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Labor Productivity Growth and Industrialization in Africa

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Abstract

Manufacturing has made an important contribution to raising living standards in many parts of the world. Concerns about premature deindustrialization have made some observers skeptical about the potential for manufacturing to play this role in Africa. But employment in African manufacturing has grown rapidly over the past 20 years. These employment gains have been accompanied by: (i) large increases in the number of small manufacturing firms, (ii) limited employment gains in large firms, and (iii) robust labor productivity growth in Africa's large firms. Limited employment growth in Africa's large manufacturing firms is partly a result of the capital intensity of the manufacturing subsectors in which African countries are most engaged—the processing of resources—and partly a result of rising capital intensity in manufacturing. The potential for manufacturing to raise living standards in Africa depends on indirect job creation by large firms through backward and forward linkages and increasing labor productivity in small firms.

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A shift from agriculture to manufacturing has been one of the hallmarks of job creation, poverty reduction and rapid growth in low-income countries around the world. Industrialization is also one of the pillars of the African Union's Agenda 2063 – the blueprint for transforming the continent into a global powerhouse (at https://au.int/en/agenda2063).

Some of the signs for industrialization in Africa are encouraging. The most comprehensive information about manufacturing employment in Africa only covers 18 countries, but based on those data, manufacturing employment in Africa's low- and middle-income countries increased from 6 million to more than 20 million from 2000 to 2018, raising the share of employment in manufacturing from 7.2 percent to 8.4 percent (Kruse et al. 2021). In comparison, the 1990s saw zero growth in Africa's manufacturing employment. Manufacturing exports from African nations have also grown at an annual average of 9.5 percent per year (Signé 2018). But while employment and value-added shares of manufacturing in Africa are rising, both remain very low in comparison to the rest of the world (Diao et al, 2017; Nguimkeu and Zeufack 2019).

The performance of the manufacturing sector varies considerably across African countries; this heterogeneity is to be expected given the vast differences in labor and natural resource abundance across Africa (World Bank 2021). Nevertheless, most African countries have a low share of formal employment in the manufacturing sector. According to the INDSTAT database of the United Nations Industrial Development Organization (UNIDO 2020), only a handful of countries in Africa in 2018 had formal employment that exceeded a total of 100,000 in firms with 10 or more employees: Ethiopia, Ghana, Kenya, Nigeria, South Africa and Tanzania. Among these countries, Nigeria stands out, with around three million workers engaged in formal manufacturing between 2010-2012 (Nigerian Manufacturing Sector Report 2014). However, very little systematic information exists about the manufacturing sector in Nigeria. To the best of our knowledge, no longitudinal census of manufacturing firms in Nigeria exists. There is a World Bank Enterprise Survey for the year 2014, but it only covers 19 of Nigeria's 36 states and the total employment generated using weights is implausibly small.

This essay considers the prospects for growth of manufacturing in Africa. We begin with a description of broad trends, drawing heavily on the results in Diao et al. (2021). Three striking patterns emerge. First, there has been a rapid increase in the number of African manufacturing enterprises with fewer than 10 employees. We call these firms "small" and "informal" although some of these firms are likely to be formally registered; for the most part, we do not have enough information to make this distinction. In contrast, in Asian comparator countries, the share of employment in small manufacturing

firms is flat or falling. Second, while Africa's large manufacturing firms appear to be productive, employment growth in these firms has not been rapid enough to decrease the share of small firm employment in total manufacturing employment, at least not yet. Third, labor productivity growth in Africa's manufacturing sector is largely accounted for by structural change (or the increase in manufacturing output associated with the increased employment share in manufacturing and the decline in activity in agriculture where labor productivity is lower than in manufacturing); conversely, within-sector labor productivity growth in manufacturing is close to zero.

The relatively nascent stage of manufacturing in Africa presents both opportunities and challenges. Probably the most important opportunity stems from the African Continental Free Trade Area, which took effect on January 1, 2021. Given that the total population of Africa is roughly equal to that of China, the integration of African markets could attract the foreign investment needed to upgrade capabilities in the manufacturing sector and elsewhere. Some evidence suggests that this is already happening (Newman et al. 2016; Abebe et al. 2021). We also discuss opportunities for Africa's manufacturing in the "in-between sector," as well as manufacturing in sectors related to Africa's specific resources, green energy sources, and health needs. As Africa's manufacturing sector evolves, its biggest challenge is likely to be that global manufacturing around the world is shifting toward rising capital intensity—think "robots"—which reduces the importance of Africa's comparative advantage in unskilled labor-intensive manufacturing (Diao et al. 2021). We emphasize that the ready-made garment industry remains relatively low-skilled labor intensive. In addition, even if a shift to capital-intensive manufacturing might limit manufacturing's direct role in job creation, there are large indirect benefits associated with manufacturing--including job creation in different but related sectors.

Industrialization spans a wide array of sectors and the continent of Africa is home to 54 countries. In this essay, we will focus on Sub-Saharan Africa and exclude discussion of the countries of North Africa, in part due to data limitations and in part because neither of the authors of this piece has worked on these countries. We also focus almost exclusively on the 21st century, the period during which many African countries experienced rapid labor productivity growth (Diao et al. 2019). Finally, we focus exclusively on manufacturing. For more on the status and potential of industries other than manufacturing, the reader is referred to the excellent work by John Sutton and his co-authors in his series of Enterprise Maps and a more recently published volume, which explores the potential for job creation in Africa's economies outside traditional manufacturing (Newfarmer, Page, and Tarp 2019).

Patterns of Labor Productivity Growth and Structural Change

The shift from agriculture to manufacturing can in theory raise labor productivity in several ways: growth in labor productivity in the agricultural sector, growth in labor productivity in the manufacturing sector, and growth in labor productivity from the structural change between lower-productivity agriculture and higher-productivity manufacturing. In the context of growth in African nations in the last two decades, it turns out that labor productivity growth outside agriculture is almost entirely from structural change, not from within the manufacturing or service sectors. In this section, we provide evidence for this claim; in the next section, we discuss how the patterns of Africa's manufacturing growth between smaller informal firms and larger formal firms helps to explain what has been happening.

To describe these patterns, we use the recently released Economic Transformation Database (ETD) (de Vries et al. 2021). There are 18 Sub-Saharan African countries included in the ETD; in 2018 these countries accounted for about 74% of Sub-Saharan Africa's GDP and 64% of its population. It includes the two most populous countries, Ethiopia and Nigeria, the two richest countries, Botswana and Mauritius (measured using GDP per capita in 2018) and two of the poorest countries in Africa, Malawi and Mozambique (author's calculations using the World Development Indicators). For the most part, economywide value-added per worker in these countries is extremely low. For example, in 2018 employment-weighted value added per worker was only 4,689 current U.S. dollars; however, the value for 10 of the 18 countries fell well below this average. Following Diao et al. (2019), we examine the period 2001-2018—which corresponds most closely to the beginning of the "growth boom" in many African countries.

The ETD data includes value added, employment and price deflators for 51 countries for the period 1990-2018. Notably, reliable data on capital inputs per sector are not available, precluding calculations of total factor productivity growth. In any case, our preferred outcome measure here is value added per worker since it corresponds most closely to GDP per capita and because it is more straightforward to interpret. Using these data for the 18 African countries, we compute value added per worker and employment shares by sector and use these values to decompose labor productivity growth into its within and between components. The within component is computed as an employment weighted average (using initial period employment weights) of the change in value added per worker across sectors. The between component – or structural change component of productivity growth – is the sum across sectors of changes in employment shares multiplied by end of period productivity; it is positive when workers move from lower productivity sectors to higher productivity sectors. Because the

emphasis in our work is on understanding how productivity is evolving outside the agriculture sector, we further decompose within sector productivity growth into its agricultural and non-agricultural components.

The bars in Figure 1 are coded according to how much of labor productivity growth comes from structural change between agricultural and nonagricultural output (in blue) and how much comes from within-sector labor productivity growth in agriculture (in red) and in non-agriculture (in black). The annual growth rate for the nations of Sub-Saharan Africa roughly doubled from the two decades before 2000 to the two decades after, rising from about 1.2 percent to 2.5 percent. Figure 1 shows that in Africa prior to the growth acceleration, average annual labor productivity growth is a little above one percentage point per year. After the growth acceleration, structural change contributes significantly to growth in Africa. This is not surprising since we expect the payoff to structural change to be greatest in poor countries. However, the contribution of within-sector labor productivity growth in the non-agriculture sector is close to zero.

To determine whether this broad pattern applies to the manufacturing sector, we report separately the within and between components for the manufacturing sector. Figure 2a displays these results ordering the countries from lowest within-manufacturing contribution to labor productivity growth (Burkina Faso) to highest (Mauritius). The growth from structural change is in blue, within sector productivity growth is in green and overall labor productivity growth in manufacturing is represented by the black diamond. The furthest bar to the right shows that in total, manufacturing has contributed only around .25 percentage point to economywide labor productivity growth; on average this growth comes entirely from structural change. This is surprising since manufacturing has historically been an engine of growth.

A closer look at Figure 2a reveals some other lessons. There is considerable dispersion across countries of Africa in how manufacturing contributes to productivity. In several countries, the purple diamonds are close to zero indicating that when we combine the two sources of labor productivity growth, the manufacturing sector is not contributing to economywide labor productivity growth. This is especially surprising in the case of Ethiopia where the government has placed a premium on the development of the manufacturing sector. But it is also surprising to see this in Ghana, Kenya, Senegal and Tanzania, four countries whose economies have performed reasonably well since the early 2000s. The patterns for Botswana and South Africa are as expected; South Africa industrialized years ago and

over time manufacturing has shed labor. Botswana is part of a customs union with South Africa and the fate of its manufacturing sector is closely tied to South Africa (McCaig and McMillan, 2020).

Another lesson is that Figure 2a shows an overall negative correlation across countries between the productivity contribution from within-manufacturing and the contribution of the sectoral shift toward manufacturing. In the figure, this is illustrated by the blue and green lines going in opposite directions—one positive and the other negative. At one extreme, within sector labor productivity growth in the manufacturing sector in Burkina Faso is negative .6 percentage point, while the between contribution from manufacturing is a positive 1 percentage point. At the other extreme, within sector labor productivity growth in Mozambique's manufacturing sector is positive .6 percentage point while the between contribution of manufacturing is negative .2 percentage point. Indeed, this negative correlation holds for trade services, business services, construction, and transport sectors, as well as for manufacturing, but it seems especially surprising in the case of manufacturing, the canonical modern sector.

In contrast to the African countries, Figure 2b shows a comparison group of Asian countries, including early industrializers like Taiwan, China, and the Republic of Korea and late industrializers such as Bangladesh, India, the Lao People's Democratic Republic, Cambodia, Sri Lanka, Myanmar, Nepal and Vietnam. Here, you can see a positive correlation between the within and structural change components of labor productivity growth for manufacturing—that is, the blue and green lines are both positive. Again, in the data for Asian industrializers, this positive correlation also holds for trade services, business services, construction, and transport sectors.

