

Industrialization on a Knife's Edge

Productivity, Labor Costs and the Rise of Manufacturing
in Ethiopia

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Abstract

The latest push for industrialization in Ethiopia has attracted much academic and public interest. This paper assesses Ethiopia's competitiveness and attractiveness as an investment destination by comparing domestic productivity and input costs to a sample of manufacturing exporting countries. The paper documents that, in a comparison with Kenya, India or Vietnam, the labor cost advantage of Ethiopian firms is more than offset by low productivity.

However, Ethiopia appears competitive when compared to Bangladesh. Capital, firm size, or sectoral composition do not explain the low productivity of the Ethiopian manufacturing sector. Ethiopian firms, however, have worse management, particularly in the area of labor management. The paper concludes by discussing the potential for labor interventions to increase productivity and create the condition for further industrialization.

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Productivity, labor costs and the rise of manufacturing in Ethiopia

Stefano Caria*

JEL codes: O14, O15, O55.

Key words: Industrialization, productivity, labor costs, Ethiopia.

1 Introduction

The latest push for industrialisation in Ethiopia has attracted much academic and public interest. While the domestic manufacturing sector is still relatively small, Ethiopia has made large investments to promote industrial development and has witnessed some early success (Oqubay, 2015). The flagship project is the creation of several industrial parks across the country. The most famous of these parks, in the southern city of Hawassa, has attracted significant foreign direct investment from international garment manufacturers. This park alone currently employs more than 15,000 workers and exports 100 million USD worth of goods, doubling the country's foreign exchange earnings from garment manufacturing (Butler, 2018).

These early results are surprising in the context of the recent literature on 'premature deindustrialization' (Rodrik, 2015). This literature argues that in the last decades developing countries have moved out of manufacturing much faster than today's rich countries did in the past, when they had comparable levels of income. This early exit from a labour-intensive sector is feared to be an obstacle to generating employment and broad-based gains from growth. Also, the international experience with special economic zones and industrial parks has been mixed (Khandelwal and Teachout, 2016).

In this paper, I assess Ethiopia's competitiveness and attractiveness as an investment destination by comparing the productivity and input costs faced by firms based in Ethiopia to a sample of manufacturing exporting countries. Given the current strategic importance of the garment sector, I select comparison countries that are garment exporters in Africa (Kenya), and Asia (Bangladesh, India, Vietnam). I use harmonized data from the World Bank Enterprise Survey, which enables me to construct aggregates figures for sales for worker (a measure of productivity), total labor costs, capital stock, firm size, and a somewhat noisy measure of value added. I compute these figures for the whole manufacturing sector and for the garment sector. Further, I use data from the World Management Survey to study the quality of management.

My main finding is that Ethiopia's labor cost advantage is more than offset by low productivity with respect to all but one of the comparison countries (Bangladesh). Ethiopia's industrialization is thus on a knife's edge. Its fundamentals make it competitive with respect to the countries at the bottom of the productivity distribution. In recent years, the increase in labour costs has also been modest compared to these countries. However, given the likely pressure on wages that will result from further expansion of the manufacturing sector, additional gains in productivity will be crucial in order to secure Ethiopia's position as an attractive investment destination.

The low productivity of Ethiopian firms is not explained by differences in size, cap-

ital, or sector. However, Ethiopian firms score particularly low on a measure of the quality of management. The most critical area is that related to the management of workers. In particular, the quality of selection, incentives and retention practices is lower than in all comparison countries. This suggests a need for reformed labor management practices. Further, given the scarcity of rigorous evidence on the merits of specific interventions, this highlights the need for more experimental work on labor management in Ethiopia.

What is particularly interesting is that the historical experience of other nations also points to the importance of developing the right labor institutions and practices to make industrialization possible and to distribute its gains. Scholars of both the industrial revolution in the UK (Thompson, 1967; Clark, 1994) and of mid 20th century industrialization in Asia and Latin America (Kohli, 2004) agree on this point. Research on early industrialization in Africa also points to labor management problems, in particular, retention (Elkan, 1971). Finally, newly available historical data has highlighted the important role of unions in securing a wider distribution of the gains from industrialization (Farber et al., 2018).

This paper is also related to and complements two recent studies by Gelb et al. (2016) and Gelb et al. (2017), which argue that high labor costs hold back industrialization in Africa. These studies identify Ethiopia as a country with relatively low labor costs. Our analysis further points out that this labor cost advantage is partly offset by low productivity.

The rest of this paper is organized as follows. Section 2 describes the data. I then present the comparison of productivity and input costs and discuss the determinants of Ethiopia's low productivity in Section 3 and 4. Finally, in Section 5, I discuss evidence from recent studies of labor interventions. Section 6 concludes.

2 Data

Most of the analysis is based on data from the *World Bank Enterprise Survey* – an harmonised representative survey of firms covering about 139 countries in the world. For the analysis, I select five countries of interest: Ethiopia, Kenya, Bangladesh, India and Vietnam.¹ Kenya is a geographical neighbour of Ethiopia and a natural competitor within east Africa, with a key advantage coming from direct access to the sea. I then select three Asian countries, covering the range of the productivity distribution among

¹I use the latest survey available for each country. For Ethiopia and Vietnam, this is the 2015 survey; for India this is the 2014 survey, and for Bangladesh and Kenya this is the 2012 survey.

major manufacturing economies: from relatively high-productivity Vietnam to relatively low-productivity Bangladesh.

I focus the analysis on manufacturing firms (two-digit ISIC codes 15-37). I also report data specific to the garment sector (ISIC codes 17-19). The key variables I extract from the data are number of workers (defined as the sum of employees on permanent and temporary contracts), total sales, total labor costs (including wages, payroll taxes, benefit payments, etc.), total cost of materials (the cost of physical inputs in production), and total value of physical capital. I measure productivity as sales per worker. Further, I calculate a measure of values added that takes into account rental payments for capital and land. All figures are converted to 2010 USD by using exchange rates from the relevant year and US CPI data.² I use sampling weights to compute averages representative of the underlying population.³ Missing data is not common, with a few exceptions – in particular for material costs. All variables are truncated at the 95th percentile of the country-specific distribution. I report all key descriptives in Tables A.1-A.5.

I also use data from two other sources to complement the analysis. First, I use original survey data collected for manufacturing firms in Addis Ababa by Abebe et al. (2017) to check the robustness of the sales figures reported for Ethiopia. Second, I use data from the *World Management Survey* to compare the quality of management across the countries in my sample (with the exception of Bangladesh, which is not included in the *World Management Survey*). This survey studies management practices in manufacturing firms in 34 countries.⁴ Firm managers are asked to describe several management practices in the firms over a phone interview and are then scored by a trained enumerator. The instrument produces an overall management score, as well as specific scores for the quality of operations management, monitoring of performance, target setting, and HR practices (including recruitment and retention strategies).

²I used exchange rate data from the World Bank, which is available here <https://data.worldbank.org/indicator/PA.NUS.FCRF?locations=ET>. For each country, I use the exchange rate for the year prior to the date when the survey was released to the public (e.g. for Ethiopia, I use the 2014 exchange rate). The CPI data is available here <https://www.measuringworth.com/datasets/usdpi/>.

³The World Bank Enterprise Survey offers three types of weights. I use the recommended median weights.

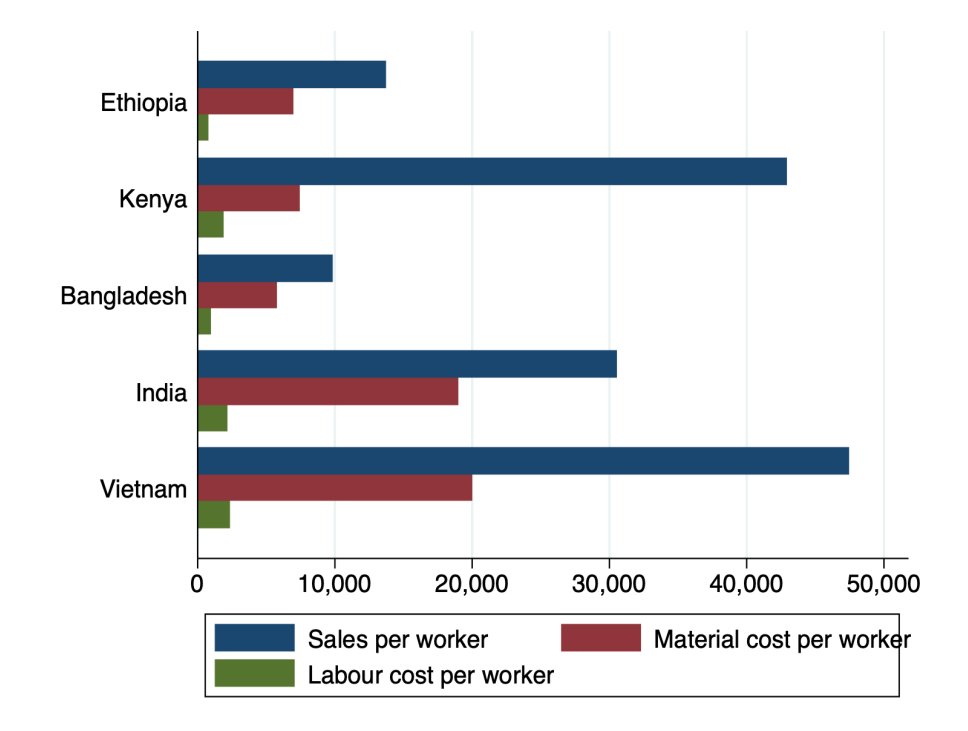
⁴I use the 2004-14 combined manufacturing survey data available here: <https://worldmanagementsurvey.org>

