

CHAPTER 5

Employment and migration



Summary

The better the job prospects, the greater the chances that rural people will be able to improve their lives. The converse is also true. Poor employment trends will have major implications for rural and agricultural development strategies. Agricultural growth and rural job creation are central to such strategies under both scenarios.

Recent decades have witnessed profound changes in both supply and demand for labour. Some changes have been global in impact, while others have been specific to certain regions and country types.

On the supply side, the widely discussed “youth bulge” will continue affecting sub-Saharan Africa (SSA), North Africa and the Middle East primarily, even though market entrants as a share of the existing labour force are now finally declining, albeit much more slowly than in the rest of the world. Rural-to-urban migration now accounts for well under half of urban population growth in all regions. Such migration appears unlikely ever to play the same role it did in urbanizing the countries of the OECD and the East Asian industrializers.

On the demand side, driven by job “deindustrialization”, the recent global erosion of low-skilled jobs is likely to continue. (Deindustrialization is marked by a declining share of employment in the industrial sector, propelled by automation based on computerization, robotics and so-called “Big Data”, and spread worldwide by the rise of global trade.) This presents special challenges for poor countries with abundant, and, in some cases, growing labour forces with few skills. Patterns of transformation seen in the past, where low-skilled labour left agriculture to low-skilled, but higher-paying jobs in industry, will be hard to replicate.

An overarching challenge for the poorest groups in general, and for women in particular, is the “meso” and the “micro” paradoxes. The meso paradox is that the zones needing to diversify income the most have the lowest capacity to do so, as they tend to be impoverished and so are weak at generating investable surpluses and effective demand. The micro paradox is the household analogue of

the meso paradox, wherein rural households in hinterlands or with low assets have a strong incentive, but little ability to engage in work off-farm that delivers higher returns. A logical extension of the two paradoxes is that the asset-rich are much better able to take advantage of many of the job opportunities that open up with economic growth and rural transformation.

To foster employment growth, a diversified approach is needed. In economies dominated by agriculture-based and other rural livelihoods, employment growth in the farming and rural non-farm sectors will remain a major source of the total, though farming’s contribution will progressively fall. Labour-intensive manufacturing will continue to provide jobs to low-skilled workers, but fewer than in the past. Governments should encourage such employment wherever possible, by improving the business environment, investing in transport and communications, and opening the economy to trade.

In all tradable sectors, including agriculture, liberalized regional trade will be especially important for many countries, especially those that have industrialized least. In these cases, open and growing regional markets can provide a larger “playing field” on which manufacturing and other firms can expand their production while competing effectively in markets similar to their own. Exports to world markets should also be pursued.

Jobs in the service sector are set to increase, but many will be informal, a fact that should be embraced as a reality across nearly all countries. Informal workers should have assistance to function well, through skills investment, infrastructural provision and legal protection against harassment. The state’s role is to strengthen the fundamental capabilities of its population, providing a broad cushion of benefits to address public goods and improve the business environment through infrastructure investment.

Demographic trends: the youth bulge, urbanization and migration

The three main demographic trends with implications for rural employment prospects

worldwide are the youth bulge (the number of youth entering the labour market), urbanization and rural-urban migration.

The youth bulge

Population growth is by far the highest in SSA. The region as a whole and every region in it (except Southern Africa) show annual growth of at least 2.6 per cent; no other region exceeds South Asia's 1.29 per cent.⁷⁰ Thus all other areas of the world are experiencing at most half of SSA's population growth rate.

One result is that SSA has seen a much slower decline in the share of its youth in total population (figure 5.1). For this analysis, we classify countries by region and by level and recent growth of per capita GDP.⁷¹

- SSA (excluding Africa)
- Lagging Latin America and the Caribbean (LAC) (Guatemala, Haiti and Nicaragua)
- Rest of LAC (Brazil, Chile, Columbia, Cuba, Dominican Republic, Mexico and Peru)
- Lagging South-East Asia (Cambodia, the Philippines and Viet Nam)
- Rest of South-East Asia (Indonesia, Malaysia and Thailand)
- South Asia (Bangladesh, Bhutan, India and Nepal)
- Rest of Asia (China and Iran (Islamic Republic of))
- Near East and North Africa (Egypt, Morocco, Sudan, Tajikistan, Tunisia, Turkey, Uzbekistan and Yemen)

In all areas of the world other than SSA and lagging LAC, the proportion of youth in the total population began declining in the mid-1960s and proceeded rapidly from that point. The decline in China was the sharpest.

Lagging LAC and SSA began to see this share fall only from around 1990, more than 20 years later than the rest of the world. Yet the decline has been far more rapid in lagging LAC than in SSA. By 2013, SSA's youth proportion had fallen only slightly. Based on United Nations projections, SSA's youth share will continue to fall faster, though not as fast as in lagging LAC. SSA thus faces a much steeper challenge than

other regions of the world in absorbing youth into its labour force.

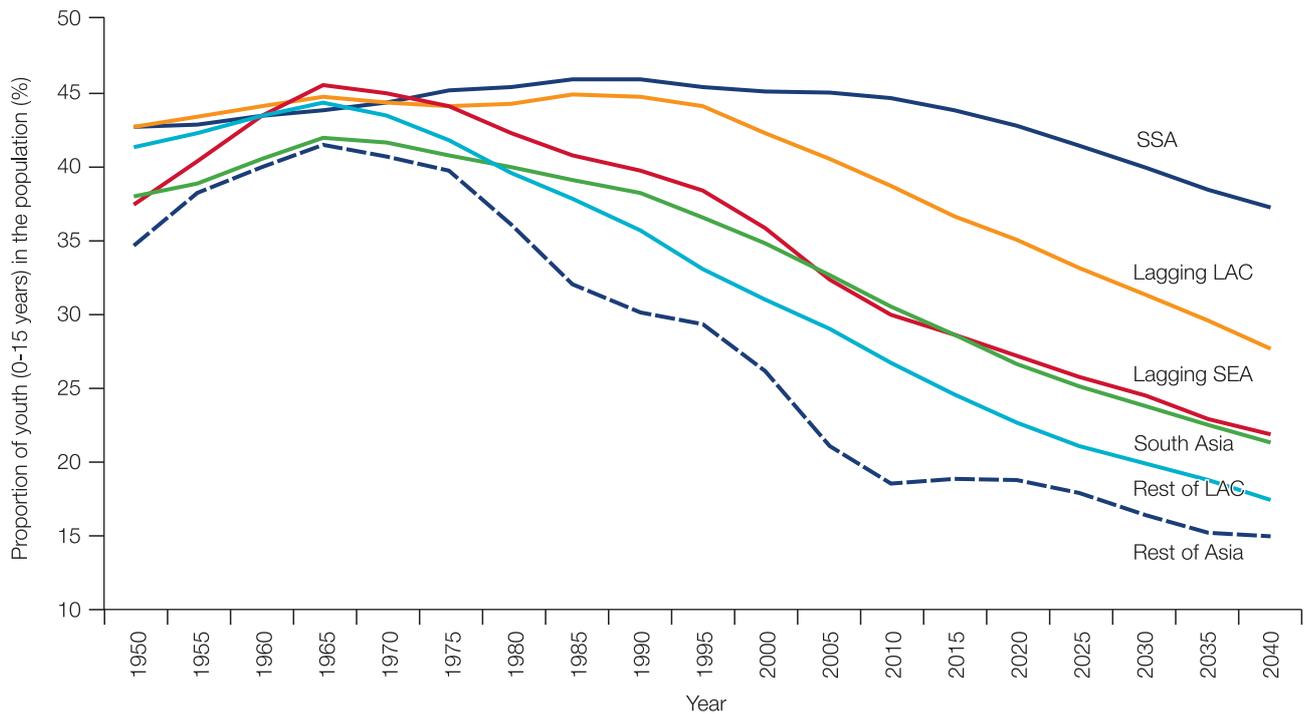
Driven by the above shifts, the youth bulge has been falling in every region of the world since 1990 (figure 5.2).⁷² This fall has, however, been very slow in SSA, and from the highest base. For example, while all other regions had to absorb a number of youths equal to 2.8-3.8 per cent of their existing labour force every year in the early 1990s, lagging LAC and SSA each had to absorb about 4.5 per cent. By 2013 this figure had fallen to 3 per cent in lagging LAC, but only marginally in SSA to 4 per cent.⁷³ In every other region this measure was 2.2 per cent or less by 2013. The youth bulge, then, is largely confined to SSA, and is a "bulge" only when seen against other regions, because actual numbers of youth labour-market entrants in SSA are falling, not rising.

