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CAN AFRICA COMPETE WITH CHINA IN MANUFACTURING?
The Role of Relative Unit Labor Costs

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Abstract:
In this paper we examine Sub-Saharan Africa's (SSA) bilateral trade and cost competitiveness with China. We review patterns of bilateral trade between SSA and China, showing an extraordinary imbalance in the structure of trade, in that China overwhelmingly exports manufactured products to SSA and almost exclusively imports primary products in return. Our principal means of assessing the competitiveness of SSA's manufacturing sector, vis-à-vis China, are measures of relative unit labor costs (RULC). We find that African RULC levels have generally been very high relative to China, but declined over the 2000s as China's wages have risen faster than Chinese productivity, while the reverse is true for the SSA countries in our sample. Nevertheless, RULC vis-à-vis China remained elevated for many SSA countries as of 2010. Generally high RULC along with weaknesses in the business climate suggest that most SSA countries are unlikely to be competitive in labor-intensive manufacturing any time soon.

Keywords: Sub-Saharan Africa, China, relative unit labor costs, trade, manufacturing

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CONTENTS

1. INTRODUCTION

Economic ties between China and Africa have intensified in recent years, with bilateral trade growing considerably faster than total trade for both parties, and booming Chinese foreign direct investment (FDI) in Africa. The effects of China's rising involvement in African economies are controversial. On the positive side, China's demand for African raw materials and its investments in African infrastructure have undoubtedly contributed to Africa's recent improved economic growth. On the other hand, trade with China does little to promote and may even inhibit African structural transformation, as booming exports of primary products exacerbate Africa's dependence on capital-intensive minerals and fuels, while China's exports of labor-intensive manufactures create strong headwinds for Africa's meagre industrial base and formal employment. Still, manufacturing wages in China have been rising quickly in recent years, potentially creating new opportunities for low-cost producers. This paper attempts to answer the question of whether African countries can develop labor-intensive manufacturing exports, taking advantage of rising wages in China.

In this paper we take a closer look at Africa's competitiveness in manufacturing, focusing on Sub-Saharan Africa's bilateral trade and cost competitiveness with China. Our principal means of assessing the competitiveness of Sub-Saharan Africa's manufacturing sector are measures of relative unit labor costs. We compare unit labor costs in SSA manufacturing to those in China. Because China is a dominant exporter of labor-intensive manufactures, our relative unit labor cost measures should be good gauges of SSA's cost competitiveness in the world market for manufactured goods. To our knowledge, our estimates are the first to evaluate Sub-Saharan Africa's manufacturing competitiveness with respect to China by comparing their unit labor costs.

Section II reviews trends in SSA-China trade and FDI, highlighting the imbalance in manufactured goods in China's favor. Section III develops the concept of relative unit labor costs (RULC) as a metric for assessing manufacturing competitiveness. RULC encompasses differences in real wage rates, labor productivity, and exchange rates into a single measure of international competitiveness. Section IV computes and analyzes RULC for selected SSA countries vis-à-vis China. Section V discusses the implications of the competitiveness analysis for expanding SSA exports of labor-intensive goods.

2. CHINA-AFRICA TRADE AND FDI IN MANUFACTURING

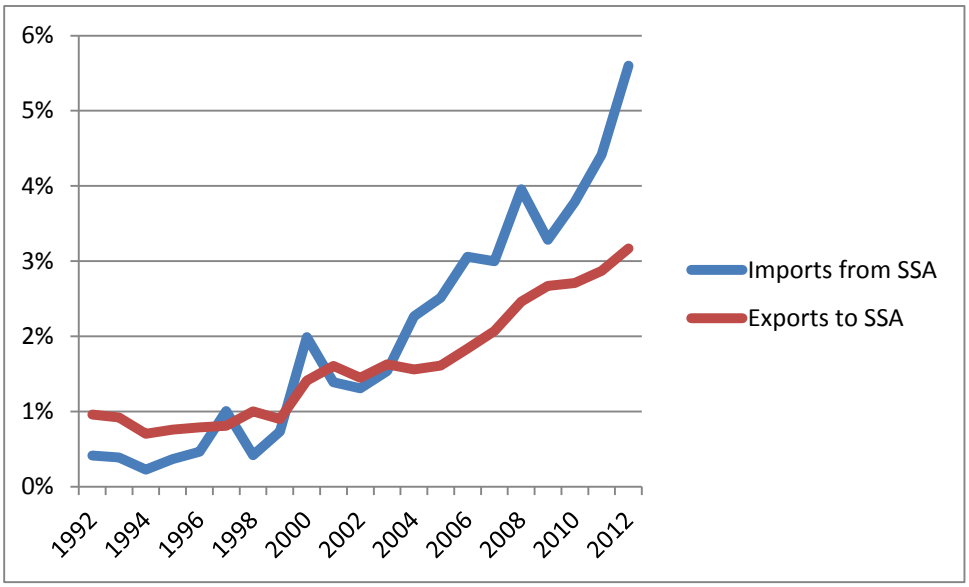
2.1 Overview

Trade and investment between China and SSA took off after the liberalization era in China, accelerating in the 2000s (Lyons and Brown, 2010; Ademola et al., 2009; Broadman, 2007; Sautman and Hairong, 2007; Li, 2005; and Zafar, 2007). Figures 1 and 2 illustrate the rapid growth of this bilateral trade from China's and SSA's perspectives, respectively.[1] Bilateral trade has grown faster for both China and SSA than their trade with the rest of the world, although it still remains quite small as a share of each economy's total trade. For China, trade with SSA has expanded from less than 1 percent of both exports and imports in the early 1990s to 3.2 percent of exports and 5.6 percent of imports in 2012. For SSA, trade with China has expanded even more strongly to 7.4 percent of its total exports and 12.9 percent of its total imports from about 1 percent each in the early 1990s. Thus, bilateral trade is more significant for SSA than China.

[1] There are very large discrepancies between the reported values for total bilateral trade for SSA and China in the UN Comtrade database. The Chinese data show much larger values for total bilateral trade than the data for SSA. They also indicate a trade surplus vis-à-vis SSA whereas the data for SSA indicate a bilateral trade deficit for China.

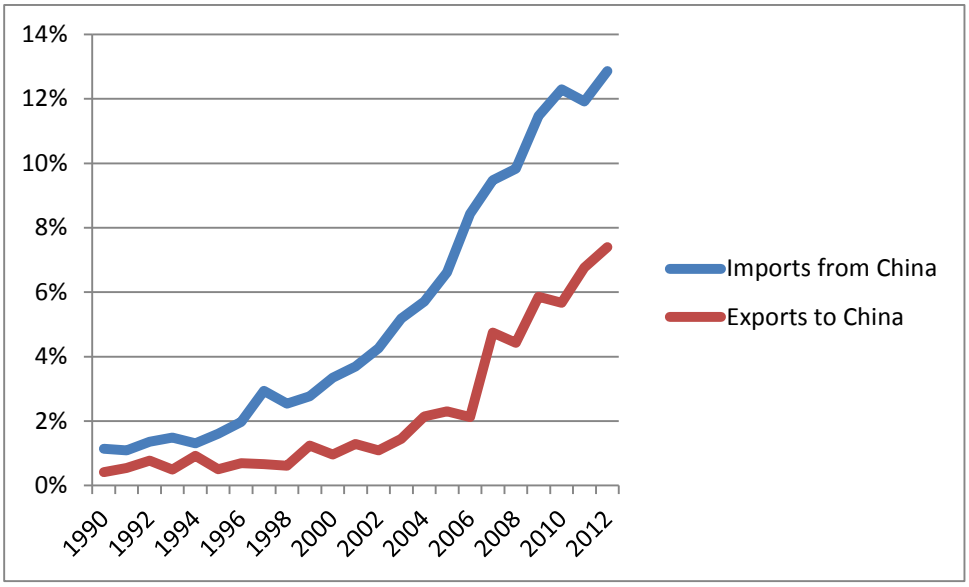
Chinese FDI in SSA has also increased rapidly. Data from the Heritage Foundation and American Enterprise Institute indicate it rose from $9 billion in 2006 to $29 billion in 2013. As Figure 3 shows, Chinese investment in Sub-Saharan Africa also became increasingly geographically diversified during this period.