3 A comparison of productivity and labor costs

Fact 1. Ethiopia and Bangladesh have the lowest productivity in the sample. The average Indian firm is twice as productive as the average Ethiopian firm.

Manufacturing firms in Ethiopia have relatively low levels of productivity. The data confirms a large productivity gap with Vietnam and India, and, surprisingly, also with Kenya. The average Ethiopian firm sells 14,180 USD worth of output per worker per year. This is about half of the sales per worker of the average firm in India (30,875 USD) and Vietnam (48,755 USD). The difference with Kenya, where the average firm sells 46,420 USD of output per year, is also striking. If we restrict attention to the garment sector, we find similar differences (e.g. sales per worker are close to 7350 USD in Ethiopia and to 26,400 USD in India). However, the data also shows that Ethiopian firms have very similar productivity to those of a key competitor — Bangladesh. Average productivity in the whole manufacturing sector is 40 percent higher (14,180 USD against 10,055 USD of sales per worker per year). In the garment sector, productivity in Ethiopia is about 16 percent lower (7,700 USD against 9,200 USD). This is a surprising finding, as Bangladesh has a larger, more established manufacturing industry. We report these findings in Figures 1 and A.1.

Figure 1: Average sales per worker and costs per worker
All manufacturing



The productivity gap highlighted above occurs mostly at the top of the distribution. In Figures A.4 and A.5 we plot the differences in sales per worker between Ethiopia and each competitor country at five different percentiles. Differences tend to be small up to the median firm. However, at the 75th and 90th percentiles of the distribution, we observe a large productivity gap. Thus, what is distinctive about Ethiopia is the lack of high productivity firms.

Fact 2. *Ethiopia has the lowest labor costs in the sample, but faces intermediate material input costs.*

Manufacturing firms in Ethiopia also face low labor costs. This confirms a wide perception that abundant labor and competitive wages can help Ethiopia expand its manufacturing sector. Monthly labor costs per worker are about 69 USD in Ethiopia, 79 USD in Bangladesh, 175 USD in Kenya, 180 USD in India, and 201 USD in Vietnam. In the garment sector, the differences are even more striking: average labor costs in Bangladesh and India are 20 percent and 128 percent higher than in Ethiopia, respectively.

On the other hand, Ethiopian firms are in the middle of the distribution in terms of the cost they pay to source inputs of production. This is not surprising, given that Ethiopia is the only land-locked country in the sample, with limited options to access the sea. Further, material costs may also reflect the mix of sectors of the economy. If I restrict attention to the garment sector, for example, I find that material costs are higher than neighbouring Kenya, but lower than Bangladesh (India and Vietnam have much higher material costs, probably due to specialisation in higher quality garment).

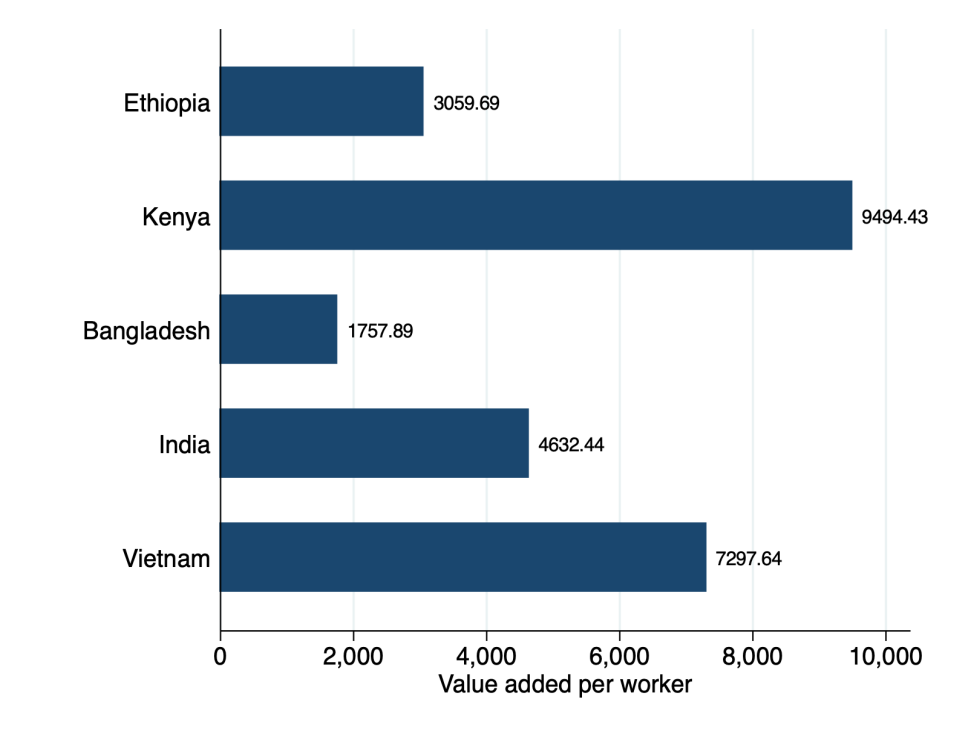
Fact 3. *The value added of Ethiopian firms is above that of Bangladesh, but below India, Kenya and Vietnam.*

Overall, low labor costs cannot fully compensate for low productivity. As a result, Ethiopian firms are among the least profitable (in terms of value added per worker) in our sample (Figure 2 and A.6). However, value added per worker in Ethiopia is actually relatively close to those of the next most profitable country – Bangladesh. If we look at the whole manufacturing sector, value added per worker is higher than in Bangladesh. If we focus on the garment sector, then we find that the profitability of Ethiopian firms is just below that of firms in Bangladesh.

There are three important caveats related the value added data I have just presented. First, the large number of missing values in the material costs variable means that I am working with a selected sample. Second, the surveys for Ethiopia and Vietnam do not record data on rental payments for land or capital. I impute these payments by using

predicted values from a model that regresses rents on capital, capital square, and firm size. Third, it is important to state that all figures are before tax, and that taxation regimes may differ across countries. The data on value added per worker should thus be interpreted with caution.

Figure 2: Median value added per worker
All manufacturing



Fact 4. *Ethiopian garment firms have substantially improved their competitiveness (in terms of relative sales per worker and cost per worker) with respect to Bangladeshi garment firms over a period of 10 years.*

The final result in this section is related to the trends in productivity and cost of labour. For this, I assembled WBES surveys from 2005 to 2007 for all countries but Vietnam.⁵ I show average sales and cost per worker in Figure A.2 and Table A.6. In Figure A.3 I plot the average annual change in these variables. This figure shows that both Ethiopia and Bangladesh have witnessed a fast growth in productivity (about 14 percent per year). However, the annual growth in labour costs in Ethiopia has been

⁵I use the 2005 survey for India, the 2006 survey for Ethiopia, the 2007 surveys for Kenya and Bangladesh. I focus on the garment sector and report sample sizes and statistics on missing data points in table A.3. I convert all values to 2010 USD, as described in the section above. The Ethiopian dataset does not include sampling weight, so the results presented for all countries are not reweighted.

about half of that of Bangladesh (7 percent versus 15 percent). While this highlights the growing attractiveness of Ethiopia as an investment destination, it may also highlight that Ethiopian employers in this sector have higher monopsony power compared to their counterparts in Bangladesh.

