Can Sub-Saharan Africa Be a Manufacturing Destination? Labor Costs, Price Levels, and the Role of Industrial Policy

Alan Gelb, Vijaya Ramachandran, Christian J. Meyer, Divyanshi Wadhwa & Kyle Navis

Journal of Industry, Competition and Trade
From Theory to Policy

ISSN 1566-1679
Volume 20
Number 2

J Ind Compet Trade (2020) 20:335-357
DOI 10.1007/s10842-019-00331-2

Journal of Industry, Competition & Trade (2020) 20: 335–357
https://doi.org/10.1007/s10842-019-00331-2

Can Sub-Saharan Africa Be a Manufacturing Destination? Labor Costs, Price Levels, and the Role of Industrial Policy

Alan Gelb[1] · Vijaya Ramachandran[1] · Christian J. Meyer[2] · Divyanshi Wadhwa[1] · Kyle Navis[1]

Received: 20 June 2019 / Revised: 20 June 2019 /
Accepted: 15 October 2019 / Published online: 19 February 2020

Abstract
Our central question is whether, and how, African countries can break into global manufacturing in a substantial way. For many poor countries, labor-intensive sectors based on low-cost production platforms have been the first step on the industrial ladder. Using a newly constructed panel of firm-level data from the World Bank's Enterprise Surveys, we look at labor costs in a range of low- and middle-income countries in Africa and elsewhere. Using fixed and random effects models, we find that relative to comparator countries at comparable income levels, industrial labor is more costly for firms that are located in Sub-Saharan Africa. This suggests that, if they are to industrialize, most countries will need to seek other paths, whether based on natural resources or on regional integration, or measures to improve their business climates and upgrade their skills to the point that competitiveness improves enough to sustain industry without resorting to low wages. Such a "balanced strategy"—perhaps along the lines of the "matrix" approach advocated for Europe—may be more politically appealing for some countries but in the interim it risks failing to create large numbers of industrial jobs and perhaps foregoing learning opportunities. However, we also find that Africa is not homogeneous: there are a few countries that, on a labor cost basis, and also on the basis of observed purchasing power parity price levels, may be potential candidates for low-wage manufacturing. Ethiopia stands out and appears to be making efforts to position itself as a low-cost manufacturing platform, although it is too early to pronounce on its success. We analyze its policies from a cost-competitiveness perspective, including those related to agriculture, to investor incentives, and to holding down the costs of essential inputs and improving their supply.

Keywords Africa · Labor · Productivity · Competitiveness

✉ Vijaya Ramachandran
vramachandran@cgdev.org

[1] Center for Global Development, 2055 L St NW, Washington, DC, 20036, USA

[2] Nuffield College, Oxford University, Oxford, UK

JEL Classification R23 — Regional Labor Markets · J24 — Labor Productivity · L60 — Industry Studies: Manufacturing (General)

1 Introduction

The question posed by this paper is whether Sub-Saharan Africa has the potential to diversify its economies by industrializing on the basis of low-cost labor. Economic diversification in general, and industrialization in particular, has for many years been a high priority of African leaders, but performance has been rather disappointing, at least compared with that of countries that have successfully navigated this path to growth. We also consider, in the context of one African country, how industrial policy is being implemented in an attempt to grow a low-cost platform for export-oriented manufacturing.

At the outset, we must recognize that cheap labor is not the only entry point for industrial development. Industrial location responds to many factors, including geographical advantage, transport, logistics and ease of integration into global value chains, domestic market size and agglomeration potential, labor and management skills, the quality and credibility of economic management and regulation, and, more recently, ICT readiness (digitization, robotics, capacity to adapt to AI). On most such measures, which form the core of competitiveness rankings such as those produced by the World Economic Forum (WEF), African countries do not perform strongly.[1] Certain industries can draw on a rich and diverse natural resource base—as the Africa Mining Vision emphasizes, resource-rich African countries can encourage forward and backward linkages, especially to small- and medium-sized enterprises. Tourism, a rapidly growing export sector, depends on a different set of natural, and cultural resources, and can also stimulate local industrial and service firms. And, there is scope for import substitution, more so if the free trade area becomes a reality to "globalize" Africa also within its own borders.[2] All these elements, and measures to improve the underlying competitive position of African economies, have the potential to sustain diversification and growth. But, on their own, these developments are unlikely to provide the scale of employment-generation needed by Africa's young and rapidly expanding population.[3] Going the "high wage route"—waiting until infrastructure and skills have been sufficiently upgraded to enable the country to compete in more complex industrial sectors—may be more in line with the long-term aspirations of African countries concerned by the risk of a "low-wage development trap." However, the risk posed by this approach is that there is an extended period of low labor absorption in the interim and forgone learning opportunities.[4]

"Footloose" industries have often served as the entry point for low-wage industrialization and structural transformation in other developing regions, generally first involving industries like garments and footwear and labor-intensive segments of industrial value chains. For countries to succeed in such areas, in addition to providing an acceptable business climate, labor costs need to be competitive. Given that poor countries usually have cheap

[1] See also the broad definition of competitiveness recently adopted by the European Economic and Social Committee and the incorporation of targets that go "beyond GDP" to include, for example, environmental sustainability (Aiginger 2016).

[2] On the current crisis in globalization, see Aiginger and Handler (2017).

[3] On mining, for example, it is not clear whether beneficiation provides for a long-term path towards industrialization and development(Hausmann et al. 2008).

[4] For a recent picture of African aspirations, see African Union (2015). For comparable discussions in Europe, including the "matrix" approach with a heavy emphasis on horizontal policies (including technology and innovation) but with a degree of sectoral differentiation, see Aiginger and Sieber (2005).

labor African countries should have some of the cheapest labor in the world. The question is—do they, and if so, is African labor cheap enough to compensate for other, less favorable, factors? Several papers have shed light on these questions. Fox et al. (2017) argue that the past decade has seen economic activity shift into higher-productivity sectors but that this structural transformation has seen labor shift into services rather than into industry. Söderbom and Teal, along with various coauthors, have written extensively on the efficiency of firms in the manufacturing sector in Africa as well as on the relationship between workers' skills and the ability to export (Siba et al. 2012; Söderbom and Teal 2004; Söderbom 2003; Söderbom and Teal 2000). Page (2012) argues that industrialization in Africa can be sped up by focusing on exports, agglomeration externalities, and investments in the capabilities of the firm. Tybout (2000) and Van Biesebroeck (2005) explore the determinants of productivity of firms including the relationship between firm size and productivity. Ceglowski et al. (2015) find that unit labor costs in most Sub-Saharan African countries are high relative to China. They argue that this, combined with a weak business climate, means that most African countries will not become competitive in manufacturing in the near future.

In 2013, we made an attempt to understand African labor costs in the global context using cross-sectional data from the World Bank's Enterprise Surveys (Gelb et al. 2013). Following on from previous research on external costs (Eifert et al. 2008), we compared labor costs and productivity in selected African countries relative to comparators using data for 25 countries from the World Bank's Enterprise Surveys. We concluded that industrial labor costs (wages and other payments to employees) are far higher in Africa than one might expect, given levels of Gross Domestic Product (GDP) per capita. We argued that part of this was an "enclave effect"—both labor costs and labor productivity are far higher for formal industry in Africa, relative to GDP per capita than in comparator countries. In addition, we found that as firms became larger and more productive, their labor costs increased more in Africa than elsewhere.

In this earlier exercise, we did not have panel data and had to rely on a cross-sectional analysis, which has its limitations. We revisit this analysis using panel data, collected from the same firm at two different points in time, for a number of countries in Africa and elsewhere. Section 2 describes the data and the methodology, and sets out the results. We include a synthetic control approach to help compensate for income differences between African and comparator countries and also adjust for age dependency rates which also tend to be different for these groups of countries. The overall results are robust to estimation methods and adjustments: the cost of labor in most African countries is far higher than what might be expected on the basis of their income per head. Nevertheless, Africa is quite heterogeneous, with some countries, like Ethiopia, so poor relative to comparators that they could be attractive to industries seeking to compete on the basis of low-cost labor. The result would be that investors migrate over most of Africa to settle only in some of the poorest countries.

Section 3 looks more broadly at costs, as reflected by purchasing power parity price levels. Previous research by Rodrik (2008) has suggested that "cheaper" countries—those with lower-than-expected price levels considering their level of income—tend to be more successful in exporting manufactured goods. Using the more recent 2011 ICP data we summarize research by Gelb and Diofasi (2015) that confirms this result, which becomes even more powerful once we correct for the effect of fuel subsidies in holding down domestic prices. We also note the likely effect of low and stagnating agricultural productivity in driving African PPP price levels well above their expected values and—again—the distinctive position of Ethiopia.