Figure 1: China's Exports to and Imports from Sub-Saharan Africa (SSA) (Percent of China's Total Exports and Imports, Respectively)



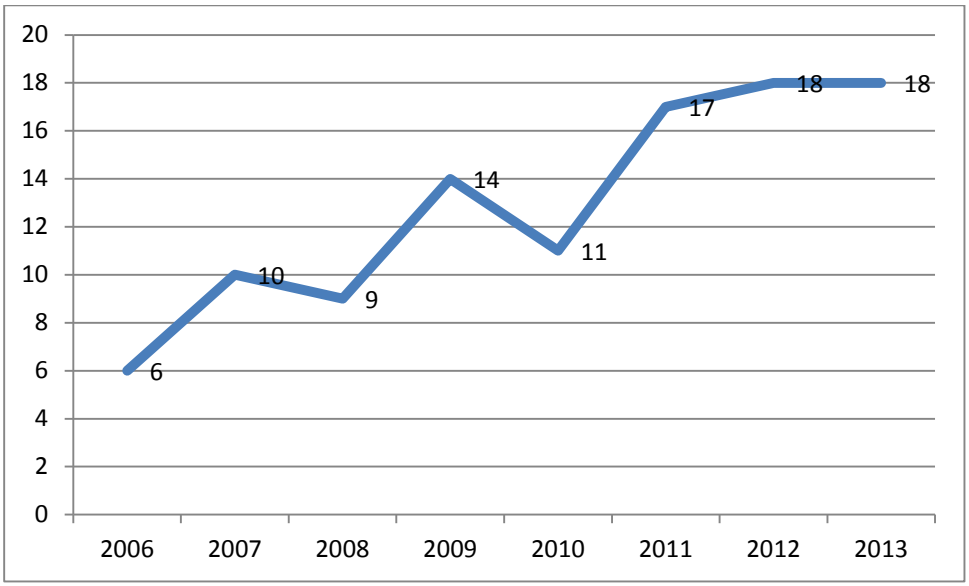
Source: authors' calculations using UN COMTRADE database

Figure 2: Sub-Saharan Africa (SSA) Exports to and Imports from China (Percent of SSA's Total Exports and Imports, Respectively)



Source: authors' calculations using UN COMTRADE database

Figure 3: Number of SSA Countries with new Chinese Foreign Direct Investment, 2006-2013



Source: authors' calculations using data from the Heritage Foundation

2.2 Sectoral Pattern of Trade and Investment

SSA's bilateral trade is characterized by large compositional differences between its exports to and imports from China. The bulk of Sub-Saharan Africa's exports to China are primary products and China's reliance on Africa as a source of natural resources, particularly oil, increased in the 2000s (Kaplinsky et al., 2007; Alden and Alves, 2009). In contrast, Chinese exports to Sub-Saharan Africa mainly consist of light manufactures including clothing, footwear and plastic products, and heavy machinery, such as transport equipment (Haugen, 2011). These compositional differences have geographic implications. While a few countries account for a significant share of SSA's exports to China, reflecting the dominance of oil and minerals in China's bilateral import, Chinese exports to the region are less geographically concentrated.[2]

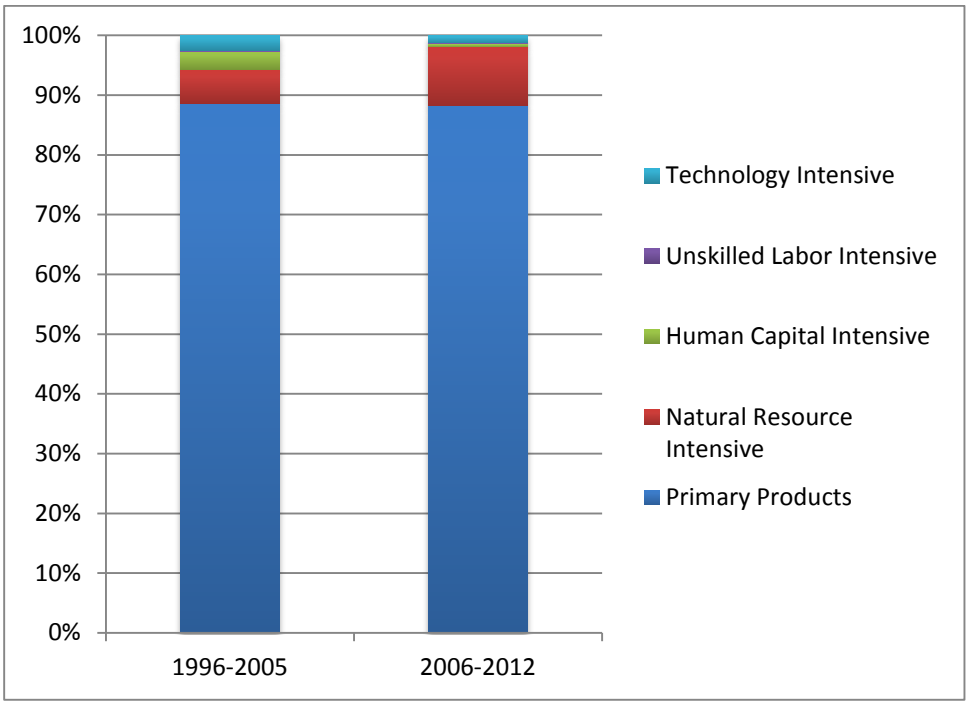
To gain greater insight into the nature of this bilateral trade, this section classifies trade flows between China and Sub-Saharan Africa using the International Trade Center's factor-intensity method (van Marrewijk and Hu, 2013; Maswana, 2011). Products are divided into five categories; primary products and four types of manufactured goods: natural resource-intensive products; unskilled labor-intensive products; human capital-intensive products; and technology-intensive products. The individual products comprising each category are shown in the Appendix.

Figures 4 and 5 depict the composition of bilateral trade between China and SSA as a whole by factor intensity for 1996-2005 and 2006-2012. SSA's bilateral exports consist overwhelmingly of primary products in both time periods (Figure 4). Moreover, the small share of manufactured exports has become increasingly concentrated in natural resource-intensive products, with the shares of technology-intensive and human capital-intensive products actually declining. Most significantly, SSA exports virtually no labor-intensive products to China. In contrast, SSA's imports from China are overwhelmingly manufactured goods, with a small and declining share of primary products (Figure 5). Reflecting China's rising sophistication in production, the shares of technology- and human capital-intensive products

[2] Angola accounted for almost half of China's total imports from SSA in 2012, up from 9 percent in 1992. South Africa is second, accounting for 21 percent of China's imports from the region in 2012.

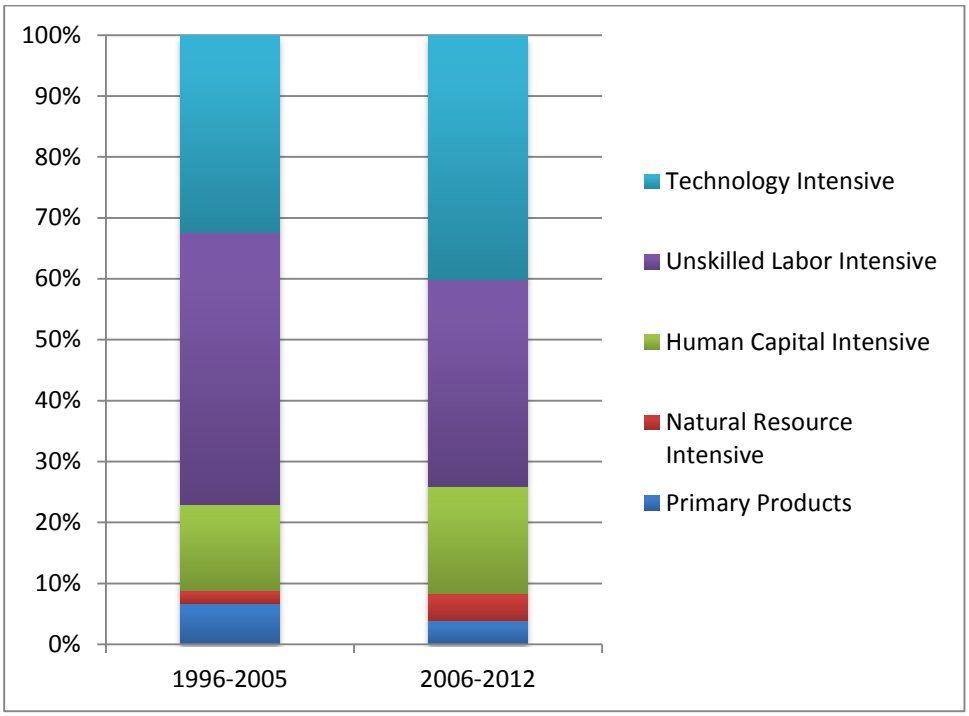
in China's exports to SSA have grown while those of unskilled-labor intensive products have declined.

