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Abstract

The rise of China in the global economy has been linked with negative impacts on employment across many high and middle-income countries. However, evidence for African countries is limited. This paper investigates the causal relationship between Chinese imports and manufacturing employment in Ethiopia. Imports may harm domestic firms through a revenue effect (lower market shares) or benefit them, either indirectly if competition spurs innovation or directly through access to better quality or cheaper inputs. I find that a 1 percentage point increase in import penetration leads to a 15.2 percent increase in industry employment. I disentangle the inputs effect from the other two effects by decomposing total Chinese imports by their end-use category using input-output tables and find evidence that imported intermediate inputs are driving the employment gains. I find evidence consistent with the idea that employment gains are a result of productivity gains and increases in capacity utilization. These employment gains appear to disproportionately benefit large firms and labor-intensive industries.

JEL Classification: O14, F14, F16, L60, C13, C23, C26, D57

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1 Introduction

After joining the World Trade Organization in 2001, China quickly grew to dominate international markets, becoming the largest exporter in the world by 2009. The rapid ascension of Chinese exports on the global stage introduced new competition for manufacturing industries, and the opportunity for high- and middle- income countries to offshore production to China. The increased competition with China has led to a reduction in manufacturing employment in high- and middle-income countries (Autor et al., 2013; Acemoglu et al., 2016; Iacovone et al., 2013; Blyde & Fentanes, 2019). However in low-income countries, like many across Africa, there is little causal evidence on how the boom in Chinese imports over the past two decades has affected domestic manufacturing employment.

Despite the well-established negative effect observed in advanced economies, the theoretical relationship between Chinese imports and manufacturing employment in any given country is ambiguous. The effect of Chinese imports can operate along two main channels: the competition channel, in which domestic producers compete against Chinese producers of similar goods; and the inputs channel, in which domestic producers upgrade their production process by leveraging the Chinese-imported goods as inputs. The competition channel can either lead to a decline in manufacturing employment due to the revenue effect (Leamer et al., 1995; Autor et al., 2013; Pierce & Schott, 2016; Acemoglu et al., 2016), meaning domestic firms lose out to the Chinese imports, or an increase in manufacturing employment due to the innovation effect, if competition pushes domestic firms to improve their production process (Bloom et al., 2016; Aghion et al., 2005; Raith, 2003; Schmidt, 1997). The inputs channel can lead to increases in manufacturing employment by improving domestic firms' access to better quality and more affordable intermediate inputs that can lower production costs while also enhancing productivity (Topalova, 2007; Goldberg et al., 2010; Redding et al., 2006; Amiti & Konings, 2007). The net impact of these countervailing effects may be quite different in African countries as compared to more advanced economies, a question which is understudied in the literature.

This paper investigates the impact of increased Chinese imports on manufacturing employment in Africa. Most African economies are still in the early stages of structural transformation with under-developed and growing manufacturing sectors (Diao et al., 2021; Rodrik, 2018; Erten et al., 2019). As such, we may expect African economies to be less prone to the competition channel than more advanced economies that have more developed manufacturing sectors. African economies also have greater potential for boosting industrialization through better access to high technology inputs they otherwise lack, meaning the inputs channel may dominate. The distinctive nature of African economies may lead to a different net effect from that observed in high and middle-income economies trading with China.

Studying the case of Ethiopia, I provide new evidence that, in contrast with the experience in wealthier countries, exposure to Chinese imports led to *employment gains* in the Ethiopian manufacturing sector. Like in other countries across the world, trade between Ethiopia and China has grown significantly since the early 2000s. Chinese exports to Ethiopia increased from 254 million USD in 2001 to 4.07 billion USD in 2016 (BACI database, CEPII). Moreover, manufacturing imports from China exceed total foreign direct investment in Ethiopia by a factor of 30 on average over the same period. At the same time, the Ethiopian manufacturing sector remains small. The average share of manufacturing employment was 7.87% over the period from 2001 to 2016 (World-Bank, 2021).

To measure industry employment and Chinese import exposure, I combine two main datasets. First, I use the Ethiopian Large and Medium Scale Manufacturing establishment census to compute manufacturing employment and other industry outcomes. Manufacturing employment is measured by aggregating employment year by year across firms that operate in the same industry. Second, I extract Chinese imports to Ethiopia from the BACI dataset. I aggregate imports to 2-digit industry level. My sample of analysis is an annual panel covering 22 manufacturing industries from 2002 to 2017 [1]

To causally identify the impact of exposure to Chinese imports on Ethiopian manufacturing employment, I relate the variation in aggregate outcomes across manufacturing industries to the variation in industry exposure to Chinese import competition. Exposure to Chinese import competition is measured by the import penetration ratio, computed at the industry-level as the contemporaneous Chinese imports relative to the initial size of an industry in the domestic market[2]. The baseline regression specification includes year and industry fixed effects to control for shocks common to all industries and industry-specific unobserved factors affecting employment respectively.

One potential concern with this estimation strategy is that increasing exposure to Chinese imports could be driven by domestic demand shocks which could simultaneously be correlated with industry outcomes. To address this concern, I instrument Chinese import penetration in Ethiopia with Chinese Import Penetration in other sub-Saharan African economies[3]. The instrument isolates the component of the variation in Chinese import pen-

[1]Examples of industries include the textiles, electrical machinery, wearing apparel, or foods and beverages.

[2]Referred to as Chinese Import Penetration for the remainder of the paper

[3]Chinese import penetration in other sub-Saharan African economies is computed as the average across other countries' industry-level ratio of Chinese imports over Ethiopia's initial size of the industry

etration that is influenced solely by productivity shocks in China. My empirical strategy follows the same logic as a vast body of literature, such as Acemoglu et al. (2016); Autor et al. (2013); Bloom et al. (2016); Pierce & Schott (2016), analyzing the effects of Chinese imports on the domestic manufacturing sector in high and middle-income economies[4]. To support my identifying assumptions, I provide evidence of a strong first stage, implying that Chinese imports to other sub-Saharan African economies strongly predict Chinese imports to Ethiopia. In support of the exclusion restriction assumption, I implement an over-identification test of the instruments, where I treat every single country included in my instrumental variable as a separate instrument.

The paper's main findings suggest that looking across industries and years, increased exposure to Chinese imports increases manufacturing employment. On average, a one percentage point increase in industry import penetration leads to a 15.2 percent increase in industry employment. This impact is economically and statistically significant, although base levels of manufacturing employment are relatively small with an industry-level average employment of 7,783 workers. The estimated employment gains associated with a one standard deviation increase in Chinese imports penetration is 1,790 workers.

This result is robust to several checks. First, I test whether the results are driven by a specific industry. For example, industries like food and beverage are top importers while they also employ the highest share of manufacturing workers. In contrast, the wood industry is a bottom importer and exporter. I show that no single industry is driving the results. Second, I run the estimation using different sub-samples of the data, varying the firms and the years included in the analysis sample. I find that my coefficients are robust to almost all alternative samples. Third, I show that my results are robust to alternative import exposure measures. I compute a different import penetration ratio where initial absorption is replaced with initial output or initial employment. Additionally, I use contemporaneous imports as the explanatory variable. I show that the coefficients stay positive and are bigger in magnitude.

The effect of Chinese imports on manufacturing employment is the result of two different channels at play, namely the competition channel (revenue effect or innovation effect) and inputs channel (inputs effect). To disentangle the employment effects arising from the competition channel from those arising from the inputs channel, I proceed in three steps. First, I categorize Chinese imports as either intermediate goods or final goods, using the Broad Economic Categories concordance table. By construction, the input usage channel is

[4] This literature instruments Chinese imports to the country under analysis by Chinese imports to other countries

present only for intermediate goods, while final goods will isolate the competition channel. Over my period of analysis, 78.5% of Chinese imports to Ethiopia consisted of intermediate goods.

Second, I estimate the direct impact of intermediate goods separately from the direct impact of final goods. I find that the imports of intermediate inputs have a positive impact on employment, whereas I find no detectable effect from the import of final goods. Specifically, one percentage point increase in exposure to Chinese-imported intermediate goods leads to a 24.1% increase in industry employment. This effect could be driven by the competition (innovation effect) or by the inputs channel.