An Asian-style positive correlation between within-manufacturing growth and between-sector growth is consistent with the interpretation that rapid productivity growth in manufacturing is drawing in resources from the rest of the economy. An African-style negative correlation between within-manufacturing growth and between-sector growth is harder to understand. Apparently, the rapid growth of Africa's manufacturing sector in the last two decades is not being accompanied by rapid within-sector labor productivity growth.

A Closer Look at the Manufacturing Sector in Africa

By taking a closer look at the patterns within the manufacturing sector—in particular, the role of small and informal manufacturing firms vs. large formal enterprises, we can draw some inferences about the underlying reasons for the relatively poor performance of the manufacturing sector in Africa. Diao et

al. (2019) develop a model to highlight the differences between demand- and supply-driven structural change. In their model, supply-driven structural change is captured by a positive productivity shock to the modern sector (in this case, say manufacturing) allowing it to draw labor from other, less productive sectors of the economy. To the extent that structural change is supply-driven, we would expect to see an expansion of modern sector (or formal) activity in the manufacturing sector. By contrast, demand-driven structural change was likely a result of positive aggregate demand shocks possibly due to some combination of factors like public investment, external transfers, or increases in rural incomes. Demand-driven structural change is more likely to be accompanied by the entry of less productive smaller manufacturing firms.

Employment Growth Is Dominated by Small and Less Productive Firms

To explore this hypothesis, we again use employment data for manufacturing from two sources: the Economic Transformation Database (ETD) (de Vries et al. 2021) and the manufacturing employment data from the INDSTAT2 2020 database produced by the United Nations Industrial Organization (UNIDO 2020). The manufacturing employment data from the Economic Transformation Database is largely based on population census data, and so covers manufacturing in both the formal and informal sectors (Timmer et al. 2015). By contrast, INDSTAT2 records manufacturing employment data for formal firms in the manufacturing sector. Although country statistics sometimes vary in terms of the size of establishments covered, typically INDSTAT2 covers firms with 10 or more employees. For several countries, we compute small and informal sector employment in the manufacturing sector as the difference between total employment (from the ETD data) and formal sector employment (from the INDSTAT2 data). We then plot total, small and informal and formal sector manufacturing employment for these countries.[1]

1 We gauged the accuracy of these data with comparisons to other data sources. For the recent total manufacturing employment numbers reported in the Economic Transformation Database, we looked at estimates of manufacturing employment based on firm-level data sets and Living Standards Measurement Study (LSMS) surveys for Ethiopia and Tanzania. This exercise leads to a reduction in total employment in manufacturing in recent years but no change in the aggregate patterns. A summary of these results can be found in Diao et al. (2021). For the INDSTAT2 employment data, we also plot formal sector employment data in Ethiopia, Tanzania and Vietnam--the three countries for which we have longitudinal census data for the formal manufacturing sector (these data are described extensively in Diao et al. 2021). The INDSTAT2 series and the series of formal sector employment data coincide almost perfectly. This is not surprising since UNIDO obtains its manufacturing employment data from national statistical agencies, but it is nevertheless reassuring.

Figure 3a shows the results of this exercise for eight African countries: the two most industrialized countries in Sub-Saharan Africa, Mauritius and South Africa, along with six African countries which experienced a relatively recent growth acceleration Ethiopia, Ghana, Kenya, Nigeria, Senegal and Tanzania. The only country for which UNIDO has data which has been excluded from Figure 3a is Botswana where the trend looks like that in South Africa. The vertical lines in each graph mark the start of the country-specific growth acceleration documented in Diao et al. (2021). The most striking trend in all but two of these countries is the upward-sloping curves for employment in small and informal manufacturing employment and the relatively flat lines for formal sector manufacturing employment. The patterns in Ghana, Kenya, Nigeria and Senegal are similar as those in Ethiopia and Tanzania presented in Diao et al. (2021). In short, the beginning of the rise in small/informal sector employment largely coincides with the beginning of the growth acceleration in the African countries. However, the relatively higher-income African countries South Africa and Mauritius have a different pattern. In more-developed economies, formal employment is a much higher share of total manufacturing employment—although one can see a modest surge in employment in firms with fewer than 10 employees starting in the mid-1990s in South Africa's manufacturing sector.

Figure 3b shows starkly different patterns for four Asian late industrializers: Bangladesh, Lao PDR, Sri Lanka, and Vietnam. Again, the vertical lines represent the beginning of each countries' growth acceleration. Unlike the African cases, formal sector manufacturing employment in these four countries grows rapidly following the growth acceleration. Over these same periods and apart from Bangladesh, employment in small and informal firms remains relatively flat and even starts to decline slightly in Vietnam after 2005: for a description of the transition in Vietnam, see McCaig and Pavcnik (2017). Like the African countries, the Asian late industrializers were largely agrarian societies before the start of their growth accelerations. Although not shown, increases in formal manufacturing employment in these countries coincided with gradual declines in agricultural employment shares. These patterns combined with the evidence in Figure 2b are consistent with the idea that structural change in these countries was a result of positive supply shocks to the manufacturing sector.

Employment and Labor Productivity Growth in Formal Manufacturing Firms

The informal sector has apparently absorbed a large majority of the growth of manufacturing workers in African countries. Why aren't formal sector manufacturing firms creating more jobs in Africa?

One possibility is that these firms are not very productive, making it unprofitable for them to expand. To explore this possibility, we take a closer look at the performance of the formal manufacturing sector following a two-pronged strategy. We begin by summarizing the recent evidence for Ethiopia and Tanzania documented in Diao et al. (2021). We then turn to UN Industrial Development Organization data to gauge whether the results for Ethiopia and Tanzania are indicative of what is happening in the other African countries for which we have data.

Diao et al. (2021) provide an in-depth analysis of the formal manufacturing sectors in Ethiopia and Tanzania. The core of their analysis rests on two newly created panels of manufacturing firms using formal firm census data, one for Tanzania covering 2008-2016 and one for Ethiopia covering 1996-2017. In both cases, the panel covers firms with 10 employees or more. In both Tanzania and Ethiopia, large firms, exporters and foreign firms all have significantly higher levels of labor productivity. These results are consistent with a very large theoretical and empirical literature on manufacturing firm performance in Africa and elsewhere. For example, see Bigsten and Soderbom (2006) for a summary of early research on the manufacturing sector in Africa based on the Regional Program for Enterprise Development and Harrison and Rodriguez-Clare (2010) for a summary of the literature on the impact of trade and foreign direct investment on firm performance.

However, the firm and sector-level results for Tanzania and Ethiopia suggest that the best-performing firms are not absorbing employment. In Tanzania, labor productivity growth in large firms is on the order of 8 percent per year, and 13 percent per year for large exporters. By contrast, labor productivity growth in firms that start with fewer than 50 employees ranges between negative 3 percent and zero. By contrast, employment growth in these small firms is as high as 13 percent while employment growth averages zero percent in firms with 50 or more employees. In Ethiopia, the picture is somewhat better although labor productivity growth is not as high as it is in Tanzania. Average sectoral employment growth in Ethiopia's large firms is around 6.5 percent per year while it is around 7.5 percent per year for firms with between 10 and 49 employees. (Although the employment growth rates may seem high in Ethiopia, it is important to remember that the country is starting from an extremely low base.) Labor productivity growth is around 5 percent per year for both small and large firms. To complete the analysis of Ethiopia, the authors examine a group of mechanized firms with fewer than 10 employees using the Small-Scale Industries survey. Average annual employment growth among these firms is around 17 percent, while labor productivity growth is an average of zero, with considerable heterogeneity. The combined evidence for Ethiopia and Tanzania suggests that the

economywide performance of employment and output in the manufacturing sector is not driven by large firms in the formal sector. Instead, it appears that the growing share of small, less productive firms is dragging down the economywide productivity performance of the manufacturing sector.

To determine whether this interpretation applies to other African countries, we turn to the UN Industrial Development Organization data, which we use to compute growth in real output per worker, real value added per worker and real exports to gauge the health of the formal manufacturing sector. The results of this analysis are presented in Table 1. The data are organized into four columns: employment growth, growth in real output per worker, value added per worker, and exports. The data coverage across the countries of Africa is admittedly sparse, but we do have information for the six countries with at least 100,000 workers in the formal manufacturing sector. We also include four Asian comparator countries: Bangladesh, Lao PDR, Sri Lanka and Vietnam.

In considering Table 1, first notice that growth in real value added per worker (or output) is positive in all the African countries. This is consistent with what we reported for Ethiopia and Tanzania and suggests that the poor productivity performance of economywide manufacturing is not a result of subpar performance in the formal manufacturing sector. Second, apart from Ethiopia and Kenya, employment growth in formal manufacturing is considerably weaker in Africa than in Bangladesh, Lao PDR and Vietnam. This gap is despite the fact the levels of manufacturing employment are considerably higher in the Asian comparator countries; for example, total formal manufacturing employment was around 300,000 in Ethiopia in 2017, while it was more than 6 million in Vietnam.

The upshot of these comparisons is that the formal manufacturing sectors in the African countries for which we have data appear to be performing reasonably well. This evidence is consistent with a large literature of on the productivity of Africa's larger manufacturing firms.[2] But the formal manufacturing sector in Africa, unlike their counterparts in Asia, does not appear to be absorbing significant amounts of labor– at least not yet -- except perhaps for Nigeria. Teal (2016) succinctly describes the issue in Ghana as follows: "It is the inability of larger firms, particularly those employing more than 100, to grow in numbers and employment that needs to be explained if the inability of Ghana to produce more productive jobs in its manufacturing sector is to be understood." As a step towards a

[2] For example, John Sutton in his Enterprise Maps argues that the reasonable performance of manufacturing firms serving domestic markets can be explained by the discipline imposed by having to compete with imports. And *Made in Africa: Learning to compete in industry* (2016) demonstrates the relatively high productivity of large African firms compared to firms with fewer than 10 employees.

deeper understanding of the issue, we use firm level census data to compare the manufacturing sectors in Ethiopia and Vietnam.

Ethiopia versus Vietnam: A Case of the Missing Huge Firms

Ethiopia is the second most-populous country in Africa. Its government has pursued an aggressive industrialization strategy, which largely revolves around attracting investment in labor-intensive manufacturing for export. As of 2021, Ethiopia's strategy mirrors to a large degree the strategy pursued by Vietnam; as noted earlier, both countries have been heavily influenced by China's use of special economic zones.