Three key points stand out in the relative youth bulges in SSA and lagging LAC. One, a bulge can help countries be competitive in labour-intensive sectors by damping wage rises. But the low shares of manufacturing in these countries, and the rising difficulty of developing the sector, suggest that it will only play a small part in helping ease youth unemployment. Two, a bulge is a challenge in that it raises the chances of an excess supply of labour, which may have unwanted socio-political outcomes including political instability. Three, the bulge imposes very large investment costs on governments if they are to build the capacities in youth that are needed to increase their productivity and make them an attractive source of labour for investors.

Urbanization

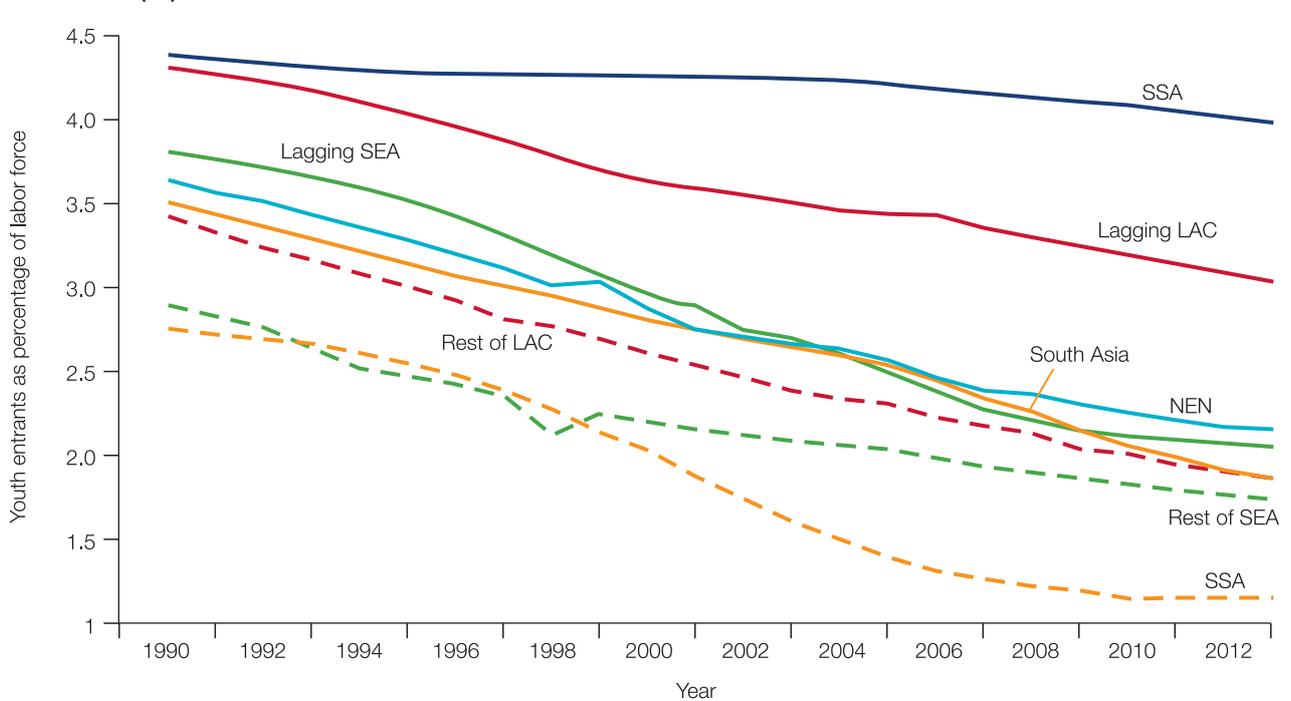
Populations have urbanized quickly in all regions (figure 5.3). Urban populations in SSA, lagging South-East Asia and South Asia are 30-40 per cent of the total population. This group of regions will stay together and reach close to 50 per cent urbanization by 2040. The rest of Asia has joined lagging Latin American countries at around 55 per cent urban population, and this combined group will move to around 70 per cent urbanization by 2040. The rest of the non-lagging (other) LAC will increase

FIGURE 5.1 Proportion of youth (0-15 years) in the population, by region, 1950-2040 (%)



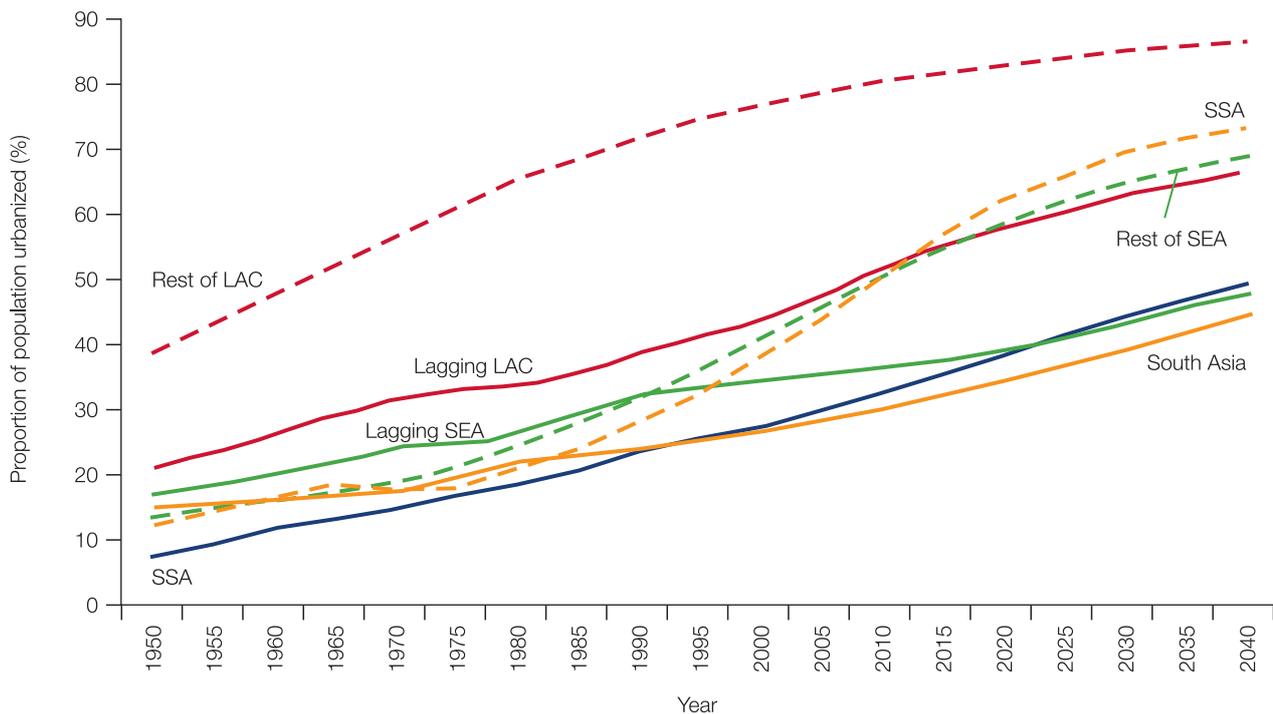
Note: LAC = Latin America and the Caribbean; SEA = South-East Asia; SSA = Sub-Saharan Africa.
Source: United Nations data.