Fig 4: Total Sub-Saharan Exports to China, by Sector



Source: authors' calculations using UN COMTRADE database.

Figure 5: Total Sub-Saharan Imports from China, by Sector



Source: authors' calculations using UN COMTRADE database.

Table 1 shows bilateral Chinese trade with selected SSA countries and SSA as a whole, with and without South Africa, by product categories, as a share of each respective country or group's total bilateral trade with China. For all countries except South Africa, primary products

account for the large majority of exports to China, with the share exceeding 90 percent in most cases and rising between 1999-2005 and 2006-2012 (Table 1a). Kenya is a notable exception; its share of primary products fell to 71 percent from 89 percent over the two periods. Even Mauritius, the most successful exporter of manufactures in SSA, exports only primary products to China. Most SSA countries import little in the way of primary products from China.

Table 1b reveals the large imbalance in labor-intensive goods. The share of labor-intensive goods in exports to China is negligible for all countries, and a mere 0.1 percent for SSA as a whole, with and without South Africa. In contrast, imports of unskilled labor-intensive products were large for all countries shown, accounting for about 45 percent of SSA's total imports from China in 1999-2005 and 32 percent in 2006-2012.[3] Tables 1c and 1d show the rising proportion of SSA's bilateral imports in the technology- and human capital-intensive categories, and the low and generally-declining shares of SSA exports to China in the same categories. South Africa experienced particularly large declines in both categories. Natural resource intensive products constitute the only improving sector for SSA exports of manufactured goods to China, but these remain small for most countries and the largest increases are for Angola and Nigeria, consisting of petroleum products (Table 1e).

[3] Benin's share of these imports is particularly large and Nigeria's low, reflecting Benin's role as a smuggling entrepot into Nigeria (Golub, 2012). Ethiopia's low share likely reflects its efforts to promote domestic industry with high import barriers.

Table 1: Sub-Saharan Bilateral Trade with China by Sector (annual average in percent)

a. Primary Products

	Exports		Imports	
	1999-2005	2006-2012	1999-2005	2006-2012
Angola	99.8	99.0	6.4	2.7
Benin	99.8	92.3	0.9	2.3
Cameroon	97.9	93.9	2.6	5.2
Ethiopia	75.3	90.3	0.8	0.8
Ghana	99.5	98.6	6.7	5.9
Kenya	89.5	70.8	1.6	1.2
Nigeria	99.0	95.6	2.2	3.8
Mauritius	98.3	99.3	15.0	13.1
Senegal	99.4	96.8	27.6	34.8
South Africa	38.1	61.5	7.0	3.6
Tanzania	99.0	90.8	3.4	1.0
Total SSA	85.1	84.7	6.7	3.8
Total SSA less South Africa	97.1	91.3	6.2	3.9

b. Unskilled Labor Intensive Products

	Exports		Imports	
	1999-2005	2006-2012	1999-2005	2006-2012
Angola	0.0	0.0	31.0	19.7
Benin	0.0	0.3	62.4	66.5
Cameroon	0.0	0.0	47.4	28.1
Ethiopia	0.7	0.6	30.8	12.8
Ghana	0.0	0.0	43.8	34.3
Kenya	1.1	0.4	46.8	35.9
Nigeria	0.1	0.0	30.9	16.2
Mauritius	0.3	0.4	55.1	57.7
Senegal	0.5	0.0	47.9	24.5
South Africa	0.2	0.0	46.0	38.6
Tanzania	0.0	0.2	38.1	34.0
Total SSA	0.1	0.1	44.6	33.9
Total SSA less South Africa	0.1	0.1	44.3	32.1

Table 1, continued. Sub-Saharan Bilateral Exports to and Imports from China by Sector (Share of Country total respective bilateral exports and imports)

c. Technology Intensive

	Exports		Imports	
	1999-2005	2006-2012	1999-2005	2006-2012
Angola	0.0%	0.0%	41.5%	44.0%
Benin	0.2%	0.0%	23.1%	17.2%
Cameroon	0.0%	4.1%	25.7%	37.7%
Ethiopia	0.0%	0.1%	46.2%	64.7%
Ghana	0.0%	0.1%	30.4%	35.1%
Kenya	2.9%	10.6%	33.3%	39.5%
Nigeria	0.3%	1.3%	44.6%	50.1%
Mauritius	1.2%	0.2%	12.7%	13.0%
Senegal	0.1%	0.2%	13.8%	24.2%
South Africa	10.3%	3.3%	32.7%	40.2%
Tanzania	0.6%	1.6%	37.6%	39.2%
Total SSA	2.5%	1.2%	32.4%	40.1%
Total SSA less South Africa	0.4%	0.6%	32.6%	40.1%

d. Human Capital Intensive

	Exports		Imports	
	1999-2005	2006-2012	1999-2005	2006-2012
Angola	0.0%	0.0%	16.3%	22.1%
Benin	0.0%	0.0%	13.0%	12.8%
Cameroon	0.0%	0.1%	19.9%	21.9%
Ethiopia	0.0%	0.0%	20.9%	19.0%
Ghana	0.0%	0.1%	16.3%	20.4%
Kenya	2.4%	0.1%	16.7%	19.7%
Nigeria	0.0%	0.0%	19.5%	21.7%
Mauritius	0.1%	0.1%	12.6%	12.1%
Senegal	0.0%	0.0%	8.8%	12.4%
South Africa	14.5%	2.4%	11.7%	14.4%
Tanzania	0.0%	0.0%	19.3%	21.3%
Total SSA	3.0%	0.5%	14.1%	17.6%
Total SSA less South Africa	0.1%	0.0%	14.9%	18.8%

Table 1, continued. Sub-Saharan Bilateral Exports to and Imports from China by Sector (Share of Country total respective bilateral exports and imports)