3.1 Robustness to use of alternative data sources

The productivity figure used for Ethiopia are consistent with those obtained by an independent survey run in Addis Ababa at a similar point in time for the study of [Abebe et al. \(2017\)](#). I show this by comparing the distribution of sales for worker in the two surveys in [Figure A.7](#) and by showing means and medians in [Table A.7](#). Average sale for workers in Addis Ababa is remarkably similar across the two surveys (22,708 USD and 22,462 USD). Median sales are somewhat higher in the survey of [Abebe et al. \(2017\)](#), but the difference is not excessively large.

Finally, the figures reported in the previous section align well with the perception of foreign firm managers. I have carried out qualitative field in the Hawassa Industrial Park at several points during 2018. During these visits I had several personal conversations with firm managers about productivity and labor management. On average, firm managers believed that productivity in Ethiopia's garment factories is between a third and a half of that of comparable factories producing similar products in India; and that wage costs are about one third of those in India. These figures confirm the aggregate statistics reported in [Figure A.1](#).

4 Where does Ethiopia's low productivity come from?

Fact 5. *Capital stock, firm size and sectoral composition do not explain the low productivity of Ethiopian firms.*

To study the factors that determine the low productivity of manufacturing firms in Ethiopia we run a regression model where we regress sales per worker on firm size, sector, and value of the capital stock. Specifically, we create dummies for quartiles of firm size and capital stock. We then create dummies for each sector and introduce them in the model on their own, and interacted with the dummies for firm size and capital stock. We compute the residual productivity for this regression model, and standardise this value using the average and standard deviation of the residual productivity for firms in Vietnam. We present the result of this exercise in [Figures 3](#) and [A.8](#).

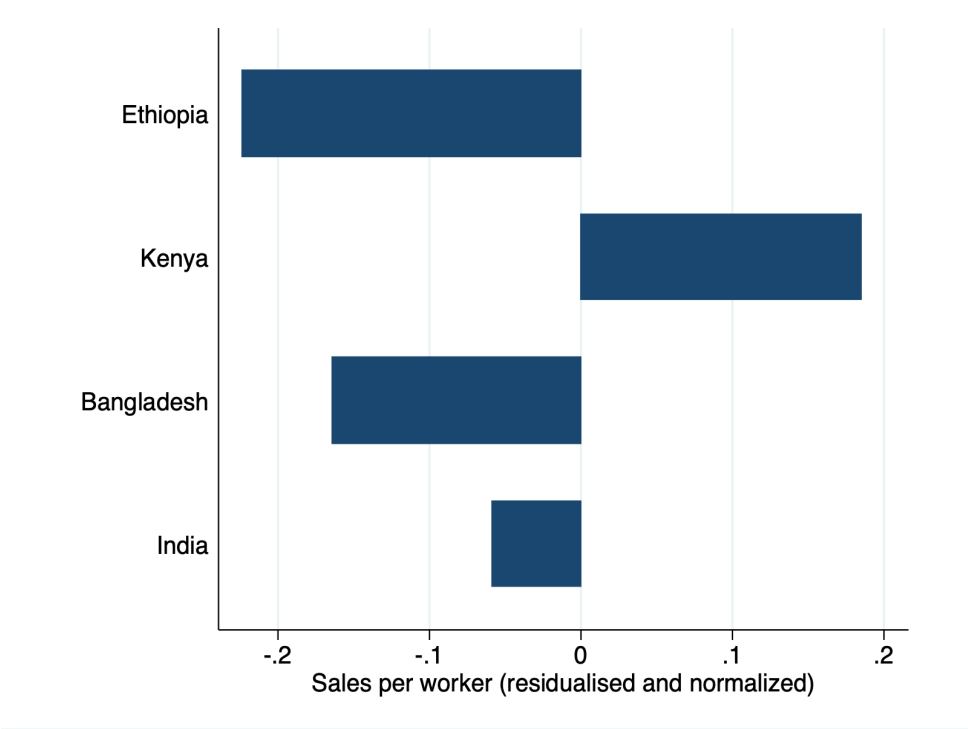
The main conclusion from this analysis, is that, after accounting for size, sector, and capital, Ethiopian firms are still less productive than firms in competitor countries. In

particular, average residual productivity is about .22 standard deviation below Vietnam. By comparison, Bangladesh has residual productivity that is about .18 standard deviations below Vietnam and India is about .08 standard deviations below Vietnam. A similar picture emerges if we look at the garment sector.

This is consistent with the fact Ethiopian firms do not appear to be exceptionally small or to operate much less physical capital compared to the other countries in the sample (Figures A.9 and A.10). For example, on average Ethiopian firms appear to use more physical capital than firms in India or Bangladesh. Ethiopian garment firms are smaller than those in Bangladesh (which are exceptionally large), but have a similar size to those in India and Kenya.

Capital, firm size and sector also do not explain the lack of high productivity firms. To show this, we regress a dummy for being a high productivity firm (ie a firm with sales per worker above 20,000 USD) on capital, firm size, sector dummies and the interactions described above. We calculate the residual probability of having a high productivity firm and normalise it by subtracting the average residual probability of Vietnam. We find that after accounting for the influence of these variables, Ethiopia still has an unusually low share of high productivity firms: 30 percentage points fewer than Vietnam and 10 percentage points fewer than Bangladesh (Figures A.11 and A.12).

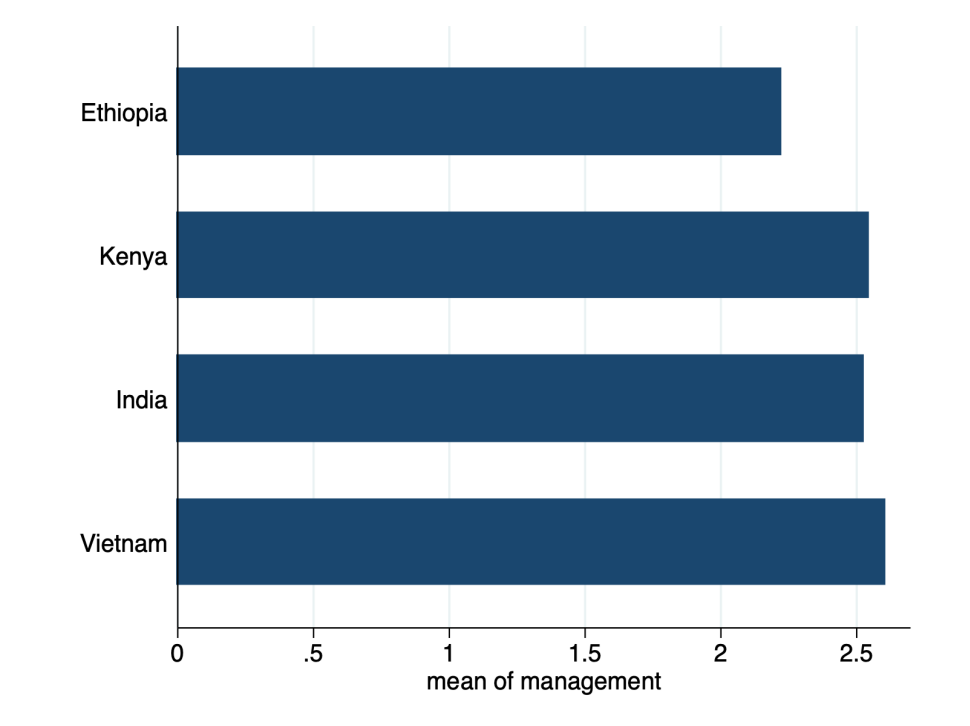
Figure 3: Sales per worker controlling for sector, size, and capital
All manufacturing



Fact 6. Management scores in Ethiopia are lower than in competitor countries, particularly in the area of labor management.