FIGURE 5.2 Youth entering labour markets as a proportion of the existing labour force, by region, 1950-2013 (%)



Note: LAC = Latin America and the Caribbean; NEN = Near East, North Africa, Europe and Central Asia; SEA = South-East Asia; SSA = Sub-Saharan Africa.
Source: United Nations data.

FIGURE 5.3 Proportion of the population urbanized, by region, 1950-2013, and projected proportions to 2040 (%)



Note: LAC = Latin America and the Caribbean; SEA = South-East Asia; SSA = Sub-Saharan Africa.
Source: United Nations data.

their urbanization rates slowly to within the 80-90 per cent range.

The pattern highlights two aspects. First, urbanization has occurred not just in mega cities, but also in intermediate cities and towns. In most developing countries, the populations in cities and towns of less than 1 million have grown at least as fast in percentage terms as those in larger cities (Christiaensen and Todo 2015: Appendix A). Such decentralized urbanization is good for the prospects of rural populations to incrementally work their way out of poverty through off-farm employment (Christiaensen et al. 2013). It also helps local agriculture by bringing urban demand closer to farms.

Second, rural-urban movement has been less important to the developing world over the past 50 years than it was to the early industrializing countries. Instead, the urban “natural increase” has been more significant. This switch has been driven by several factors – urban death rates today are lower than they used to be. Urban birth rates have fallen more slowly in Africa than in the rest of the world (Jedwab et al. 2014),

and so the urban natural increase now accounts for at least half of urban growth in Africa, Latin America and Asia. While rural-urban migration accounts for the rest, some share of this “migration” involves no movement of people, arising instead from reclassification of rural into urban households due to growth in settlement size. Thus movement of rural households to urban areas in all regions of the developing world now accounts for well under half of total urban population growth.⁷⁴

Migration

Rural-urban (and international) migration represents economic opportunities distributed unevenly among rural households, reflecting conditions such as distance from the city, pre-migration income and education. Migrational employment can be a “permanent” move from the rural area, a seasonal move or a commuting arrangement into the urban area. The opportunities are seen in three main areas.

They are linked, first, to direct employment in urban areas, other rural areas and foreign countries. Remuneration tends to be positively

correlated with distance of migration – relatively low returns from migrating to another rural area (like migrant farm labourers), higher for migration to cities, and higher still for movement to foreign countries. The destination's remuneration is generally correlated with the formality and skill level of the job (if a wage job) or the investment requirement if the migrant becomes self-employed.

Like earnings from rural non-farm employment (RNFE), migration remittances can be invested in agriculture or the rural non-farm sector, creating indirect employment in the sending rural areas from investment linkages and so creating multipliers from investment in agriculture (Taylor 1992) and in rural non-farm activity (Taylor 1999; Wouterse and Taylor 2011 for Burkina Faso). These investments in the sending areas can be self-employment or employment of third persons in those businesses, as well as induced employment in spin-off activities.

Remittances can, however, have differential effects according to the distance of migration, which is correlated with the remuneration and thus remittances. Wouterse and Taylor (2011) found in Burkina Faso that migration within West Africa had little effect on the sending-area's agriculture and local RNFE, but that intercontinental migration stimulated livestock accumulation, while reducing grain farming and local non-farm activity.

Finally, migration can influence the sending locality's farm labour market directly by reducing sending-family labour to agriculture or by increasing labour hiring to replace migrants. Further, where local credit markets function poorly, migration income can fund investment in mechanization (Taylor 1992 and Reardon et al. 1994 for Africa). While mechanization often displaces labour, in the case of irrigation pumps, it augments the productivity of and demand for labour for other tasks. In smallholder farming systems, mechanization induces machine rental markets, enabling smallholders to benefit, and changing the labour market for the long term (for the Philippines, see Takahashi and Otsuka 2009).

In pure economic terms, migration is, on the one hand, a function of incentives, usually measured as the rural-urban wage differential net of transport or transaction costs (Lewis 1954; Todaro 1969; Massey et al. 1993). On the other hand, a would-be migrant's ability to act on that incentive is a function of capacities, such as initial skills, investment capital (in land and non-land assets), predetermined migration networks and so on. These capacities are often concentrated in relatively favourable agricultural environments (Reardon and Taylor 1996; Sadoulet et al. 2001). Also, they are generally greater for men than women and for young people than older ones. The essence is that those with the least capacity migrate least, and that the distance and the returns from migration are higher for those with more prior assets.

It is for these reasons that Lipton (1980) found that migration is "unequalizing" in the sending locality, a proposition much tested empirically since. Corral and Reardon (2001), for example, showed that even in places like Nicaragua where migration is thought to be widespread, only a small share of rural households (and the better off before migration) undertake it. Taylor et al. (2005) showed that poorer migrants (still often better off than non-migrants) migrate internally in Mexico while richer rural households migrate or send migrants to the United States. The consequence is that migration often makes it harder to include women, poor regions, poor people and ethnic minorities in mainstream growth trends.

Deindustrialization and automation

A major threat to meeting the inclusive employment challenge in developing countries is the worldwide trend towards deindustrialization, driven by automation and global trade liberalization. These two drivers work in tandem, with automation decreasing the demand for labour and global trade spreading this effect worldwide. One possible effect is that one of Africa's potential competitive advantages – a plentiful supply of low-cost labour – becomes less attractive to global investors as the share of labour cost in total cost declines.

The centrality of formal manufacturing to overcoming this challenge is based on two characteristics that make it especially effective in supporting the structural transformation of economies (Introduction). First, it exhibits “unconditional convergence” in labour productivity (Rodrik 2015). That is, its labour productivity in manufacturing tends to rise over time to world standards, regardless of the broader economic conditions in which it takes place. Manufacturing workers in, say, Bangladesh, see their wages begin to rise once the Lewis turning point is reached,⁷⁵ ultimately reaching world levels for that skill level, despite the poor conditions of the surrounding economy. Though others have claimed to show such convergence for formal services (KinfeMichael and Morshed 2015), this literature is less established. In either case, formal manufacturing also spurs growth in formal services.

The other characteristic is that formal wage work tends to be more stable than informal sector jobs or self-employment and to offer social benefits that enhance household financial stability. Such stability self-evidently brings important social, political and development benefits.

Falling shares of employment in formal manufacturing (and related formal services) push labour coming off the farm into informal activity and self-employment, most typically in services. A key question – quite aside from concerns about their instability – is whether these types of jobs can generate the same growth in labour productivity (and thus incomes for workers) typically delivered by formal manufacturing. We touch on this issue throughout this chapter, but here note that the answer is very likely “no.”

Deindustrialization has two types. Employment deindustrialization refers to a declining share of employment in industry, while value-added deindustrialization is a declining share of industry in an economy’s total value added. Historically, because manufacturing has tended to be more labour intensive than other industrial sectors, such as mining or other natural resource-based activities,

manufacturing has accounted for about 90 per cent of industrial employment.⁷⁶

Employment- and value-added deindustrialization can diverge. Automation causes the former to start much earlier and progress faster than the latter. Value-added deindustrialization is in part a natural result of structural transformation as incomes grow past a certain point and consumer expenditure shifts from manufactures towards services, just as it shifted towards manufactures from food earlier in its growth. In developed countries, for example, industry has largely maintained its share in real value added while its employment share has fallen sharply (Rodrik 2015).

“Premature deindustrialization” is defined relative to the path and speed of the historical shift in developed countries and is seen in many developing countries, which are deindustrializing at lower peaks of industry’s employment and value-added shares, and at lower per capita incomes than today’s developed countries did. For example, Rodrik (2015) shows that historically in OECD countries the industrial share in national employment peaked around 30 per cent when income levels were about US\$14,000 (in 1990 United States dollars). Today in the developing world, countries such as Brazil and India have seen their share of industrial employment in total employment peak at 13-15 per cent when incomes were US\$5,000 or less. India and some African countries may have peaked at incomes of only US\$700.