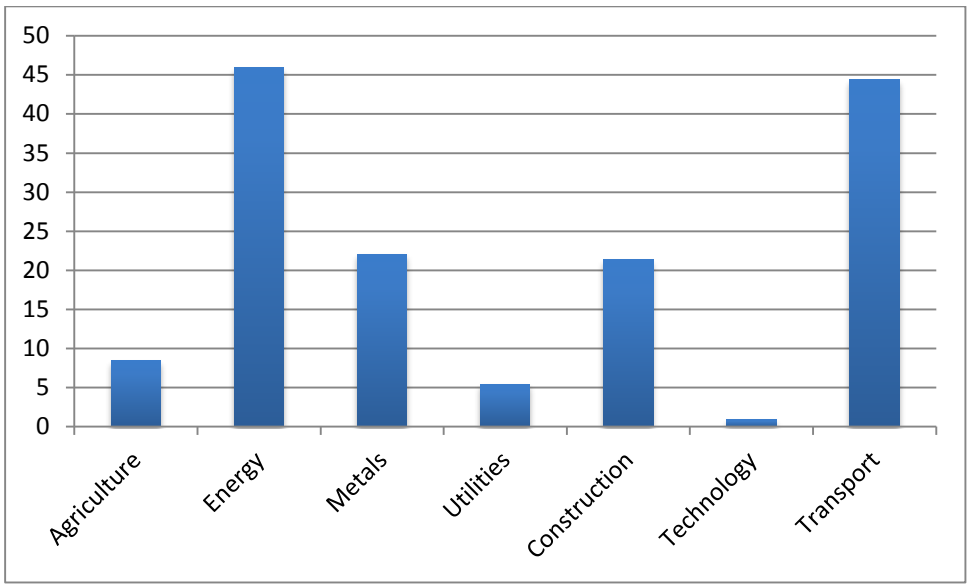
e. Natural Resource Intensive

	Exports		Imports	
	1999-2005	2006-2012	1999-2005	2006-2012
Angola	0.4	8.1	4.8	11.5
Benin	0.2	0.9	0.5	1.2
Cameroon	2.6	5.7	4.4	7.1
Ethiopia	0.6	2.0	1.3	2.6
Ghana	1.2	3.8	2.7	4.2
Kenya	0.9	2.4	1.6	3.6
Nigeria	1.6	6.1	2.8	8.3
Mauritius	0.0	0.0	4.6	4.1
Senegal	0.5	3.6	2.0	4.1
South Africa	2.2	3.4	2.7	3.2
Tanzania	1.5	3.0	1.7	4.4
Total SSA	1.2	3.6	2.2	4.6
Total SSA less South Africa	1.0	3.7	2.0	5.1

Source: Authors' calculations using UN Comtrade database.

Chinese foreign investment is also heavily oriented towards primary products with energy and metals accounting for over half of the value of FDI inflows into SSA over 2006-2014 (Figure 6). Infrastructure, particularly transport, is another important sector for Chinese FDI in the region. While there are some reports of increasing FDI in African manufacturing, these investments are small and oriented towards the domestic market (Shen 2014), with the possible exception of Ethiopia (Dinh et al, 2012).

Figure 6: Cumulative Chinese FDI in SSA, 2006-2014 ($ billion)



Source: authors' calculations using data from the Heritage Foundation.

There is considerable debate on the motivations and effects of China's foreign investment in Africa. Referring to the "Beijing Consensus", some claim that Chinese FDI differs from Western

FDI in that it is motivated by political considerations. Proponents of non-economic motivations assert that shared ideals of illiberalism have pushed China towards Africa, which is home to several authoritarian regimes (Eisenman, 2012). Tull (2006) posits that the establishment of global multipolarity is a key objective of China's growing relationship with Africa. China has also been accused of being more import dependent on African countries with poorer governance records (de Grauwe el al., 2012; Asongu and Aminkeng, 2013). Lin (2012) argues that China's state-sponsored capitalist model makes it difficult to separate economic and political motivations for trade and investment.

Others argue that China's investment and trade in Africa is driven substantially by its demand for African minerals and that Africa provides a market for Chinese manufactured goods. Thus, China's trade is often seen as consistent with the Heckscher-Ohlin theory which predicts that bilateral trade depends on the relative factor abundance between trade partners. Proponents of this theory argue that the distinct composition of SSA-China bilateral trade reflects China's relatively scarce resource endowment and its comparative advantage in labor-intensive manufactures (Biggeri and Sanfilippo, 2009; Alden and Alves, 2009; Wang, 2007; van Marrewijk and Hu, 2013). Political and economic considerations can also coincide insofar as China's trade with Africa is seeking resource security (Alden and Alves, 2009).

Factor endowment-based explanations of SSA-China trade, however, are inconsistent with the fact that a significant number of Sub-Saharan African countries have few natural resources and most countries have a large reservoir of underemployed workers with very low earnings (Golub and Hayat, 2015). From this perspective, imports of labor-intensive goods from China inhibit the growth of manufacturing in SSA (Giovanetti and Sanfilippo, 2009; Jenkins and Edwards, 2006). Thus, while Chinese demand for raw materials has benefited some SSA countries (Jacobs, 2012), the question remains why SSA is unable to compete with China in manufacturing despite rising wages in China and plenty of underemployed labor in SSA. To address this issue we propose a framework based on relative unit labor costs.

3. ASSESSING COMPETITIVENESS: RELATIVE UNIT LABOR COSTS

3.1 Method

A country's international competitiveness in manufacturing depends on its costs of production relative to competitors. Relative unit labor costs are a useful metric of these relative production costs in manufacturing. Golub et al (2007) emphasize the importance of non-tradable input costs in attracting footloose inputs, notably FDI and technology transfer from global buyers. Tradable input costs are likely to be similar everywhere so global buyers will tend to source from locations with low non-tradable costs. Labor is the most important non-tradable input, particularly for labor-intensive goods, justifying our focus on RULC as a measure of competitiveness. Infrastructure (electricity, transport, telecommunications) is also an important non-tradable input not explicitly considered in RULC calculations, but the quality and cost of infrastructure may be reflected partially in RULC measures through their impact on labor productivity. In previous work we have analyzed RULC for Africa and China separately (Mbaye and Golub, 2003; Edwards and Golub, 2004; Ceglowski and Golub, 2007; Ceglowski and Golub, 2012).

RULC is a simple concept that can be explained as follows. Let a represent the unit labor requirement (the inverse of productivity) in manufacturing:

(1) $$a = \frac{L}{Q}$$

where Q is value added and L is labor employment. Marginal productivity and hence a are assumed to be constant with respect to variations in L.

Let w denote the average labor compensation per worker in manufacturing. If labor is the only factor of production (or other factor costs do not differ across countries), average costs of production are equal to unit labor costs (ULC), the product of the unit labor requirement and average labor compensation, aw. Expressed in domestic currency, foreign unit labor costs are a^*w^*e, where * refers to the foreign country and e is the exchange rate (domestic currency per unit of foreign currency). A country's international competitiveness in manufacturing then depends on its relative unit labor costs (*RULC*):

$$(2) \qquad RULC = \frac{aw}{a^* w^* e} = \left(\frac{a}{a*}\right)\left(\frac{w}{w*e}\right)$$

The last expression in equation (2) shows that relative unit labor costs can be decomposed into relative productivity and relative wages measured in a common currency. The home country will have a competitive advantage in manufacturing when *RULC* < 1, i.e., its unit labor costs are below those of its trading partners.

Alternatively, equation (2) can be written as

$$(3) \qquad RULC = \frac{aw}{a^* w^* e} = \left(\frac{a}{a^*}\right)\left(\frac{w}{w^* e}\right) = \left(\frac{a_i}{a^*}\right)\left(\frac{w_i}{w^* e^{PPP}}\right)\left(\frac{e^{PPP}}{e}\right)$$

where e^{PPP} denotes the purchasing power parity (PPP) exchange rate for manufacturing defined as the ratio of the domestic to foreign price levels for manufactured goods, p and p* respectively, i.e., $e^{PPP} = \frac{p}{p^*}$. Substituting the definition of e^{PPP} into the middle term of the right-hand side of equation (3) yields:

$$(4) \qquad RULC = \left(\frac{a}{a^*}\right)\left(\frac{w/p}{w^*/p^*}\right)\left(\frac{e^{PPP}}{e}\right)$$

A country's competitiveness vis-à-vis other countries depends on the three terms in equation (4): 1) labor productivity in the home country relative to other countries, 2) real labor compensation in the home country relative to those of other countries[4] and 3) the level of the bilateral exchange rate relative to its PPP level or, equivalently, the real bilateral exchange rate. Gains or losses in a country's competitive position over time can originate with changes in any of these ratios.