Auxiliary evidence suggests that the positive impact of intermediate goods is likely due to the inputs channel for two main reasons. On one hand, although the data do not allow explicit separation of domestic producers by intermediate and final goods, suggestive evidence on the category of products indicates that the majority of goods produced by manufacturing industries in Ethiopia are final goods. This could suggest that there is not much competition between intermediate goods producers and importers of the same products. On the other hand, the share of own industry input usage is relatively high within the manufacturing sector. For example, the textile industry sources 57% of its manufacturing inputs from the textile industry. Overall, 55% of its total inputs are supplied by the agricultural and mining sectors, 15% from the services sector, and about 30% from the manufacturing sector (including more than half from the textile industry). This suggests that the imported intermediates do not compete with domestic producers of intermediate inputs and that domestically produced intermediate inputs are more likely to be locally produced agricultural products or other non technologically advanced goods.

To clearly identify the inputs effect, I construct a new measure of imports exposure using the input-output table, the industry imports usage. Specifically, I proportionally allocate imports of intermediate inputs to industries based on the industry's input usage share in total intermediate usage. Industry imports usage is the weighted average of Chinese intermediate imports from each upstream industry supplying inputs to the exposed industry. I find that my employment results are driven by the inputs channel, consistent with the composition of Chinese imports dominated by intermediate goods. In particular, industries exposed to Chinese imports through downstream linkages, namely their input suppliers, record employment effects of 14.3%, consistent with the inputs usage channel. I only find these positive effects on firms using imported inputs while there is no effect on firms that use domestic inputs. This result suggests that the technologies incorporated by the use of imported inputs are efficiency enhancing (Amiti & Konings, 2007). Moreover, this is consistent with the fact that in 2001, shortage of raw materials and other issues related to difficulty accessing inputs was listed among the top reasons that prevented Ethiopian manufacturing firms from operating at full capacity. Accordingly, I find that Chinese import penetration reduced the proportion of firms facing a shortage of raw materials by 13.8%.

Next, I analyze the mechanisms linking Chinese imports and Ethiopian manufacturing employment. I provide supporting evidence that the input channel is operating through increased productivity and capacity utilization. I estimate industry production functions using the Levinsohn & Petrin (2003) methodology to correct for simultaneity in the choice of inputs. I find that firms using intermediate imports from China through upstream linkages display higher productivity. Moreover, I find a positive impact on skills upgrading for the industries affected through the downstream shock. This suggests that, with the assumption of complementarity between labor and inputs, the use of higher quality inputs from China might require firms to employ more skilled workers. While I find no evidence of changes in entries and exits in response to Chinese imports, I do find heterogeneous results across industry characteristics. In particular, the positive employment impacts are driven by large and labor intensive firms, whereas ownership type does not influence this impact.

This paper makes three contributions. First, it contributes to the literature on the impact of Chinese import competition on domestic manufacturing employment by studying the case of a relatively low income African country. Previous literature on this topic focused on explaining rising wage inequality and manufacturing job losses in high income economies with import competition from general low-wage competitors (Revenga, 1992; Bernard et al., 2006; Ebenstein et al., 2014), and specifically from China (Autor et al., 2013; Acemoglu et al., 2016; Iacovone et al., 2013; Mion & Zhu, 2013; Bloom et al., 2016). In contrast, I analyze the impact of Chinese import competition in sub-Saharan Africa, which provides a distinct economic context and a different dynamic of trade relations than countries commonly studied in the literature. In Ethiopia, the manufacturing sector is small and growing and, unlike many high and middle-income economies, China is a comparatively more advanced economy. Studying the effects of increased Chinese imports on manufacturing employment in Ethiopia demonstrates how a low-wage country, like many African economies, is affected when trading more with a more technologically advanced economy with a bigger manufacturing sector, such as China.

One related paper that analyzes the impact of Chinese imports on employment in sub-Saharan Africa is Edwards & Jenkins (2015). Our approaches diverge in a few ways. Their paper focuses on South Africa, a more advanced economy relative to most of sub-Saharan

Africa. Moreover, they focus on the competition channel rather than the inputs channel, which is likely to be significant in less advanced economies as I demonstrate in this paper. In contrast with the findings in the literature, my results suggest that, in low income countries that face input constraints, increased imports of intermediate goods can increase domestic manufacturing employment.

Second, this paper contributes to the literature on the labor market impacts of the "China Shock" by separating imports of final goods from imports of intermediate goods. The studies cited above estimate only the competition effects arising from the impact of total imports. In this paper, I show that the total imports can mask greater positive impacts arising from importing intermediate goods. To my knowledge, the two papers that distinguish between final and intermediate goods are Mion & Zhu (2013) and Biscourp & Kramarz (2007). Mion & Zhu (2013) focuses on the offshoring of these goods, while I analyze their impact as imports on domestic manufacturing sector. I also separate the competition and inputs usage channels by using the input-output linkages. On the other hand, where Biscourp & Kramarz (2007) focuses on the competition channel imposed by final goods imports only, I also examine intermediate imports.

Third, this paper advances the literature on importing and productivity, specifically the studies that provide empirical evidence that imports of intermediates or the decline in input tariffs are associated with productivity gains (Goldberg et al., 2010; Abreha, 2019; Goldberg et al., 2010; Redding et al., 2006; Nocke & Yeaple, 2006; Topalova & Khandelwal, 2011; Topalova, 2007; Amiti & Konings, 2007; Kasahara & Rodrigue, 2008). These studies use input or output tariffs as the treatment variable. I complement this literature by using the value of imports as the treatment variable. I also show that skills upgrading can also result from access to better inputs, not only from competitive effects of trade.

The remainder of the paper is organized as follows. Section 2 presents the background and conceptual framework. Section 3 describes the empirical strategy and presents the data. Section 4 presents the baseline results and section 5 presents the results on the two channels of Chinese imports impacts. Section 6 discusses the mechanisms through which imports impacted employment. Section 7 concludes.

2 Background and Conceptual framework

In this section, I describe the nature and the evolution of Chinese imports in Ethiopia. Specifically, I argue that Ethiopia experienced an increase in exports from China due to reforms in China, rather than specific trade policies in Ethiopia. Moreover, I elicit the variation in exposure to Chinese imports across industries, which enables me to implement my empirical strategy. Lastly, I provide background information about the Ethiopian manufacturing sector and their drive to industrialization.

2.1 Chinese imports in Ethiopia

Over the last two decades, Ethiopia has experienced a sharp increase in economic relations with China, especially through trade. This fact is common to most countries around the globe. Figure 1 plots the value of Chinese manufacturing imports[5] and FDI inflows to Ethiopia from 1996 to 2017. Since 2001, Chinese exports to Ethiopia have increased at an annualized rate of 27%, from 59 million USD in 1996 to 4.07 billion USD in 2016. Even as Ethiopia increasingly welcomed Chinese Foreign Direct Investment, total FDI to Ethiopia is still dwarfed by the value of Chinese imports. Chinese FDI approximated 327 million USD per year over from 1996-2017, about 30 times less than the value of Chinese imports.

The Chinese imports trend remained positive throughout the 2002-2017 time period, although a slowdown occurred a few years following the 2009 financial crisis and a major drop in 2016. Imports have generally been declining in Ethiopia since 2016 due to a severe shortage of foreign exchange. The shortage was caused by a drought and a weak global environment, causing a rapid decline in foreign reserve buffer accompanied by general economic growth slowdown IMF (2016). Chinese imports reflect that macroeconomic trend.[6]

The rise of Chinese imports to Ethiopia coincides with China's accession to the World Trade Organization in 2001. As depicted in Figure 1, the slope of the trend becomes steeper in 2002. The timing of this increase in Chinese imports suggests that it is unlikely to be the result of a demand shock in Ethiopia. Rather the increase was likely due to the reforms China undertook to make its economy to more market-based and competitive (Ianchovichina & Martin, 2001). My empirical approach accounts for this feature while also focusing on the post-2002 period.

Ethiopia imports a mix of manufactured goods from China. Imports range from fertilizers and other types of chemical products, to plastics, rubber articles, clothing, and mechanical appliances. Electrical and non-electrical machinery, communication equipment,

[5]In this paper, I focus on manufacturing imports. 99.7 % of Chinese imports in Ethiopia are manufactured goods. The other 0.3% are goods classified as agriculture, electricity, mining and services.