In some ways, the manufacturing sectors of Ethiopia and Vietnam look similar. In both countries, annual average employment growth between 2000 and 2017 was between 7 and 8 percent. In both countries, employment growth was driven almost entirely by the entry of new firms, not the expansion of existing firms. Employment growth in both countries is more rapid in firms with between 10 and 49 employees at 7.5 percent in Ethiopia and 12.1 percent in Vietnam. Average annual labor productivity growth in Vietnam was 7.5 percent, higher but not that much higher than the 5.2 percent registered in Ethiopia.

There are high rates of entry and exit in both countries indicating a significant degree of dynamism. Capital-labor ratios are comparable in both, yet Ethiopia is much poorer than Vietnam – a point to which we will return. In both countries, public sector firms played a significant role in the early stages of industrialization. Public-sector firms are still involved in manufacturing in both countries today but by 2017, the employment share of public-sector firms was considerably lower at around 8 percent in Ethiopia and 5 percent in Vietnam (in 2017).

There are of course some striking differences. The most notable is the sheer size of the formal manufacturing sector in Vietnam relative to Ethiopia. An 8 percent increase in formal sector manufacturing in Vietnam adds an additional 520,000 jobs while an 8 percent increase in formal sector manufacturing in Ethiopia adds around 28,000 jobs. If employment in Ethiopia's manufacturing sector continues to grow at 8 percent per year, it will take Ethiopia 38 years to catch up to the level of employment seen in Vietnam today. Part of this difference has to do with the fact that Vietnam had a much larger industrial base when it embarked on its strategy of export-led manufacturing development. In 1986, at the start of the "Doi Moi" reform period in Vietnam, the country already registered 2.5 million employees in the manufacturing sector. By contrast, when the Ethiopian government embarked

on its reforms in the mid-2000s, the country had fewer than 100,000 workers in the formal manufacturing sector.

Like Ethiopia, the share of informal employment in Vietnam was very high at the onset of its reforms in 1986. Thirteen years after the start of reforms, the share of informal employment was still around 86 percent, although it was lower in the manufacturing sector. And between 1990 and 1995 the share of informal employment in Vietnam's manufacturing sector increased by 10 percentage points, peaking at around 58 percent in 1995 (GSO, 2006). This growth in informal manufacturing sector employment is similar as what we observe in Africa today, albeit of a shorter duration. By 2009, the share of informal employment in Vietnamese manufacturing had fallen to 43 percent (McCaig and Pavcnik, 2015). Today it stands at around 36 percent.

A striking difference between Ethiopia and Vietnam is the rapid expansion of foreign firms in Vietnam's manufacturing sector. In 1990, at the onset of Vietnam's reforms, there were fewer than 1,000 workers employed in foreign-owned firms. Between 1990 and 2000, employment in foreign-owned manufacturing enterprises grew at an annual average rate of 47.3 percent (GSO, 2006). Employment growth in domestic private and state-owned enterprises paled in comparison at 3 percent and 2 percent respectively. Although employment growth in foreign-owned enterprises slowed down after 2000, it remains the dominant source of employment growth in Vietnam's manufacturing sector. Between 2000 and 2017, annual employment growth in foreign-owned manufacturing enterprises averaged close to 14 percent; employment growth in domestic private firms averaged 4 percent while it was -6 percent in state-owned enterprises. By 2017, the share of manufacturing employment in foreign-owned enterprises exceeded 60 percent in Vietnam.

By contrast, in 2017 the share of employment in foreign-owned enterprises in Ethiopia was less than 10 percent and the share of employment in domestic private firms exceeded 60 percent. However, prior to the onset of the pandemic, the landscape in Ethiopia was rapidly changing. In 2014, the Ethiopian Industrial Parks Development Corporation (IPCD) was established to help promote exports and job creation primarily in the manufacturing sector. This first park, Eastern Industrial Zone, was established in 2012-13, and as of 2020, it hosted 91 firms employing over 18,000 workers. Since then, 13 additional parks have been opened, which in total are home to 154 firms that employ about 93,000

workers. Indeed, 19 of these firms employ more than 1,000 workers.[3] Of these employees, 74 percent are engaged in apparel production. In absolute terms, the number of employees in the parks is still relatively small. However, since 2015, employment in industrial parks increased by 78 percent, comparable to what we saw in Vietnam over the period 1990-2000.

All but three of the new industrial parks are owned by the Ethiopian government: two of the other owners are Chinese and one is Bangladeshi. Almost all the firms in these parks are foreign-owned; 79 percent are owned by Asian investors, with China in the lead at 66 percent, 12.4 percent are owned or partially owned by Ethiopian investors, and 8.6 percent are owned by EU and UK investors.

Within Ethiopia's industrial parks, 83 percent of employment is in firms with more than 1,000 employees. Women account for 74 percent of total employment; firm managers tend to hire young female workers who have completed a 10th grade education. These women typically work 8 hours a day for 6 days a week plus an average of two hours overtime each day bringing the average hours worked per week to 60. Ultimately, the sustainability of these parks depends in part on working conditions in the parks. Using a phone survey of firm managers, Meyer et al. (2021) find that the base salary in most of the firms in these industrial parks exceeds the cost of basic needs as measured by the local poverty line. When bonuses, overtime pay, incentive payments and in-kind benefits are included, total compensation is roughly four times the cost of basic needs. However, they also find that 21 percent of firms in the industrial parks report paying a base wage below the local poverty line. Based on the information in the report, it is not clear how far below the poverty line these wages fall and what happens to total compensation for these workers when non-wage benefits are included.

A unique feature of many of the foreign firms in Vietnam is their sheer size. For example, in 2017, there were 756 foreign-owned firms with more than 1,000 employees while in Ethiopia, this number is only 21. Moreover, there were 125 foreign firms with more than 5,000 employees in Vietnam while there are no firms of this size in Ethiopia's manufacturing sector. This difference does not apply only to foreign firms, although the "huge" firms are more prevalent among foreign-owned enterprises and in the labor-intensive sectors of apparel and footwear. We call this the case of the missing huge firms.

[3] A list of Ethiopia's industrial parks, with some basic data on when they started, number of firms and workers, and share of workers who are female and/or in the garment industry, is available in the Appendix. Our evidence is consistent with that of Meyer et al. (2021).

A final point worth mentioning is the productivity growth of the very small firms in Vietnam. The census of establishments in Vietnam covers firms with fewer than 10 employees. Productivity growth in these very small Vietnamese firms was around 9 percent per year between 2000 and 2017; the corresponding growth rate in Ethiopia is imprecisely estimated at zero percent per year. We do not have an explanation for this difference. The firms with fewer than 10 employees in the Vietnamese enterprise survey are all registered; we do not know the registration status of the small-scale industries in Ethiopia but in 2014, more than 85 percent of these firms had a license. In any case, given the prevalence of small manufacturing establishments in Africa, this difference seems worth investigating.

The evidence discussed so far suggests that employment growth in Africa's small and informal manufacturing firms is considerably more rapid than employment growth in manufacturing firms which employ 10 or more workers. However, labor productivity growth in the larger formal firms is reasonably strong. This mixture of outcomes is not all bad news. Productivity growth in formal sector firms is indicative of an advancing technology frontier. The rapid growth in small manufacturing firms is indicative of entrepreneurial spirit; indeed, anyone who has spent time in an African country understands the incredible ingenuity of African entrepreneurs. Nevertheless, if African governments want to expand manufacturing exports and employment opportunities for those who prefer formal wage work, they will need to grow their formal manufacturing sectors. How might this happen? In the next section, we consider some of the opportunities.

Opportunities

African Continental Free Trade Area

The African Continental Free Trade Area was founded as a free trade area in 2018 with 54 of the 55 African Union nations as signatories (the exception being Eritrea). To date, 36 states have ratified the agreement, and trade under the agreement officially commenced at the start of 2021.[4] Its key functions include progressively eliminating tariffs on intra-African trade (with alternate timelines for implementation based on countries' income status), implementing rules-of-origin, monitoring and

[4] A useful source of background information on the African Continental Free Trade Area is the South Africa–based nonprofit Trade Law Center often called "tralac." For details on the agreements and membership behind the African Continental Free Trade Area, a starting point is https://www.tralac.org/resources/by-region/cfta.html (accessed June 1, 2021).

eliminating nontariff barriers, as well as establishing an online negotiating forum, a digital payment system, and the African Trade Observatory. Arguably, the largest potential gains of the African Continental Free Trade Area are dynamic and arise mainly from access to larger markets and economies of scale in production. Another less tangible but potentially important benefit of the agreement is political. Most of Africa's economies are relatively small; this limits their bargaining power vis a vis the rest of the world in international forums such as the World Trade Organization. Regional integration has the potential to change this dynamic.

To what extent might the African Continental Free Trade Act catalyze employment and export growth within Africa? A comparison between Ethiopia and Tanzania is instructive (based on Diao and McMillan 2019). Both countries showed a steady upward trend in the value of exports in the two decades leading up to the pandemic. However, Ethiopia's exports go almost exclusively to countries outside Africa, which is consistent with what we know about the Ethiopian governments' push to include Ethiopia in global value chains. By contrast, a large majority of Tanzania's manufacturing exports go to other countries in Africa.

What is perhaps surprising is that Tanzania's export volume and growth from 1998 through 2017 are more than double that of Ethiopia. After all, the government of Ethiopia has aggressively incentivized manufacturing for export with its industrial parks and tax incentives while as far as we can tell, the Tanzanian government has been much more laissez-faire.

One reason for the differential export performance is that exports from Ethiopia and Tanzania are very different. The top 50 products exported from Ethiopia account for 65 percent of Ethiopia's manufacturing exports; 84 percent of the top 50 products are classified as textiles including leather and footwear. More than 85 percent of Tanzania's export products are resource-intensive, with 50 percent classified as agro-processed goods and another 35 percent classified as material-intensive products. The agro-processed goods consist of items like bottled juices, cooking oils and packaged flour while the resource intensive products consist of items such as wood products and furniture, household articles made from plastic materials such as buckets, washbasins, chairs and clothing hangers, and construction materials such as cement, glass, and ceramic products. In sum, agro-processed and resource intensive goods account for 68 percent of total manufacturing exports from Tanzania (Diao and McMillan, 2019). Intra-African trade in manufactured exports, like that occurring in Tanzania, has also been documented elsewhere (Hallward-Driemeier and Nayyar 2017). In many ways, this trend bodes well for the African

Free Trade Area. African countries still import much of their food; the evidence from Tanzania suggests that some of this demand could be met by Africa-based agro-processors.

But while Tanzania's export performance is impressive, there has been little employment growth in Tanzania's formal manufacturing sector. The issue (to which we will return in the next section) is the high capital intensity of resource-based manufacturing. Nonetheless, agro-processing has the potential to create jobs and wealth indirectly for logistics and packaging companies, restaurants and hotels, agricultural input suppliers and so on. For perspective, Sexton et al. (2015) estimate using input-output tables that in 2012, California's food and beverage processing sector directly accounted for around $25 billion in value-added and 198,000 jobs. However, the indirect benefits associated with the food and beverage industry were far greater and include an additional $57 billion in value-added and another 562,000 jobs. The extent to which these sorts of linkages can generate large scale job creation in Africa is an open question.

