 29483.

Srhoj, S, and J Mikulić (2025), "The hidden geography of tourism firm spending: Tracking economic leakages with firm-to-firm transactions," *Annals of Tourism Research,* 112: 103933.

Storesletten, K, B Zhao, and F Zilibotti (2019), "Business cycles during structural change: Arthur Lewis' theory from a neoclassical perspective," NBER Working Paper, 26181.

Temin, P (1997), "Two views of the British industrial revolution," *Journal of Economic History*, 57(1): 63–82.

Timmer, M P, G J de Vries, and K de Vries (2015), "10-sector database," Groningen Growth and Development Centre.

Toews, G, and P-L Vézina (2022), "Resource discoveries, FDI bonanzas, and local multipliers: Evidence from Mozambique," *Review of Economics and Statistics*, 104(5): 1046–1058.

Topalova, P (2010), "Factor immobility and regional impacts of trade liberalization: Evidence on poverty from India," *American Economic Journal: Applied Economics*, 2(4): 1–41.

Ulyssea, G (2010), "Regulation of entry, labor market institutions and the informal sector," *Journal of Development Economics,* 91(1): 87–99.

Uy, T, K-M Yi, and J Zhang (2013), "Structural change in an open economy," *Journal of Monetary Economics*, 60(6): 667–682.

Verhoogen, E (2023), "Firm-level upgrading in developing countries," *Journal of Economic Literature*, 61(4): 1410–1464.

Wade, R (1990), *Governing the market: Economic theory and the role of government in East Asian industrialization*, Princeton University Press.

Wang, J (2013), "The economic impact of special economic zones: Evidence from Chinese municipalities," *Journal of Development Economics,* 101: 133–147.

Wang, S, and D Y Yang (2025), "Policy experimentation in China: The political economy of policy learning," *Journal of Political Economy*, 133(7).

Williams, E (1944), *Capitalism and slavery*, University of North Carolina Press.

Wrigley, E A (1985), "Urban growth and agricultural change: England and the continent in the early modern period," *Journal of Interdisciplinary History*, 15(4): 683–728.

Wrigley, E A (1990), *Continuity, chance and change: The character of the industrial revolution in England*, Cambridge University Press.

Xu, C (2011), "The fundamental institutions of China's reforms and development," *Journal of Economic Literature*, 49(4): 1076–1151.

Yu, M (2015), "Processing trade, tariff reductions and firm productivity: Evidence from Chinese firms," *Economic Journal*, 125(585): 943–988.

Zheng, S, M E Kahn, W Sun, and D Luo (2014), "Incentivizing China's urban mayors to mitigate pollution externalities: The role of the central government and public environmentalism," *Regional Science and Urban Economics,* 47: 61–71.