Can industrial policy contribute to a low-cost industrial platform and, if so, through what mechanisms? Section 4 presents a deeper examination of Ethiopia, which is making

a determined effort to industrialize on the basis of low costs. We consider its policies in three areas—those aimed at boosting agricultural productivity and enhancing food security; those involving tax incentives and other inducements to investors; and those directed towards holding down the prices of essential inputs and assuring their future supply. While there has been some sectoral focus, these are more in the nature of "horizontal" policies than "vertical" policies targeted narrowly to particular firms or sectors. Industrialization has not proceeded far enough in Ethiopia to claim success for these policies but the shape of the package provides useful insight on how countries can try to gain a foothold on the lower rungs of the industrial ladder by creating a critical mass of such industry (Aiginger and Sieber 2006). Conclusions are in Section 5.

2 Industrial Labor Costs

Data The World Bank has been conducting Enterprise Surveys at firm level since the 1990s, often at intervals of three to four years. In each survey round, the aim is to include about fifty percent of the firms from the previous round.[5] This enables the construction of panel data but, due to numerous country-specific questions in the survey, a full panel data set has to be constructed separately for each economy. We use this data to build a multi-economy panel that includes a more limited set of variables that is common across countries.

We include data for all available African economies and all low-, lower-middle-, and upper-middle-income countries outside of Africa that could be considered as competing destinations for manufacturing investment. Since our analysis focuses on labor costs in the manufacturing sector, we use data from manufacturing firms only. We take the subset of only firms that were followed over time to create a balanced panel of firms that have been surveyed in at least two survey rounds.

As shown in Fig. 1, the sample comprises firms from 17 comparator countries and 12 African countries. Of these, two comparator countries and four African countries include firms from more than two rounds. For example, Turkish firms were surveyed in 2006, 2010, and 2013. We identify firms from the 2006 survey that were also surveyed in 2010, and include them, and we identify firms from the 2010 survey that were also surveyed in 2013, and include them–such that there are Turkish firms from two panel years: 2006–2010 and 2010–2013. We note at the outset that on average the comparator countries have higher incomes than the African countries. Most are established middle-income economies, a status enjoyed by only South Africa and Botswana in the Africa sample. This complicates the comparative analysis somewhat; because Africa is a poor continent it is not so easy to assemble a similar comparator set. We return to this topic in Section 4, where we develop a rough synthetic control.

We exclude all firms that we categorize as outliers if values for variables of interest are more than three standard deviations away from the mean. We also exclude all firms that have less than 5 employees. Many firms with fewer lack the features of formal firms. The final dataset comprises 5467 firms. The samples are generally larger, in terms of the number of firms surveyed per round, for comparator countries as compared with African countries and the distribution of firms in our sample is also reflective of this trend. Of the final data set, 1181 firms are located in African countries and 3876 firms are located in comparator countries.

[5]For example, if 100 firms in Afghanistan were interviewed in 2002, in their next round of survey, say 2006, they would contact 50 randomly selected firms from the previous survey round, and if available would survey them again.

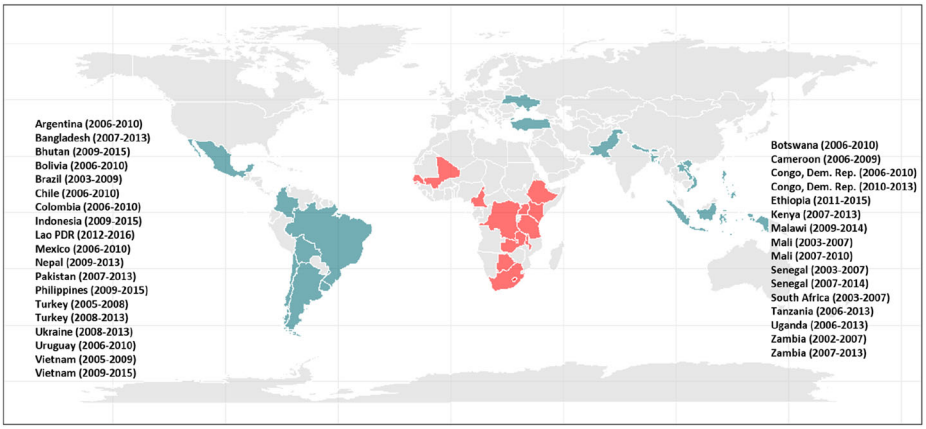

Fig. 1 Analytical sample

We focus on the average labor cost per worker for each firm, defined as the total labor cost divided by the number of permanent employees reported by the firm.[6] The total labor cost is defined as "the total annual wages and all annual benefits, including food, transport, social security (i.e., pensions, medical insurance, and unemployment insurance)." Labor cost is then converted to constant prices (2010 US dollars) for all countries as are all cost and sales values. In addition to location in Africa as a 0-1 dummy, our regression models incorporate a variety of controls that include firm characteristics and country characteristics (for description of all variables, refer to Table 1).

Labor costs cannot be considered in isolation as a determinant of competitiveness. Switzerland, for example, ranks at the top of the World Economic Forum's Global Competitiveness Index (GCI). With an outstanding business environment, rich technical and management skills and excellent location, it can sustain a large manufacturing industry despite very high costs of labor. Policy quality and predictability, administrative capacity, human, institutional and governance capital, physical and financial infrastructure, and location can be taken as important indicators of the quality and sophistication of a country's business environment. Some of these indicators are difficult to measure and there is no unique way to combine them into a single index, but many of them correlate quite strongly with GDP per capita. One option, then, is to take this as a proxy for the physical and institutional capacity of the country and the human capital embedded in its workforce. Thus, a comparison of labor cost per worker, given GDP per capita, may help to indicate how well a country can compete on the basis of low labor costs, taking into account its general level of development relative to competitors.[7]

[6] We do not use other concepts of labor costs, such as the ratio of labor costs to value added or labor costs to sales.

[7] An alternative approach could be to directly take an indicator like the GCI to represent the physical, human and institutional capital of the country; this correlates strongly, and approximately linearly, with ln GDP per capita. The approach is less useful here because of the small size of the country sample; various factors can cause sizeable deviations between countries' income and GCI rankings. The approach also confronts the problem of dualism. South Africa, for example, ranks far higher on the GCI than in terms of GDP/head but its high formal wage levels coexist with unemployment estimated at 27 percent, one of the highest rates in the world. From the perspective of job creation, it is less useful to consider South Africa's enclave wage levels in relation to its CGI than relative to the broader, income-based, measure of its economic development.

Table 1 Variables' definitions

Variables	Definitions
Dependent variables	
Log labor cost per worker	A continuous measure used as close approximation of a firm's average wage
Log unit labor cost—measure 1	A continuous variable measuring output relative to the firm's wages. Output is measured as the firm's sales.
Log unit labor cost—measure 2	A continuous measuring of output relative to the firm's wages. Output is measured as the firm's value added.
Key independent variable	
Africa	A dichotomous variable that indicates whether a firm resides in Africa
Control variables	
Firm size category	A categorical variable for the size of the firm measured by the number of employees. It consists of four categories: "small" (5 to 20 employees), "medium" (21 to 100 employees), "large" (101 to 500 employees), "very large" (more than 500 employees)
Ratio of skilled workers to unskilled workers	A continuous variable that acts as a proxy for measuring human capital
Foreign ownership	A dichotomous variable that indicates whether more than or equal to fifty percent of the firm is owned by a foreigner
Log capital per worker	A continuous measure of capital cost (market value of capital) relative to the size of the firm
Log GDP per capita	A continuous measure of GDP per capita (USD 2010), adjusted for purchasing power parity (PPP)
Log GDP per capita—age dependency ratio adjusted	A continuous measure of GDP per capita (USD 2010, PPP) that also adjusts for the share of working age population
Industry	A categorical variable for the type of industry. It consists of four categories: "Mining," "Manufacturing," "Construction," "Retail," "Other."

Some Descriptive Statistics The analytical sample comprises of 5467 firms, 29 countries, and 35 country-year panels. In this section, we discuss some key descriptors of our sample, comparing values for African firms and their comparators outside the region. From Table 2, the representative African firm is younger, smaller, and more likely to be owned by foreigners than the average comparator firm. However, the average proportion of skilled to unskilled production workers in the firms is nearly the same. This could signal that the human capital of African firms is not significantly different than that of comparator firms, and that the level of technology used in production is similar. But it could also mean—as suggested by some observers—that African firms have to operate with higher levels of oversight and supervisory staff than firms in other parts of the world.