One potential challenge for the African Continental Free Trade Area involves the rule-of-origin provisions, which define the products that are eligible for preferential tariff treatment. To qualify, a product must be wholly obtained or substantially transformed within an African country that is a member of the agreement (Signé and Madden 2020). The goal of rules-of-origin is to prevent trade "deflection": that is, a situation where exports arrive from outside Africa's free trade area in any one country and are then re-exported to other African countries under the preferential rules. On the other side, Signé and Madden (2020) find that low intra-African trade volumes mean that the fixed cost of compliance with rules-of-origin may be burdensome for many traders. Moreover, underdeveloped African value chains make it difficult and costly for African exporters to source intermediate inputs from domestic or regional sources. For these reasons, overly strict rules-of-origin could mean that firms or products which need inputs from outside Africa are effectively excluded from the free trade agreement.

The In-between Sector

We have documented the rapid growth in small and informal firms in the manufacturing sector of many African countries, along with their relatively low levels of labor productivity. However, there is a great deal of heterogeneity in the productivity of these small firms. For example, Diao et al. (2020) show that in 2010, 15 percent of the small firms in Tanzania have labor productivity higher than economy-wide manufacturing labor productivity. Also, more than 50 percent of firm owners report that they would not leave their business for a full-time salaried job. While 15 percent may seem high in

comparison to what others have found, it is only half the share of "gung-ho" entrepreneurs (30.4 percent) identified by Banerjee et al. (2019); these entrepreneurs are those whose businesses benefitted from access to microfinance in India. Following Lewis (1979), we describe this group of firms as "the in-between firms" to signal their status and performance as somewhere between formal (most productive) and informal (least productive) manufacturing firms.

How can policy makers support the productive small firms while not encouraging over-investment in unproductive activities? The importance of this question cannot be overstated. These small firms are considerably more likely to use labor-intensive technologies and will thus could be an important source of employment in African countries (and elsewhere) for years to come.[5] One popular strategy for spurring growth in promising ventures in both the developed and developing world is business plan competitions, which seek to identify and encourage entrepreneurs with growth aspirations by helping them to develop a detailed plan and then providing financing or in-kind benefits (such as training) to those deemed most likely to succeed.

YouWin! is an example of a successful, large-scale nationwide business plan competition initiated in Nigeria in 2011. The top-scoring plans overall and in each region won awards of roughly $50,000, and then out of the 1,900 plans that were semifinalists in the competition, 700 were selected at random as winners. An evaluation of this competition using the underlying random variation by McKenzie (2017) tracked winners over five years and shows that winning firms had higher survival, profits, sales and employment: winning also increased the likelihood that a firm has more than 10 employees by 20 percent. For present purposes, what is important about the business competition is that manufacturing was the second most common sector for new firms, comprising 13 percent, and third most common for existing firms, comprising 14 percent of winners. The types of products being manufactured by firms in the competition are very heterogeneous, and include processed food products, books and media, metal products, chemicals and detergents, and a range of other items.

[5] A related question which we do not take up here is the extent to which support for small firms has encouraged the proliferation of unproductive businesses (for example, Martin et al. 2017). However, in the context of Sub-Saharan Africa where wage employment is scarce, it is difficult to think of this as a misallocation of resources. Instead, we might think of indiscriminate programs targeted at small businesses as a kind of social safety net. A final consideration is the extent to which support in the form of financial resources displaces or substitutes for alternative sources of financing (Fafchamps et al. 2014).

However, a follow-up paper McKenzie and Sansone (2019) highlights the difficulties of picking the outright competition winners. They compare the relative performance of three approaches to predicting outcomes from the YouWin! competition: business plan scores from judges with business experience; simple ad hoc models used by researchers who study entrepreneurship; and machine learning approaches. The results are sobering: i) business plan scores from judges are uncorrelated with performance; ii) gender, age, ability and business sector do have some predictive power (education might have an effect also, but applicants were required to apply using the internet which likely screened out individuals with little education); iii) machine learning methods did not enhance predictive power and; iv) the overall predictive power of all approaches is very low, highlighting the fundamental difficulty of picking competition winners. This of course does not mean that the program had no impact; it just means that it could have had a similar or even stronger impact had it been possible to identify promising projects with greater accuracy. Business plan competitions appear to have been successful in several other African countries, although not on the same scale: for a description of results for Ethiopia, Tanzania, and Zambia, see Fafchamps and Quinn (2017). In fact, business plan competitions in other African countries are in the works.

While such competitions seem useful, there is no substitute for business-to-business linkages for raising productivity and employment in small firms. The "putting out system" or sub-contracting has been important since the first industrial revolution and is still common in many parts of the world including China and India; this small enterprise sector is often referred to as the "cottage industry." A detailed description of the way this worked in Taiwan several decades ago highlights the sophisticated nature of these enterprises in one village in rural Taiwan (Niehoff 1987). In that setting, all but one of the enterprises were self-financed with no formal guidance apart from production and export brokers; these brokers were identified as an important source of ideas regarding types of factories and commodities suitable for household entrepreneurship. We have some evidence of linkages between domestic and foreign firms in Ethiopia (Abebe et al. 2021). However, survey data from Ethiopia indicates that less than 5 percent of large firms do any sub-contracting. Overall, we have very limited knowledge about linkages between small and large firms in Africa.

The African Center for Economic Transformation (ACET) is taking business-to-business linkages very seriously. In early 2021, ACET launched the ACET Private Sector Development Program. The program has two symbiotic objectives. The first – at the macro level - is to promote evidence informed private-sector friendly public policies and regulations to strengthen the ecosystem for small and

medium sized enterprises (SME). The second – at the micro level – is an incubator program designed to integrate SMEs in the manufacturing space into local, regional and global value chains. The incubator phase of the program assists firms in all aspects of business from input sourcing to management training; ACET has partnered with firms such as Price Waterhouse Coopers and EVC Africa Ltd to provide this assistance (https://acetforafrica.org/psd/acet-business-transform/). ACET is currently piloting the incubator program with 10 businesses in Ghana with plans to expand (also to other countries) if the pilot is successful. The 10 firms range in size from about 6 to 46 employees and operate in agro-processing, cosmetics, construction, electric vehicles and plastic waste recycling (Brown, Ed and Odoom, Charles, December 15, 2021).

The importance of small and medium-size manufacturing firms in Africa cannot be overstated; they are considerably more likely to use labor-intensive technologies and will thus be an important source of employment in African countries for years to come. It therefore makes sense to devote more time and energy to understanding their dynamics, especially the prospects for outsourcing to these firms.

Our lack of information about small firms in developing economies is not unique to Africa (Li and Rama 2015). This is not surprising given the large share of informality among small firms, which makes it difficult to come up with adequate sampling frames. Nevertheless, it has not prevented generalizations about small firms based on tiny samples (for example, La Porta and Shleifer 2016). To see why this can be problematic, consider the work of Bassi et al. (2020) on three sectors of urban manufacturing in Uganda with a mix of "small" and large firms. The authors show that the way in which one defines the borders of a small firm matters a lot. For example, the active rental market in carpentry equipment allows firms which manufacture two-panel doors to achieve scale, collectively turning a seemingly unproductive one-person business into a productive one, where the productivity gains come through mechanization.

Value Addition in Natural Resources

Africa is home to immense reserves of minerals that could help to spur its industrialization. Indeed, the US economy became the world's largest extractor and exporter of natural resources at precisely the same time it became the largest industrial power, via heavy utilization of resources (Wright 1990; Robinson 2015). In the modern economy, natural resources are a key part of global value chains. For example, tantalum is used in the production of cellphones, DVD players, laptops, and gaming

devices. By building backward and forward linkages and developing associated industries, African countries can tap into Africa's advantage as the dominant supplier of these resources.

Industrialization prospects depend critically on how natural resources are managed. Africa – with the exceptions of Botswana and South Africa -- has had a bad record on this front. But over time, governance has improved and the domestic private sector is considerably more robust and mature. For example, the Dangote Group (a Nigerian multinational founded by Aliko Dangote) is setting up the largest oil refinery in Africa. Robinson (2015) argues that this sort of private sector involvement can play a useful role in disciplining African governments and holding them accountable. Oil refining in Nigeria could be a significant boon to a continent that has mostly exported crude oil, and then imported refined oil.

Green Manufacturing

Green energy involves production and uses of green energy including both deploying renewable energy sources like compressed natural gas, wind, solar, and biomass, along with achieving higher energy efficiency in operations. An International Renewable Energy Agency (2020) report highlights Africa's substantial endowment in renewable resources like biomass, geothermal, hydropower, solar, and wind power. Africa's estimated solar power generation potential greatly exceeds that of other regions (Kabir et al. 2018; Schwerhoff and Sy 2020).

As countries around the world seek to reduce greenhouse gas emissions, Africa's comparative advantage in clean energy production could be a boon to both domestic and foreign manufacturing firms both in terms of cost reductions and compliance with international climate agreements. A transition to green manufacturing could also make light manufacturing in Africa more cost competitive, thereby increasing employment. In the example of South Africa, Winkler and Black (2021) argue that part of South Africa's unemployment problem is a result of policies that encouraged mining and heavy industry. In those industries, emissions are especially high and employment low due to a reliance on coal-powered energy and heavily subsidized capital-intensive factories. They argue that an employment-intensive, low energy, light manufacturing industrial policy is more aligned with South Africa's real comparative advantage.

More broadly, low-cost renewable energy sources could have an important impact on electricity access in Africa. Low-cost electrification has the potential to raise the productivity of small and large manufacturing firms alike. This could be especially impactful in rural areas where electrification rates

average only 17 percent (Altenburg et al. 2017). Of course, encouraging green energy would not alleviate some of the problems associated with energy distribution and pricing (see for example Burgess et al (2020) and Jack and Smith (2015)).

Pharmaceuticals

Africa relies heavily on imports of health commodities, with most countries importing between 70-90 percent of pharmaceuticals consumed (Conway et al., 2020). The only African countries with relatively sizable pharmaceutical production industries are Kenya, Nigeria, and South Africa, and the entire continent accounts for just 3 percent of global medicine production. Furthermore, almost all manufacturing capacity in Africa produces generic medicines, for which firms import the active pharmaceutical ingredients (Banda et al. 2016). In 2014. According to a 2021 report on "Vaccine manufacturing in Africa," funded by the UK government, Africa produces just 1 percent of the vaccines it administers, with the other 99 percent being imported.[6] Africa's pharmaceutical industry employed 250,000 workers and created $6.8 billion in gross value added, significantly lower than other global regions—for example, Latin America employed 466,000 workers and created $24.6 billion in gross value added in pharmaceuticals manufacturing (IFPMA 2017).