3.2 Data

Our measures of SSA-China RULC are constructed in two steps. We first construct RULCs for individual SSA countries and China relative to the US. We then compare the RULCs for individual SSA countries to the RULC for China to assess their competitiveness in manufacturing relative to China. These calculations require data for manufacturing productivity and wages, as well as exchange rates. Productivity is calculated as manufacturing value added per employee, deflated by a manufacturing value-added deflator and converted to US dollars

[4] Labor compensation is deflated by producer prices for manufacturing in equation (4) rather than consumer prices, so it is not an indicator of workers' welfare.

at an equilibrium or purchasing power parity exchange (PPP) rate. Wages are defined as total labor compensation per employee, converted to dollars at the market exchange rate. As is accepted in the literature on international labor productivity and unit labor cost comparisons, PPP exchange rates are used for international productivity comparisons to eliminate the effects of exchange-rate volatility on measures of real output, which should be invariant to such exchange-rate fluctuations. But deviations of exchange rates from PPP do affect relative labor costs, so it is appropriate to use the market exchange rate in converting wages. Currency depreciation consequently tends to improve international competitiveness by reducing labor costs relative to labor productivity.

The primary data source for manufacturing productivity and wages is the UNIDO Industrial Statistics database (INSTAT). INSTAT reports nominal value added, labor compensation and employment for various countries through 2010, including China and a limited number of African countries. The INSTAT data were supplemented with national data for the United States and Senegal. The series for nominal value added in manufacturing were converted to real terms by deflating them by manufacturing value-added deflators derived from measures of nominal and real manufacturing value added reported in the World Bank's World Development Indicators.[5] Two sources are used for PPP exchange rates: the International Comparison Project (ICP) PPPs for traded goods, and the University of Groningen manufacturing PPPs. While manufacturing-specific PPPs are ideal, and are available for China, they are not available for most SSA countries, with the exception of South Africa.

4. AFRICAN RELATIVE UNIT LABOR COSTS VIS-À-VIS CHINA

This section compares manufacturing productivity, wages and unit labor costs in selected SSA countries to China.[6] Some initial insights into SSA's competitiveness in manufacturing emerge from a comparison of manufacturing wages to per capita GDP. Per capita GDP can be taken as an indicator of a country's overall productivity level. In comparison to a number of other countries, manufacturing wages are very high in SSA relative to per capita GDP (Table 2). In 2010 most Asian countries, including China, had ratios of manufacturing wages to per capita GDP at or below 1.0. That is, average annual manufacturing wages are roughly equal to per capita income in most Asian countries. The same is true in Eastern Europe and Latin America. In Sub-Saharan Africa, however, wages are typically several times per capita GDP. The only exception is Mauritius and to a lesser extent South Africa. The ratio of wages to per capita GDP has fallen in Sub-Saharan Africa since 2000 but remained very high as of 2010.

[5] The World Bank measures of manufacturing value added differ from UNIDO's, as the former are based on a national accounts concept and the latter are census-based. See Ceglowski and Golub (2007, 2012) for further discussion. However, the ratios of nominal to real value added are likely to be less dissimilar across countries than the levels of the two alternative measures.
[6] Countries are selected based on data availability.

Table 2: Annual Manufacturing Wages, Selected Countries in Africa and Other Regions, current US$

	2000		2010	
	Level in US$	Relative to Per Capita GDP	Level in US$	Relative to Per Capita GDP
Sub-Saharan Africa				
Burundi	NA	NA	3261	14.9
Cameroon	3088	5.3	NA	NA
Ethiopia	771	6.3	807	2.4
Ghana	1832	4.9	NA	NA
Kenya	2118	5.2	2854	3.6
Malawi	436	2.8	2045	5.7
Mauritius	3254	0.8	6285	0.8
Senegal	3680	7.8	6450	6.5
South Africa	7981	2.6	12331	1.7
Tanzania	2296	7.5	1581	3.0
North Africa				
Egypt	2028	1.3	3453	1.2
Morocco	4123	3.2	6654	2.4
Tunisia	4066	1.8	5455	1.3
Latin America				
Brazil	5822	1.6	10918	1.0
Colombia	4096	1.6	4680	0.8
Mexico	8048	1.2	7310	0.8
Asia				
Bangladesh	NA	NA	680	1.6
China	1016	1.1	4770	1.1
India	1356	3.0	2619	1.8
Indonesia	929	1.2	1897	0.6
Malaysia	4405	1.1	6548	0.7
Vietnam	NA	NA	1727	1.3
Eastern Europe				
Czech Rep.	3964	0.7	12673	0.7
Latvia	3689	1.1	9191	0.8
Poland	5829	1.1	10162	0.8

Source: Authors' calculations using UNIDO INSTAT database and per capita GDP from World Bank, *World Development Indicators*

Table 3 and Figure 7 compare the unit labor costs in manufacturing of individual SSA countries to Chinese unit labor costs. Two sets of RULC measures are shown based on the two alternative estimates of PPP exchange rates.[7] The first set, labeled ICP-based, is based on tradable-goods PPPs (exports and imports) from the International Comparison Project (ICP). The second set of estimates, labeled ICOP-based, uses manufacturing PPP values derived from the University of Groningen International Comparison of Output and Productivity (ICOP)

[7] The PPP exchange rates are used in constructing relative productivity.

project for those countries for which such data are available (China and South Africa), and the ICP traded goods values for other countries. The higher values in the second set of estimates are mainly due to the fact that the China-US PPP exchange rate in ICOP is considerably lower than that of ICP.

Table 3: Relative Unit Labor Cost vis-a-vis China (RULC), 2010

	ICP-based measures	ICOP-based measures
Ethiopia	0.61	1.01
Kenya	1.21	2.01
Malawi	1.75	2.92
Mauritius	1.61	2.68
Senegal	1.38	2.30
South Africa	1.52	3.01
Tanzania	0.56	0.94

Note: RULC > 1.0 means African countries have higher unit labor costs than China.
Source: Authors' calculations using UNIDO INSTAT database.

Figure 7: Relative Unit Labor Cost vis-a-vis China, 2003-2010

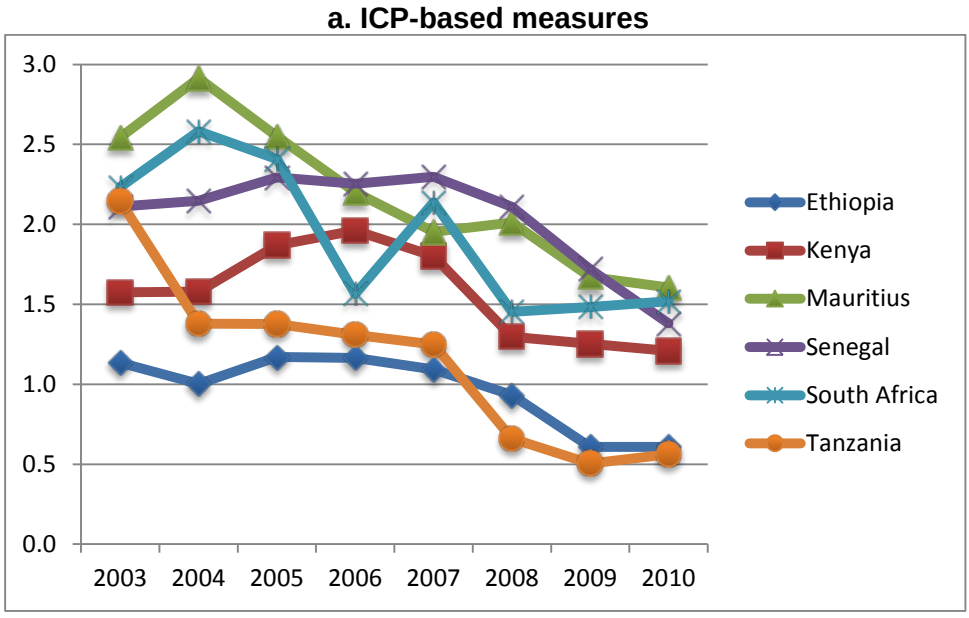
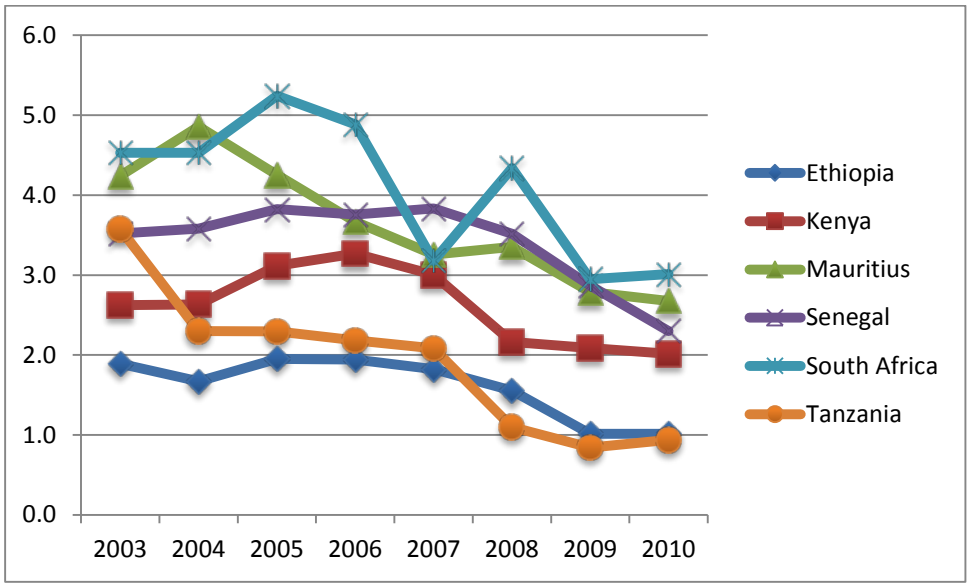