In contrast to these modest differences, there are striking productivity and structural differentials. The median African firm has sales per worker of $15,615 compared with the median comparator firm at $22,335 and value added per worker is only $5203 for the median African firm but $11,372 for the comparator firm. Among the firms for which we could

Table 2 Descriptive statistics

	Africa	Comparators
Age	14	19
Share of firms with foreign ownership ≥ 50 percent	0.17	0.09
Number of employees	38	47
Ratio of skilled to unskilled production workers	1.07	1
Sales per worker (2010 USD, constant)	$15,615.51	$22,334.94
Value Added per worker (2010 USD, constant)	$5202.67	$11,371.83
Observations	2362	7752

All values are medians except share of foreign ownership

Values for value added per worker are not available for the entire sample. The median is representative of a smaller sample

calculate value added per worker, we find that African firms' value added is 50 percent of sales, nearly the same as comparator firms. Labor costs constitute 25 percent of value added per worker and 15 percent of sales per worker for African firms. For comparator firms, the numbers are 35 percent and 17 percent respectively.

The book value of capital per worker, as recorded by the firms, is high in Africa even though we might expect less capital-intensive production in, mostly poorer, Africa. Together with lower value added per worker and relatively similar levels of human capital this suggests that African firms have lower productivity and/or must pay a higher premium for technology and access to capital than comparator firms. African industrial labor costs are lower in absolute terms but not as low as we might expect. In Fig. 2, for the ratio of median labor cost per worker relative to GDP per capita, almost all the comparator countries in our dataset have a ratio that is below 1, while nearly all African countries are above this threshold.[8]

Table 3 helps us to better understand these patterns by comparing selected countries: Tanzania, Ethiopia, Kenya, and Senegal, with Bangladesh. The African countries are sometimes cited as among the more competitive while, among the comparator group, Bangladesh is a major manufacturer and has comparable GDP per capita. Indeed, the WEF Global Competitiveness rankings are similar for all of the countries (Schwab and Sala-i Martín 2016). The labor cost per worker for Bangladesh is $835, almost identical to its GDP per capita. However, for the four African countries, labor costs per worker are *twice or more* the level of GDP per capita. Only Ethiopia, at $909, is comparable with Bangladesh.

OLS Regressions We estimate a series of OLS regression models with firm fixed effects and with firm random effects, with increasing complexity of control variables. The fixed effects model is estimated separately for African firms and for comparator firms; we cannot observe any effect for an Africa dummy in a pooled fixed effects model as it is a time-invariant firm-specific characteristic. We estimate the following fixed effects regression models with the Africa and comparator samples:

- Model 1: (Log labor cost per worker)$_{fi}$ = β_0 + β_1(Firm size category)$_{fi}$ + β_2Ratio of skilled workers to unskilled workers)$_{fi}$ + β_3(Foreign ownership)$_{fi}$

[8]Value of 1 on *y*-axis indicates that country's median labor cost per worker is equal to the country's mean wage (defined by the country's GDP per capita).

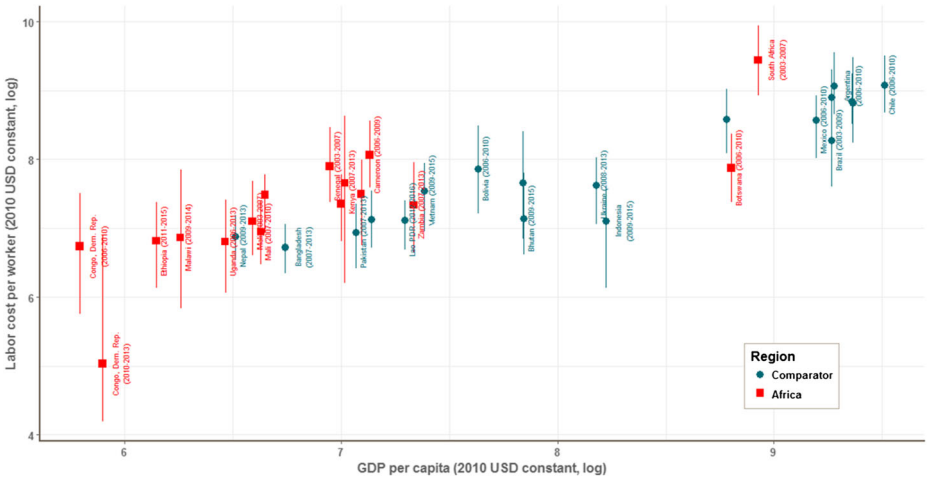

Fig. 2 Median labor cost vs. GDP per capita. Data for each country shows values for the median, 25th percentile, and 75th percentile

- Model 2: (Log labor cost per worker)$_{fi}$ = $\beta_0 + \beta_1$(Firm size category)$_{fi}$ + β_2(Ratio of skilled workers to unskilled workers)$_{fi}$ + β_3(Foreign ownership)$_{fi}$ + β_4(Log capital per worker)$_{fi}$
- Model 3: (Log labor cost per worker)$_{fi}$ = $\beta_0 + \beta_1$(Firm size category)$_{fi}$ + β_2(Ratio of skilled workers to unskilled workers)$_{fi}$ + β_3(Foreign ownership)$_{fi}$ + β_4(Log GDP per capita)$_{fi}$
- Model 4: (Log labor cost per worker)$_{fi}$ = $\beta_0 + \beta_1$(Firm size category)$_{fi}$ + β_2(Ratio of skilled workers to unskilled workers)$_{fi}$ + β_3(Foreign ownership)$_{fi}$ + β_4(Log capital per worker)$_{fi}$ + β_5(Log GDP per capita)$_{fi}$
- Model 5: (Log labor cost per worker)$_{fi}$ = $\beta_0 + \beta_1$(Firm size category)$_{fi}$ + β_2(Ratio of skilled workers to unskilled workers)$_{fi}$ + β_3(Foreign ownership)$_{fi}$ + β_4(Log capital per worker)$_{fi}$ + β_5(Log GDP per capita − age dependency ratio adjusted)$_{fi}$

For each model, we predict labor costs based on the coefficients for all firms (Fig. 3). The predictions made with the African model coefficients are tested against the predictions made with the comparator model coefficients for a difference in means. We consider the difference in three ways:

- First, we conduct the difference in means test for the whole sample.

Table 3 Comparing countries

	Labor cost per worker	Capital cost per worker	GDP per capita	WEF competitiveness rankings
Bangladesh	$835.31	$1069.84	$853.02	106
Kenya	$2118.01	$9775.45	$1116.69	96
Tanzania	$1776.65	$5740.99	$1094.95	116
Senegal	$1561.64	$2421.98	$775.45	112
Ethiopia	$909.28	$6137.98	$471.19	109

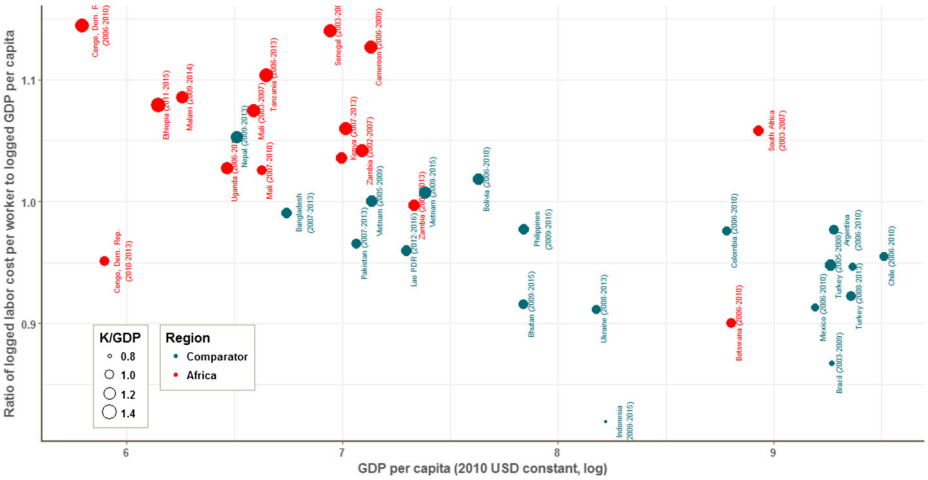

Fig. 3 Ratio of labor cost and GDP per capita v. GDP per capita. K/GDP refers to the ratio of logged capital cost per worker to logged GDP per capita

- Second, we perform the difference in means test for only African firms. In this case, the predictions for African firms based on the comparator coefficients suggests what African firms' labor costs could look like if they resided outside of Africa.
- Finally, we perform the difference in means test for only comparator firms. In this case, the predictions for comparator firms based on the African coefficients refer to what comparator firms' labor costs would look like if they resided in Africa.