There has been increasing focus on this need in the last decade, for example, the African Union has a Pharmaceutical Manufacturing Plan for Africa, which aims for countries to develop their capacities in pharmaceuticals production, innovation, and research and development (Banda et al. 2016). However, the COVID-19 pandemic has compounded the need for local pharmaceutical industries. According to the World Health Organization (2021), only Senegal and South Africa currently have the capacity to produce vaccines, although the Ethiopian government is currently building an industrial park dedicated to pharmaceuticals (https://www.ipdc.gov.et/service/parks/12) and Nigeria's relatively large pharmaceuticals industry has had the capacity to produce vaccines in the past.

A silver lining of the pandemic may be that it focuses the international community on assisting African governments in shoring up capabilities in the pharmaceuticals industry. There is some evidence that this may be happening. In January 2021, ten African countries along with China introduced a resolution at the World Health Organization calling for greater local production of medicines, which was co-sponsored by 100 countries including all 54 countries in Africa. The Director-General of the World

[6] For the presentation slides for this report, see https://www.dcvmn.org/IMG/pdf/20210316_vx_mf_africa_dcvmn_briefing_vpre-read.pdf, accessed June 1, 2021.

Trade Organizations, Ngozi Okonjo-Iweala, is urging members to facilitate the transfer of technology for vaccine production to more countries. A spokesperson for the Switzerland-based public-private vaccine alliance GAVI has stated that the US supports manufacturers to transfer not only intellectual property but also know-how in a bid to boost global production (Zarocostas 2021).

Challenges

Two of the common concerns raised about the prospects for manufacturing in African nations of are the business climate and the risk of political instability. These issues are real, but we believe they are much less important than a more fundamental issue: manufacturing around the world shows a pattern of rising capital intensity, which raises questions about the prospects for manufacturing in countries with a comparative advantage in low-skilled labor.

Rising Capital Intensity of Manufacturing

Technological innovation in manufacturing in recent decades has favored capital over labor. At the same time, the spread of global value chains and increased openness to trade have had the effect of homogenizing technology around the world (Rodrik 2018). As a result, trade integration tends to reduce the employment intensity of manufacturing production in developing countries (Sen 2019). Thus, participation in global value chains tends to increase labor productivity, but not employment (Pahl and Timmer 2020). Indeed, Pahl et al (2019) show that technological change in formal manufacturing has led to employment declines in Kenya, Senegal and South Africa. This confluence of events makes it more difficult for low-income African countries to gain a foothold in formal manufacturing – even in their own domestic markets.

Using firm-level data from Ethiopia and Tanzania, Diao et al. (2021) show that the capital intensity of formal manufacturing in both countries far exceeds economywide capital intensity. This is especially true of the larger, most productive firms, where capital intensity approaches (or exceeds) levels observed in the Czech Republic, a country with per capita income around 20 times higher. High levels of capital intensity (and possibly of skill intensity as well, although the study does not measure that) appear to be an important reason behind the poor employment performance of Africa's most productive manufacturing firms. This creates a conundrum for countries in Africa: competing with established producers on world markets is only possible by adopting technologies that make it harder to generate significant employment.

In Figure 4, we compare the evolution of the capital intensity of manufacturing in Ethiopia, Vietnam and the United States. Overall manufacturing capital intensity in Ethiopia and Vietnam look similar, with comparable levels and growth trajectories in capital-labor ratios from 2006-2017. The key distinction is that Ethiopia's capital-labor ratio in manufacturing is four times the capital intensity for its economy as a whole capital (Diao et al, 2021); in Vietnam, the two were roughly equal. In US manufacturing, capital intensity is actually lower than economywide capital intensity. In short, the prevailing capital intensity of manufacturing does not play to Ethiopia's comparative advantage in relatively low cost and low skilled labor.

Might certain sectors of manufacturing be less capital-intensive? The mass produced ready-made garment industry is the least capital-intensive industry within manufacturing, and it still employs large numbers of workers across the globe.[7] In 2019, the ready-made garment industry in the Asia and the Pacific region employed an estimated 65 million garment sector workers or 75 percent of all ready-made garment workers worldwide (ILO 2020). More than half of these workers are in China and Vietnam, two countries where wages are rising. To get a sense for technological changes in the ready-made garment industry, Figure 4 also examines trends in capital-labor ratios in the apparel industry in Ethiopia, Vietnam and the United States; we include the US as a benchmark for where the industry might be headed.

In 2017, capital-labor ratios in the apparel industries of Ethiopia and Vietnam are a fraction of what they are for total manufacturing. (Contrary to popular perception, this pattern does not hold for textiles or leather.) Moreover, in Ethiopia and Vietnam, capital-labor ratios in apparel are not rising the way they are in total manufacturing. There is an uptick in apparel manufacturing's capital intensity in Vietnam between 2015 and 2017 but the overall level remains at less than one-third of total manufacturing's capital intensity. In the US economy, although capital intensity in apparel far exceeds that in Ethiopia or Vietnam (as shown by the difference in the vertical axis), capital-labor ratios increased substantially in the apparel industry between 2000 and 2010 but then leveled off. While the apparel products produced in the United States are likely not comparable to those produced in Ethiopia and Vietnam, the leveling of capital intensity in the apparel industry is indicative of a stall in technological change in this industry. One reason for this appears to stem from the difficulty associated

[7] Authors' calculations based on firm-level data for Ethiopia, Tanzania and Vietnam, the NBER productivity database and KLEMS.

with mechanizing the sewing process.[8] At least for now, the ready-made garment industry appears to offer some opportunity for some nations in Africa.

The Business Environment

Much has been made of the poor business environment in Africa and business environment does matter, of course. But as nations across Asia have shown, where there are profits to be made, businesses find a way to work around business environment problems. Similarly, despite the business environment in Africa, formal manufacturing firms have performed well in terms of productivity growth (Diao et al. 2021).

Indeed, measuring the business environment by the World Bank Doing Business index, many countries of Africa compare favorably to countries of Asia that have experienced rapid growth. In 2013, for example, Ghana ranked 27 countries ahead of Vietnam in the Doing Business indicators. According to these indicators, it was considerably easier to get credit in in Ghana than in Vietnam, paying taxes was less of a hassle, insolvency was much more quickly resolved, and access to electricity was less problematic. In terms of how well investors are protected, there was a 40-point difference between the two countries in favor of Ghana (McMillan et al. 2017). A comparison between the rankings of countries in Africa and those of countries in Asia with established bases in manufacturing for the year 2019 offers several similar examples. Rwanda ranks 40 points ahead of Vietnam at 29, Mauritius and Kenya are also ranked ahead of Vietnam at 21 and 61 respectively. 17 African countries rank ahead of Cambodia. Bangladesh has 5 million garment workers (ILO 2020) but out of 48 countries in Africa only eight countries are ranked below Bangladesh and seven of these countries are at war. Nigeria is ranked 30 points ahead of Bangladesh.

An important aspect of doing business not covered by the World Bank's index is the ease and cost of international travel. For example, Campante and Yanagizawa-Drott (2018) find that air links increase business links and that the movement of people fosters the movement of capital; the advent of just-in- time manufacturing has also raised the importance of short-term air shipping. In a novel study of traders in Lagos, Nigeria, Startz (2021) uses Nigeria's 2016 ranking in Henley and Partners Visa

[8] Interview with Willy Shih, Robert and Jane Cizik Professor of Management Practice, Harvard Business School, May 7, 2021.

Restrictions Index to motivate estimating the welfare gains associated with relaxing travel restrictions between China and Nigeria. A look at these rankings for 2021 reveals similar patterns to what we observed with the Doing Business Indicators rankings. Travel is less restrictive for Ethiopians and Nigerians than it is for Bangladeshi citizens and 27 African countries are ranked ahead of Vietnam. which ranks 88th along with Chad and Mali.

Political Instability

Political instability, with its associated violence and uncertainty, disrupts markets and growth. For example, Ksoll et al. (2016) estimate the impact of electoral violence on cut flower exporters in Kenya and find that this violence induced a large negative supply shock reducing exports by around 50 percent. Worker absence was responsible for much of the reduction; larger firms and firms with direct contractual relationships suffered somewhat smaller losses. Evidence from Ethiopia indicates significant declines in manufacturing activity associated with political unrest in 2015 and 2016 (Abreha et al. 2021).

Prior to 2017, countries in Sub-Saharan Africa had made significant progress toward democracy and political stability. On the Polity 2 scale -- ranging from -10 (hereditary monarchy) to +10 (consolidated democracy) -- the population weighted average for 46 African countries rose by 10 points from -5 to +5 between 1990 and 2016 (for details, see Figure A.1 in the Appendix). And between 1990 and 2008, the incidence of civil wars in Africa dropped from 18 to 8. But currently the situation seems to be taking a turn for the worse. This year alone, there were 5 coups in Africa more than in any other year over the past two decades (Financial Times, November 14, 2021) and the ongoing civil war in Ethiopia has shuttered factories in the Tigray region. These may be temporary setbacks on the road to progress. However, there is some evidence that climate change and religious extremism are increasing the incidence of conflict in Africa (McGuirk and Nunn 2020).

Conclusion

Manufacturing has an important role to play in the development of Africa. Some patterns are clear. Manufacturing employment has increased at a rapid pace since 2000. Labor productivity growth in Africa's large manufacturing firms appears healthy but employment growth in these firms has been disappointing. There is a concern that manufacturing is becoming more capital-intensive, and thus may not be as powerful a direct creator of jobs as in the past. But in the ready-made garment sector, there still seems to be an opportunity for considerable employment expansion, at least for now. Yet, the processing of natural resources or agricultural products, which are both abundant in Africa, has always

been capital intensive. The evidence from Tanzania clearly shows that while this type of manufacturing can contribute significantly to value added and export growth, it does little for employment. But even if the capital intensity of manufacturing precludes huge employment gains, the indirect employment gains associated with manufacturing could be large. Moreover, the managerial and logistical capabilities of large international manufacturing firms that have operations in Africa could be transferred to other activities through worker turnover or informal networks (Newman et al. 2016; Abebe et al. 2021).

A pattern that stands out in the African context is the rapid growth of small and informal firms in the manufacturing sector. On the one hand, this is exemplary of African's entrepreneurial spirit. On the other hand, average productivity growth in these firms appears to be a drag on labor productivity growth in manufacturing. However, there is substantial productive heterogeneity among these small firms. Integrating some of the more productive small firms into domestic value chains could have large payoffs.