Automation is accelerating and spreading its influence from low- to higher-skill jobs. This impact has started first in manufacturing then – currently nascent, but set to grow – in services. The progression is from routine manual activities for manufacturing to routine service activities (such as scanners in supermarkets) to more complex services (such as legal case reviews, which are already starting to be automated). This progression is driven by the merging of robotics, digital technology and “Big Data”. This latter is based on massive and rapidly growing databases on consumer behaviour that are fed by the use of the internet and cell phones. These databases are set to explode in volume over the coming years,

when “the internet of things” ties machinery, appliances and even clothes more closely to the internet. With the continued unfolding of Moore’s Law, which predicts that computing power will double every 18 months – and thus increase 1,000 times every 15 years – these technologies allow increasing use of computing power to solve problems and carry out tasks until recently thought to be the domain of human beings (Brynjolfsson and McAfee 2014, 2011a, 2011b; Autor 2014; Ford 2015).⁷⁷

Fortunately, as employment deindustrialization plays out across the world, agrifood systems in developing countries are modernizing (or “industrializing” – see the chapter on markets and value chains). This modernization is driven by urbanization and rapid income growth, resulting in changed diets and very rapid growth in demand for processed and perishable foods through mass-consumption markets (Monteiro et al. 2011; Popkin 2014; Zhou et al. 2015; Tschirley et al. 2015a, 2015b; Dolislager et al. 2015; Reardon et al. 2015). Such foods could see market-demand growth in SSA of seven to 10 times in the next three decades (Tschirley et al. 2015b), driving a rapid rise in the share of off-farm value added.

Effects of deindustrialization on employment and rural livelihoods

Employment

The dynamic discussed above, of deindustrialization driven by automation and spread worldwide by global trade, could have three effects on employment. It could change its composition, its quality (wage rates, stability, social benefits, etc.), and its level. We first discuss the evidence on these issues – much of it generated in the industrialized world – and then we consider the implications for developing countries.

Composition

This impact relates to labour-market polarization and the “disappearing middle”. The empirical record is strong, showing three changes (Autor and Dorn 2013; Feng and Graetz 2015). Jobs in the middle-skill, middle-wage portion of the distribution have declined, jobs in the high-

skill and low-skill ends of the distribution have risen, and the increase in low-skill jobs has been generated by the combination of a sharp worldwide decline in jobs requiring routine manual tasks (traditional manufacturing jobs) and an even larger rise in the number of low-skill service jobs.

A widespread concern is that continued advances in computer processing speed and robotic dexterity will reverse the increase in low-skill service jobs (a key engine of job growth in advanced countries over the past two decades) and drive an overall decline in low-wage jobs. Examples of automation of low-skill service jobs include ubiquitous ATM machines replacing traditional bank tellers, widely deployed retail checkout scanners, and the near disappearance of secretaries in many offices because of computerization. Banking industry data and analysis suggests that “traditional bank tellers” will disappear, replaced with higher-skilled information providers. This is consistent with automation taking over routine jobs and converting them into jobs requiring greater skill. Since late 2014, Lowe’s Home Improvement Stores in California, United States, have been testing OSHbot, a robotic shopping assistant with the potential to dramatically reduce the on-floor human sales force in the chain (Wall Street Journal 2014). Many other such robotic assistants, including those for homes and offices, are in advanced stages of development.

Frey (2013) estimates that 47 per cent of all jobs in the United States, and 70 per cent of that country’s low-skill jobs, are at risk of loss through automation over the next 20 years. He is explicit. “Our model predicts a truncation in the current trend towards labour-market polarization. As technology races ahead, low-skill workers will reallocate to tasks requiring creative and social intelligence. For workers to win the race, however, they will have to acquire creative and social skills,” (Frey 2013, p. 45). Another concern from computing and robotic advances is that the incursion of automation into some high-skill, non-routine service jobs will pick up speed.

Two categories of jobs seem less vulnerable to automation. In one category are the middle-

skill service jobs requiring creativity and judgment (Frey 2013) that are specific to a place (largely skilled trades such as plumbing, electrical, equipment repair and so on). In the other category are high-skill jobs requiring abstract procedures and creativity that can be complemented by computing power – professional, technical and managerial positions whose holders become more productive working with computers (Autor 2014; Brynjolfsson and McAfee 2014; Frey 2015).

Autor (2014) argues that middle-skill jobs will persist because *jobs* typically require the execution of several *tasks* that are not easily unbundled without harming overall quality. Some of the tasks involved in a job may be complemented by computing power, and so are still done by humans, while others can be replaced by it and are thus done by computer, increasing human productivity.

Quality

Two sets of evidence in the United States and Europe are pertinent. The first relates to job market polarization and the shift from stable manufacturing jobs, some being replaced by new jobs in the high-skill service sector, but more by low-skill service jobs. The latter are frequently part-time, with variable schedules, and rarely offering social benefits (as discussed above).

The second set of evidence pertains to the declining share of labour in total income. A fixed labour share of income has been such an empirical regularity that it became a fundamental feature of macroeconomic models at least 60 years ago. Yet Karabarbounis and Neiman (2013) present evidence on key developments that defy this feature. For example, labour's share in national incomes has declined globally since 1975, across developed and developing economies. Of 46 countries with significant trends in the share, over 80 per cent were negative, including most OECD countries and others such as China, India and Mexico.

Further, this decline is not limited to certain sectors and is not explained by movement of labour across sectors. Six of the eight tested sectors with significant trends had negative trends, and these "within-sector" effects

dominated "cross-sector" effects in explaining the declines. The authors link this decline to the sharp drop in the price of investment goods since 2000, "likely associated with the computer and information technology age," leading to substitution of information technology for labour. Finally, they link their results to rising inequality, concluding that the model implies "meaningful changes in the distribution of income when households have heterogeneous assets...or skills," (ibid).

Levels

Whether changes in job composition and quality affect job levels depends on whether the (embodied capital) technologies are primarily complements or substitutes for labour.

A fundamental observation is that the ways in which technology can be complementary (having a neutral or even positive impact on employment) are more difficult to identify than those in which it can be a substitute. This is for the simple reason that one *sees* the jobs being lost but has to *imagine* the new jobs that could emerge (Autor and Dorn 2013). "Journalists and expert commentators overstate the extent of machine substitution for human labour and ignore the strong complementarities that increase productivity, raise earnings, and augment demand for skilled labour" (Autor 2014).

This reason helps explain the long history in the industrialized world of periodic false alarms over machine and computer displacement of labour. In each case, previously unimagined jobs have emerged and employment has continued to grow, though sometimes with a lag. In a similar vein, Feng and Graetz (2015) cite historical evidence of labour-market polarization – a "hollowing out" of the middle of the wage distribution similar to that seen today in the United States and Europe – in two previous periods of momentous technological change: the rise of the steam engine in the mid-nineteenth century, and the rise of electricity in the early twentieth century. In neither of these instances did overall employment decline in the long term.

Still, Beaudry et al. (2007) observe a sharp decline in the demand for skill in the United States labour market from 2000,

following many years of increase. The result is a progressive “de-skilling” of the workforce, with more educated workers taking lower-skill jobs. This pushes those job holders to lower levels of the skill ladder, who in turn displace the even less skilled holding those jobs. The authors link this declining demand for skill to the contemporaneous fall in United States labour-market participation. Their results call into question the ability of better education and technical training alone to ensure robust employment in the future. Together with evidence on the realized and likely future decline in demand for low-skill jobs, Beaudry et al.’s evidence also suggests continuing declines in overall employment.

So, there is no agreement on the basic question of whether twenty-first century technology will drive a long-term decline in employment. If it does, a wide range of policies – economic, social, educational and others – will need to be fundamentally re-engineered over the coming decades.

Implications for developing countries

Deindustrializing and modernizing trends are playing out most directly in developed economies and in the modern sectors of some developing countries such as China. The effects, however, are felt globally and in all countries through their impact on the patterns of global investment and global trade.

Developing countries with cheap labour may get less help from the “domino effect” of international firms seeking new sources of cheap labour,⁷⁸ meaning that the positive side of Africa’s youth bulge – plentiful, low-cost labour – may be less valuable over time.