Figure 7: Continued.

b. ICOP-based measures



In both sets of estimates, RULCs with respect to China were very high in key SSA countries in the early 2000s (Figure 7). They have dropped for all countries since then but nevertheless remain high for most countries in 2010. The majority of countries have RULCs above 1, indicating their unit labor costs in manufacturing exceed those in China. Ethiopia and Tanzania are exceptions. As of 2010, unit labor costs for Ethiopia and Tanzania are at rough parity with China according to the ICOP-based measures and are substantially below China's according to the ICP-based measures (Table 3).

Table 4 breaks down the improvement in RULCs for SSA into Chinese and SSA real wage and productivity growth and real exchange rate movements over 2000-2010. Chinese productivity and wages both grew strongly, with wage growth outpacing productivity and pushing up Chinese unit labor costs. Manufacturing productivity growth in the SSA economies was slower than China's, substantially so in most cases. However, real wage growth in the SSA economies was even slower, pushing down unit labor costs. In a nutshell, the improvement in SSA's manufacturing competitiveness reflects both rising Chinese unit labor costs and productivity growth in SSA countries that outpaced wages. Figures 8a-8f plot the factors underpinning the bilateral RULC levels vis-à-vis China over 2000-2010: relative productivity, real wages and the real bilateral exchange rate of our sample of SSA countries relative to China. These figures show that relative real wages and relative productivity in the SSA countries are both high and generally declining, with relative real wages consistently exceeding relative productivity. There is no clear trend for the real bilateral exchanges rate between the SSA countries and China over 2000-2010. However, exchange rate changes contributed to falling RULCs for Ethiopia, Mauritius, and Tanzania; these countries all experienced real appreciations that were smaller than the real appreciation of China's currency, effectively resulting in a real depreciation against the renminbi (Table 5).

Table 4: Productivity, Real Wages, Real Exchange Rates, and Relative Unit Labor Costs, Annual Percent Changes, 2000-2010

	Productivity Growth	Real Wage Growth	Real Appreciation vis-à-vis US dollar	Relative Unit Labor Cost vis-à-vis USA	Relative Unit Labor Cost vis-à-vis China
China	11.7	12.9%	4.7%	7.8%	NA
Ethiopia	0.2	-1.3%	2.5%	2.2%	-5.6%
Kenya	1.5	-0.7%	5.0%	4.7%	-3.1%
Mauritius	5.2	4.8%	3.1%	4.7%	-3.1%
Senegal	2.2	0.3%	6.7%	6.8%	-1.0%
South Africa	3.0	2.0%	4.6%	5.6%	-2.2%
Tanzania	8.4	0.6%	1.8%	-4.2%	-12.0%

Source: Authors' calculations using UNIDO INSTAT database.

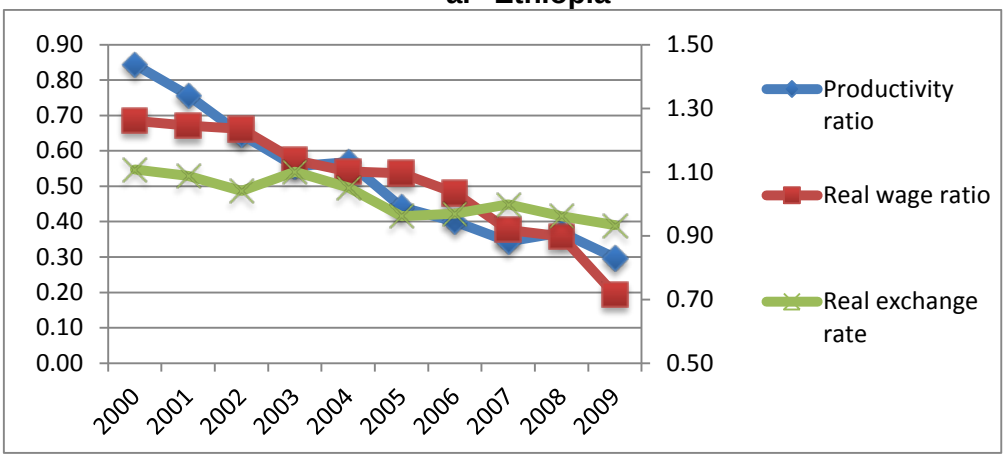
Table 5: Clothing Exports, By Region and Country (Percent of World Exports)

	2000	2005	2010	2013
Sub-Saharan Africa				
Ethiopia	0.00	0.00	0.00	0.01
Ghana	0.00	0.00	0.00	0.00
Kenya	0.00	0.07	0.05	0.06
Lesotho	0.08	0.16	0.12	0.09
Madagascar	0.16	0.12	0.10	0.08
Nigeria	0.00	0.00	0.00	0.00
Senegal	0.00	0.00	0.00	0.00
Swaziland	0.06	0.06	0.01	0.01
Tanzania	0.00	0.00	0.00	0.00
Middle-Income Africa				
Mauritius	0.48	0.27	0.19	0.17
South Africa	0.11	0.06	0.03	0.04
North Africa				
Egypt	0.16	0.07	0.36	0.30
Morocco	1.22	1.02	0.85	0.68
Tunisia	1.13	1.12	0.87	0.61
Latin America				
Dominican Republic	1.29	0.68	0.16	0.18
El Salvador	0.85	0.61	0.48	0.45
Honduras	1.15	1.00	0.82	0.87
Mexico	4.37	2.63	1.23	0.98
China and India				
China	18.25	26.65	36.73	38.55
India	3.02	3.14	3.18	3.66
High-Income East Asia				
Taiwan	1.53	0.56	0.28	0.19
Korea	2.54	0.93	0.46	0.46
Middle-Income East Asia				
Indonesia	2.40	1.78	1.93	1.67
Malaysia	1.14	0.89	1.10	1.00
Thailand	1.90	1.47	1.22	0.89
Low-Income Asia				
Bangladesh	2.56	2.48	4.20	5.11
Cambodia	0.49	0.79	0.86	1.11
Myanmar	0.40	0.12	0.10	0.10
Viet Nam	0.92	1.68	2.94	3.74

Source: author's calculations using WTO Statistics database.