[6]The major drops from 2015 to 2016 are concentrated in the Tobacco industry (74%) and the transport equipment industry (69%). While between 2015 and 2016 many industries imports kept growing, almost all experienced drops from 2016 to 2017 when the major drops were observed in the metals industry (70%) and the transport equipment industry (60%).

wearing apparel and textiles goods are among the largest share of imported goods. For example, in 2016, about 36% of total Chinese imports consisted of electrical machinery and equipment, television, video projectors, and mechanical appliances (Figure A.1). Not all the goods imported to Ethiopia were also produced domestically. For example, some types of power engines, marine engines, milling machines and other textile industry goods, machinery and medical equipment have no domestic production. The majority of goods not produced in Ethiopia are in the textile, machinery, and medical equipment industries. This suggests that not all imported goods directly compete with domestically produced goods.

There is variation in the degree of Chinese import exposure across industries and through time in Ethiopia. Table 1 reports four main characteristics across industries.[7] The first column captures industry size as measured by the industry share of total average, annual manufacturing employment in the country. The second column presents relative exposure to Chinese imports as measured by the industry's average annual imports share of total manufacturing imports. The last two columns report the average annualized growth of employment and imports between 2002 and 2017. As shown in the table, there is great variation in the share of imported goods, as well as the annual growth of imports across industries. For example, the machinery industry originally has a large share of total imports, but grows at the same pace as the average industry betwen 2002 and 2017. In contrast, the transport equipment industry represents a relatively small share of total imports in 2002 but grows much faster than the average industry. My empirical analysis exploits this variation across industries to measure the effect of exposure to Chinese imports.

The overall correlation between manufacturing imports and employment across industries is positive, but not systematic. For most industries around the 50th percentile of both employment and imports, the table suggests a positive correlation between employment and imports. For example, the textile and non-metallic mineral industries employ an important share of manufacturing workers (37%, 19% and 13% of the total manufacturing workers respectively) and are also exposed to Chinese imports. The industries that experienced large growth of Chinese imports also grew in terms of employment. For example, the vehicles industry experienced a 62% growth in imports and a subsequent 22% growth in employment. Meanwhile the fabricated metals industry grew less in imports (38%) and subsequently less in employment (16%).

Nonetheless, some of the biggest manufacturing industries - as measured by employment share - display a relatively small exposure to imports. This is the case for the food

[7] Industries use the the 2-digit ISIC codes. Further details on the industry coding are presented in section 3

and beverages industry, representing 27% of total manufacturing employment while their share of imports is less than 1%. In parallel, some of the top importing industries, such as the communications equipment and machinery industries, have a small share of domestic employment. In this paper, I employ a rigorous empirical approach to shed light on the direction and magnitude of the relationship between industry exposure to Chinese imports and industry employment.

2.2 Ethiopia's industrialization

As discussed in the previous subsection, the Ethiopian manufacturing sector remains small, although the overall trend of the manufacturing sectors' contribution to GDP is increasing. Importantly, most of the studies analyzing the impact of China are realized for high income countries where the contribution of the manufacturing sector is declining. In contrast, in Ethiopia, efforts are made by the government to increase the contribution of the manufacturing sector to GDP and employment growth.

The Ethiopian industrialization efforts focus on infrastructure development rather than targeted trade protection. While the policy instruments that prevailed since the imperial period focused on high tariff and import substitution, post-2002 industrial policy favors direct support for selected export sectors and provision of economic incentives and credit scheme (Gebreeyesus, 2013). The major trade policy change in Ethiopia was implemented between 1993 and 1998.[8] During this time period, the average import tariff (both output and input) declined from 41.6% to 19.5%. Before 1993, the maximum tariff recorded was 230%. After 1998, tariffs kept declining but at a much lower, practically negligible, pace as shown in Figure A.5 (Bigsten et al., 2016).

Following the reforms and trade liberalization efforts of the 1990s, three industries maintained relatively high tariff rates: the wearing apparel, footwear, and tobacco industries (Ianchovichina & Martin, 2001). This policy is consistent with the Ethiopian government's focus on promoting some of the most labor intensive industries within the country. These tariffs are not necessarily predictive of these sector's share of total Chinese imports. The wearing apparel industry has a relatively large import share, while the tobacco industry imports less. Notably, these tariffs were not specific to trade with China. Figure A.5 shows an almost flat trend in tariffs between 2002 and 2017, while Chinese imports were growing steadily during this period. My empirical analysis accounts for these potentially confounding factors as well as the relative importance of each industry in the industrial policy.

[8] See Gebreeyesus (2013), Fenta (2014) and Bigsten et al. (2016) for extensive details about the economic reforms undertaken by the Ethiopian government to move towards a private and marketed economy.

Together, these features reinforce the assumption that the rise in Chinese imports in Ethiopia is likely driven by reforms undertaken in China, rather than specific policies in Ethiopia. They also show why it is more appropriate to capture the Chinese trade shock through the directly observed industry imports rather than through tariffs.

As a country, China is currently Ethiopia's top export and import partner: Chinese imports represent 25% of total imports. The share of Chinese imports has grown substantially relative to other trader partners. Prior to the China shock, Ethiopia was primarily importing from Europe, but the relative share of imports from China grew substantially such that in 2016, the total value of imported goods from China was higher than those from Europe (Figure 2). Specifically, the Chinese share of total imports grew from 6.48 % to 27.96 % between 1998 and 2016. The reallocation away from Western economies could reflect the fact that China has become more competitive in producing the goods that Ethiopia needs to import, hence supplying similarly sophisticated goods but at a lower price.

2.3 Conceptual framework

Theoretically, the total impact of imports on domestic manufacturing employment is an empirical question. The direction and magnitude of impact depends on the relative importance of two main channels, namely the competition channel and the inputs channel.

Competition arises from domestic industries producing the same goods as those being imported from China, leading Ethiopian producers to compete against Chinese producers within the same industry. This channel may have two opposite effects on manufacturing employment. Competition may reduce employment through revenue effects driven by lower sales, potentially in conjunction with increased firm exit. This revenue effect is consistent with the Heckscher-Ohlin factor-proportions theory of comparative advantage (Leamer et al., 1995; Feenstra, 2003). According to these models, Chinese competition reduces the relative prices of goods in competing Ethiopian sectors. As such, high-cost Ethiopian producers see their sales fall and are eventually forced to exit, ultimately leading to lower employment in those sectors. As in Autor et al. (2013); Pierce & Schott (2016) and Acemoglu et al. (2016), increased competition imposed by imports from China led to declines in manufacturing employment.

However, competition may also increase employment due to an innovation effect whereby domestic producers upgrade their technology to compete with Chinese producers. The innovation effect is supported by Schumpeterian models which predict that firms willing to escape competition will innovate Aghion et al. (2005). Moreover, competition can increase firms' incentives to expand their market share (Raith, 2003) or minimize agency costs (Schmidt, 1997), which induces innovation. In Europe, Bloom et al. (2016) found that innovation - as measured by patenting - rose within firms that were more exposed to increases in Chinese imports. In Peru, Medina (2022) provides evidence for quality upgrading in response to competition from China and documents increases in annual sales and employment.

According to the inputs channel, imported intermediate goods may increase employment through productivity gains (Topalova, 2007) arising from access to better quality (Amiti & Konings, 2007), cheaper (Grossman & Rossi-Hansberg, 2008), or a greater variety (Goldberg et al., 2010) of inputs. Such intermediate goods produced and exported from China can be considered to be higher quality, to have lower prices, or to be completely non-existent in Ethiopia, and therefore may increase productivity in Ethiopian industries using Chinese inputs. Quality aside, if Chinese imports have lower prices, access to these inputs can improve firms' efficiency by lowering their production costs (Halpern et al., 2015). Higher productivity may allow firms to expand their production and, consequently, employment. Additionally, increased access to inputs may induce an expansion of firms' capacity utilization. The inputs channel is potentially more salient in low-income countries with poor access to good quality inputs.

One way to disentangle the competition and input effects is by separating the effects of imported goods by their end use category. Imports of final goods from China will spark competition in domestic markets. As discussed above, this competition can have *two* opposite effects: a reduction in employment through lower sales (revenue effects), or an increase in employment through technology upgrading (innovation effect). On the other hand, imports of intermediate goods can both spark competition or induce input effect. As a result, we can observe *three* possible effects on domestic producers: a revenue, innovation, and input effect. In this paper, I will proceed in two steps. In the first part of the paper, I will estimate the overall impact of total Chinese imports. In the second part, I will investigate the two channels of the impact in the context of Ethiopia.