These trends could also hit female employment particularly. More than one third of manufacturing employment in developing countries is female, and nearly one half in some Asian countries (Barrientos et al. 2004). Female employment is often heavier in export manufacturing, especially during its early phases. This pattern is driven in part by competitiveness in the world market and the push for flexible labour – part-time, temporary and casual – which historically characterizes female employment.

Manufacturing also shows a broad pattern of lower pay for women than men. Since much of this work is low-skilled and repetitive, it is also the type that is most likely to decline as automation spreads. Barrientos et al. (2004) cite many studies showing that female employment declines as automation proceeds and as the skill – and wages – of remaining workers rise. This is not necessarily due to inability to obtain the skill, but rather to employer preference for males in such positions, partly to avoid paying maternity and childcare benefits (Barrientos et al. 2004).

For developing countries that have suffered the most deindustrialization (many of them in Latin America), “re-shoring” is unlikely to bring many of these jobs back. Manufacturers in the United States (and now even China) who had previously placed some of their production offshore in search of low-cost labour are now repatriating at least some of it. Repatriation (re-shoring) stems from the falling importance of labour costs in total costs because of automation and the rising importance of other productivity factors, like network effects, in highly automated production. But countries that have heavily deindustrialized may find it too late to attract back these manufacturing jobs, especially if they have insufficiently developed “fundamental capabilities” (Rodrik 2015), such as human capital, technology, infrastructure and strong institutions.

Developing countries that modernize their domestic agrifood system find that the process threatens current and future rural employment by supplying products and services from efficient urban firms, competing with local, rural goods (Reardon et al. 2007). Increasingly, small, rural firms – those now in operation or those that could form in response to emerging demand – cannot “hide” from the challenges posed by more modern urban firms. Steadily integrating markets and falling transaction costs see to that, especially since less than 10 per cent of the rural population across all developing countries resides in remote areas further than several hours from cities (Barbier and Hochard 2014). Modern firms also have stricter requirements for quality, volume and delivery, creating entry barriers for

farmers and any firms wishing to provide first-stage processed raw material to urban-based food manufacturing and food service businesses (see the chapter by Reardon and Berdegué).

These urban processors require cheap labour from rural areas in their initial labour-intensive phase. How much flows into informal self-employment or into wage employment depends largely on the importance of urban food manufacturing and preparation (restaurants and street vendors), which have a higher share of wage employment, relative to urban marketing, transport and other services, which tend more towards self-employment (Tschirley et al. 2015a).

Very rapid growth in market demand for perishable and processed foods in urban areas of developing Asia and Africa means that food manufacturing and preparation will probably account for 7-8 per cent of all new jobs over the next 15 years or so, and marketing, transport and other services for about 10 per cent – both among the fastest-growing employers (Reardon et al. 2015; Tschirley et al. 2015a, 2015b). Combined, the post-farm food system should account therefore for 15-20 per cent of all new jobs over the period. Farming should provide about one third, non-food sectors the rest.

Barrientos et al. (2004) cite work showing that women can have high shares of employment in the post-farm segments of high-value agrifood supply chains. Jaffee (2011) shows the same for export horticulture in Kenya. As demand for these products grows locally, this can be an opportunity for female employment.

Opportunities for rural livelihoods and jobs

Rural people are not passive observers of employment trends. They respond and anticipate in order to mitigate risks and boost opportunities in a handful of strategies, some open primarily to the strong (workers with skills or the self-employed with capital assets), others potentially accessible by the weak and vulnerable (workers with low skills or the self-employed with little capital).

A leading candidate strategy, broad in volume and inclusive in coverage and accounting for perhaps 50-60 per cent of rural incomes, is

traditional agriculture itself, whether from own-farms or from farm wage labour (typically performed by the poorest in the community). However, its ability to absorb more labour faces difficulties (see the subsection on challenges below).

A second opportunity, also broad and inclusive, is RNFE from services and manufactures (Haggblade et al. 2007). RNFE provides 30-50 per cent of rural incomes across the developing world – more in some countries – and is much more important than farm wage labour and extra-local migration employment. RNFE is based either in fully rural areas or in rural households commuting to local rural towns (this constitutes half of RNFE in India, but less in Africa).

RNFE is expected to expand and change in composition (see the Introduction), especially in poorer areas and in the early stages when it is heavily based on production linkages with local farming. It is closely tied to development of off-farm components of the agrifood system (agricultural services, processing, distribution and logistics). These off-farm components are expanding very quickly, with start time, speed and depth correlated roughly with GDP per capita and urbanization (see the chapter on markets and value chains), in a shift mirrored on the demand side by rapid diet change that requires handling for perishable foods and processing.

Gradually, RNFE services and manufactures start to extend beyond local-farming production linkages (Haggblade et al. 2007; Reardon et al. 2001). The trends are from self-employment to wage employment, from manufactures to services and from hinterland to villages or rural towns and to near highways (Reardon et al. 2001 for Latin America; Bhalla 1998 for India; Haggblade et al. 2007 in general).

The distribution of RNFE in activities with low barriers to entry (meaning accessible to the weak) is denser in areas with better agriculture or nearer to cities (or both). These areas often show a U curve of reliance on RNFE, where the horizontal axis is household assets. The challenge is that in unfavourable areas, poorer households and women have a harder time accessing RNFE (Reardon et al. 2000; discussed

below). These unfavourable areas also show more externally oriented non-farm activity as they have fewer production- and consumption-linkage activities, implying geographical and asset-based poverty traps in RNFE.

Self-employment microenterprise, especially in manufactures, blossoms where it has economic space. Examples are most vigorously in high-potential rural zones and rural areas close to cities and peri-urban areas, and less so after privatization of parastatals (as in Zimbabwe; Rubey 1995) and in the initial phases of demand for processed foods (Snyder et al. 2015 for Dar es Salaam).

A third strategy for rural employment, but limited in volume and inclusivity, is a growth path of natural resource exploitation, such as energy, mines and forests. This is typical of countries in all regions with oil, with other mineral resources or with large, forested hinterlands, particularly in Africa.

A fourth, also limited in volume and inclusivity, is tied to tourism services around natural and cultural resources. They are major sources of service-sector jobs in some areas, and of job multipliers to local communities. This opportunity is not, however, broadly based because tourist places, by definition, are special and individual.

A fifth option, limited in volume and inclusivity except in the short term, is temporary migration by rural household members. This strategy is not directly inclusive because even in rural zones renowned for sending migrants, the share of households sending migrants is small.

Challenges facing marginalized groups

An overarching challenge for the poorest groups in general and for women in particular is what Reardon et al. (2001) call the “meso” and the “micro” paradox. This key message underlies most of the challenges faced by marginalized groups seeking to follow any of the five employment options above.

The meso paradox is that the zones needing to diversify income the most have the lowest capacity to do so. These zones, such as hinterland areas and locations with poor agroclimates, tend to be impoverished

and exposed to high risk, and so are weak at generating investable surpluses and effective demand for goods and services beyond the most basic. These areas need new employment sources, but have a hard time investing in, maintaining or indeed locally demanding them. This paradox is at work across zones within countries, across countries within regions and across regions.

The micro paradox is the household analogue of the meso paradox. Rural households in favourable regions and hinterlands or in low-potential zones have a strong incentive to work off-farm to manage risk or alleviate poverty. But very often these households lack key assets and have poor access to credit and financial services, curtailing their ability to enter the labour market. This challenge can be exacerbated if an affected household is headed by a woman facing gender biases and a preponderance of unremunerated home chores. These households may not be income poor, but rather investment poor (Reardon and Vosti 1995), meaning that they do not have the needed assets – or a market to convert the assets they do have into assets of the needed form – such as labour sold to buy start-up equipment for a self-employment enterprise.

A logical extension of the two paradoxes is that the asset-rich are much better able to take advantage of many of the job opportunities listed above, in an “elite capture” reflecting the activities’ investment needs or entry barriers.