Random Effects Random effects models allow for more flexibility. Many firm and country characteristics included as control variables have little variation over time so that the fixed effects model may "over-control.". For example, only a few firms in the sample increase or decrease in size to the extent that their firm size category changes. Firms that do not switch firm size categories are not captured in the coefficient for firm size categories in a fixed effects model. A random effects approach allows us to ease these problems and may provide better estimates.

We also control for the type of industry and introduce an interaction term between the Africa dummy and the firm size category to allow for the possibility that the pay gradient by firm size could be different for African and comparator firms.

Towards a Synthetic Control Being poorer than other regions, Africa is strongly represented at the low-income end of the spectrum. Only two (out of seventeen) comparator countries have GDP per capita below $1000, while there are six (out of twelve) African countries with GDP per capita below this level. It could be argued that such an imbalance makes it difficult to compare the two groups of countries and that a simple comparison of the African countries and the others may be misleading.

One approach could be to simply restrict the number of comparator countries, disregarding cases such as Turkey or Chile to reduce the disparity. However, these are credible competitors as manufacturing destinations, at least for the few (but important) middle-income African countries, and this would also introduce an element of arbitrariness into the analysis. Instead, we develop a rough synthetic control for Africa by assigning weights to

firms in our comparator countries based on their levels of GDP/head to create an "Africa-like" comparator distribution. Firms in poor comparator countries are assigned more weight than firms in middle-income comparator countries which, in turn, are assigned more weight than firms in the richest set of countries.

Allowing for Dependency Rates One other adjustment is to allow for different demographic structure. Africa's population is growing rapidly so that younger cohorts of the population are far larger than older cohorts. Population size is therefore larger in these countries relative to working-age population; this high age dependency rate will reduce GDP per head relative to the productivity of people of working age. Another way of looking at this is that to sustain a comparable level of GDP per head an African country will need to have a more productive adult workforce than a comparator. To some extent, this effect could help to explain the combination of high labor productivity costs with low levels of GDP per head. We have therefore also used GDP per head adjusted for the age dependency ratio as an indicator of the level of productivity and development.

Table 4 Fixed effects model: Africa

	(1) Log labor cost per worker	(2) Log labor cost per worker	(3) Log labor cost per worker	(4) Log labor cost per worker	(5) Log labor cost per worker
Ratio of skilled to unskilled workers	0.0138	0.00488	0.0116***	0.00406	0.00431
	(0.0100)	(0.0107)	(0.00377)	(0.0103)	(0.0103)
Foreign ownership of firm ≥ 50 percent	0.255^{+}	0.292^{+}	0.293^{+}	0.327^{+}	0.327^{+}
	(0.171)	(0.196)	(0.191)	(0.188)	(0.188)
Medium	− 0.197	− 0.381	− 0.217	− 0.407	− 0.408
	(0.263)	(0.305)	(0.327)	(0.369)	(0.368)
Large	− 0.179	− 0.481	− 0.247	− 0.550	− 0.557
	(0.303)	(0.355)	(0.443)	(0.522)	(0.521)
Very large	− 0.771*	− 0.724^{+}	− 0.889*	− 0.881*	− 0.892*
	(0.399)	(0.472)	(0.493)	(0.464)	(0.460)
Log capital/w		0.244***		0.238***	0.239***
		(0.0452)		(0.0745)	(0.0746)
Log GDP in USD 2010			1.006	0.960	
			(1.038)	(0.992)	
Log GDP (age dependency adjusted)					1.054
					(1.010)
Constant	7.721***	5.914***	0.440	− 1.001	− 2.332
	(0.200)	(0.428)	(7.439)	(7.171)	(7.919)
N	1367	1161	1367	1161	1161
r^2	0.0198	0.166	0.0328	0.177	0.178

Standard errors in parenthesess

$^{+}p < 0.15$, $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Results The results of the fixed effects regression estimations are presented in Table 4 for the sample of African firms and in Table 5 for the sample of comparator firms. These suggest that the average African firm's labor cost per worker is approximately 60 percent that of the average comparator firm. However, after controlling for GDP per capita, the relationship is reversed and the average African firm's labor cost per worker is 190 percent that of the comparator firm.

Predictions made using only coefficients from the African sample show that after controlling for GDP per capita, the median labor cost per worker with the African model coefficients is 3 times that of the median labor cost per worker with the comparator model coefficients. This suggests that, if African firms were outside Africa, their labor costs would be only 33 percent of what they are in Africa. Similarly, predicted labor cost per worker for the comparator sample using African coefficients is 189 percent that of the predicted labor cost per worker using comparator coefficients. Thus, if comparator firms were in Africa, their labor costs would be approximately 1.9 times higher.

Table 5 Fixed effects model: comparator

	(1) Log labor cost per worker	(2) Log labor cost per worker	(3) Log labor cost per worker	(4) Log labor cost per worker	(5) Log labor cost per worker
Ratio of skilled to unskilled workers	− 0.00532***	− 0.00138	− 0.00556***	− 0.00117	− 0.00129
	(0.000213)	(0.00447)	(0.000322)	(0.00656)	(0.00642)
Foreign ownership of firm ≥ 50 percent	0.216	0.0249	0.126	− 0.0638	− 0.0570
	(0.185)	(0.194)	(0.167)	(0.0899)	(0.0881)
Medium	− 0.150	− 0.147	− 0.164^{+}	− 0.175^{+}	− 0.170^{+}
	(0.119)	(0.127)	(0.0952)	(0.113)	(0.112)
Large	− 0.377**	− 0.229	− 0.429*	− 0.293^{+}	− 0.286^{+}
	(0.176)	(0.184)	(0.216)	(0.179)	(0.177)
Very large	− 1.107***	− 0.511*	− 1.125***	− 0.578***	− 0.574***
	(0.309)	(0.297)	(0.335)	(0.179)	(0.174)
Log capital/w		0.226***		0.214***	0.215***
		(0.0303)		(0.0522)	(0.0517)
Log GDP in USD 2010			1.461***	1.117*	
			(0.440)	(0.620)	
Log GDP (age dependency adjusted)					1.232*
					(0.691)
Constant	8.251***	6.359***	− 4.106	− 3.052	− 4.567
	(0.108)	(0.285)	(3.672)	(4.885)	(5.784)
N	4363	3512	4363	3512	3512
r^2	0.0370	0.117	0.0606	0.133	0.132

Standard errors in parentheses

$^{+}p < 0.15$, $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

With the inclusion of capital cost per worker as a control variable in models 2, 4, and 5, the coefficients for other independent variables do change but only slightly. The coefficient for capital cost per worker is highly significant and has a positive relationship with labor cost per worker for both African firms and comparator firms. This relationship is as expected—capital-intensive firms tend to have more skilled employees, which would generally contribute to higher labor costs. A 10 percent increase in cost of capital per worker correlates with 2.3 percent increase in labor cost per worker for African firms and with 2.1 percent increase in labor cost per worker for comparator firms. This difference indicates that an increase in capital costs is associated with higher labor costs in African firms more so than in comparator firms, perhaps because of a premium associated with high skill labor in Africa.

The data also suggest that differences in human capital, measured as the ratio of skilled production workers to unskilled production workers, are significantly related to change in labor costs in comparator firms, but not in African firms. However, this relationship is lost with inclusion of capital cost and GDP per capita as control variables.

Foreign ownership is correlated, with marginal significance, with higher labor costs for African firms (but not for comparators). The relationship of foreign ownership with labor cost persists even with inclusion of more control variables. Many more firms in Africa are foreign-owned than comparator firms. Such an "enclave effect" may contribute to the difference in the relationship for African firms vs. comparators. In addition, it is believed that foreign-owned firms in Africa are more sophisticated than domestic firms. However, even after controlling for capital, a close proxy for level of sophistication, the relationship persists. If an African firm shifts towards majority foreign ownership, then the labor cost per worker is 32.7 percent higher than an African firm that is owned by a local.

Finally, we include controls for any changes in firm size category. With little variation, we find nearly all of the firm size category coefficients to be insignificant. However, in the comparator sample, the coefficient for very large firms is significant and negative. GDP per capita also varies only slightly over time, and is therefore not significant for African firms. It is significant for comparator firms possibly because there is more variation in the comparator countries.