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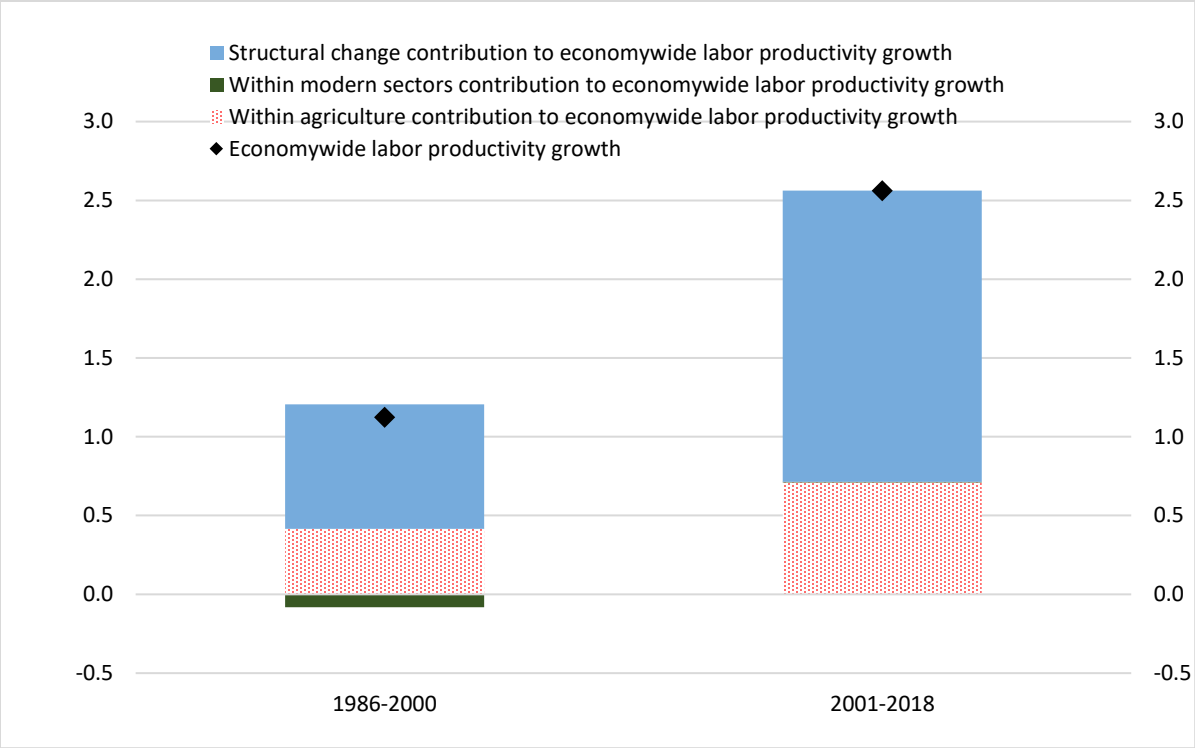
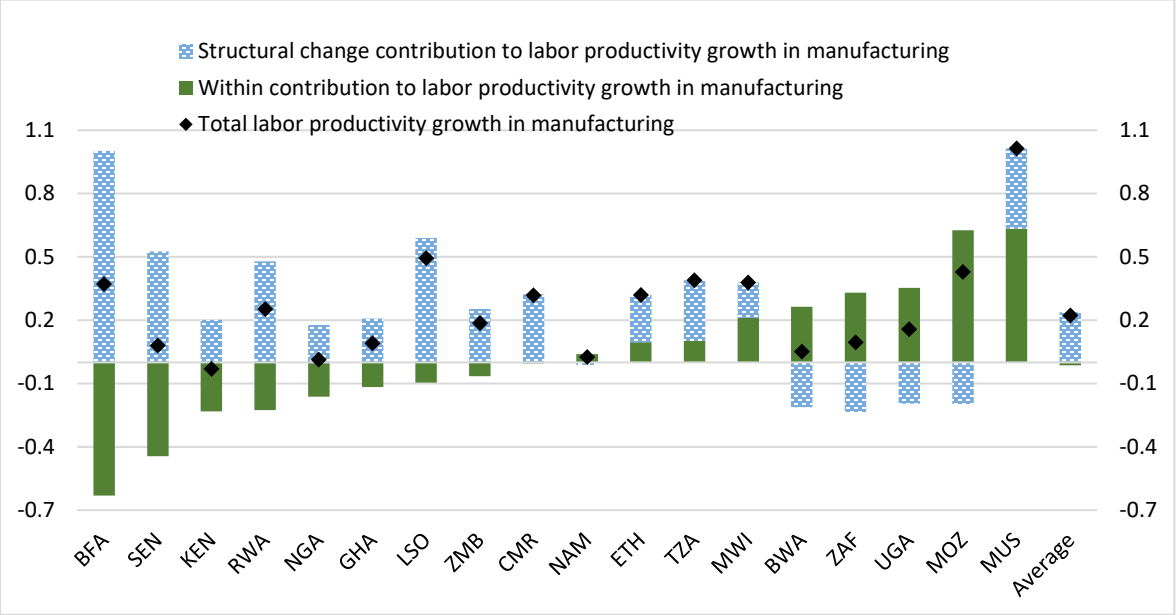
Figure 1: Labor Productivity Growth Decomposition



Source: Author's calculations using the Economic Transformation Database and base on 18 African countries: Burkina Faso (BFA), Botswana (BWA), Cameroon (CMR), Ethiopia (ETH), Ghana (GHA), Kenya (KEN), Lesotho (LSO), Mauritius (MUS), Mozambique (MOZ), Malawi (MWI), Namibia (NAM), Nigeria (NGA), Rwanda (RWA), Senegal (SEN), Tanzania (TZA), Uganda (UGA), South Africa (ZAF), and Zambia (ZMB).

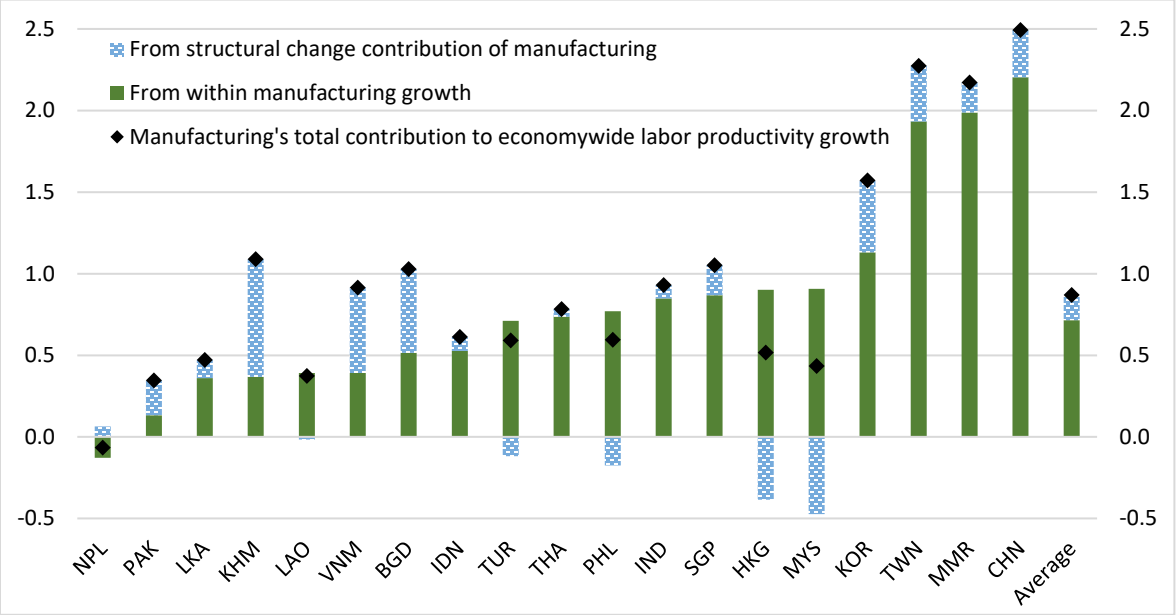
Figure 2a. Manufacturing Annual Average Labor Productivity Growth in Percentages, African countries, 2001-2018



Source: Author's calculations using the Economic Transformation Database.

Notes: The 18 African countries Burkina Faso (BFA), Botswana (BWA), Cameroon (CMR), Ethiopia (ETH), Ghana (GHA), Kenya (KEN), Lesotho (LSO), Mauritius (MUS), Mozambique (MOZ), Malawi (MWI), Namibia (NAM), Nigeria (NGA), Rwanda (RWA), Senegal (SEN), Tanzania (TZA), Uganda (UGA), South Africa (ZAF), and Zambia (ZMB). Data for Mauritius covers the period of 1973 – 2002 its' period of industrialization. The average is for the 16 low and low-middle income African countries and so excludes Botswana and Mauritius.

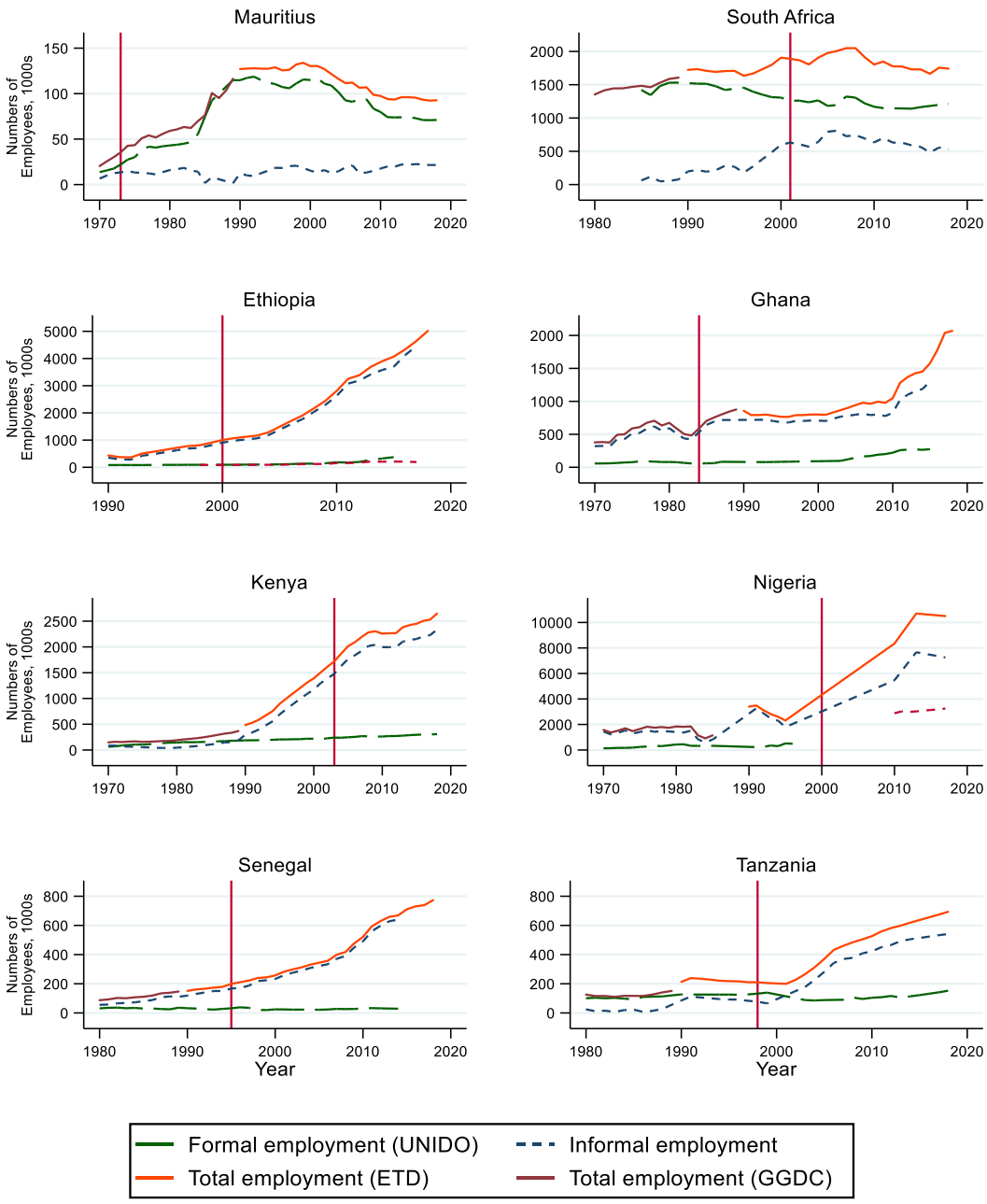
Figure 2b. Manufacturing Annual Average Labor Productivity Growth in Percentages, Asian countries, 2001-2018