For example, to start a mine or a forest operation of a scale to be competitive, an entrepreneur needs to buy digging equipment and chain saws, and to hire crews. Employment in mining and forestry, therefore, tends to be concentrated, not broad, except where it is informal or artisanal. But even that requires investment and is controlled by intermediaries (see the chapter on land and natural resources). Rural women may face other challenges to get these jobs, given the need to live away from home in camps, and so forth.

Land is the obvious entry requirement for self-employment in agriculture – inherited, rented or bought. (Chapter 3 discusses the substantial and persistent land-market

constraints for youth.) Labour-intensive high-value products like fish or horticulture can be important additions to employment, but here too gender can blight opportunities. Targeted investments are required.

Although wage employment in agriculture is a key refuge activity of the poorest, worldwide, farm labourers are increasingly at risk from ever-cheaper automation, from farm machinery to mechanized packing houses to conveyor systems to load trucks. Many developing countries have mechanized in a spurt, as industrialization and urbanization take rural wages to the Lewis turning point in, for example, China (Zhang et al. 2011) and Bangladesh (Zhang et al. 2013). Africa is less mechanized, as expected by its lower income, but it may be poised to rise quickly on the back of a rise in medium-scale farming (Jayne et al. 2015).

Some of these challenges to agricultural wage employment are, however, offset by three positive trends. These are:

- The rise of livestock farming, horticulture and aquaculture, which are all very labour demanding per unit of land.
- The emergence of medium-sized and large farms that may require much hired labour (Neven et al. 2006 for mid-sized produce farms near Nairobi).
- Expansion of non-farm employment and agricultural intensification, tightening the labour market and pushing up wages for farm wage labour (Lanjouw and Murgai 2009).

But for each positive trend, inclusion issues persist, especially for women, who may have difficulties joining livestock, horticulture or aquaculture enterprises as owners rather than workers, or in accessing non-farm opportunities (ibid). And for both men and women, new emerging larger farms may initially hire much labour, but as with all large farms, may mechanize (Das Gupta et al. 2010 for potato farming in western Uttar Pradesh, India).

Wage RNFE can be easy for the rural poor to enter, especially where it is abundant (as in spin-off employment from agricultural development), and where it demands little

transport or few skills. But it, too, throws up challenges. For instance, as the employing entity moves further from the rural household, the rural poor need to commute to work. Bhalla (1998) reports shifts of non-farm manufacturing from villages to near highways in rural India. (Rural women might be especially constrained given home chores and cultural strictures.) Additionally, the skills demanded for RNFE wage work can increase over time as manufacturers and even service firms increase their capital-labour ratios to attain scale. Reardon et al. (2012), for rice-milling enterprises and Snyder et al. (2015), for maize-milling operations, show how equipment size grew, even in small and medium-sized enterprises (SMEs), an increase that may displace labour.

A potential migrant – domestically, let alone internationally – must often meet a whole gamut of requirements, including speaking the language of the city, having some marketable skill, having enough money to afford the transport and the (often illegal) intermediaries, having money to live on while looking for a job, having connections such as migration networks and being protected from the criminals that prey on migrants. These hurdles are even worse for women, who usually face job discrimination or are consigned to low-paying arduous jobs – the image of lines of women carrying rocks on their heads to building sites comes to mind. It is thus not surprising that migration is a relatively non-inclusive channel. Migrant employment is also fraught with risk, such as changing immigration policies, informal housing crackdowns, criminality and mechanization in the receiving area.

In summary, rural and urban self-employment can be a promising employment avenue for marginalized groups in rural areas, especially when SMEs are proliferating. But competitive forces can pressure SMEs to make investments, which become entry barriers for those with no capital or few skills (see the chapter on food-system transformation).

Responses to protect the vulnerable and improve rural employment

How can policies and programmes foster inclusive rural employment in the midst of the above technological trends? The same forces are at work throughout the world, but are likely to play out differently across countries – for which reason it is important to classify countries by type, offering a framework for responses.

A country classification scheme for analysing employment prospects

The four-group scheme has:

- *Lagging industrializers*.⁷⁹ Low-income countries that have attracted limited international investment in manufacturing, have very low manufacturing employment, and no evidence of rising shares of manufacturing in their economies.
- *Nascent industrializers*. Low-income countries otherwise similar to lagging industrializers, but with indications of the rising importance of manufacturing.
- *Successful industrializers*. Countries that have climbed the manufacturing ladder (though to a lower rung than fully industrialized countries) through a combination of policies and investments that have driven competitive advantage in world markets. In part for that reason, these countries have been able to invest in the fundamental capabilities needed to compete in the more automated manufacturing environment.
- *Premature deindustrializers*. Countries that have seen deindustrialization as a consequence of the exposure of uncompetitive local industries to global trade, resulting in a sharp increase in the share of informal and self-employment in total employment.

To implement this classification, we used data from a sample of 38 countries drawn from across the globe on real per capita manufacturing GDP in 2011 and the change in the share of manufacturing in their GDP over 20 years up to 2011. The categories were defined as follows:

- *Lagging industrializers*. Countries with per capita manufacturing GDP below the median

of countries in the IFAD data set (US\$773), and a falling share of manufacturing in GDP in the period. Countries in this group have a mean per capita manufacturing GDP of just US\$170 and the manufacturing share of GDP fell by an average of 9 percentage points. This category is dominated by Africa.

- *Nascent industrializers*. Countries with per capita manufacturing GDP below the median, but a rising share of manufacturing in GDP. These countries have a per capita manufacturing GDP of US\$215 and the manufacturing share of GDP rose by an average of more than 2 percentage points. Africa holds six of the nine countries in this group. Cambodia is the outstanding member, with Bangladesh and Uganda also seeing substantial growth in manufacturing share.⁸⁰
- *Successful industrializers*. Countries with per capita manufacturing GDP above the median and a rising share of manufacturing in GDP. Countries here have a per capita manufacturing GDP of US\$1,750 and the manufacturing share of GDP rose on average by more than 3 percentage points. Asia holds three of the five spots in this group, Cuba and Nicaragua occupying the other two. Thailand is the outstanding entry, with the second highest (after Cambodia) growth in manufacturing share and the second-highest per capita manufacturing GDP.⁸¹
- *Premature deindustrializers*. Countries with above median per capita manufacturing GDP and a falling share of manufacturing in GDP. Countries in this group have a per capita manufacturing GDP of US\$2,018, and the manufacturing share of GDP fell on average by nearly 5 percentage points. Malaysia, China, Tunisia, Egypt and India move into the successful industrializer group under the approach of percentage change in real per capita manufacturing GDP. Latin America accounts for five members of this group, including four of the five that fall most firmly within the group – Colombia, Chile, Brazil, Dominican Republic and South Africa.

Table 5.1 and figure 5.4 summarize the results by category, for the classification variables and other related variables.⁸² Surprisingly, China, India and Malaysia emerge as premature deindustrializers rather than successful industrializers. These are countries with fast-growing economies whose manufacturing share in GDP may have fallen only slightly. We therefore tested an approach in which the change in manufacturing GDP share is replaced with percentage growth in real manufacturing value added over the past 20 years.⁸³ The eight countries (out of 38) that change category using the second approach are all within the blue box in figure 5.4. All premature industrializers within this box become successful industrializers under the second approach, while all failed industrializers become nascent industrializers.

Prospects and policy approaches by country type

The vast technological changes of the past 50 years have fundamentally changed the transformation pathways open to developing countries. And as employment is central to structural and rural transformation, this implies fundamental changes to the employment paths that countries can follow.

Cross-cutting

A common theme across nearly all countries (with the possible exception of successful industrializers), is the high and rising level of informality in employment, which is likely to be a long-term feature of most developing economies. Policies need to work with this informal sector, not against it, to improve its productivity and extend social protection not only to workers in the informal sector, but also to the growing number of informal workers used by firms in the formal sector.

Inclusive agricultural and rural development strategies need to put employment objectives on a par with growth objectives, which is particularly important for lagging and nascent industrializers that still have high shares of labour in agriculture. (Other chapters discuss options to do so.)