Random Effects, Synthetic Control and Age Dependency–Adjusted GDP The random effects model reiterates the pattern of the fixed effects regressions. Without controlling for GDP, the Africa premium is negative, but after controlling for GDP per capita, the labor cost per worker for African firms is found to be much higher than those for comparator firms. The Africa premium also increases with firm size. While a small African firm is 39 percent more expensive than a small comparator firm, a medium African firm is 52 percent more expensive than a medium comparator firm. Medium and large African firms are about 50 percent more expensive than comparator firms while the Africa premium is almost 55 percent for very large firms.

We find evidence of a pay gradient in comparator firms—that labor in larger firms is more expensive than in smaller firms in all countries. However, this pay gradient is not steeper for African firms in every size category. Labor in a medium-sized African firm is, on average, 26.6 percent more expensive than that in a small firm; this difference is only 6 percent for comparator firms. The pay gradient is steeper for comparator firms when we compare large firms to medium-sized firms (14 percent for comparator firms vs. 5.8 percent for African firms).

Results are essentially the same using the synthetic control approach and change little if GDP per head is adjusted for age dependency in either the fixed or random effects models.

One Africa—or several? "Africa" encompasses a very wide range of countries and conditions. The statistical picture suggests breaking down the continent into three groups of countries.

The first group consists of the *solidly middle-income countries*, dominated by South Africa but also including Botswana. Relative to middle-income comparators, South Africa's labor costs are very high; they are the highest in the sample even though it includes some richer countries. Its industrial section is highly capital intensive in the face of unemployment levels of between 20 and 30 percent. There are few small informal firms and those that do exist have low productivity, even relative to firms in other, poorer, African countries (Gelb et al. 2009). Irrespective of whether the cause of this dualism reflects structural factors or restrictive labor laws and high statutory minimum wages, the country is not likely to emerge as a strong competitor in labor-intensive industry in the foreseeable future. The furor over the Newcastle experiment suggests that pay levels low enough to compete with poor countries are politically unacceptable (Mail and Guardian 2013). If this is taken as given, South Africa would have to find an alternative to a low-wage expansion if it is to accelerate industrial growth.

The second group includes *leading low- and lower-middle-income African countries* like Kenya, Tanzania and Senegal—coastal, relatively stable, and with a strong business sector, particularly in the case of Kenya. If any countries were to feature in an African manufacturing take-off, these countries would surely be expected to be in the vanguard and, indeed, there may be some local and regional stimulus from growth in intra-African trade. Yet, taking the broader global picture, as shown in Table 3, their manufacturing labor appears costly relative to that of Bangladesh, a country with comparable income level and WEF competitiveness rating. On average, the firms in these countries are also smaller; to the extent that they confront a sharp pay gradient the picture is even more clouded since successful, expanding, firms will probably need to pay still higher wages.

The third group consists of *countries at the very low end of the income spectrum*, so poor that there are almost no real comparators. In our sample, the DRC, Ethiopia and, to a lesser degree, Malawi, appear to fit the bill. As a destination for footloose manufacturing the DRC is implausible. Rich in natural resources, the governance failings that have depressed its business climate and income leave little opportunity for investors in such sectors; and like Malawi, the DRC is also very low on the WEF rankings.[9] Ethiopia is another matter however. Though landlocked, it has been moving (including on the political front) towards easing logistics constraints through road and rail connections; it also has good air connections. It benefits from a stable administration, that sees the manufacturing as a central part of its growth strategy. The firm surveys suggest comparable levels of labor costs to Bangladesh and a similar WEF Global Competitiveness ranking despite its far lower income level.

3 A Broader Costs Picture: Summary Evidence from PPP

Countries will find it more difficult to maintain a low-labor cost platform for industry if the general level of costs and prices is high. In a recent study, Gelb and Diofasi (2015) sought to understand the factors responsible for the global patterns of Purchasing Power Parity (PPP) exchange rates using the results of the 2011 International Comparison Project (ICP) round. The results confirmed the Balassa-Samuelson hypothesis—rich countries were generally

[9]The 2017 WEF competitiveness rankings for DRC and Malawi are 129 and 134 respectively.

more costly than poor ones—but showed that most of the power in this relationship was at the middle and upper-income levels. At lower income levels, the relationship between incomes and PPP price levels was muted, largely because of the weight of African countries. These were, on average, around 30% more costly than expected on the basis of income/head. Small island states were, on average, also costly relative to their income levels. On the other hand, countries that subsidized, or otherwise held down, the price of fuels were less expensive in PPP terms than the countries at comparable income levels that levied high taxes on fuels and sustained high market prices. As discussed further below, the productivity of the agriculture value chain also appears to be an important determinant of the ability of countries to keep PPP price levels low.

PPP parities appear to matter for industrial competitiveness. Rodrik (2008) places particular emphasis on the importance of undervalued currencies—measured by low PPP price levels—in spurring the growth of manufactures and manufactured exports. This is confirmed by the 2015 study; the PPP exchange rate demonstrates a significant negative relationship with the share of manufactured goods in total exports, after controlling for income, small islands, and fuel subsidies. Controlling for fuel subsidies actually boosts the strength of the relationship because many oil exporters, which do not export manufactures, subsidize domestic energy. On average, Africa's appreciated price levels would correspond to a substantially lower share of manufactures in total exports. One unit lower on the log PPP price level (other things equal) corresponds to an additional 60 percent in the share of manufactured goods in exports, so that the average difference of 0.3 in the log of PPP price levels between African and other low-income countries would correspond to a modelled reduction in the export share of manufactures by 20 percent.

Again, among the African countries, Ethiopia stands out. As measured by Purchasing-Power Parity, the general level of prices in Ethiopia is below the level in India and comparable to that in Bangladesh. To some extent this reflects the expected Balassa-Samuelson link to its very low level of income, but Ethiopia's PPP price level is also less appreciated, relative to its income, than most other African countries.

It is useful to note the contrast between industrial policy as seen by the low-cost platform that Ethiopia provides to manufacturers and the high-cost platform, as exemplified by South Africa. The Industrial Policy Action Plan 2018 issued by the Department of Trade and Industry of the government of South Africa focuses on 10 themes which it says will "inform the work of the DTI and act as a roadmap for the wider industrial effort." Of these 10 themes, 4 relate to technology (including green technology), 2 relate to market development and competition, 1 to industrial finance and incentives, and 3 to general topics: growth, exporting and policy certainty. None is directly related to reducing costs as a spur to competitiveness. This provides a nice illustration of the importance placed on innovation for a high-cost country. Exactly how these policies are implemented, the role and mechanisms for learning and adaptation etc. are important topics and will likely be the subject of future work.

4 Can Ethiopia Be the New China? Industrial Policies from the Cost Perspective

The New China? The final question addressed in this paper is the role of industrial policies in supporting a low-cost platform for labor-intensive manufacturing. Asian countries, including China, India, and more recently, Bangladesh have been attractive destinations for low-wage manufacturing, but with labor costs now rising faster than productivity,

large manufacturing firms have started exploring opportunities for production outside Asia. Recently, Huajian International has been receiving complaints from workers about long hours (Bradsher 2017); workers have also been seeking more pay. The young population of China is shrinking, largely attributed to the "one child" policy; more youth are attending college and wanting office jobs, instead of work in manufacturing. This shift in the demographic profile is contributing to a fall in new labor entrants and a more expensive workforce for manufacturing jobs. Fashion brands like H&M are now finding potential in Ethiopia, one of the few African countries being proclaimed for having cheap labor (Hansegard and Vogt 2013). Their hope appears to be supported by the results in the previous sections, at least among African countries. Ethiopia stands out as the most labor cost-competitive.

As a check on the firm surveys, we surveyed production workers in a typical garment factory. Most were female, all had at least primary education and were literate; for many, this was their first formal job. Wages were uniformly low, averaging around $2 per day, but after allowing for the cost of local accommodation (which in this case was not provided by the firm) this fell to little over $1 per day. At these pay levels, the cost of industrial labor in Ethiopia would be comparable to that of China in the 1980s and only about one-quarter of that in China today. From the employees' responses, there is little prospect of supply and demand factors resulting in a rapid tightening labor market. A common refrain was the desperate need for employment to absorb surplus labor from the countryside. Ethiopia is one of the least urbanized countries in Africa, and, much like China in the 1980s can supply industry with a young, abundant, and moderately well-educated workforce.

A recent McKinsey survey administered to Chief Procurement Officers of large apparel companies asked questions regarding which countries would serve as the top manufacturing destinations in the next five years (Berg et al. 2015). While Bangladesh seemed to take the place of China as the most attractive manufacturing location, this was the first time that several survey respondents also expressed interest in African countries. Ethiopia was ranked seventh in the world, and first among African countries, followed by Egypt and Tunisia, but none of the leading lower-middle-income African countries made the grade. It seems that another reason why some manufacturers are seeking to diversify away from Asian industrial locations is the ongoing reputational problem of poor working conditions. Some claim that manufacturing working conditions in Ethiopia—though far from ideal—are better than in Bangladesh and Cambodia (Young 2016). In the International Trade Union Global Rights Index, Ethiopia fared better than Mexico and Malaysia (ibid.). Our survey results were mixed in this area, with some voicing health and safety concerns but others appreciating their jobs despite low pay and expressing good relationships with supervisors.