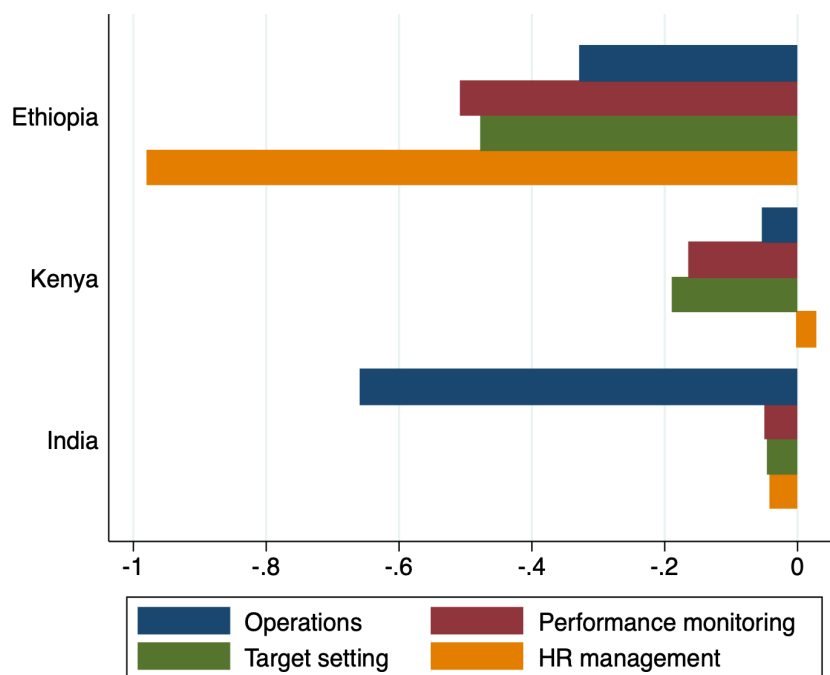
What could explain the residual difference in productivity? The recent literature has emphasised the role of good management in determining productivity (Bloom et al., 2013, 2018). However, the World Bank Enterprise Survey does not have enough information to measure management practices. We thus turn to the World Management Survey. Using this dataset, we are able to document two facts. First, Ethiopian firms have worse management compared to India, Kenya and Vietnam. Second, the main driver of the low management scores is poor HR practices. Ethiopian firms scores below Vietnamese firms on all dimension of management (operations, monitoring, targets, and HR). However, the gap in HR practices is about twice as large as the gap in the other three dimensions of good management (almost one standard deviation versus .5 of a standard deviation). We document these results in Figures 4 and 5.

Figure 4: Management scores



Labor management consists of a host of practices including recruitment policies, performance incentives and retention strategies (Oyer and Schaefer, 2010; Bandiera et al., 2011). In Figure A.13 we show that Ethiopian firms perform poorly in terms of their strategies to identify and retain high performers within the organisation, and to deal with poor performers. This is consistent with the fact that, in a survey of HR managers, Abebe et al. (2017) show that the two most pressing HR problems reported are

Figure 5: Dimensions of management performance (compared to Vietnam)



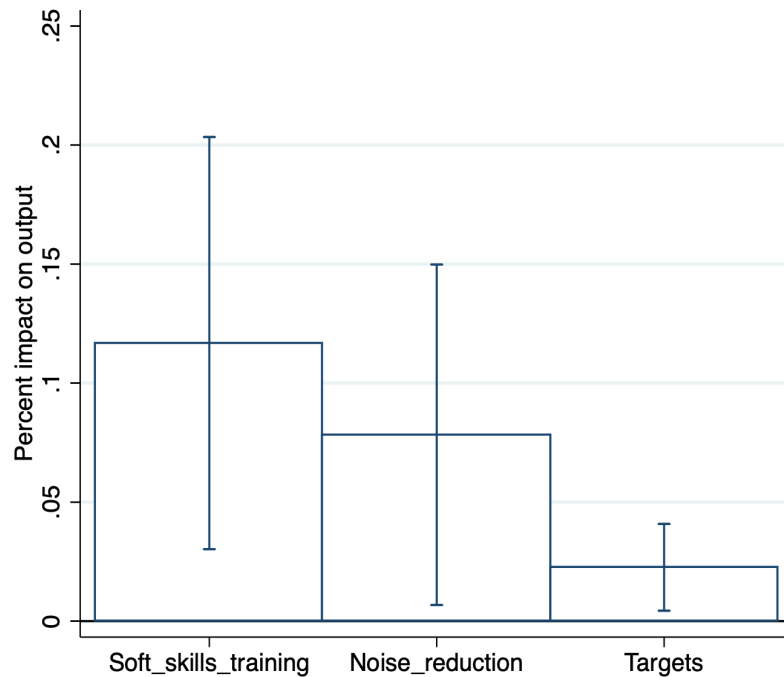
worker selection and retention. Further, [Blattman and Dercon \(2017\)](#) document high rates of turnover in a sample of Ethiopian factories.

5 Possible labor management interventions

The recent experimental literature in development economics confirms that labor interventions can increase firm productivity. For example, [\(Adhvaryu et al., 2018\)](#) evaluate the effects of soft skills training on the productivity of garment workers in India; [\(Kaur et al., 2015\)](#) study the effect of policy where Indian data entry workers can choose their own targets; [\(Dean, 2018\)](#) measures the effect of changes in background noise. We present the estimates from these studies in Figure 6. Treatment effects on output per worker range from less than 1 percent (for the target intervention, which, however had a 9 percent treatment effect on a subgroup of workers with self-control problems) to about 13 percent (for soft skills training). The soft skills intervention costed about 90 USD per worker, but generated much larger benefits over time. The estimated net rate of return for the firm was 256%.

The literature in this area, however, is still limited. In particular, we know little about how workers can be retained by private firms. In the context of government and non-profit institutions, [Deserranno \(2014\)](#) and [Ashraf et al. \(2014\)](#) show that information about the nature of the job enables organisations to attract workers that are retained for

Figure 6: Treatment effects on output from recent studies



longer. However, we have no evidence on whether these findings generalise to private sector firms.

6 Conclusion

In this paper, I assess the competitiveness of the Ethiopian manufacturing sector relative to other manufacturing exporters. I document that, in a comparison with Kenya, India or Vietnam, the labor cost advantage of Ethiopian firms is more than offset by low productivity. However, Ethiopia appears competitive when compared to Bangladesh.

The prospects for further industrialisation in Ethiopia seem to critically depend on achieving higher productivity. Poor management, particularly in the area of labor, is a key factor that may be holding Ethiopian firms back. The evidence on how labor management can be improved, however, is scarce. To develop this evidence, we need systematic experimentation with different interventions targeting how workers are selected, trained, incentivised, and retained.

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Appendix

A.1 Figures

Figure A.1: Average sales per worker and cost per worker
Garment sector

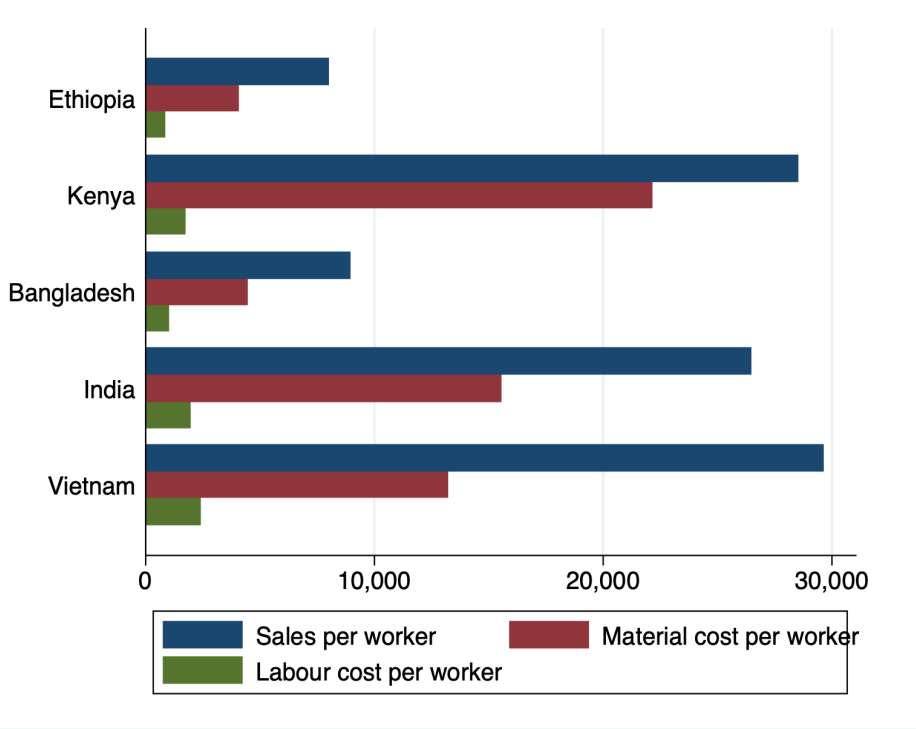


Figure A.2: Average sales per worker and cost per worker
Garment sector: mid 2000s