Most countries will find it hard to escape the pressures of reducing employment and making it less inclusive. Social protection will have to play a larger role. Growing experience with social protection, especially in Latin America, provides lessons for design across the developing world. Unlike in the past – and because informality is rising across the world – these protections will have to be de-linked from employment,

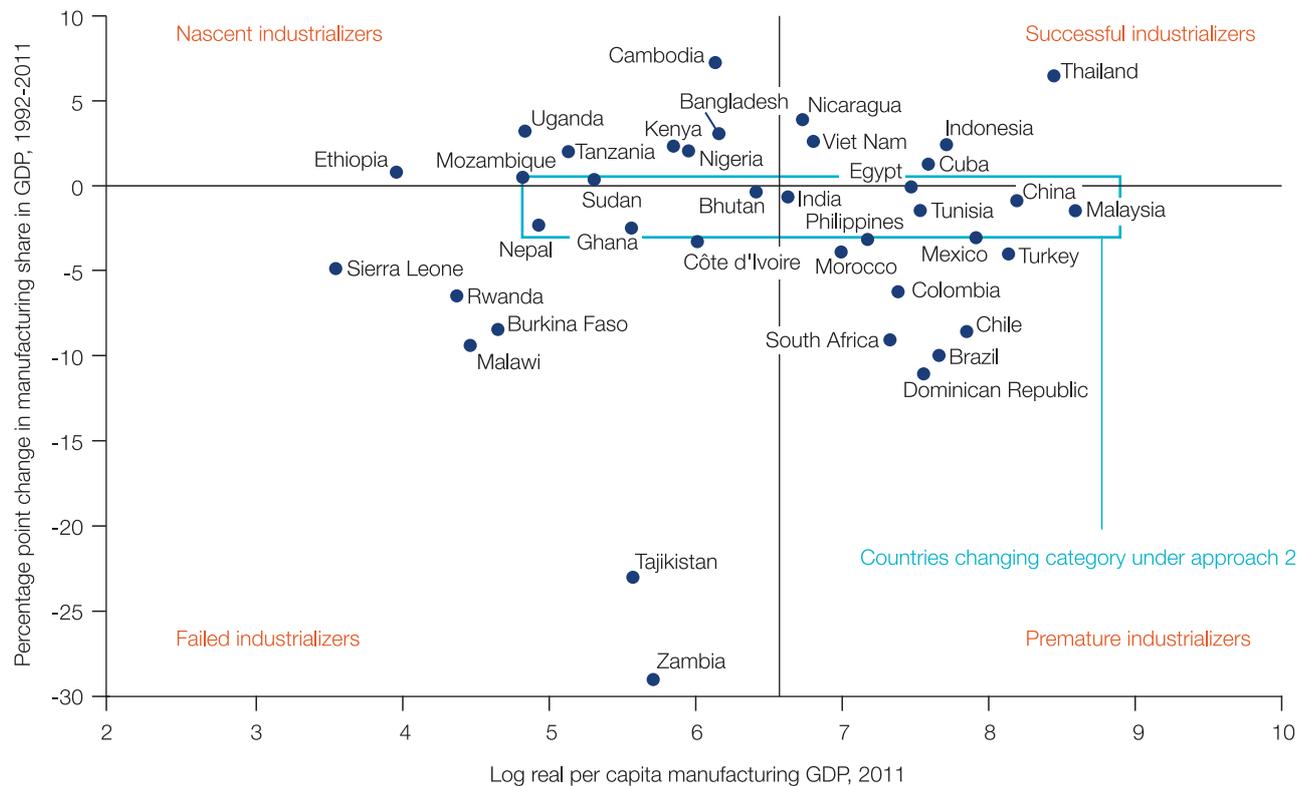
TABLE 5.1 Summary data on a classification scheme for assessing employment prospects, 2011

	Per capita FDI (US\$)	Industrial employment (%)	Per capita GDP (US\$, real)	Real manufacturing GDP per capita, US\$	Manufacturing share in GDP (%)	Percentage point change in manufacturing share in GDP, 1992-2011
Lagging industrializers	41	10.4	2 780	5.14	8	-9.0
Nascent industrializers	60	9.0	2 515	5.37	11	2.4
Successful industrializers	104	19.5	10 324	7.47	21	3.3
Premature deindustrializers	261	23.9	12 958	7.61	18	-4.6

Note: Simple country means are used; classification variables are in the three columns on the right.

Source: Authors' elaboration of IFAD data compiled for the RDR 2016 from the World Bank and other sources.

FIGURE 5.4 Classification scheme for employment analysis



Notes: Horizontal axis: Per capita manufacturing GDP; Vertical axis: Growth of manufacturing measured either by the percentage point change in manufacturing share of GDP, 1992-2011 or percentage change in real per capita manufacturing GDP, 1992-2011.
Source: Authors' elaboration of IFAD data compiled for the RDR 2016 from the World Bank and other sources.

and based instead on broad provision of basic coverage for all citizens, or targeted groups of citizens, regardless of employment status, but the challenges will vary markedly across the four types of country.

A key challenge for inclusive employment policy will be raising the fiscal revenue needed to fund the investment in human capital, technology, infrastructure, social protection and strong institutions that could ensure stronger growth and greater inclusiveness. However, with growing informality, it will be difficult to broaden the tax base. Premature industrializers – many of them in Latin America – are seeing sharp rises in informality, while informality is already high among lagging and nascent industrializers. Formal services depend for their growth largely on formal manufacturing. A decline in the former makes it harder to expand the latter.⁸⁴

The next major challenge is the political one of convincing the (relatively few) owners of the formalized means of production to tax themselves enough to fund the investments (including social protection programmes) needed to remain competitive on world markets. Countries with higher incomes, better fundamentals and that have already climbed the manufacturing ladder (successful industrializers and some of the premature deindustrializers, such as China, Malaysia and perhaps others such as Brazil) will be in a position to meet these challenges better than many of the lagging and nascent industrializers in Africa and parts of Asia.⁸⁵

The outstanding development success stories of the past several decades come primarily from Asia – first Japan and Taiwan, followed by the Republic of Korea, then China and others such as Thailand. To varying degrees, all

these economies have followed a strategy of the “developmental state” – industrial policy featuring strategic collaboration between the government and private sector to channel investment into high-potential sectors while creating the conditions for success through heavy investment in infrastructure and human capacity. More recently, Latin America has observed its sharp decline and limited recovery from the financial crisis of 2008 and has tried to learn from Asia’s success and from its own mistakes during its period of “infant industry” protection. The emerging strategies, such as “productive development policies” (Crespi et al. 2015), bear a strong resemblance to the practices of Asia’s developmental states.

The literature emerging in Latin America emphasizes the need for strong institutions if the developmental state approach, or Latin America’s “productive development policies,” are to be successful. Yet most African countries have wide institutional capacity gaps. Still, the flood of investment into the continent from Chinese firms suggests a chance to “piggyback” on it, which has been important in building large transport and energy infrastructure. African leaders wanted this infrastructure, but could not finance it in other ways, and it could now boost broader development by reducing the cost of doing business.⁸⁶ Chinese investment has also created nearly 10 special economic zones across the continent, most of them focused on manufacturing (Brautigam and Xiaoyang 2011). The debate over the desirability and design of new “innovation policies” and productive development policies is a major part of the discussions on development policy, and feeds into any analysis of employment prospects and the role of agricultural and rural development.

Lagging and nascent industrializers

These countries face exceptional challenges, especially the small, landlocked ones, all of which are lagging industrializers and account for five of the eight “core” members of that category – Burkina Faso, Malawi, Rwanda, Tajikistan and Zambia. These countries are all still agrarian economies and the bedrock

of their response has to be focused on the agricultural and rural non-farm sectors. This requires huge public investment in the basic capabilities of the rural population – health, education and nutrition. Equally important is to build agricultural capacities and corresponding institutions for market and value chains, rural finance and natural resource management, as well as technology.