3 Empirical strategy and Data

3.1 Industry exposure to Chinese imports

To measure industry exposure to Chinese imports, I follow Acemoglu et al. (2016) and Bernard et al. (2006) and define the import penetration ratio as the increase in Chinese imports by industry relative to the initial domestic industry demand. It is a measure of the degree to which domestic demand is satisfied by Chinese imports. Specifically, the industry import penetration is given by:

$$IP_{it}^{China} = \frac{Imports_{it}^{China}}{Output_{i,1998} + Imports_{i,1998} - Exports_{i,1998}} \tag{1}$$

where IP_{it}^{China} denotes the import penetration of Chinese imports in industry i and year t. $Imports_{it}^{China}$ is the total imports from China in industry i and year t. $Output_{i,1998}$, $Imports_{i,1998}$ and $Exports_{i,1998}$, are the production, total imports and exports respectively, for industry i in 1998. Together, the denominator represents the industry-specific initial domestic absorption. I chose 1998 as the base year because it is the earliest year before the rise of Chinese imports in 2002 with a sufficient number of observations across industries [9]

Figure 3 shows that, consistent with the trend in Chinese imports, import penetration increased significantly during the time period of analysis. In 2002, less than 10 % of the initial domestic demand was met by Chinese imports. In contrast, in 2016, Chinese imports represented 135 % of initial domestic absorption. This trend is observed across all industries taken individually (Figure A.2).

3.2 Main estimating equation

My empirical strategy leverages the variation in industry exposure to Chinese import competition to explain the variation in a range of outcomes across manufacturing industries. The baseline specification is as follows:

$$Y_{it} = \beta_1 IP_{it}^{China} + X_{it}'\beta_2 + \theta_t + \theta_i + \epsilon_{it} \tag{2}$$

In this context, Y_{it} is the outcome for industry i and year t. The main outcome of interest is the logarithm of industry employment. IP_{it} is Chinese import penetration in Ethiopia at year t. To address concerns of omitted variables bias, I include θ_i and θ_t as the industry and year fixed effects, respectively. Industry fixed effects control for industry-specific unobserved factors affecting employment, like for example the availability of raw hides in the leather processing sector which is variable due to animal disease. Year fixed effects control for nationwide shocks common to all industries, such as the global financial crisis of 2008. I include a vector X_{it}' of industry-level time-varying controls. In the baseline specification, I

[9]As a robustness test, I use two alternative base years: 2001 and the average domestic absorption from 1998 to 2001.

control for yearly imports from Africa, America, Europe and Asia excluding China. These control for confounding factors that may be correlated with Chinese imports to Ethiopia while also driving industry aggregate employment. Figure 2 also shows that, while China has become Ethiopia's top source of imports, Ethiopia still trades with other regions in the world. ϵ_{it} is the error term, clustered at the industry level as the import shocks may be correlated within industries. The coefficient of interest is β_1, which provides an estimate for the percentage change in industry employment associated with the industry's increase in Chinese import penetration.

3.3 Instrumental Variable

As specified in equation 2, the estimates of β_1 could be biased if rising Chinese import competition is endogenous to domestic factors in Ethiopia that also correlate with industry outcomes. For example, the Ethiopian manufacturing industries can experience shocks leading to increased demand for Chinese goods while also boosting domestic demand, and subsequently domestic employment. To address this concern, I implement an instrumental variable approach. The goal of the instrument is to capture the component of the rise in Chinese exports to Ethiopia that is unrelated to domestic factors. As discussed in Section 2, the rise in exports from China is more likely driven by reforms undertaken by the Chinese government to transition to a market based economy, which resulted in its accession to the WTO in 2001. If Chinese exports to Ethiopia grow over time, exports to China's other trading partners should similarly grow.

Therefore I instrument Chinese Import Penetration in Ethiopia with Chinese Import Penetration in other sub-Saharan African economies. I include a set of 11 sub-Saharan African countries that also import from China and whose Gross Domestic Product per capita is not greater or smaller than twice that of Ethiopia. I exclude countries that experienced major conflicts[10] during the period of analysis.[11] The assumption is that this instrument will isolate the component of the variation in exposure to Chinese imports that is influenced by productivity shocks in China. Under the identifying assumptions discussed below, this instrument will yield causal estimates of the Chinese exports shock on manufacturing employment. The instrument is given by:

$$IP_{it}^{China\_O} = \frac{Imports_{it}^{China\_O}}{Output_{i,1998} + Imports_{i,1998} - Exports_{i,1998}} \tag{3}$$

[10] According to the World Bank's list of "High institutional and social fragility" countries (2021)

[11] The countries included are: Chad, Guinea, Guinea-Bissau, Liberia, Madagascar, Malawi, Rwanda, Sierra Leone, Togo, Uganda, Tanzania.

where $IP_{it}^{China\_O}$ denotes Chinese Import Penetration of industry i in year t in the set of other sub-Saharan African economies. Likewise, $Imports_{it}^{China\_O}$ is total imports from China in industry i and year t. $Output_{i,1998}$, $Imports_{i,1998}$ and $Exports_{i,1998}$, are production, total imports and exports respectively, for industry i in 1998 in Ethiopia.

3.4 Identifying assumptions

In order for the aforementioned instrument to provide causal estimates of the impact of increased exposure to Chinese imports, it should satisfy two conditions. First is the relevance condition, which is satisfied if Chinese Import Penetration in other African economies causes variation in Chinese Import Penetration in Ethiopia. I test for weak instruments by testing the joint significance of the instruments' coefficients via the Kleibergen-Paap F-statistic. A first-stage F-statistic smaller than 104.7 indicates the presence of a weak instrument (Lee et al., 2022). My instrument satisfies this condition, as shown in Figure 4 displaying the first-stage of the instrument.

The second main assumption is the exclusion restriction. The exclusion restriction imposed by the instrument is that rising Chinese Import Penetration in other African economies affects the Ethiopian manufacturing industry only through the increase in Chinese imports in Ethiopia. In other words, import demand shocks need not to be correlated across countries. Arguably, rising imports from China is associated with supply-driven shocks such as the policy efforts to lowering barriers to trade, among others. In fact, Chinese imports in Ethiopia did not start rising until 2002, following China's accession to the WTO. Moreover, being a small economy, Ethiopia is unlikely to have caused the rise in Chinese exports to other African countries. Although this assumption is plausible, I take steps to ensure my estimates are consistent and the instrument is valid. First, I test for the endogeneity of the growth in Chinese imports. Second, I provide an overidentification test, treating each country separately as an instrument. Lastly, I provide robustness checks using an alternative instrument[12]. The results from these tests are presented in Section 4.

3.5 Data

To examine how exposure to Chinese imports affected the Ethiopian manufacturing sector, I use data from two main sources: the manufacturing sector data from the Ethiopian Large and medium scale manufacturing establishment census and trade data from the BACI Bilateral

[12] In the future, I will implement another robustness test to control for potential correlated demand shocks across the African economies using the gravity-based estimation strategy, following Autor et al. (2013).

trade flows database.

Trade data Data on trade flows is compiled from the BACI bilateral trade dataset of the CEPII [13]. BACI is an international trade database providing yearly data on bilateral trade flows at the product level. There are advantages to using the BACI data over the United Nations COMTRADE data, the most commonly used in trade related studies. BACI is a harmonized version of the UN-COMTRADE data. It uses statistical approaches to reconcile the discrepancies in the reporting of trade flows between importers and exporters, and verifies the reliability of the reported flows. This harmonization yields a higher level of reliability and greater coverage of products (more than 5,000) and countries (more than 200) compared to other similar datasets (Gaulier & Zignago, 2010).

For every importer-exporter-year combination, the dataset contains information on the trade quantity and trade value of each traded product for the period from 1994 to 2018. I adjusted trade flows to 2017 US dollar. Products are classified using the Harmonized commodity description and coding System (HS) at six-digits. The data is available in all HS revisions. This study uses the 1996 revision nomenclature (HS96). The revisions of the HS nomenclature are only available for the corresponding years. Since I use trade data from earlier years, the earlier HS revisions are more appropriate.