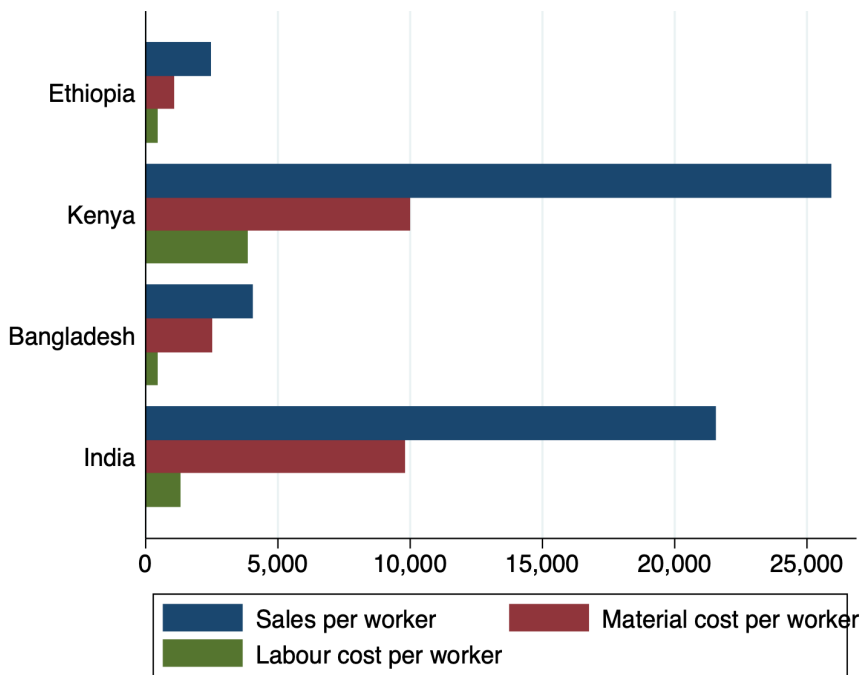


Figure A.3: Change in average sales per worker and cost per worker between two waves

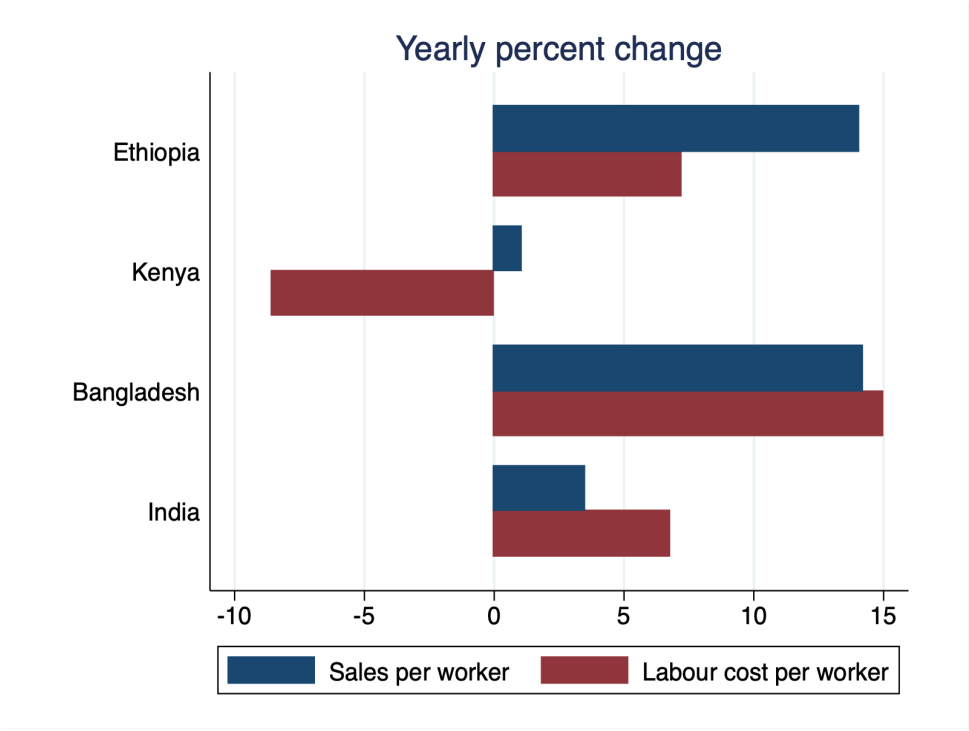


Figure A.4: Differences in sales per worker across the distribution
All manufacturing

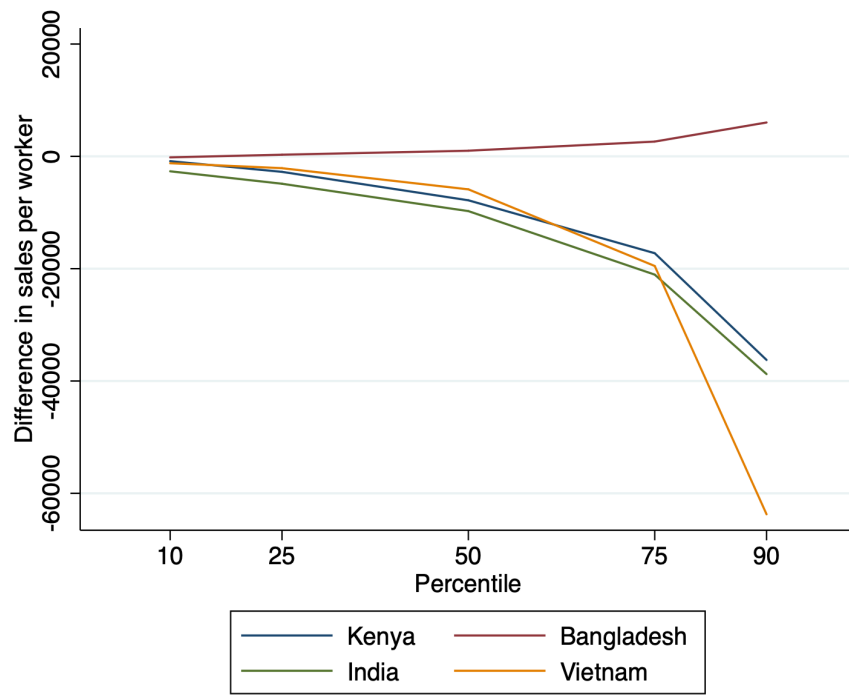


Figure A.5: Differences in sales per worker across the distribution
Garment sector