Figure 8: Levels of Productivity, Real Wages and the Real Bilateral Exchange Rate Relative to China ICP-based measures

a. Ethiopia



b. Kenya

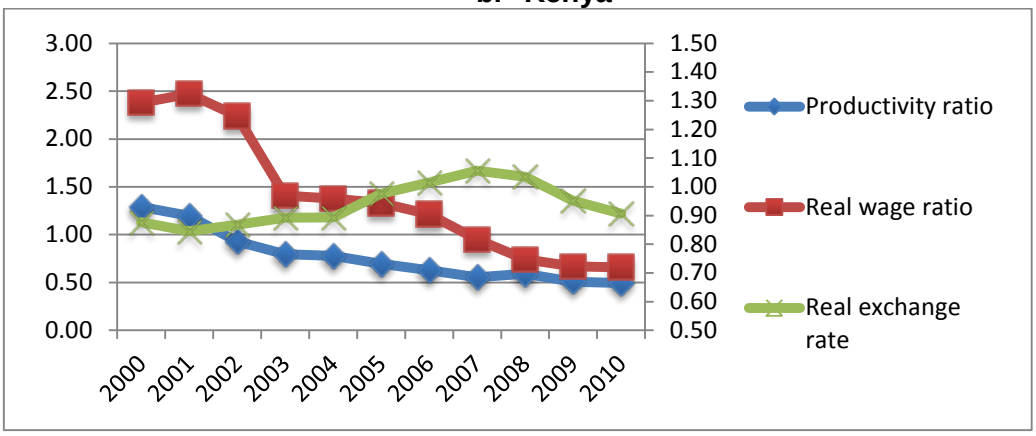
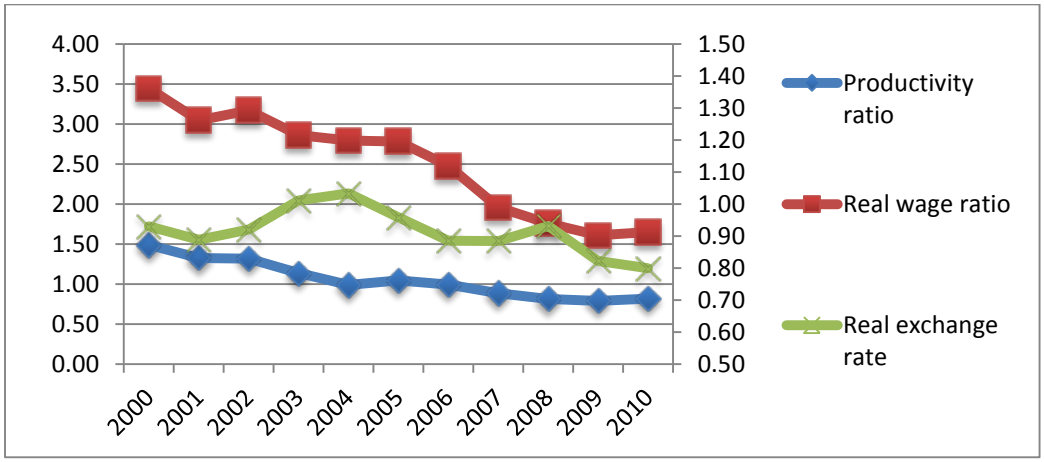


Figure 8, continued Levels of Productivity, Real Wages and the Real Bilateral Exchange Rate Relative to China, ICP-based measures

c. Mauritius



d. Senegal

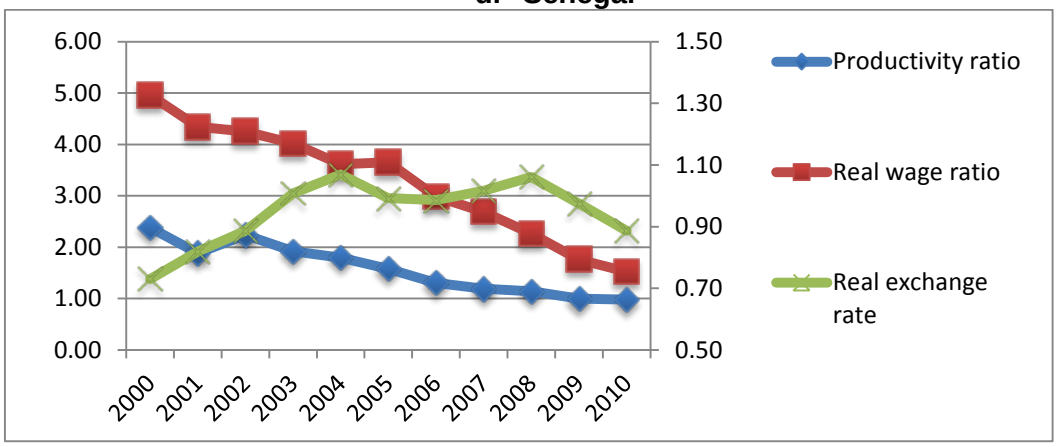
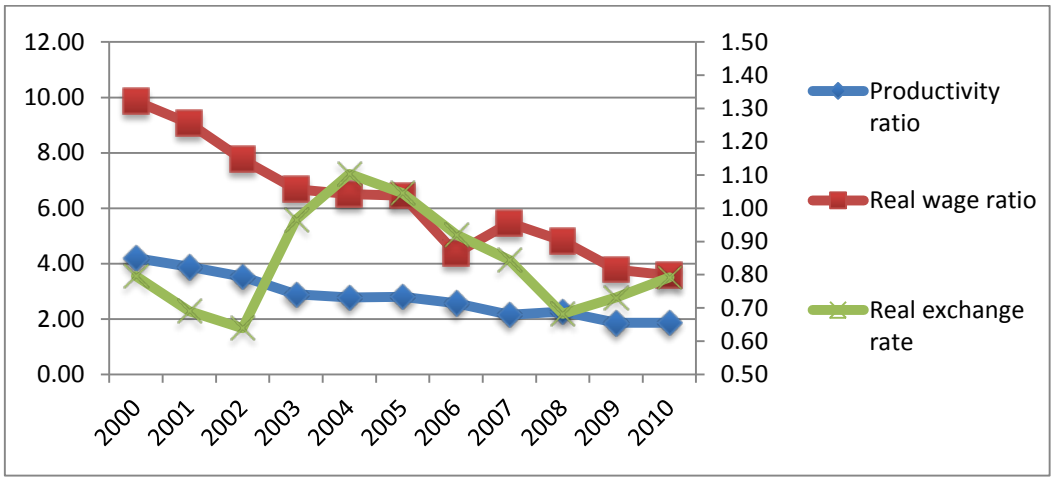
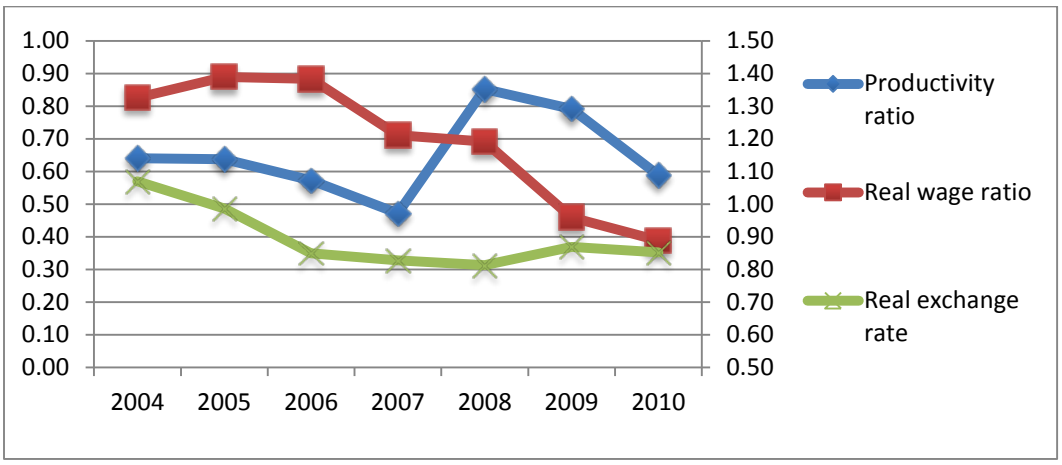


Figure 8, continued Levels of Productivity, Real Wages and the Real Bilateral Exchange Rate Relative to China, ICP-based measures

e. South Africa



f. Tanzania



Several key findings emerge from this analysis. First, manufacturing wages in Sub-Saharan Africa are very high relative to per capita GDP. Second, until recently, real wages and productivity in SSA manufacturing have been both well above China's levels, with the real wage differential exceeding the productivity differential. Consequently unit labor costs in our sample of SSA economies have been significantly higher than in China. These high labor costs have harmed African competitiveness and explain in part Africa's failure to develop labor-

intensive manufacturing. Third, the growth of real wages and productivity in SSA manufacturing has lagged the growth in their Chinese counterparts in recent years. Fourth, relative real wages have dropped more rapidly than relative productivity for our sample of SSA countries, boosting their competitiveness vis-à-vis China. Unit labor costs in some countries (Ethiopia and Tanzania) are now at or even below China's levels. For other SSA countries, however RULC remains high.