Source: Author's calculations using the Economic Transformation Database and Groningen Growth and Development Center (GGDC).

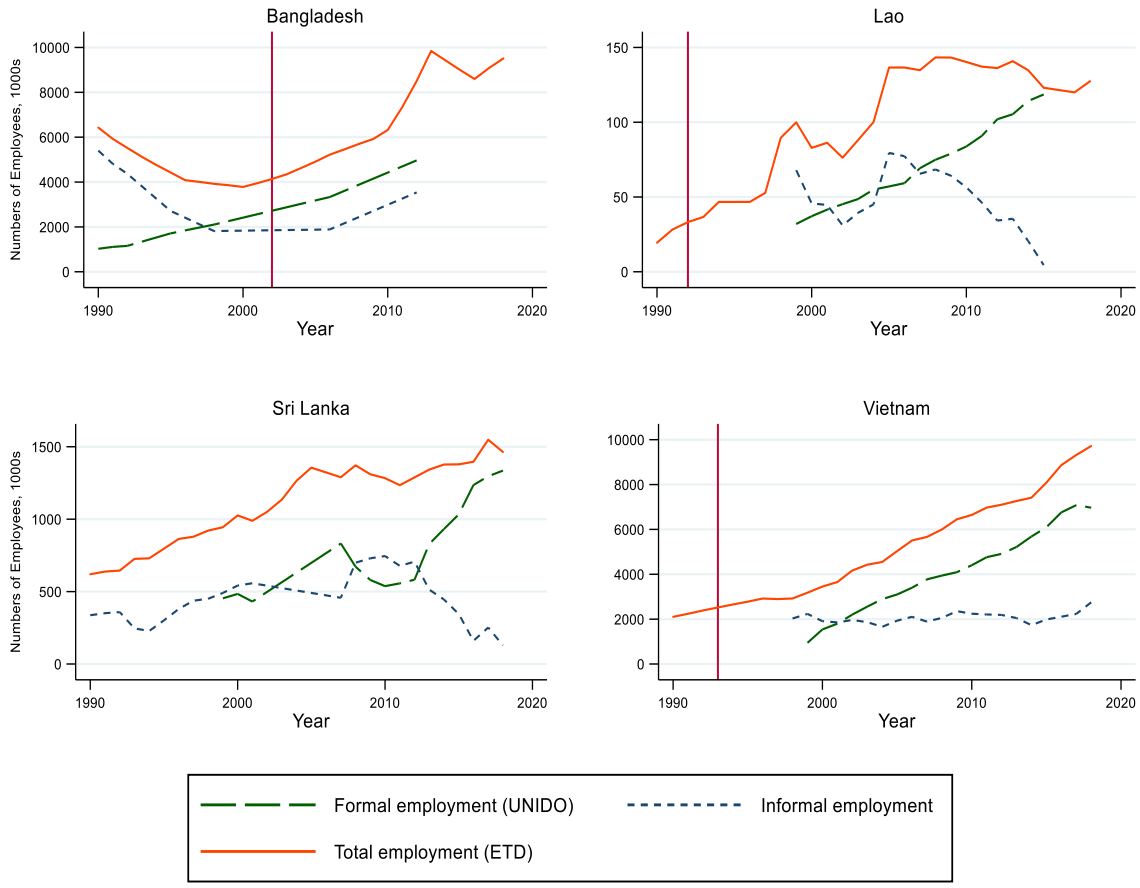
Notes: The 17 Asian countries are Bangladesh (BGD), Cambodia (KHM), China (CHN), India (IND), Indonesia (IDN), Korea (KOR), Lao PDR (LAO), Malaysia (MYS), Myanmar (MMR), Nepal (NPL), Pakistan (PAK), Philippines (PHL), Singapore (SGP), Sri Lanka (LKA), Thailand (THA), and Vietnam (VNM), as well as Hong Kong, China (HKG) and Taiwan, China (TWN). Data for advanced countries/regions, including Korea, Singapore, Hong Kong, and Taiwan is from GGDC database averaged for the period of 1976-1990. For the rest of countries, data is from Economic Transformation Database averaged for the period of 2001-2018.

Figure 3a: Manufacturing employment in Africa



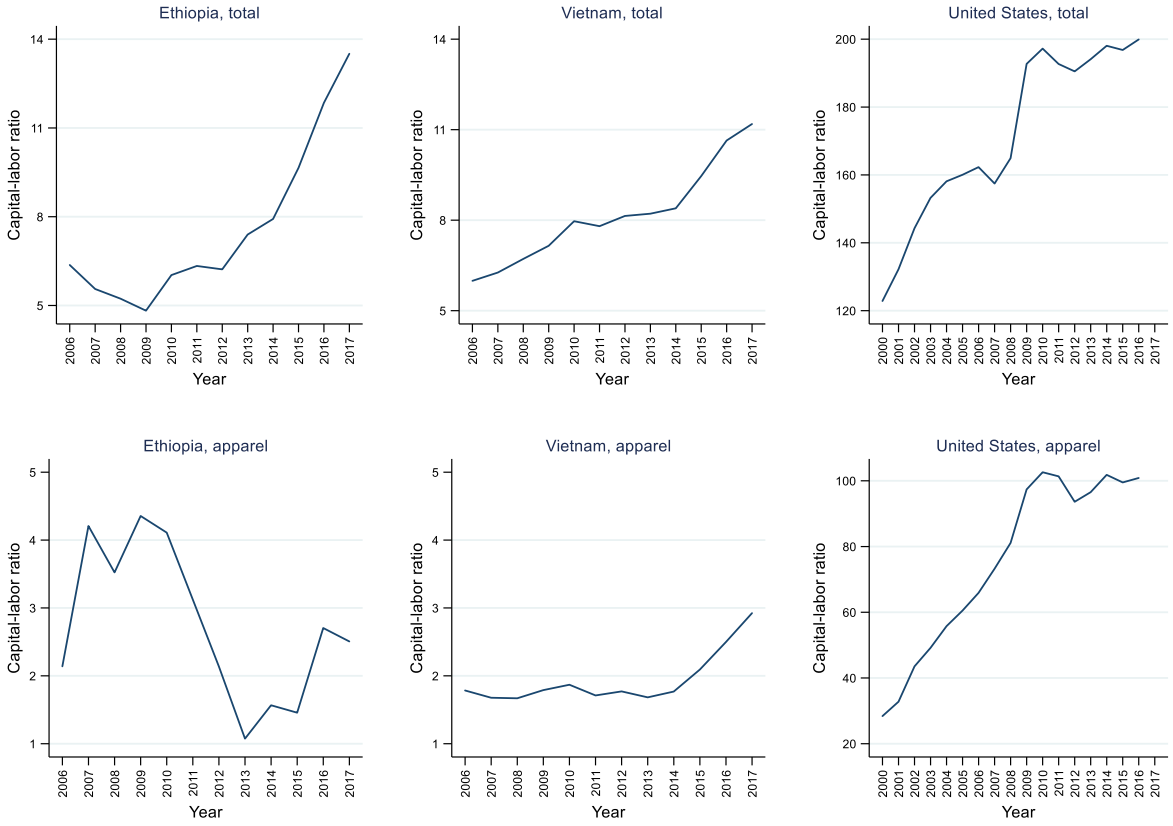
Notes: The vertical red line indicates the start of the country's growth acceleration. Informal employment is calculated as the difference between GGDC (total) and UNIDO (formal) employment pre-1990, and ETD (total) and UNIDO (formal) employment from 1990 onward. We augment the UNIDO data on formal employment with census data for Ethiopia and Nigeria, indicated by the dashed red line. In Ethiopia the data from the Large and Medium Scale Manufacturing (LMSM) census covers two additional years (2016-17), and this is the same source of UNIDO INDSTAT2. Nigeria does not have UNIDO employment data post-2000, so we instead measured formal employment in manufacturing using numbers from the national census for 2010-2017.

Figure 3b: Manufacturing employment growth in Asia



Notes: The vertical red line indicates the start of the country's growth acceleration. Informal employment is calculated as the difference between GGDC (total) and UNIDO (formal) employment pre-1990, and ETD (total) and UNIDO (formal) employment from 1990 onward. The Bangladesh series for formal employment post-2000 comes from two datapoints in 2006 and 2012.

Figure 4: Capital Labor Ratios, Total Manufacturing and Apparel



Notes: Capital-labor ratios are expressed in 2012 USD 1,000s terms and are measured as annual averages weighted by sector employment shares. The top row is total manufacturing and bottom row is apparel. For the Ethiopia apparel figure, we limit the sample to firms in the sector for at least 5 years from 2006-2017, to reduce the impact of entry and exit on the trend (there are only 43 firms in Ethiopia in the apparel sector per year on average, compared to 2,606 in Vietnam). These figures are produced using a cleaned panel of firms for Ethiopia (LMSM) and Vietnam (enterprise survey), and the United States data come from the NBER CES (2012 NAICS version). NBER CES data are organized at the NAICS 6-digit level so with Ethiopia and Vietnam we aggregate the firm-level data to the ISIC 4-digit level so that we can use similar methods. The 2011 data for Ethiopia is missing firms from apparel, so that value is replaced through interpolation.