A major risk for all these lagging and nascent industrializers – doubly so for the small, landlocked countries – is that de-industrializing and modernizing trends, alongside governments’ minimal capacity to invest in their countries’ fundamental capabilities, will choke off manufacturing growth, or cause it to peak at a lower income and number of manufacturing jobs than even the levels now seen elsewhere in the developing world.

Some optimism can be based on the rapid growth, driven by foreign direct investment (FDI), in the production of apparel, leather goods and other manufactured goods for domestic and export in Ethiopia (allAfrica 2015; *Daily Maverick* 2013) and some other large foreign investments in Nigeria, Kenya and Madagascar (*Economist* 2014) and Uganda (Byiers et al. 2015). These investments show that, though countries will in all likelihood peak at far fewer manufacturing jobs than in the past, this does not preclude them from now achieving growth in these job areas for some time, even if this progress can only be viewed as fragile. For example, Cambodia appears an outstanding success, having taken its roughly 9 per cent manufacturing share in GDP in 1993 to over 16 per cent by 2012 – but this share has *fallen* since peaking at nearly 20 per cent in 2004. Uganda, another potential ground for optimism, has also seen its manufacturing share fall slightly since the late 1990s.

Countries with natural resource wealth (most of them in Africa)⁸⁷ could generate the fiscal revenue for investments and social protection through taxes on widespread formal activity, but will have to overcome the elite capture and institutional failures that often accompany resource booms. Botswana is a fine exception in Africa, yet the conditions that have driven its

success – exceptionally high per capita earnings and a unique political culture – exist nowhere else on the continent.

China's infrastructural investments are potentially transformative if managed well and maintained, but weak public-sector capacity increases the chances of inadequate local learning and participation. A key question is what level of fiscal revenue these investments generate and whether such receipts will be used to build local capacity for direct and indirect (local service provision) participation.

Because the economies of lagging and nascent industrializers are small, regional trade and economic cooperation should boost their chances for sustained growth. Low GDP and small urban populations mean that growth in domestic-market demand can take off when economic policy falls right, through a combination of rapid urbanization (greater dependence on markets) and fast per capita income growth. Given these economies' structures, much of this demand growth will be linked to agriculture and broader agrifood systems, including mid- and downstream elements (see the chapter on markets and value chains).

This mix of rapid urbanization and food-system transformation over the past 15 years has spurred food- and broader market-demand growth near 10 per cent a year in some African countries. Some Asian countries have seen even faster growth. If buttressed by closer regional trade integration and broader regional economic cooperation to ensure larger and more stable markets, by investment that increases agricultural productivity, and by other investments and policies that foster a vigorous local response to local and regional demand for manufactures, such growth could fuel transformation for some time. One attractive aspect of domestic and regional markets is that they are based on consumers with rising, but still low, incomes who may be satisfied for some time with the quality that local producers can offer (see the regional chapter on SSA).

The question for this scenario of high domestic demand growth is: Where will the purchasing power come from? While

recent growth in Africa appears to be real (not a statistical artefact) and research shows associated sharp upturns in the contribution of structural change to growth over the past decade (McMillan and Harttgen 2014; Fox et al. 2013), it is still not clear what is driving it. Thus we cannot answer the question.

This scenario also has a built-in limit. If incomes continue to rise, increasing numbers of middle-class consumers will begin to demand the quality produced only with modern manufacturing techniques. Where will the needed investment funds and the ability to channel them into high pay-off sectors come from? These countries are the least capable of developing and applying solid industrial policies, which require a sophisticated public sector and a long-term commitment to pragmatic, iterative learning with the private sector about what works (Crespi et al. 2015). Yet, these countries will need to pursue such policies if they are to stay on a sustainable growth path over decades, pointing to high-potential returns to sustained investment in human and institutional capacity strengthening.

RNFE is a more important source of income in these lagging and nascent industrializers than in other countries. Infrastructural investment, tighter regional economic integration, and stronger human and institutional capacity will all help RNFE to expand. Two more direct approaches include micro- and small-scale credit, and business development services. Both can have positive effects, but programmes need to control costs, as cost per beneficiary can be steep. And, as per the meso and micro paradoxes, it is hardest for these programmes to reach the firms, farmers, herders and artisans who most need it. Consequently, benefits are typically concentrated among the top-tier of poor people (not the poorest) or those already above the poverty line (Haggblade et al. 2007).

Successful industrializers

All countries in this group have built their success on productivity growth in agriculture, and demand from growing urban populations has contributed to their agricultural growth. Most of them have well-designed agricultural

and rural development strategies, focused on small-scale farmers and inclusiveness. Their emphasis on agricultural development has been longstanding and they have no intention of cutting it. (Policies and programmes are explored more deeply in chapter 2).

The strong challenge for these economies – and for countries such as China and Malaysia with high growth and high manufacturing shares in GDP that have slipped slightly – is that they will have to invest heavily in automation to maintain their value-added share in manufacturing, thus driving continued employment deindustrialization. This outcome appears unavoidable, with the process well underway in Western industrialized nations and already starting in China, where for example the country's largest manufacturer of computer parts plans to go to *fully* automated production over the next few years.

Maintaining value-added shares in manufacturing would mean that these countries could generate the fiscal revenues needed to fund continued investment in the fundamental capabilities of their populations (and in social programmes for those left behind) – if they solve their political problems on tax revenue.

These countries are likely to avoid value-added deindustrialization, but will continue to confront employment deindustrialization. The effects could be partially offset by the entrance of labour into the formal service sector (as in all Western industrialized countries). A key challenge for them will be to continue evolving their developmental state approaches to manage the inevitable transition into more service employment. Yet this is no “magic bullet” as these jobs are also increasingly subject to automation. Their real difficulty is in “looking around the corner” and imagining the new jobs that might emerge, and if they will be based on complementarities between humans and computers.

Premature deindustrializers

Most of these countries are well advanced in the structural transformation, with small shares of agriculture in employment and GDP. However, agriculture can still contribute to rural poverty

reduction and welfare, via the right development strategies (World Bank 2008). Countries now most firmly in the grip of premature deindustrialization – mainly in Latin America plus South Africa – earlier industrialized behind protective infant industry policies. They are now deindustrializing for two reasons; they find it hard to compete in global trade, and, relatedly, are investing less in their fundamental capabilities⁸⁸ than in the most successful Asian countries. (Chapter 1 analyses these factors further.)

It is not clear how much these countries can re-shore, as that affects industries that are highly capital and skill intensive, and as China and others are investing heavily in cutting-edge automation. Mexico could become an exception, and bears close observation as it attempts to bring manufacturing back.

The size of some of the domestic markets in Latin America – and, if politics permit, the even larger sizes of emerging continental trade zones – provides a potential cushion similar to that for lagging and nascent industrializers in Africa and Asia. These large domestic and regional markets mean that the more advanced countries of the region may be able to generate the fiscal resources needed to ramp up investment in fundamental capabilities. What they cannot expect is a sustained rebound in manufacturing employment – slowing the decline while raising the labour productivity of those they do employ is the best they can aspire to.

Latin America is a leader in the developing world in designing social protection that builds human capital (see chapters 1 and 10). Ensuring that social protection becomes part and parcel of investment in human capabilities will be a key feature of inclusive transformation in that region.

Possible future implications of labour-substituting technology

This chapter has implicitly assumed that the technology driving employment deindustrialization, though profoundly affecting the composition and quality of employment, will be similar to past technology in acting broadly, though perhaps with lags, as a

complement and not a substitute for labour. If this proves untrue, and if the employment polarization to date becomes a broad decline in employment (except in high-skill areas), a more profound rethinking of economic and social policy will be required.

In industrialized countries, the most commonly discussed policy response to such a world is some kind of guaranteed income scheme. Given the persistent operation of the meso paradox, one could imagine the need for something like this approach. The political challenges of moving in such a direction would be, to say the least, formidable, and the policy options have only begun to be thought about. Venturing there is well beyond what can be done in this report.

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