Manufacturing data Data on the Ethiopian manufacturing sector comes from the Large and Medium Scale Manufacturing establishment census (LMSM) collected by the Central Statistical Agency (CSA) from 1996 to 2017. The data are an unbalanced panel of all registered firms engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products. The survey is limited to establishments that employ at least ten workers (permanent and seasonal) [14] and use power-driven machinery. Data provides information, among other things, about each firm's capital, number of workers by occupation, sales, inputs, industry, etc. (output, capital, labor, raw material, energy inputs, and other industrial costs in the dataset). Both public and private firms are included.

Sample construction To construct my dataset, I aggregate both the imports data and the manufacturing firm data to the 2-digit International Standard Industrial Classification level (ISIC, Revision 3.1). Although the recent literature has emphasized the benefits of firm-level analysis to control for various factors, I conduct this analysis at the industry level for three

[13] The dataset was downloaded from the website http://www.cepii.fr/anglaisgraph/bdd/baci.htm.

[14] Firms continue to be surveyed even if their number of employees falls temporarily below 10. Firms are removed from the survey in subsequent rounds if they continue to employ less than 10 workers and are added back to the survey if they return to employing 10 workers.

reasons. First, my research question is targeted at understanding the impact of exposure to Chinese imports on industry manufacturing employment. Second, my treatment varies at the industry level. Third, aggregating the manufacturing data at the industry level addresses some concerns inherent to firm level. In particular, the manufacturing data exhibits high turnover. The average annual entry rate is estimated to be 32% with an average exit rate of 35%. Moreover, roughly 16% of the manufacturing firms appear only once in the dataset over the 16-year window. Firms' employment numbers range from 1 to more than 3,000. This pattern could be driven by firm ID entry errors[15]. Aggregating the firm data at the industry level accounts for these entries and exits. To aggregate the imports data to 2-digit ISIC codes, I use the WITS' crosswalk from the 6-digit HS96 product codes to the 4-digit ISIC codes.[16] The crosswalk file from HS96 product codes to ISIC Rev3.1 industry codes contains 5,113 products. I successfully map 4,236 imported products to 34 industries (including 22 manufacturing industries), representing manufactured goods Ethiopia imported from China between 1996 and 2017.

To construct the LMSM data at the firm level, I follow the cleaning steps described in Abebe et al. (2022). This yields a sample of 9,220 firms spanning 20 industries throughout the period from 2002 to 2017, with an average of 1,821 firms per year, indicating high firm turnover as mentioned above. As many as half of the firms are surveyed 5 times across the entire time period, a fact also established by other authors using the Ethiopian manufacturing dataset (Diao et al., 2021; Abreha, 2019; Gebreeyesus, 2013; Abebe et al., 2022).

I map the imports and manufacturing data by the 2-digit industry and year. To estimate the direct impact of exposure to Chinese imports, I restrict my sample of analysis to manufacturing industries[17]. As a result, I exclude all non-manufacturing industries from the imports data, since they do not have any corresponding industry in the manufacturing census data. Ultimately the sample contains 352 observations (22 industries from 2002 to 2017). Excluding the observations where there was zero employment due to nonexistent domestic production [18], my final estimation sample contains 278 observations. Data is winsorized at 1% overall.

[15]In other contexts, firm mergers could also explain such a pattern. However, this is unlikely the case in Ethiopia

[16]The World Integrated Trade Solution Concordance table can be downloaded from the website :https://wits.worldbank.org/product_concordance.html

[17]In Section 5, I also map non-manufacturing imports to account for indirect effects through the industries' input-output linkages.

[18]The transport equipment and the computing machinery industries do not have domestic production in Ethiopia. In addition, the following industries did not start counting firms until in the later years: electrical machinery industry, the petroleum and fuel, communication equipment, medical equipment. In this sense, my analysis is relevant for the industries with domestic production.

Summary statistics Summary statistics of the primary analysis sample are presented in Table 2. Panel A reports summary statistics on trade variables. Chinese imports represent 25.6% of total imports in Ethiopia. On average, each industry imported goods values at 86 million real 2017 USD over the time period of analysis. This corresponds to an average import penetration measure of 0.925, suggesting that for the average industry, the initial domestic demand was met almost fully by imports from China.

Panel B reports summary statistics on the manufacturing sector. The sector remains small overall. Mean employment across industries is 7,783 with a high standard deviation of 9,518. The average number of firms across industries is 94; howevver, similar to employment, firm counts vary dramatically across industries. About 40% of firms are considered "large" as they employ more than 20 workers. The average industry is more capital intensive than skills intensive. The ratio of capital (including buildings) expenditures to labor costs is 5.6 on average, whereas the ratio of labor costs to capital expenditures, measuring labor intensity, is 0.5. For the average industry, the ratio of skilled workers is 0.31. The ratio of permanent workers to total workers (both permanent and seasonal) is 0.94. The average entry and exit rates within industries are 15% and 19%.

4 Estimating the impact of total Chinese imports exposure

In this section, I argue that exposure to Chinese imports led to an increase in manufacturing employment. I estimate a manufacturing employment gain of 1.23 standard deviations attributable to a 1 standard deviation increase in import penetration as compared to the absence of such a shock. Moreover, I show that this result is robust across alternative instruments, alternative measures of import exposure, and alternative samples. I discuss how this result diverges from the most commonly reported results in the literature on the impact of Chinese import competition on manufacturing employment.

4.1 Baseline results

Results on the average impact of Chinese import penetration on manufacturing employment in Ethiopia are reported in Table 3. All regressions in this table follow the main estimating equation 2. They control for year fixed effects, industry fixed effects, as well as industry controls. Standard errors in parentheses are clustered at the 2-digit industry level.

I first present the OLS estimates of equation 2, reported in Column (1) of Table 3. I find that on average, a one percentage point increase in Chinese import penetration leads to a 13% increase in manufacturing employment. This estimate of the correlation between Chinese import penetration and industry employment is statistically and economically significant.

Next, I turn to the results on the instrumental variable approach. Column (2) of Table 3 presents the results on the first stage regression. In this regression, the independent variable is Chinese import penetration in Ethiopia, and the explanatory variable is Chinese import penetration in other African economies as measured in the same way as equation 3 but replacing industry imports from China by Ethiopia with industry imports by other African countries from China. The positive and significant coefficient on the first-stage estimate demonstrates that the instrument has strong predictive power on Chinese import penetration in Ethiopia. The Kleibergen-Paap F-statistic for the excluded instrument is 150.85, greater than 104.7, indicating that my estimates are unlikely biased by weak instruments. The first-stage coefficient suggests that a percentage point increase in Chinese import penetration in other African economies increases Chinese import penetration in Ethiopia by 0.302 percentage points.

The instrumental variable estimates suggest that exposure to Chinese imports led to an increase in manufacturing employment. The two-stage least squares estimates are presented in Column (3). The Ethiopian import exposure is instrumented with Chinese imports from other African economies. I find that a one percentage point increase in Chinese import penetration leads to a 15.2% increase in manufacturing employment. When multiplied by the mean of log(employment), this effect represents a 0.23 standard deviation increase in employment in response to a 1 standard deviation increase in import penetration. The estimated employment gains associated with a one standard deviation increase in Chinese imports penetration is 1,790. The impact is therefore statistically and economically significant. Lastly, column (4) presents the reduced form results, where the outcome variable is manufacturing employment and the explanatory variable is the instrument in equation 3. The reported coefficient indicates that Chinese imports lead to an increase in manufacturing employment by 4.6%. This effect is economically significant and statistically significant at the one percent level.

Table 3 indicates that the IV estimate in Column (3) is bigger than the OLS estimate in Column (1). This is consistent with a downward bias on the OLS estimates. One might expect downward bias in OLS estimates if the industries that face more import competition from China have other characteristics causing them to also have lower employment. Alternatively, measurement errors in the Chinese imports variable may cause attenuation bias, in which case OLS estimates will be attenuated towards zero. Finally, IV estimates provide a Local Average Treatment Effect (LATE). In particular, the instrumental variable is identified off of compliers, i.e. industries experiencing Chinese import competition in Ethiopia while also experiencing Chinese import competition in these same industries in other African countries.