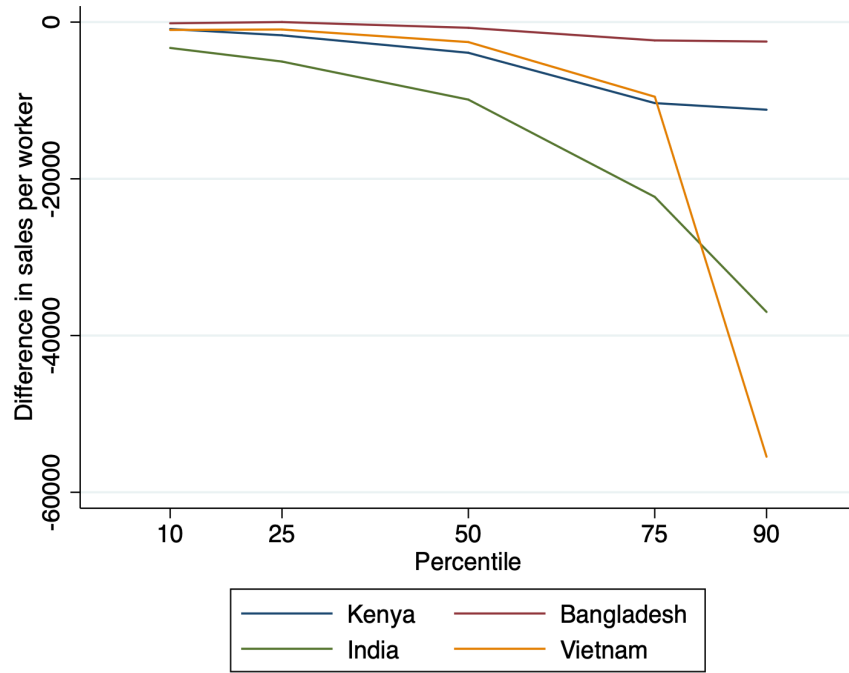


Figure A.6: Median value added per worker
Garment sector

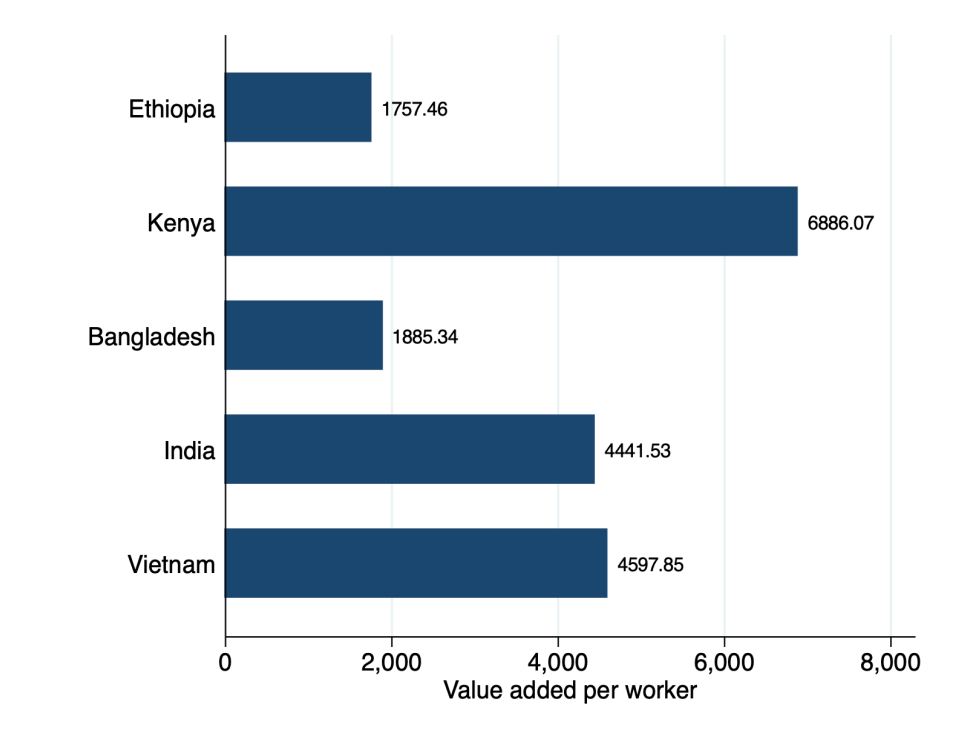


Figure A.7: Comparison of data from two surveys

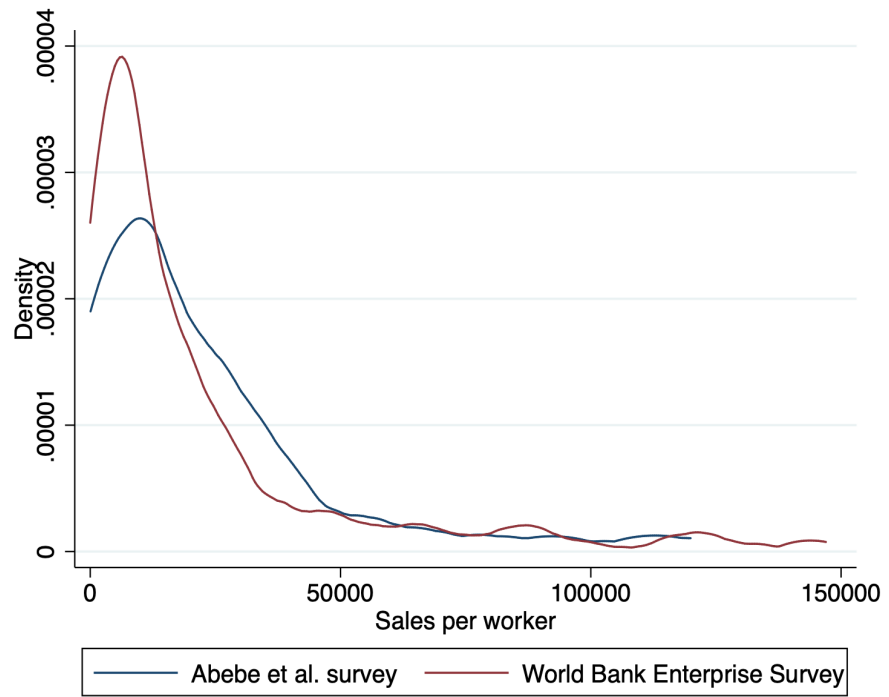


Figure A.8: Sales per worker controlling for sector, size, and capital
Garment sector