5. CAN AFRICA NOW COMPETE IN LABOR-INTENSIVE MANUFACTURING?

The previous section indicated that some African RULCs have declined considerably relative to China due both to rising wages in China and productivity growth that has exceeded wage growth in SSA countries. Have SSA countries been able to take advantage of rising Chinese costs? While there are some reports of increasing FDI in African manufacturing, these investments are small and oriented towards the domestic market (Shen, 2014), with the possible exception of Ethiopia (Dinh et al., 2012).

We assess the situation by examining SSA's success in exporting clothing, a basic labor-intensive export product that has served as an initial gateway for some countries' greater participation in world export markets for manufactures. Table 6 shows shares of world clothing exports by region and country, comparing sub-Saharan countries to other regions. Sub-Saharan African countries' presence in the world export market for clothing has never been large and has declined further in recent years. A few low-income African countries benefited from trade preferences under the African Growth and Opportunity Act (AGOA) enacted in 1999. These include Lesotho and Madagascar and to a lesser extent Swaziland and Kenya. With the expiration of the Multi-Fiber Accord in 2005, however, AGOA preferences have apparently been insufficient to sustain African countries' competitiveness and their modest shares of exports in the early 2000s fell off. Many other African countries, including relatively successful countries such as Ethiopia, Ghana and Tanzania have yet to enter the clothing export market in any significant volume, as of 2013. Middle-income Mauritius and South Africa have also seen their moderate shares of the market decline in recent years.

Table 6: Productivity, Wages and Unit Labor Costs in Africa and Asia, Relative to the United States, 2010 (United States = 1)

	Relative Productivity	Relative Wage	Relative Unit Labor Cost
Sub-Saharan Africa			
Ethiopia	0.03	0.02	0.53
Kenya	0.05	0.06	1.23
Malawi	0.03	0.05	1.79
Mauritius	0.09	0.14	1.64
Senegal	0.10	0.15	1.41
South Africa	0.18	0.28	1.56
Tanzania	0.06	0.04	0.57
Asia			
Bangladesh	0.02	0.02	0.70
China	0.18	0.11	0.61
India	0.12	0.06	0.50
Indonesia	0.08	0.04	0.55
Vietnam	0.03	0.04	1.23

Source: Authors' calculations using UNIDO INSTAT database.

Based on the apparel market, there is no indication from recent data to indicate that African countries are becoming successful exporters of labor-intensive manufactures in the face of China's falling competitiveness. Instead, the shares of other low-income Asian countries' exports are growing as is China's, despite its rising costs.

Why have African countries failed so far to take advantage of China's falling competitiveness? There are two main reasons. First, unit labor costs in SSA countries remain high relative to China and other Asian countries in most cases. Table 6 shows wages, productivity and ULC in manufacturing relative to the United States for the SSA and Asian countries for which data are available.[8] While relative unit labor costs indicate that Ethiopia and Tanzania have become very competitive, other African countries have high unit labor costs compared to those in the US. In contrast, most Asian countries in Table 6 have low RULCs relative to the US, implying that the SSA economies have very high unit labor costs relative to these Asian competitors. Second, labor costs are not the only source of competitiveness. The general business environment also matters. African countries tend to perform poorly in comparisons of the quality of infrastructure, corruption and institutional quality more generally (Eifert et al., 2008, Golub et al., 2011). In Ethiopia and Tanzania, the two countries with favorable unit labor costs, power outages are frequent, roads are of poor quality, and ports are slow to process containers (Golub and Hayat, 2015).

6. CONCLUSION AND POLICY IMPLICATIONS

Economic growth in Sub-Saharan Africa has improved but has been substantially based on capital-intensive sectors such as minerals and telecommunications, with consequent limited growth of formal sector employment. This contrasts with Asian reliance on labor-intensive manufacturing exports, which have boosted employment and contributed dramatically to poverty reduction. China in particular has become a dominant exporter of manufactured goods, and its bilateral trade with Sub-Saharan Africa is highly unbalanced in the sense that it

[8] These estimates use the ICP values of the PPP exchange rate for all reported countries.

overwhelmingly exports manufactures to the region while importing minerals from it. In recent years, however, Chinese wages have been rising rapidly and outpacing productivity growth, reducing China's competitive advantage in manufacturing and opening the door to inroads by lower-income countries, including those in Sub-Saharan Africa.

We show that Sub-Saharan Africa's international competitiveness has improved but remains largely unfavorable relative to China, as measured by relative unit labor costs. Real wages in Sub-Saharan African formal manufacturing are very high relative to per capita income. High real wages in formal manufacturing reduce competitiveness in labor-intensive manufacturing. Poor infrastructure and weak institutions also adversely affect the business environment for foreign investment. Low-income Asian countries have so far shown a greater ability to enter into the global manufacturing than sub-Saharan countries, in particular in the crucial clothing sector. Given new Asian competitors and China's continued dominant presence, the possibilities for Africa to compete in low-skill manufacturing are not encouraging, despite some glimmers of progress in a few countries such as Ethiopia (Dinh et al., 2012).

Instead, African countries may have greater potential to boost labor-intensive exports in other sectors, especially agriculture, including traditional primary products, horticulture and fishing (Golub et al, 2008). Agricultural exports share many of the features of manufacturing, both in terms of their potential to spur growth and employment, and the institutional constraints they face in achieving this potential. Several critical aspects of manufacturing exports that promote development and poverty reduction apply to traditional and non-traditional agriculture. These include high labor-intensity, possibilities for technological upgrading and consequently raising producer incomes, and access to state-of-the-art foreign technology through FDI and outsourcing. But they also include the necessity of attaining international competitiveness, and thus the critical roles of low-cost labor and a favorable climate for investment. For agriculture, especially, sanitary and phyto-sanitary norms in developed-country markets are a major hurdle for successful exporting (Golub and McManus, 2009; Mbaye and Gueye, 2014), analogous to the demanding specifications of global buyers of manufactures. Sub-Saharan Africa's success in exporting labor-intensive products, in agriculture as in manufacturing, hinges on improving the business climate and boosting competitiveness through increased labor productivity and wage moderation.

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APPENDIX

Definition of Product Groups

Group	Constituents	SITC Codes
Primary Products	Food, Beverages, Minerals, Crude Oil, Animal and Vegetable Oils	0,1,2,32, 333, 34, 35, 4
Natural Resource Intensive	Leather Manufactures, , Lime, Cement, Clay, Mineral Manufactures, Precious Stones, Pig Iron, Non Ferrous Metals	61,63,661,662, 663,667, 671, 68
Human Capital Intensive	Dyeing materials, essential oils, Rubber Manufactures, Steel Ingots, Telecommunications equipment, Photographic apparatus, watches	53,55,62,672,673,674,675,676.677, 678,679,69,761, 762,73,885,894,895, 896,897,898,899
Unskilled Labor Intensive	Textile yarn, Glass, Prefabricated buildings, plumbing, heating, furniture, Travel goods, apparel, footwear	65, 664, 665, 666, 81, 82, 83, 84, 85, 894,895
Technology Intensive	Organic and inorganic chemicals, fertilizers, plastics,	51,52,54,56,57,58,59,71,72,73,74 75,764,77,792,87,881,882,883, 884,892,893