Together, these results suggest that on average, Chinese import competition caused the most exposed industries to hire more labor. Although the 2SLS impact is large in magnitude and economically significant, its impact is not very big. As presented in Table 2, the average industry employment is 7,783. Therefore, evaluated at the sample mean, one percentage point increase in Chinese import penetration is predicted to increase manufacturing employment by 1,183.

4.2 Robustness checks

The main results presented above are robust to many checks. I run three groups of robustness tests on the main results. The first group addresses potential remaining endogeneity concerns from my empirical approach. The second provides evidence that my results are robust to employing alternative measures of the trade shock. The third group provides robustness checks from running the analysis on different data samples. In every specification, I instrument the Chinese import penetration shock with a similarly constructed measure for African economies.

Endogeneity of the Chinese imports. One concern about the exclusion restriction assumption of the instrument is that the increase in Chinese exports to Ethiopia may be correlated with the characteristics of the Ethiopia manufacturing industries. In this case, the estimates of Chinese import penetration would be biased. As discussed in Section 2, the rise in Chinese imports in Ethiopia has more to do with the reforms undertaken in China than domestic factors in Ethiopia. To support this hypothesis, I provide a test for the correlation between initial employment and future growth in imports. This test is in line with the recent discussion on shift-share instruments by Goldsmith-Pinkham et al. (2020). Results from Column (1) of Table B.3 suggest that initial industry employment does not predict future industry growth in Chinese imports. In column (2), I run a similar test but this time using initial employment growth defined as employment growth from 1996 to 2002. I find a statistically significant but very tiny negative coefficient on future imports.

Overall, this supports the idea that Chinese imports to Ethiopia are less likely driven by initial industry characteristics. Nonetheless, given that the small coefficient on the correlation between initial employment growth and future imports growth is statistically significant, I present results controlling for initial industry employment * trend; as well as initial industry employment in the robustness checks in Column(4) of Table B.3. The results remain robust after including the interaction term to control for potential endogeneity in the Chinese imports expansion.

Over-identification test of instruments. The validity of my instrument is not testable. However, the test of overidentifying restrictions can be performed in the presence of an overidentified model (Bowsher, 2002). To implement this test, I treat every single country included in my instrumental variable as a separate instrument. I then perform the J-test, where Chinese import penetration in Ethiopia is instrumented with Chinese import penetration in each of the 13 sub-Saharan African countries. I test the null hypothesis that, for each instrument, the remaining instruments are exogenous. Table B.5 shows that while the majority of instruments are valid, two are not. I run a robustness check restricting my instrument to the countries proved valid.

Alternative instrument. The tables in the Appendix subsection A.2 show results instrumenting Chinese import penetration in Ethiopia with Chinese imports penetration in high-income countries. I use the same set of countries used in Autor et al. (2013)[19]. This test addresses the concern that, given their regional proximity, Ethiopia and the other African economies can have an economic relationship that could affect Chinese exports to Ethiopia. In this case, one can argue that the rise in Chinese imports in Ethiopia could be correlated with Ethiopia's domestic demand[20]. For example, the African Continental Free Trade Area - although only recently operational - could influence Chinese imports in many African countries.

When using these alternative instruments, I find similar results overall. However, the instrument on total imports in Table B.5 does not pass the weak instrument test. For this reason, I use a subset of high-income economies where the corresponding instrument successfully predicts the Chinese exports to Ethiopia [21]. Using this subset, I find similar results from the total imports estimates, although the reduced form estimate is not precisely estimated.

Excluding one industry at a time. In table C.11, I test whether specific industries drive my results. As discussed in sections 2 and 3, there exists important variations in industry

[19] Australia, Denmark, Finland, Germany, Japan, New Zealand, Spain and Switzerland.

[20] In addition to this test, I will implement the gravity model of trade approach to address potential correlation of shocks across countries

[21] This includes New Zealand, Spain and Iceland

exposure to Chinese imports as well as the dynamics of industry manufacturing employment in Ethiopia. In particular, despite the overall positive correlation between employment and Chinese imports (see Figure 3), the high fluctuations in permanent employment observed across industries, especially in the textile, machinery, wearing apparel, and basic metal industries could obscure heterogeneity across industries. I implement this test by running the reduced form specification on different subsamples, excluding one industry each time. Focusing on the top and bottom importers as well as employers, columns (1) to (8) exclude the Textiles; Leather & footwear; Machinery; Chemicals, Coke, petroleum and nuclear equipment; Computing machinery; Wood; Food & beverages respectively. The reduced form results are robust across all these specifications.

More sample adjustments. In table C.12, I account for more sample adjustments, given the limitations/decisions in the datasets in use. I implement this test by running the reduced form specification on different subsamples. Column(1) presents the baseline results where the analysis includes years 2002 to 2017, hence excluding observations before 2002. Column(2) includes all years (1996-2017). Column(3) excludes the following industries due to lack or negligible imports and/or employment data: Tobacco products, Wood, Petroleum and nuclear fuel, Computing machinery, Communication equipment, and Medical equipment. Column(4) excludes firms where employment varies inconsistently (by more than 5 times the average over time). Column(5) Excludes firms that only appear once in the data. Compared to the main results, all samples provide similar results in sign, magnitude and statistical significance, except for the sample including all years available in the data. Although the coefficient remains positive, its magnitude and precision decrease. This is consistent with the fact that imports from China were almost nonexistent prior to 2002.

Alternative measures of import penetration. In table C.13, I capture the Chinese import competition shock through alternative measures. In essence, instead of normalizing industry import shares with initial industry absorption, as in equation 3.1, I normalize the measure using initial industry employment as well as initial industry output. In addition, I use a more direct measure of imports, the total industry imports from China, without any adjustment. All results are similar to the main results in sign and statistical significance. The magnitudes of the estimated coefficients are very similar when using total imports, whereas they differ slightly when using imports adjusted by initial employment or initial output. However, this is not inconsistent with the main results given different measures used to adjust imports.

Lagged imports shock. In table C.14, I use the lagged values of the baseline import penetration as well as the import penetration measures described in the previous paragraph. Lagged values of the trade shock account for two main facts. First, they account for any delay in transmission of the shock. Second, they also account for endogeneity. Results are overall similar. If anything, they are of the same sign and larger in magnitude.

The pattern of a robust and significantly positive coefficient of total Chinese imports on manufacturing employment in Ethiopia is in contrast with the experience of the high and middle income countries examined in the literature, including in North America (Autor et al., 2013; Acemoglu et al., 2016; Bernard et al., 2006), Europe (Bloom et al., 2016; Mion & Zhu, 2013), and Latin America Blyde & Fentanes (2019); Iacovone et al. (2013). In those countries, the literature finds that Chinese imports had disruptive impacts on domestic manufacturing employment. In the next section, I investigate one feature of the Ethiopian manufacturing sector that could drive this result; namely, the composition of its imported goods.

5 Separating out the competition from the inputs channels

In light of my conceptual framework, import exposure can affect employment through two main channels: the competition channel and the inputs channel. One way to disentangle the two channels is to break down total imports into the imports of final goods and the imports of intermediate goods. The impact of final good imports provides one estimate of the competition channel as imported final goods will compete with final goods produced by the domestic manufacturers in Ethiopia. Final goods are not used as inputs to production, so they will not affect the inputs channel. Intermediate goods can include both the competition and input channels as these imports can serve as inputs to domestic firms' production process and can also compete with inputs produced and sold in Ethiopia. This is particularly true if the domestic market has important supply chain linkages. I expect the competition channel to be less prevalent in Ethiopia when it comes to imported intermediates since I show that imported intermediates are very high relative to domestic consumption.

In this section, I argue that the positive total impact of increased Chinese import exposure is dominated by the inputs channel. First, I find that 78.5% of total Chinese imports in Ethiopia are made of intermediate goods. I find that on average, a one percentage point increase in exposure to Chinese intermediate imports leads to a 9% increase in industry employment. This effect is statistically and economically significant. On the other hand, exposure to final good imports has no detectable impact on manufacturing employment.