Table 1: Formal Manufacturing Sector Performance 2000-2018

	Employment growth, 2000-	Real output per worker growth, 2000-	Real value added p.w. growth, 2000-	Real exports growth, 2000-
Bangladesh[1]	0.066	0.042	0.000	0.100
Botswana	0.016	0.070	0.044	0.037
Cameroon[2]	0.038	0.082	0.119	0.089
Ethiopia[3]	0.065	0.047	0.041	0.093
Ghana	0.086	0.059	0.099	0.073
Kenya	0.019	0.065	0.067	0.056
Lao People's Dem Rep[4]	0.074	0.072	0.083	0.208
Lesotho[5]	0.065			0.031
Mauritius	-0.031	0.027	0.033	-0.012
Nigeria[6]	0.015			0.133
Senegal	0.025	0.021	0.023	0.030
South Africa	-0.005	0.018	0.014	0.025
Sri Lanka	0.049	0.024	0.019	0.024
United Republic of Tanzania	0.036	0.033	0.081	0.134
Viet Nam	0.078	0.063	0.065	0.178

Notes: Employment, output per worker, and value added per worker series come from UNIDO INDSTAT2 database; the exports series comes from WDI; monetary values are deflated using the manufacturing PPI index from WDI. The results for employment, output per worker, and value added per worker growth all cover the same years, while the results for export growth use any years for which data are available in the period. Unless otherwise indicated below, the countries all have 14-19 years of useable data post-2000. Detailed information on the data availability can be found in table A1.

1 Bangladesh only has two datapoints, in 2006 and 2012.

2 Cameroon only has four datapoints, in 2000-2002 and 2008.

3 We use census data from the LMSM survey for Ethiopia because the UNIDO data from 2014-2015 are estimates, and the census data extend past 2015 allowing us to include 2016-17. The LMSM series match well to the UNIDO series pre-2010 and the LMSM is the source of the UNIDO data.

4 Lao's export data is only available from 2010-2019.

5 Lesotho only has employment data from 2001-2009, but not output or value-added data--we therefore only report employment and export (2000-2017) growth results.

6 Nigeria does not have UNIDO INDSTAT2 data post-2000, so we estimated formal employment from a report released by Nigeria's National Bureau of Statistics that has employment statistics for 2010-2012 (NBS, 2014); we extrapolated values up through 2017 using a linear trend. Because of the limited data availability in UNIDO, we only report employment and export (2001-2019) growth results.

Table A1: Data availability in UNIDO IndStat2 and WDI[1]

Country	Employment	Real Output	Real Value added	Real Exports
Bangladesh	2006, 2012	2006, 2012	2006, 2012	2000-2013, 2015
Botswana	2000-2018	2000, 2002-2018	2000-2018	2000-2019
Cameroon	2000-2002, 2008	2000-2002, 2008	2000-2002	2000-2017
Ethiopia	2000-2017	2000-2017	2000-2017	2000-2018
Ghana	2000-2015	2000-2015	2000-2015	2000-2001, 2003-2019
Kenya	2000-2018	2000-2018	2000-2018	2000-2010, 2013, 2015-2019
Lao People's Dem Rep	2000-2017	2000-2017	2000-2017	2010-2019
Lesotho	2001-2009			2000-2017
Mauritius	2000-2018	2000-2018	2000-2018	2000-2019
Nigeria[2]	2010-2017			2000-2003, 2006-2019
Senegal	2000-2014	2000-2014	2000-2014	2000-2019
South Africa	2000-2018	2000-2018	2000-2018	2000-2019
Sri Lanka	2000-2001, 2006-2018	2000-2001, 2006-2018	2000-2001, 2006-2018	2000-2017
Tanzania	2003-2018	2003-2018	2003-2018	2000-2018
Vietnam	2000-2018	2000-2018	2000-2018	2000-2019

Notes: (1) This table reports the years for which we have each data series available. Employment, output, and value added come from UNIDO Indstat2, while exports come from WDI. (2) For Nigeria, which does not have UNIDO INDSTAT2 data post-2000, we estimated formal employment from a report released by Nigeria's National Bureau of Statistics that has employment statistics for 2010-2012 (NBS, 2014); we extrapolated values up through 2017 using a linear trend.

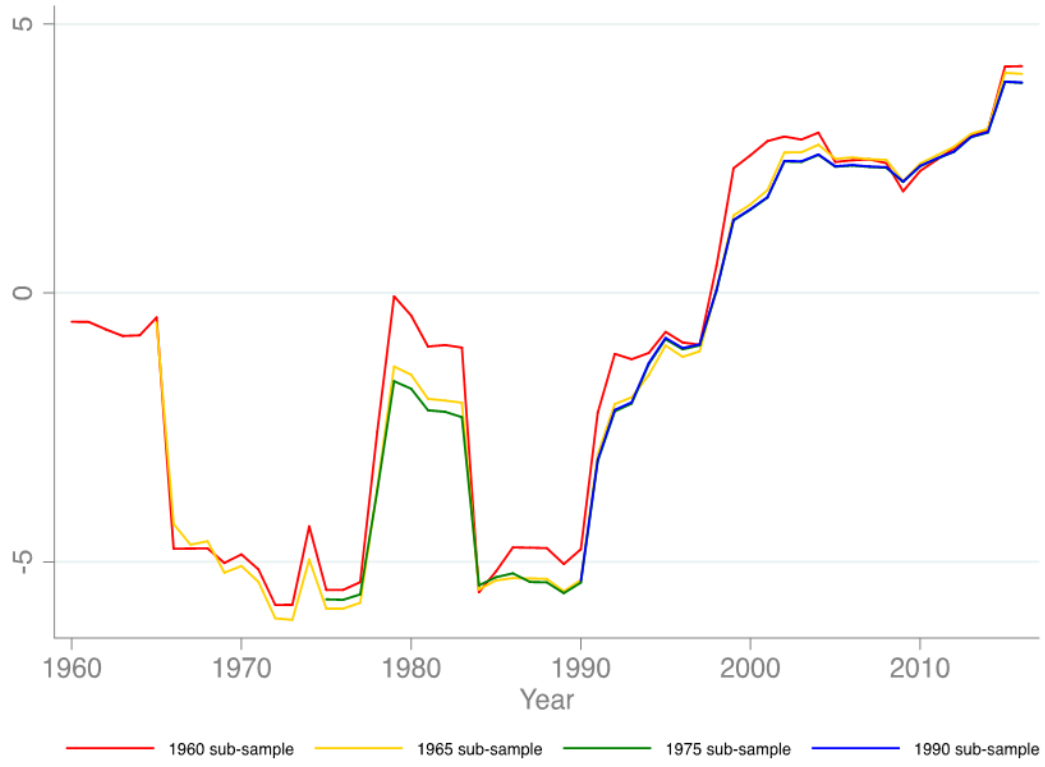
Appendix Table A.1: Ethiopia Industrial Parks: Number of Firms and Employees as of 2020/21

		# of firms		# of workers, annual		
		All firms	Garment	All firms	% Female	Garment
Eastern IP	Total	91	33	18,075	64	8,110
(Since 2012/13)	With 1,000+ workers	1	1	1,381	71	1,381
Bole Lemi IP	Total	12	10	17,169	90	15,723
(Since 2015/16)	With 1,000+ workers	3	3	14,004	89	14,004
Hawassa IP	Total	21	19	28,721	86	25,712
(Since 2016/17)	With 1,000+ workers	10	10	21,589	91	21,589
Huajian Shoes City IP	Total	4	1	4,643	27	393
(Since 2016/17)	With 1,000+ workers	1	0	3,699	33	0
George Shoes IP	Total	1	0	584	26	0
(Since 2017/18)	With 1,000+ workers	0	0	0	0	0
Adama IP	Total	4	4	10,816	52	10,816
(Since 2018/19)	With 1,000+ workers	1	1	4,872	94	4,872
Kombolcha IP	Total	4	4	3,126	89	2,166
(Since 2018/19)	With 1,000+ workers	1	1	1,924	89	1,924
Mekelle IP	Total	4	4	4,410	78	4,410
(Since 2018/19)	With 1,000+ workers	1	1	1,168		1,587
Velocity IP	Total	1		1,621	79	
(Since 2018/19)	With 1,000+ workers	1		1,621	79	
Bahir-Dar IP	Total	2	2	692	94	692
(Since 2019/20)	With 1,000+ workers	0	0	0	0	0
Debre Brehan IP	Total	1	1	896	83	896
(Since 2019/20)	With 1,000+ workers	0	0	0	0	0
Dire-Dawa IP	Total	4	0	1,017	46	0
(Since 2019/20)	With 1,000+ workers	0	0	0	0	0
ICT Park	Total	1	0	957	56	0
(Since 2015/16)	With 1,000+ workers	0	0	0	0	0
Jimma IP	Total	4	1	953	83	69
(Since 2019/20)	With 1,000+ workers	0	0	0	0	0
Total Ips	Total	154	79	93,680	74	68,987
	With 1,000+ workers	19	17	50,258	83	45,357

Sources: The data comes mostly from the Ethiopian Investment Commission and the Industrial Park Development Corporation but is complemented with information from Cepheus Research and Analytics (2019) and Oya and Schaefer (2019). Whenever there's inconsistency in the figures from different sources, data from the EIC is adopted.

Note: Since the outbreak of the conflict in Tigray in November 2020, the Mekelle and Velocity IP have not been in operations and hence the figures indicate number of firms and employment prior to the onset of the conflict. Garment includes textiles; there are only 21 textile firms which employ a total of 2,000 workers.

Appendix Figure A.1 The Evolution of Polity 2 Scores in Africa 1960-2016



Source: Author's calculations using data from the Polity IV Project and The World Bank's WDI dataset.

Notes:

1. Graph shows a weighted average of the polity2 score (weighted by population) in the Polity IV dataset. The polity2 score is the revised combined polity score which, is the result of substracting the "autoc" score from the "democ" score. It scores how democratic or autocratic a regime is and ranges from -10 (strongly autocratic) to +10 (strongly democratic).

2. Solid bright lines are population-weighted averages of the individual country scores for each cohort: the 1960 cohort (red), 1965 cohort (yellow), 1975 cohort (green), and the 1990 cohort (blue).

3. Countries included are: Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo Brazzaville, Congo Kinshasa, Ethiopia, Gabon, Ghana, Guinea, Ivory Coast, Liberia, Madagascar, Mali, Mauritania, Niger, Nigeria, Senegal, Somalia, South Africa, Sudan, Togo, Rwanda, Sierra Leone, Tanzania, Burundi, Uganda, Kenya, Malawi, Zambia, Gambia, Botswana, Lesotho, Equatorial Guinea, Mauritius, Swaziland, Zimbabwe, Guinea-Bissau, Angola, Cape Verde, Comoros, Mozambique, Namibia, Eritrea, and South Sudan.