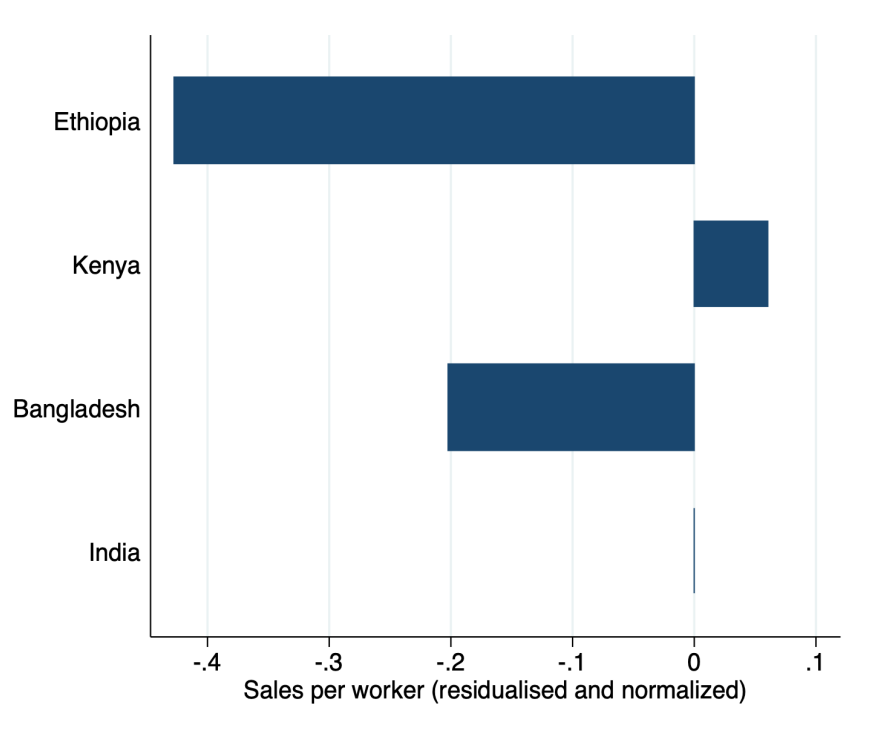


Figure A.9: Firm size and capital stock
All manufacturing

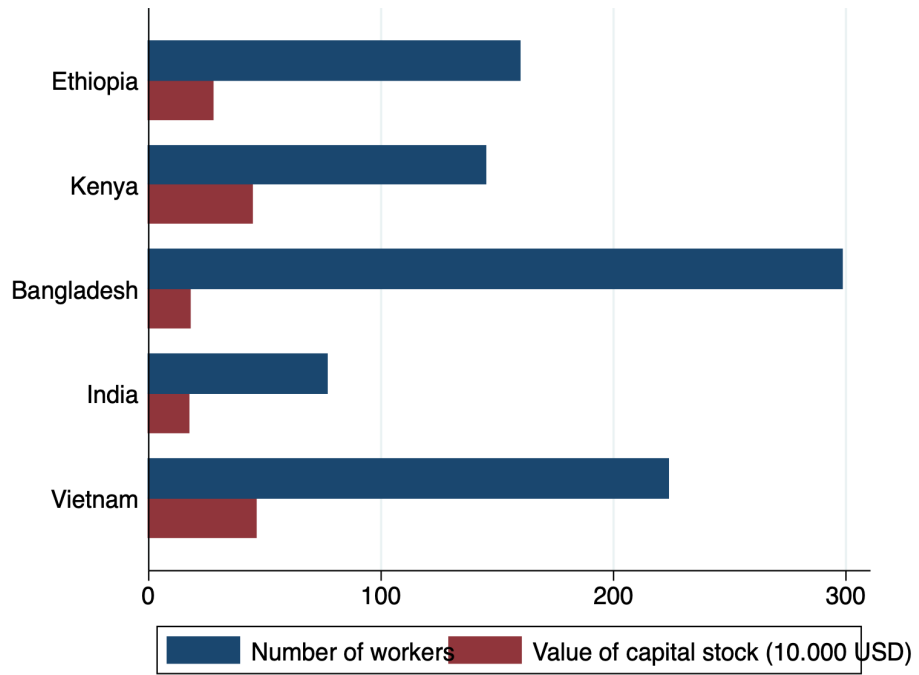


Figure A.10: Firm size and capital stock
Garment sector

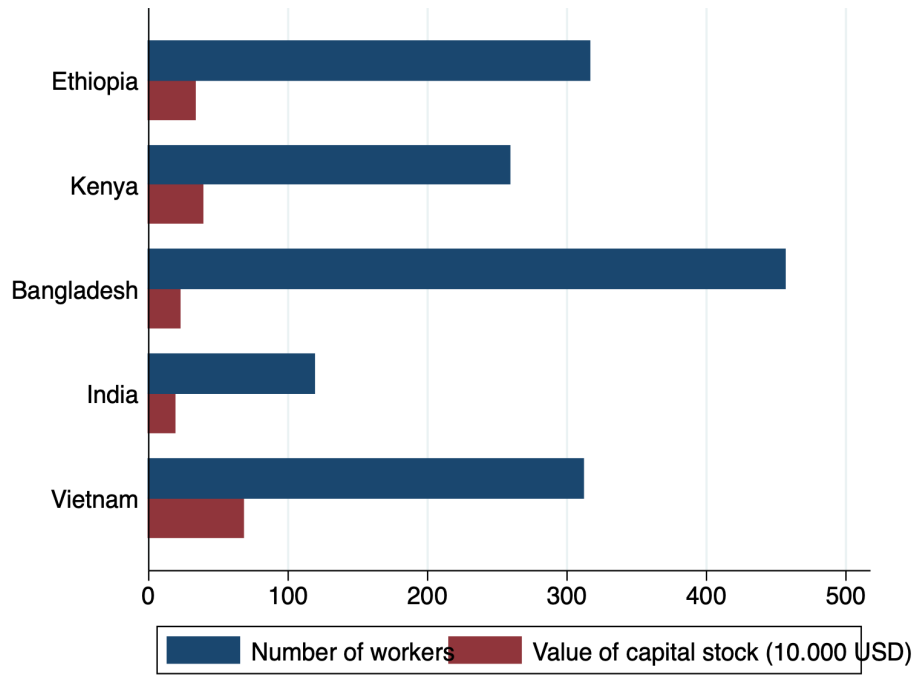


Figure A.11: High productivity firms controlling for sector, size, and capital
All manufacturing

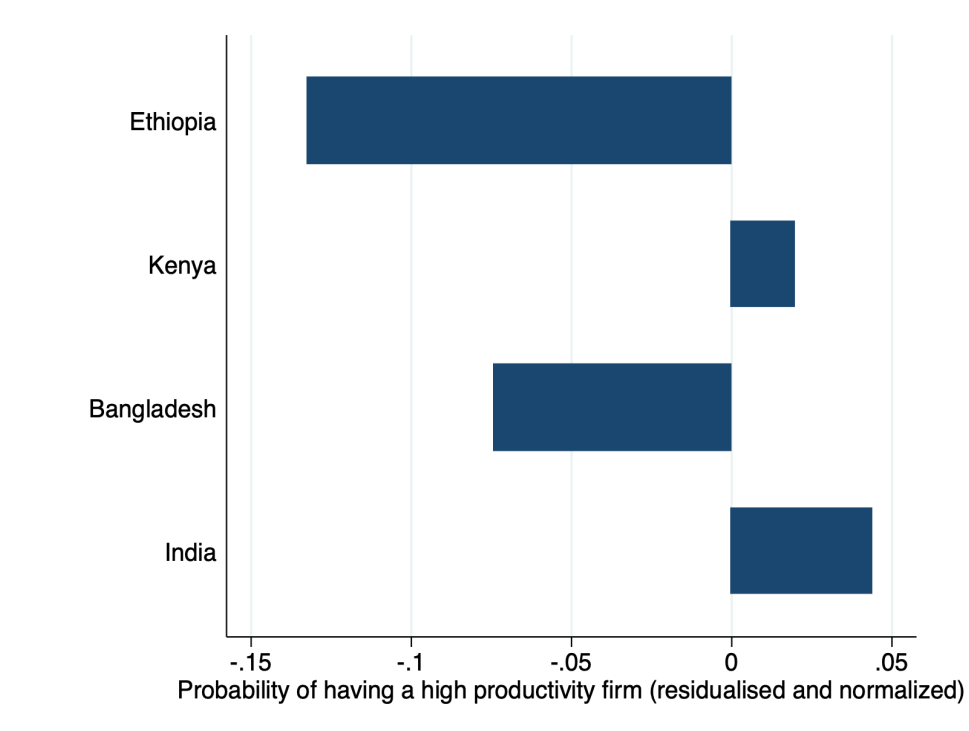


Figure A.12: High productivity firms controlling for sector, size, and capital
Garment sector

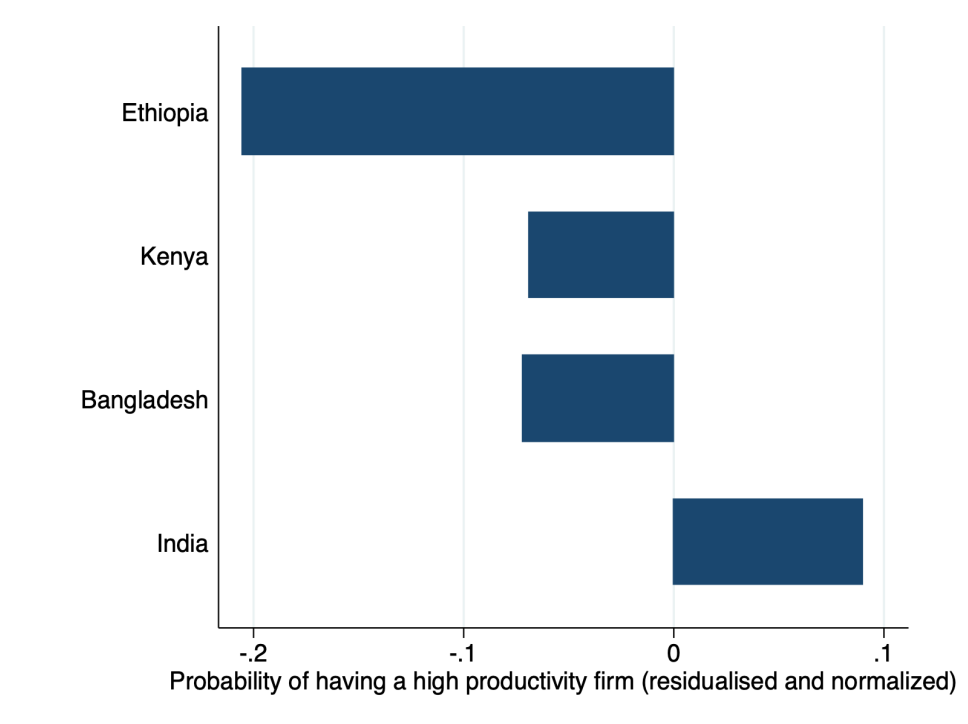
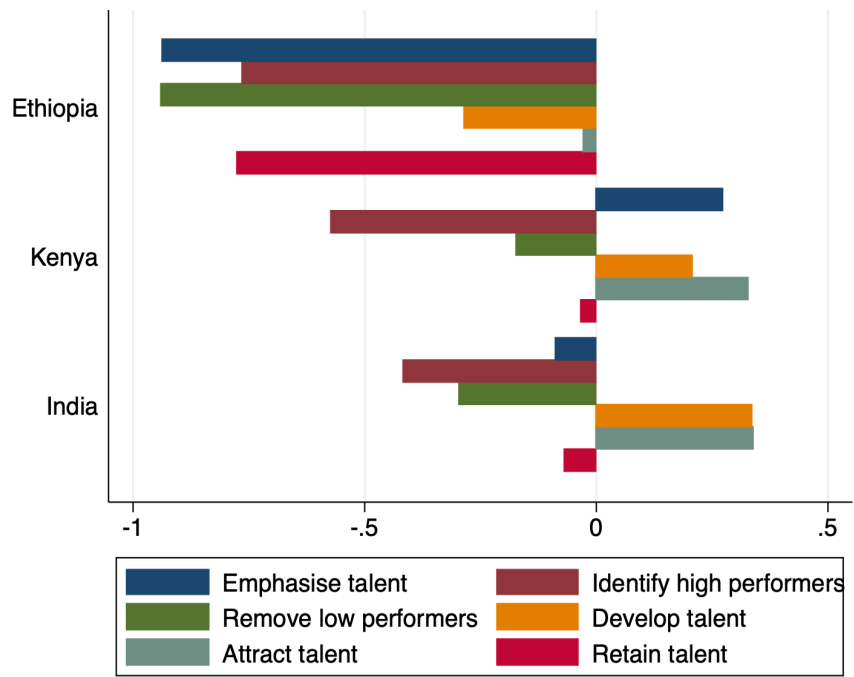


Figure A.13: Quality of HR practices (compared to Vietnam)



A.2 Tables

Table A.1: Sample size and missing data
All manufacturing

	Sample size (no.)	Missing data (%)			
		Worker no.	Sales	Labor costs	Material costs
	(1)	(2)	(3)	(4)	(5)
Ethiopia	383	0.01	0.09	0.08	0.17
Kenya	414	0.02	0.12	0.19	0.28
Bangladesh	1179	0.00	0.03	0.02	0.04
India	7163	0.00	0.02	0.04	0.06
Vietnam	694	0.00	0.01	0.09	0.20