5.1 Decomposing total imports by end use

To determine the end use category of imported goods, I map the imports dataset at the 6-digit product level to the Broad Economic Categories (BEC) classification. This classification yields two categories of goods: final goods and intermediate goods. The initial BEC end use categories includes capital goods as well. In this analysis, I group the intermediate goods together with the capital goods because both types of goods enter in the production process. The proportion of imported capital goods is relatively small (13%)[22]. Only 0.8% of all imports are unclassified.

The decomposition reveals that on average, 78.5% of total Chinese imports to Ethiopia during the time period from 2002 to 2017 were intermediate goods. Figure 5 displays the evolution of the share of each category of imports over the total value of Chinese imports. The proportion of intermediate imports by Ethiopia was on a positive trend over time, reaching a peak of 89.1% in 2008. When compared to other countries, this composition of imports is relatively high in intermediate goods. For example, over the same time period, the average share of intermediate imports over total Chinese imports in the United States was 51.3% (see Figure A.4). When compared to other imports origins, the composition of Chinese imports is proportionate to European imports (Figure A.3). Ethiopia imports a higher share of final goods from the rest of Asia[23]. This is consistent with the fact that Ethiopia has been substituting its imports away from Europe (Figure 2), probably due to lower prices.

The large majority of goods produced in Ethiopia are final goods. Although the LMSM data does not allow me to neatly distinguish between the Ethiopian producers of intermediate goods and the producers of final goods, an inspection of Table B.1 suggests that the large majority of imported intermediates are not produced in Ethiopia. For this reason, I expect the competition channel to be less prevalent in Ethiopia when it comes to imported intermediate goods.

[22] A few example of goods classified as capital goods: machines (which constitutes the majority of capital goods), electrical transformers, radiators, turbines, engines.

[23] Major countries are India, United Arab Emirates and Vietnam

5.2 Impact of final and intermediate goods imports

Having decomposed the Chinese imports across intermediate and final goods, I separately estimate their impacts on manufacturing employment. Specifically, I construct a new measure of Chinese import penetration. I first aggregate the final or intermediate good imports by industry-year. Then, I adjust each import type by the initial absorption as in equation 3.1.

For example, consider the textile industry. Goods such as mattresses, blankets, towels, rugs, tents, bedspread, and other similar goods imported for retail sale will be classified as textile final goods. Conveyor belts, staple fibres, woven fabrics, and other similar unfinished fabrics not destined for retail sale but used in the preparation, spinning, or weaving of textiles will be classified as textile intermediate goods. Table 4 presents the breakdown of intermediate and final goods import shares across industries. As shown in the table, for the majority of industries, the biggest share of imports are intermediate goods. The exception is for the wearing apparel, tobacco, as well as the leather and footwear industries where the share of intermediate imports was zero or close to zero.

To evaluate the separate *direct* impact of final good and intermediate good imports, I estimate the following regressions:

$$Y_{it} = \beta_1 IP\_Final_{it}^{China} + X_{it}'\beta_2 + \theta_t + \theta_i + e_{it} \tag{4}$$

$$Y_{it} = \beta_1 IP\_Intermediate_{it}^{China} + X_{it}'\beta_2 + \theta_t + \theta_i + e_{it} \tag{5}$$

where $IP\_Final_{it}^{China}$ is the Chinese import penetration in Ethiopia for final goods exclusively, for industry i and year t. It is computed by aggregating all products classified as final goods within the 2-digit industry. Similarly, $IP\_Intermediate_{it}^{China}$ is the Chinese import penetration in Ethiopia for intermediate goods exclusively, for industry i and year t. Since the BACI dataset provides product-level information across all the countries available, I construct the instruments separately for final good imports and intermediate good imports. Specifically, I instrument the Chinese final good imports to Ethiopia with the Chinese final good imports to other African economies. Similarly, I instrument the Chinese intermediate good imports to Ethiopia with the Chinese intermediate good imports to other African economies. Everything else is the same as in equation 2. The coefficients of interest are β_1 and β_2, which provide an estimate for the percentage change in industry employment associated with an industry-level increase in Chinese import penetration for final goods and intermediate goods respectively.

Overall, I do not detect an effect on manufacturing employment from the imports of

Chinese final goods. Table 5 presents the estimates of β_1 on equation 4, where Chinese final good imports to Ethiopia is instrumented with the Chinese final good imports to other African economies. Column (1) presents the OLS results where the effect of the trade shock is positive, relatively small and statistically insignificant. Column (2) presents the first-stage results. It shows a strong first stage with an F-statistic greater than 10. Column (3) presents the 2SLS coefficient, which is positive but not precisely estimated. Column (4) presents the reduced form results, which also has a positive coefficient but not statistically significant. The associated standard deviation increase in employment is 0.08. This suggests that the competition channel is not likely driving the aggregate positive impact on employment.

Note that the coefficient on both the 2SLS and the reduced-form regressions are not small in magnitude. However, they are not precisely estimated. This could indicate that the competition channel might be operating, and I do not have sufficient power to fully reject it. To explore further, I run the regression using a subset of the data that excludes the industries with no variation in the composition of imports, i.e. those that import only the final goods, namely the tobacco and wearing apparel industries. I report the results in column (5) of Table 5, which show a negative but insignificant impact. I also run, in Column (6), the regression for the industries whose imports are only final goods. I find a similarly small coefficient as in Column (4). However, it is not statistically significant.

Furthermore, using my alternative instrument - the one in Autor et al. (2013) -, I find a similarly imprecise estimate on the impact of final goods, but with a negative coefficient (see Table B.6)[24]. In sum, these results suggest that if anything, the competition channel would have contributed to the total effect with only a very small magnitude, but it is unlikely the major channel through which imports led to higher employment.

Turning to the impact of intermediate goods imports, Table 6 presents the estimates of β_1 on equation 5, where Chinese intermediate good imports to Ethiopia are instrumented by the Chinese intermediate good imports to other African economies. Column (1) presents the OLS results where the effect of the trade shock is positive and statistically significant. Column (2) shows a strong first stage, with the F-statistic greater than 123.06 allowing the rejection a weak instrument. Column (3) presents the 2SLS coefficient, which is positive and statistically significant. Column (4) presents the reduced form results, with a coefficient that is also positive and statistically significant. Focusing on the IV results, the findings suggest that a percentage point increase in Chinese intermediate good import penetration leads to an increase of employment by 24.1%.

[24] In other unreported robustness checks, I also find negative and insignificant effects on final good imports

These results suggest that the overall positive impact of Chinese imports is driven by the imports of intermediate goods. When compared to the estimates of final goods imports, those of intermediate imports are larger and precisely estimated. Nonetheless, these estimates could contain both the inputs and the competition effects. The estimates could be driven by input effects if each industry is importing a large share of intermediate inputs also classified in that industry. They would reflect competition effects if domestic industries manufacture and sell intermediate goods to other domestic industries or to export markets. There are a few ways for separating out these two effects.

First, whether or not domestic industries produce intermediate manufactured goods that they sell in the domestic market. If they do, then competition may also exist over intermediate goods. One way to check this is by examining the products sold in Ethiopia to separate out the producers of intermediate inputs and the producers of final goods. Unfortunately, it is not possible to determine the end use category of domestic manufactured goods from the Ethiopian manufacturing census data. The manufacturing census does not consistently provide information on the products sold by firms. In addition, the data is not detailed enough to determine whether the goods are intermediate or final goods. Nonetheless, the large majority of imported intermediates are not produced in Ethiopia. Therefore, these estimates are unlikely to provide competition effects on imported intermediate goods.

We can also find suggestive evidence by analyzing the input-output table. The input-output table provides the distribution of aggregate demand between intermediate demand from firms and final demand from households. The 2005 input-output table indicates that only 24.3% of aggregate demand is served in the intermediate market (including the non-manufacturing sectors). The remaining 75.8% is allocated to households consumption. Within the manufacturing sector, the share of own industry input usage is relatively high (see Figure 7). For example, as shown in Figure 6, about 20% of the textile industry inputs are supplied by the textile industry. Note that this percentage is higher (about 57%) if I restrict to the manufacturing sector. Because the manufacturing sector in Ethiopia is underdeveloped, the majority of manufacturing inputs are domestically sourced from the agricultural and services sectors. Overall, 55% of its total inputs are supplied by the agricultural and mining sector, 15% from the services sector, and only 30% from the manufacturing sector (including more than half from the textile industry). This breakdown implies that, relative to the competition channel, the inputs channel is likely dominant.