It is still too early to judge the success of Ethiopia's industrial drive. Domestic value chains are still embryonic, and political unrest could unsettle investment in the manufacturing sector if repeated on the scale seen in 2015 and 2016. Even with some of the cheapest electricity in Africa, grid failures and power outages are frequent. Firms often have to rely on generators that are four times more expensive than grid electricity. There has been support from the Ethiopian government to improve electricity access by setting up a grid for industrial zones and ensuring its reliability, as well as major investments to tap the country's abundant hydroelectric potential. In fact, H&M has already begun its factory operations in Mekelle, promising 4000 jobs to locals (Scarano 2016). Some are hopeful that this high-profile venture will attract many more investors to the country.[10]

[10]Taking a further leaf from China's playbook, Ethiopia's government has taken additional steps to woo its large diaspora (Africa News 2018)

Industrial Policies from a Cost Perspective Ethiopia is implementing three types of industrial policies to reinforce its low-cost strategy: (i) measures to boost agricultural productivity and increase food security; (ii) policies to support industrial investors, including a package of fiscal incentives offered in special zones; and (iii) policies to hold down the prices of essential inputs and expand the supply of power and transport. Only a few of these policies are narrowly targeted towards particular subsectors or firms; most are more horizontal than vertical policies.

Boosting Agriculture to Contain Food Prices Among the main ICP sub-sectors, prices for food and non-alcoholic beverages appear to be a major driver of PPP price levels. In poor countries, food is more costly relative to the overall price level, and more so in most African countries (Gelb and Diofasi 2015). However, the ratio of food prices to overall prices in Ethiopia is closer to what is "normal" for a poor country rather than elevated as for most African countries. This may be due to investments in agriculture going back several decades.

In contrast to many African countries that have discriminated against agriculture[11], the post-Derg government has emphasized investment in the sector and more broadly in the rural economy. Four major strategic plans have been implemented.[12] The two early growth strategies, SDPRP and PASDEP, were built on assumptions based on the Lewis two-sector model of development, predicting structural transformation driven by the industrialization of agriculture. They therefore focused on promoting the use of modern agricultural techniques and inputs to increase productivity. After the fall of the Derg, which had pursued Maoist-style farm collectivization, the government loosened its control of agricultural markets and attempted to replicate the success of the Green Revolution by promoting the uptake of hybrid seeds, chemical fertilizers, and modern farming techniques (McCann 2017; Dechassa and Tolosa 2012). Dechassa and Tolosa note that the SDPRP focused on social programs, food security, and resource conservation in rural areas (Finance and Economic Development Ministry 2002), while PASDEP built on this foundation by emphasizing agricultural commercialization and private sector growth. The second plan included infrastructure investments, increasing access to credit, a focus on export crops, and continued promotion of modern crop inputs and techniques (Finance and Economic Development Ministry 2006). At 13%, Ethiopia's share of government spending devoted to agriculture, including extension services, is one of the highest in Africa.

A number of recent studies, including (Vandercasteelen et al. 2016; Bachewe et al. 2016) suggest that these strategies have been successful at raising agricultural productivity and reducing transport costs to markets, so facilitating lower food prices. Increases in the uptake of modern methods and inputs accompanied TFP growth in the agricultural sector. The studies attribute these effects to government expenditures in the agricultural sector as well as physical infrastructure (road) improvements, education, and price incentives. Labor and TFP were estimated to represent 31 percent and 22 percent, respectively, of the contributing

[11] Hoeffler (2011) reviews agriculture and food policies in Sub-Saharan Africa, noting that, even after heavy discrimination against the sector was reduced with the partial retreat from import-substituting policies in the 1980s, governments were far more attentive to concentrated urban elites than to dispersed rural populations engaged in so-called "backwards" sectors.

[12] 2002–2005: Poverty Reduction Program (SDPRP), 2005–2010: Plan for Accelerated and Sustained Development to End Poverty (PASDEP), 2010-2015: Growth and Transformation Plan I (GTP I), 2015–2020: Growth and Transformation Plan II (GTP II)

factors to overall crop output growth over 2004–2014. Likewise, since 2009 the proportion of cereal-growing smallholders using fertilizer and the areas on which they are applied have increased by around 50 percent.

Abate et al. (2018) provide further evidence of policy-driven productivity growth from a randomized controlled trial, where—even with only 61 percent uptake—a government wheat program increased smallholder wheat yields by 14 percent. Agricultural output and production have increased while output prices have increased enough to encourage reinvestment without increasing wages so much as to produce a long-term cycle of food-price-based instability—a prospect also mitigated through social safety nets including the Productive Safety Net Programme (PSNP), a food-and/or-cash-for-work program that targets food insecure households (Bachewe and Headey 2017; Hoddinott et al. 2018). At some 3-4%, Ethiopia's agricultural TFP growth compares with rates observed in countries like China and India, and stands in contrast to the average for Africa of barely 0.5%. Meanwhile, even as food expenditures increased by 56 percent over the period 1996 to 2011, the share of food expenditures in the total consumption basket is decreasing as incomes increase, and food choices are shifting towards higher-value products (Worku et al. 2017).

The fact that land in Ethiopia is state-owned could affect costs and prices but the net effect seems unclear. Farmers with use rights could not sell or mortgage land (Gebreselassie 2006) which was seen as providing social security and stability; people stayed on the land; rural density increased, and Ethiopia remains one of the least urbanized countries in Africa, with lower labor migration into low-productivity informal service and industrial activities than in many other countries. State land ownership could have inhibited private investment in complementary assets, but it has also enabled the state to appropriate low-cost land for large-scale agribusiness, industrial zones and transport projects—albeit at the cost of stoking tensions between the central government and some ethnic groups.

Support to Industrial Investment While SDPRP and PASDEP may have been successful at strengthening agriculture, they did not deliver the income convergence predicted by endogenous growth models. Reflecting on the outcomes of PASDEP, Dechassa and Tolosa (2012) note disappointment with the lack of poverty reduction associated with growth and describe the government's next steps towards activist agriculture-driven industrial development (in contrast to expecting that industrial development would emerge spontaneously as the non-agricultural labor force increased, as might have been expected from the Lewis model). PASDEP did incorporate nascent forms of industrial policy, but with GTP I the Ethiopian government began to focus much more heavily on supporting export-oriented light industry (Gebreeyesus 2013).

The GTP approach provides for an influential public role in fostering the growth of industries through facilitation and private-public coordination, based loosely on models imported from Germany and East Asia (Oqubay 2018b). GTP I and II combine sector-specific coordination with a pivot towards industrial park development as the primary means for facilitating manufacturing goals, in particular to reduce the barriers to entry faced by foreign investors and lower the costs for manufacturers. Case studies illustrate how the government has provided sector-specific investments and coordination, with the leather products industry receiving the most attention (Mbate 2016). Along with similar institutes in other industries, the government founded the Leather Industry Development Institute (LIDI) to provide information and support for investors, coordinate the development of human capital resources with universities and vocational schools, facilitate public-private sector coordination, and also point investors towards financial incentive schemes.

Complementing sector-specific support, the government has invested heavily in export-oriented industrial park developments, drawing on other countries' experiences.[13] Staritz et al. (2016) profile the Ethiopian government's active industrial policy highlighting policies to attract FDI, integrate with global value chains, develop forward and backward linkages domestically, and facilitate resource mobilization and labor training. Additionally, while private land ownership is forbidden in Ethiopia, the government will lease land to investors in industrial parks under 99-year leases. Staritz et al. note that demand for industrial park sites has outstripped the government's capacity to build them, leading to licensed foreign investor-led industrial park development as well. Table 6 shows the incentives available to foreign investors, many of which are tiered to offer extra benefits for exporting a minimum proportion of production (Ethiopian Investment Commission 2017).