Table A.2: Sample size and missing data
Garment sector

	Sample size (no.)	Missing data (%)			
		Worker no.	Sales	Labor costs	Material costs
	(1)	(2)	(3)	(4)	(5)
Ethiopia	70	0.00	0.04	0.09	0.17
Kenya	58	0.03	0.09	0.21	0.21
Bangladesh	467	0.00	0.01	0.01	0.03
India	912	0.00	0.04	0.06	0.08
Vietnam	178	0.01	0.01	0.09	0.22

Table A.3: Sample size and missing data
Garment sector: mid 2000s

	Sample size (no.)	Missing data (%)			
		Worker no.	Sales	Labor costs	Material costs
	(1)	(2)	(3)	(4)	(5)
Ethiopia	105	0.00	0.00	0.00	0.09
Kenya	29	0.00	0.00	0.00	0.00
Bangladesh	296	0.00	0.00	0.00	0.00
India	275	0.07	0.07	0.08	0.08

Table A.4: Descriptives
All manufacturing

	Mean	St.Dev.	Percentiles				
			10th	25th	50th	75th	90th
Ethiopia							
Number of workers	159.94	1060.41	7.00	17.00	52.00	140.00	341.00
Sales per worker	13725.23	17110.34	1175.71	2588.93	6206.52	14093.96	31165.12
Labor costs per worker	805.51	696.94	130.23	268.73	699.03	1128.68	1626.67
Material costs per worker	6950.81	10821.35	376.23	940.56	2565.18	7683.99	17566.12
Physical capital per worker	2851.29	7127.28	2.99	331.90	1508.20	3846.36	7901.64
Kenya							
Number of workers	145.01	593.51	10.00	18.00	45.00	140.00	356.00
Sales per worker	42960.24	1.2e+05	2028.72	5373.74	14045.01	31326.89	67416.06
Labor costs per worker	1927.80	2790.24	140.45	325.75	1123.60	2331.72	5185.85
Material costs per worker	7485.05	36595.53	97.08	421.35	1797.76	5618.01	15730.42
Physical capital per worker	4809.24	9662.65	51.07	449.44	2247.20	6741.61	14045.01
Bangladesh							
Number of workers	298.78	734.57	9.00	19.00	40.00	224.00	650.00
Sales per worker	9858.11	37717.17	1353.57	2320.41	5220.93	11447.37	25137.81
Labor costs per worker	925.90	1115.29	174.03	464.08	756.66	1044.19	1546.94
Material costs per worker	5751.81	35400.55	232.04	725.13	2320.41	5801.03	13535.75
Physical capital per worker	1804.03	4612.95	77.35	232.04	773.47	2417.10	5801.03
India							
Number of workers	76.78	310.97	10.00	18.00	40.00	100.00	250.00
Sales per worker	30508.62	51232.20	3833.74	7487.78	15973.93	35142.65	69930.34
Labor costs per worker	2139.47	3586.33	492.85	958.44	1597.39	2475.96	4312.96
Material costs per worker	19032.04	34671.05	1448.30	3194.79	8519.43	20446.63	44727.01
Physical capital per worker	4100.20	6874.08	239.61	745.45	2007.83	4792.18	9983.71
Vietnam							
Number of workers	224.12	1049.23	13.00	22.00	56.00	150.00	400.00
Sales per worker	47482.83	57533.16	2395.72	4718.85	12099.61	33602.33	94895.48
Labor costs per worker	2384.72	2011.57	301.56	871.17	1742.34	2756.33	4188.32
Material costs per worker	20003.75	32481.13	194.40	871.17	3555.80	13938.74	43558.58
Physical capital per worker	6038.23	9550.89	164.37	622.27	2177.93	5782.11	13814.29

Table A.5: Descriptives
Garment sector

	Mean	St.Dev.	Percentiles				
			10th	25th	50th	75th	90th
Ethiopia							
Number of workers	316.74	963.66	6.00	14.00	69.00	272.00	783.00
Sales per worker	8026.21	10939.86	1175.71	2653.31	5023.56	9936.79	21583.00
Labor costs per worker	874.96	626.31	157.50	453.25	750.42	1080.31	1626.74
Material costs per worker	4065.42	5302.97	352.71	817.98	2137.65	5206.70	13781.62
Physical capital per worker	2251.48	4141.68	0.00	124.14	1149.25	3630.86	5681.37
Kenya							
Number of workers	259.74	815.35	12.00	25.00	68.00	168.00	500.00
Sales per worker	28544.99	83634.90	1940.08	4369.56	8863.96	19975.13	44471.86
Labor costs per worker	1724.27	2042.17	123.60	224.72	1123.60	2496.89	3606.62
Material costs per worker	22135.72	87844.56	157.30	468.17	1123.60	3862.38	6938.19
Physical capital per worker	3636.56	5857.69	86.43	290.89	1726.47	5477.56	9987.57
Bangladesh							
Number of workers	456.90	1005.04	14.00	24.00	115.00	450.00	1050.00
Sales per worker	8978.94	15905.52	1325.95	2677.40	5801.03	11976.33	24063.55
Labor costs per worker	1030.42	1281.02	135.36	556.90	835.35	1160.21	1740.31
Material costs per worker	4459.05	10591.25	283.15	966.84	2747.09	5994.40	12709.54
Physical capital per worker	1420.82	3909.78	79.11	248.62	709.67	2578.24	5273.67
India							
Number of workers	119.52	579.60	14.50	26.00	60.00	167.00	427.50
Sales per worker	26481.62	35929.71	4472.70	7720.73	14912.53	31947.87	58571.09
Labor costs per worker	1955.41	2879.70	588.51	1037.86	1536.67	2236.35	3422.99
Material costs per worker	15559.22	25555.54	1464.28	3288.75	7768.55	17838.43	37012.77
Physical capital per worker	3275.27	5432.36	159.74	501.66	1597.39	3993.48	8407.33
Vietnam							
Number of workers	312.48	1120.31	15.00	30.00	90.00	250.00	800.00
Sales per worker	29667.93	42984.62	2177.93	3629.88	7599.08	19165.78	77044.23
Labor costs per worker	2437.67	2647.62	241.59	614.85	1718.29	2480.55	3798.07
Material costs per worker	13206.43	23576.74	114.63	435.59	3097.50	9333.98	40207.92
Physical capital per worker	3791.38	6836.35	65.50	248.91	1028.94	2903.91	6556.47

Table A.6: Descriptives
Garment sector: mid 2000s

	Mean	St.Dev.	Percentiles				
			10th	25th	50th	75th	90th
Ethiopia							
Number of workers	110.70	364.62	5.00	7.00	11.00	50.00	200.00
Sales per worker	2452.07	3069.46	389.42	856.68	1522.12	2760.31	4831.53
Labor costs per worker	467.84	448.25	89.32	193.26	397.57	618.44	821.36
Material costs per worker	1060.75	1575.87	100.21	225.47	445.79	1380.44	2576.81
Kenya							
Number of workers	152.17	313.28	10.00	13.00	80.00	150.00	350.00
Sales per worker	25943.92	35994.88	5000.61	8673.37	12858.71	30003.66	44123.02
Labor costs per worker	3857.40	4597.00	750.09	1393.70	2474.30	4552.53	8182.82
Material costs per worker	10016.56	15697.87	1750.21	2500.30	3475.25	9478.43	23574.30
Bangladesh							
Number of workers	606.57	714.68	110.00	250.00	400.00	650.00	1350.00
Sales per worker	4042.69	3403.03	871.74	1824.57	3303.43	5579.12	7398.13
Labor costs per worker	445.87	195.13	203.99	313.83	441.60	564.89	696.07
Material costs per worker	2511.09	2398.83	222.76	792.72	1824.44	3536.07	5265.37
India							
Number of workers	68.91	116.49	5.00	9.50	28.00	92.50	145.00
Sales per worker	21534.18	89165.36	1401.05	3056.85	8253.49	16035.27	22044.57
Labor costs per worker	1320.87	3522.43	185.83	509.47	1017.13	1264.13	1728.14
Material costs per worker	9823.08	21307.47	407.58	1557.15	4275.95	9486.60	14710.10

Table A.7: Comparison of data from two surveys
All manufacturing, Addis Ababa

	Sample size	Mean	Median
	(1)	(2)	(3)
Abebe et al. survey	90	22708.90	14874.57
World Bank Manufacturing Survey	393	22462.02	11029.03