Empirical evidence is only beginning to emerge about the efficacy of these industrial policies. Abebe et al. (2018) show that domestic firms in districts with more greenfield FDI development enjoy positive spillovers on "(i) production processes; (ii) managerial and organizational practices; (iii) logistics; and (iv) knowledge about exporting." Likewise, newly opened domestic plants in the treated districts had 8 percent higher TFP than in others. Brautigam et al. (2013) also find that government support for the leather products industry appears to be successfully delivering technology transfer. On the other hand, Gebrewolde and Rockey (2016) exploit the geographic variation in tax policy applications and find that the incentivized policies had no (or net negative) effect on the TFP of "treated" firms over the period 1996 to 2010, but problems with the sampling assumptions make it difficult to take the results at face value.[14]

The attractiveness of Ethiopia to a particular investor depends on the relative importance of a number of factors. Calabrese et al. (2017) analyze four major global regions competing with Eastern China for manufacturing potential and find that Africa is not competitive. Ethiopia is a positive outlier for the low price of electricity, internet, and minimum and average wages (Dijkstra 2015) notes there is no statutory minimum wage); but it stands out negatively for water insufficiencies, rail density, time to export and import, mobile phone subscriptions, internet usage, and adult literacy, constraints that are confirmed by Oqubay (2018a). Hai (2016) and Brautigam et al. (2013) echo that very low wages are a strong draw for Chinese investment—enough to offset increased logistical costs and the need to remedy workforce skill deficits. Other positive factors cited by Hai include low import duties due to United States and European Union trade initiatives, as well as improved perceptions of quality to international standards, and the accessibility of government support.

Assuring Essential Inputs A third focus for policy has been to improve the provision of key inputs and services, such as power and transport, and to hold down their prices. Gas was subsidized until 2008 (Reuters 2008), and a subsidy reintroduced in 2017 along with the devaluation of the birr (Abiye 2017). At 68 cents per liter (as of August 2018) fuel prices in Ethiopia were lower than prices in Vietnam ($0.92), Bangladesh ($1.05), Kenya ($1.13)

[13] Weldesilassie et al. (2017) provide a comprehensive review of best practices in developing industrial parks, based on the successes and challenges of Chinese special economic zones.

[14] This paper is built on a stated assumption that the tax-incentive policies were not targeted, but other papers in this summary have provided abundant evidence to suggest that they are; for example, Ethiopia has seen the leather products industry as key to its industrialization pathway. Likewise, the focus on the floriculture industry began in the 2005-2010 PASDEP, but the enterprises of that sector are excluded from this analysis for unclear reasons, although it also was a targeted sector. Finally, the growth in manufacturing has accelerated in the years after 2010, which suggests that extending the time horizon of the sample could have yielded different results.

Table 6 Industrial incentives in Ethiopia

Fiscal incentives	Non-fiscal incentives
1. Income tax exemption	1. One-stop shop service
2. Customs duty exemption	2. Customs facilitation
3. Access to industrial park sites at promotional rate	3. Expedited visas
	4. Guarantee against expropriation
	5. The right to own immovable property
	6. Guarantee for remittance of funds
	7. Right to open and operate foreign currency accounts

Source: Ethiopian Investment Commission (2017)

and other African countries (GlobalPetrolPrices.com 2018). Since Ethiopia is not yet a substantial producer, this suggests either some subsidization or at least not levying substantial indirect fuel taxes. There are efforts towards greater self-sufficiency—the country has had a functional blending program using domestically produced ethanol since 2009 (Tadele 2014) while a Chinese firm is starting to test output of crude oil in the southeast region of the country. Some estimates place potential annual production at up to $7 billion (Manek 2018).

For electricity, the industrial incentives package already offers power at the minimal cost of $0.03 per kWh along with supply priority in the case of blackouts (Ethiopian Investment Commission 2017). The Grand Ethiopian Renaissance Dam, slated to open in the next few years, will generate more electricity than Ethiopia itself can consume, which should be a boon to light manufacturers when evaluating the cost structures of potential investment destinations (International 2014). As of 2017, power purchase agreements with Djibouti, Kenya, Rwanda, Sudan, and Tanzania promise another source of foreign exchange as well as an abundance of cheap electricity over the near term (Donnenfeld 2017).

Finally, from a political economy perspective, the recent rapprochement with Eritrea seems to be part of a coordinated political strategy to lower logistical barriers to trade and investment (as well as providing another potential electricity customer). Re-opening road transport routes is a priority; air routes have already been re-opened and Ethiopia's Prime Minister also announced four seaport developments, in conjunction with Somalia, on the Indian Ocean and Red Sea coasts, along with highways to interlink the two countries (Manek 2018). Permanently resolving the conflict will end Djibouti's port monopoly and increase competition to service imports and export Ethiopia's production.

5 Conclusion: Can Africa Industrialize on the Basis of Low Wages?

It is always risky to speculate on the future, especially considering evolving trends in technology which will shape the evolution of comparative and absolute advantage in manufacturing, among other sectors (Norton 2017). However, based on enterprise survey data, Africa does not, in general, appear to be poised to embark on a low-wage manufacturing-led take-off by stepping into the shoes of emerging Asia. The results using panel data confirm the conclusions of previous cross-section research that most of lower-income Africa has high manufacturing labor costs relative to GDP. Labor in South Africa is also very expensive relative to that in comparator middle-income countries. Re-balancing the comparators

through a simple synthetic control and adjusting for demographic differences do not change these conclusions. Most African countries are also costly in PPP terms relative to comparators at comparable income levels, a feature not associated with revealed comparative advantage in manufactures. If Africa is to launch into industrial growth, it will probably need to find a path to strengthening the multiple dimensions of competitiveness rather than rely on a low-wage strategy. Though essential for longer-run productivity gains, this is not likely to generate a rapid expansion in low-skill manufacturing jobs.

Breaking "Africa" down into sub-groups suggests a more nuanced picture. Within the sample, Ethiopia stands out as distinctive. Its income level is so low that there is no real external comparator and, as shown by PPP patterns, its general level of prices and costs also appears to be lower than those of other African countries. This opens up the question of whether the investors migrating out of emerging Asia will pass over middle- and lower-middle-income Africa to find a landing place in the poorest countries, provided that these countries can provide a stable platform for the industry.

We do not know how much of Ethiopia's cost-competitiveness is directly attributable to industrial policy, but it appears to be making a considerable effort to position itself as a low-cost platform for investment. Its development strategy could plausibly be described as an "accelerated and managed" classic Lewis model, trying to be Asian in Africa, which is alluded to by government references to the Japanese *kaizen* system and close study of Chinese special economic zones (Weldesilassie et al. 2017). The policy elements include: (i) an Asia-like effort to increase agricultural productivity and boost food security; (ii) a range of incentives for investors; and (iii) measures to hold down the costs of essential inputs and boost their long-term supply through investments and diplomatic overtures to neighbors. State ownership of land enables the government to provide it to investors at low cost. As one of the least urbanized countries in Africa, Ethiopia has still to experience the massive flows of rural-urban migration that have taken place in many other African countries expanding employment in low-productivity informal services and manufacturing. The hope appears to be that much of these can instead be diverted into formal light industry which—especially if encouraged by policies to further upgrade skills and boost access to technology—offers the possibility of increasing productivity and moving upwards on the global production ladder.

Our results suggest further avenues of research. We still do not really understand the factors driving prices and costs, whether for industrial labor or, more generally, in terms of purchasing-power parity price levels, and why so many African countries appear to be costly relative to their income levels. It would also be useful to understand better the determinants of industrial investment and development in the poorest countries, and the payoff to carefully designed industrial policy—whether it can unleash the potential for formal manufacturing and rapid structural change, as well as deliver on living standards. it is still too early to assert the success of Ethiopia's export-led strategy but this bears watching. The next few years will offer opportunities for comparison with other countries in East Africa that are more likely to stress regional integration and import-substitution as avenues for industrial growth.

Acknowledgments The authors are grateful to Karl Aiginger, Tom Bundervoet, Ranil Dissanayake, Louise Fox, Matthew Johnson-Idan, David Lam, Dani Rodrik, Alexis Smallridge, Mallika Snyder, Francis Teal, an anonymous external reviewer, and seminar participants at the DFID-IZA Growth and Labor Markets in Low Income Countries Workshop at Oxford University, the DFID economist seminar series, the World Bank's Trade and Competitiveness Learning Week, and the Research in Progress series at the Center for Global Development. We owe a special debt to Joshua Wimpey at the World Bank for his guidance regarding the Enterprise Surveys dataset. All errors are, of course, ours alone.

References

Abate GT, Bernard T, de Brauw A, Minot N (2018) The impact of the use of new technologies on farmers' wheat yield in Ethiopia: evidence from a randomized control trial. Agricultural Economics

Abebe G, McMillan MS, Serafinelli M (2018) Foreign direct investment and knowledge diffusion in poor locations: Evidence from Ethiopia. National Bureau of Economics Research

Abiye Y (2017) Gov't to absorb fuel prices change due to devaluation. The Reporter

Africa News (2018) Commercial bank of Ethiopia woos diaspora with mortgage loans. Africa news, October 6

African Union (2015) Agenda 2063: The Africa We Want—First Ten-Year Implementation Plan 2014–2023. African Union

Aiginger K (2016) New dynamics for Europe: Reaping the benefits of socio-ecological transition. Synthesis Report. WWW for Europe

Aiginger K, Handler H (2017) Towards a european partnership policy (EPP) with the south and the east. Fostering dynamics, fighting root causes of migration. Policy crossover center: Vienna - europe, Working Paper 3/2017

Aiginger K, Sieber S (2005) Towards a Renewed Industrial Policy in Europe. Prepared as Chapter 1 for the 2005 Background Report of the Competitiveness of European Manufacturing. European Commission

Aiginger K, Sieber S (2006) The Matrix Approach to Industrial Policy. International Review of Applied Economics, vol. 20, no. 5, December

Bachewe F, Headey D (2017) Urban wage behaviour and food price inflation in Ethiopia. Journal of Development Studies

Bachewe FN, Berhane G, Minten B, Taffesse AS (2016) Ethiopia Strategy Support Program II Research Note No. 53. International Food Policy Research Institute

Berg A, Hedrich S, Russo B (2015) East Africa: The next hub for apparel sourcing? McKinsey & Company

Bradsher K (2017) Chinese maker of Ivanka Trump's shoes looks for cheaper labor. The New York Times

Brautigam D, Mcmillan M, Tang X (2013) The role of foreign investment in Ethiopia's leather value chain. PEDL Research Note-ERG project

Calabrese L, Gelb S, Hou J (2017) What drives Chinese outward manufacturing investment? a review of enabling factors in Africa and Asia [Background Paper]. Supporting Economic Transformation, Overseas Development Institute

Ceglowski J, Golub S, Mbaye A, Prasad V (2015) Can Africa compete with China in manufacturing? The role of relative unit labor costs. Manuscript, Swarthmore College

Dechassa C, Tolosa T (2012) The contribution of agriculture to development: A critical review in Ethiopian context. The International Journal of Social Sciences

Dijkstra A (2015) Low wages draw international textile companies to Ethiopia. Deutsche Welle

Donnenfeld Z (2017) Downstream costs of the Grand Ethiopian Renaissance Dam. Institute for Security Studies

Eifert B, Gelb A, Ramachandran V (2008) The cost of doing business in Africa: Evidence from Enterprise Survey Data. World Development Report 36(9):1531–1546

Ethiopian Investment Commission (2017) Industrial Parks in Ethiopia Incentives Package [Brochure]. Ethiopian Investment Commission, Addis Ababa

Finance and Economic Development Ministry FDRoE (2002) Ethiopia: Sustainable Development and Poverty Reduction Program. Ministry of Finance and Economic Development, Addis Ababa

Finance and Economic Development Ministry FDRoE (2006) Ethiopia: Building on progress—a plan for accelerated and sustained development to end poverty (Volume I: Main text). Addis Ababa: Ministry of Finance and Economic Development

Fox L, Thomas A, Haines C (2017) Structural transformation in employment and productivity: What can Africa hope for? International Monetary Fund

Gebreeyesus M (2013) Industrial policy and development in Ethiopia. Manufacturing Transformation, 27. WIDER Working Paper 2013/125

Gebreselassie S (2006) Land, land policy and smallholder agriculture in Ethiopia: Options and scenarios. Discussion Paper No 008. Brighton: Future Agricultures

Gebrewolde TM, Rockey J (2016) The effectiveness of industrial policy in developing countries: Causal evidence from Ethiopian manufacturing firms. Discussion Papers in Economics No 16/07. Leicester: University of Leicester

Gelb A, Diofasi A (2015) What determines Purchasing Power Parity exchange rates? - Working Paper 416. Center for Global Development

Gelb A, Mengistae T, Ramachandran V, Shah MK (2009) To formalize or not to formalize? Comparisons of microenterprise data from Southern and East Africa - Working Paper 175. Center for Global Development

Gelb A, Meyer CJ, Ramachandran V (2013) Does poor mean cheap? a comparative look at Africa's industrial labor costs - Working Paper 325. Center For Global Development

GlobalPetrolPrices.com (2018) Gasoline prices, liter

Hai H (2016) Why invest in Africa: Markets, know-how and comparative advantage. In: Calabrese L (ed) China-Africa: a Maturing Relationship? Growth Change and Resilience. DFID-ESRC Growth Research Programme, Johhanesburg, pp 13–16

Hansegard J, Vogt H (2013) H&M looks to source clothing from Ethiopia. Wall Street Journal

Hausmann R, Klinger B, Lawrence R (2008) Examining beneficiation. Harvard Kennedy School Working Paper Series

Hoddinott JF, Stifel D, Hirvonen K, Minten B (2018) The impact of large-scale social protection interventions on grain prices in poor countries: Evidence from Ethiopia. International Food Policy Research Institute (IFPRI) and Ethiopian Development Research Institute (EDRI)

Hoeffler H (2011) The political economy of agricultural policies in Africa: history, analytical concepts and implications for development cooperation. Q J Int Agric 50(1):29–53

International Non-partisanEasternNileWorkingGroup (2014) The Grand Ethiopian Renaissance Dam: An opportunity for collaboration and shared benefits in the Eastern Nile Basin. MIT Abdul Latif Jameel World Water and Food Security Lab

Mail and Guardian (2013) Minimum wage disputes: Is it worth the fight in Newcastle? Mail and Guardian, 30 May

Manek N (2018) As crude tests begin, Ethiopia touts nascent oil, gas industry. Bloomberg

Mbate M (2016) Structural change and industrial policy: A case study of Ethiopia's leather sector. J Afr Trade 3(1-2):85–100

McCann J (2017) The history of agriculture in Ethiopia. Oxford Research Encyclopedia of African History

Norton A (2017) Automation and inequality: The changing world of work in the global South. International Institute for Environment and Development

Oqubay A (2018a) Industrial policy and late industrialisation in Ethiopia. African Development Bank No. 303

Oqubay A (2018b) The structure and performance of the Ethiopian manufacturing sector. African Development Bank No. 299

Page J (2012) Can Africa industrialise? J Afr Econ 21(suppl 2):ii86–ii124

Reuters (2008) Ethiopia ends fuel subsidy, increases pump prices. Reuters

Rodrik D (2008) The real exchange rate and economic growth. Brookings Papers on Economic Activity, Fall 2008

Scarano G (2016) H&M commits to 4,000 new jobs in Ethiopia. Sourcing Journal

Schwab K, Sala-i Martín X (2016) The Global Competitiveness Report 2016-2017: Insight Report. World Economic Forum. OCLC, Geneva, p 989119813

Siba E, Söderbom M, Bigsten A, Gebreeyesus M (2012) Enterprise agglomeration, output prices, and physical productivity: Firm-level evidence from Ethiopia. WIDER Working Paper, (2012/85)

Söderbom M. (2003) Are manufacturing exports the key to economic success in Africa? J Afr Econ 12(1):1–29

Söderbom M, Teal F (2000) Skills, investment and exports from manufacturing firms in Africa. CSAE-UNIDO

Söderbom M, Teal F (2004) Size and efficiency in African manufacturing firms: evidence from firm-level panel data. J Dev Econ 73(1):369–394

Staritz C, Plank L, Morris M (2016) Global Value Chains, Industrial Policy and Sustainable Development—Ethiopia's Apparel Export Sector. International Centre for Trade and Development, Geneva

Tadele N (2014) Bio-fuel development experience of Ethiopia

Tybout JR (2000) Manufacturing firms in developing countries: How well do they do, and why? J Econ Lit 38(1):11–44

Van Biesebroeck J (2005) Firm size matters: Growth and productivity growth in African manufacturing. Econ Dev Cult Change 53(3):545–83

Vandercasteelen J, Tamru S, Minten B, Swinnen J (2016) Cities and agricultural transformation in Africa: Evidence from Ethiopia. International Food Policy Research Institute (IFPRI) and Ethiopian Development Research Institute (EDRI)

Weldesilassie A, Gebreeyesus M, Abebe G, Aseffa B (2017) Study on industrial park development: Issues, practices and lessons for Ethiopia. Ethiopian Development Research Institute (EDRI)

Worku IH, Dereje M, Minten B, Hirvonen K (2017) Diet transformation in Africa: the case of Ethiopia. Agric Econ 48(S1):73–86
Young R (2016) Made in Ethiopia. Fashion's next sourcing hub? The Business of Fashion