Lastly, I can distinguish between the competition and inputs channels by looking at the indirect effect through the supply chain to compute an estimate of input usage. Instead of assigning intermediate imports of each industry only to the corresponding domestic industry, I adjust the exposure measure by accounting for imports from all other industries entering the production process of the domestic industry. For example, since the textile industry sources inputs from the metals and the rubber industries among others, my textile import exposure measure will account for imports from metals and rubbers according to their usage shares in the textile industry. This is by far the cleanest way for identifying the inputs channel. I implement this in the next subsection.

5.3 Accounting for input usage

To estimate domestic intermediate input usage, I proportionally allocate imports of intermediate inputs to industries using the input-output table. Imports of intermediate inputs are distributed across industries based on the industry's input usage share in total intermediate usage. This allocation assumes that industry patterns of input usage are the same for imported goods and domestic goods. This approach allows me to estimate the impact on the textile industry when its domestic suppliers, for example the metals or rubber industries import from China. Chinese imports shocks are allocated to industries as follows:

$$Imports\_usage_{it}^{China} = \sum_j \alpha_{ji} * intermediate\_imports_{jt}^{China} \tag{6}$$

where i is input purchaser industry, j the input supplier industry, and α_{ji} the share of input j in total inputs of industry i. The aggregate intermediate imports for each industry correspond to the sum of industry imported intermediate goods. I then estimate the input channel impact of Chinese intermediate as follows:

$$Y_{it} = \beta_1 IP\_usage_{it}^{China} + X'_{it}\beta_2 + \theta_t + \theta_i + e_{fit} \tag{7}$$

where $IP\_usage_{it}^{China}$ is the import penetration measure computed with $Imports\_usage_{it}^{China}$. I use the input-output table from the 2003 Kenyan Social Account Matrix (SAM) constructed by the International Food Policy Research Institute[25].

One thing to keep in mind is that the above measure of input usage includes own industry input usage. Computationally, the adjusted measure of intermediate imports includes the main diagonal elements of the input-output table. For this reason, I do not include the unadjusted (direct intermediates exposure) and the adjusted (intermediate usage) measures of imported intermediates in the same regression. However, as a robustness check, I run the

[25] Given the data limitations from the Ethiopia Input-Output table, I use an alternative country source. The major limitation from the Ethiopian I-O table is that it lacks the linkages. For example, some industries that are a natural source of inputs do not show up.

regression including the direct impact while excluding the self-consumption when computing the I-O input shares.

Results are presented in Table 7. The first four Columns present the same information as in previous tables. Running the impact through the supply chains, I find that most of the impact documented in the direct impact is driven by the input usage channel. The 2SLS estimate on Column (3) can be interpreted as a 13.8% change in manufacturing employment in response to a percentage point increase in the Chinese intermediate good import penetration. The corresponding standard deviation increase in employment is 0.33, which is a bigger impact than the direct impact of the unadjusted imports exposure measure.

To further support the input usage channel, I estimate this impact on two subsamples. The first sample contains the firms that report using imported inputs in their production process. The hypothesis is that, if the industries are benefiting from Chinese intermediate inputs, then the results should hold for input importers and not the others. As a placebo test, I examine this regression in the sample of domestic input users. I aggregate only firms that reported using imported inputs at least once. About 70% of firms report using imported intermediates. As shown in Table 2, at the industry level, the ratio of imported inputs cost to total inputs cost averages 60 %. Values ranges from 20% to 100% with a median of 74%. For the placebo test, I aggregate only firms that never reported using imported inputs in their production function.

Consistent with the input channel, I find that the impact on imported inputs users is positive, larger in impact than the full sample, and statistically significant. The estimates for the sample of firms with not imported inputs show no impact of imported intermediates on employment in these firms. The larger and significant impact on input importing firms than for input non-importing firms suggests that the technology embodied in the imported inputs Amiti & Konings (2007) are beneficial to firms. In fact, imports of inputs from more developed economies are considered to be of higher quality (Strauss-Kahn, 2014; Feng et al., 2016). This is consistent with the fact that in 2001, shortages of raw materials and other issues related to difficulty accessing inputs was listed among the top reasons that prevented Ethiopian manufacturing firms from operating at full capacity [26]. This observation has been highlighted across many developing economies.

[26]Source: author's calculation using the LMSM census

6 Mechanisms

In the previous section, I demonstrated that exposure to Chinese imports is positively affecting employment through the inputs channel. These results can be explained by a few possible mechanisms. I test three mechanisms through which the imported inputs can lead to increases in employment: total factor productivity (TFP), skills upgrading, and within industry reallocation. I also examine the heterogeneous impact of Chinese imports based on industry characteristics.

I argue that in Ethiopia, Chinese inputs increase employment through the positive impact on industry total factor productivity. I find a positive impact on skills upgrading for the industries affected through the downstream shock. This suggests that, with the assumption of complementarity between labor and inputs, the use of higher quality inputs from China might require firms to employ more skilled workers. I do not find evidence of within industry reallocation in response to Chinese imports. Finally, the heterogeneity analysis reveals that the employment impact of Chinese imports exposure is driven by large firms and more labor intensive industries. Whereas, ownership type does not influence this impact.

6.1 Productivity

There are several hypotheses of how trade impacts firm productivity. In this section, I focus on the impact on productivity driven by access to imported inputs. Several empirical studies provide evidence that access to cheaper and better intermediate inputs is a source of increased efficiency and productivity (Grossman & Helpman, 1991; Amiti & Konings, 2007; Topalova, 2007). Topalova & Khandelwal (2011) assert that the intermediate imports are particularly beneficial for developing countries facing limited access to technology and better inputs.

I determine the industry-level productivity by computing the weighted average of firm-level productivity. To estimate firm-level productivity, I assume a Cobb-Douglas production function for the firm. The log-linear transformation of the production function is given by:

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + \omega_{it} + \eta_{it} \tag{8}$$

where y_{it} is the logarithm of the firm's value of production, k_{it} is the logarithm of the capital input, and l_{it} the logarithm of labor input. ω_{it} and η_{it} are error terms representing firm productivity. The first error term captures the unobservable productivity shocks that are endogeneous to input choice. η_{it} is the productivity shocks that are uncorrelated with input choice.

Firm productivity is obtained by estimating the production function and extracting the estimation residual. Olley & Pakes (1996) points to two challenges for estimating firm productivity. First is the simultaneity bias, which arises from the correlation between the firm's productivity and their choice of inputs. For example, there could be a positive correlation between productivity and labor, such that high productivity firms will employ more workers. Second is the selection bias which arises from the negative correlation between the firms' capital and their probability of exit. For example, low productivity firms endowed with larger capital will be less likely to exit the market.

To address the simultaneity and selection bias in estimating the production function, I follow Levinsohn & Petrin (2003). This estimation approach addresses the bias by using material inputs as a proxy for the unobservable productivity shocks that are correlated with input choice. To support the validity of material inputs as a proxy, Levinsohn & Petrin (2003) show that the demand function of intermediate inputs is monotonically increasing in the materials demand function to be inverted as follows:

$$\omega_{it} = \omega_{it}(k_{it}, m_{it}) \tag{9}$$

Substituting this function in the production function, we can rewrite:

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + \beta_m m_{it} + \omega_{it} + \eta_{it} \tag{10}$$

$$= \beta_l l_{it} + \phi_{it}(k_{it}, m_{it}) + \eta_{it} \tag{11}$$

$$\phi_{it}(k_{it}, m_{it}) = \beta_0 + \beta_k k_{it} + +\beta_m m_{it} + \omega_{it}(k_{it}, m_{it}) \tag{12}$$

The estimation of the production function is done in two steps. In the first step, $\hat{\beta}_l$ is estimated using a third-order polynomial approximation of k_{it} and m_{it}. With $\hat{\beta}_l$, ϕ can also be estimated as follows: $\hat{\phi_{it}} = y_{it} - \hat{\beta}_l l_{it}$. Next, β_k and β_m are estimated using the Generalized Method of Moments approach. The details about these steps can be found in Levinsohn & Petrin (2003) and Petrin et al. (2004).

The reduced form results are reported in Table 9, Column (1). I estimate the impact of intermediate input usage and restrict the sample to industries aggregating across importing firms. I find that a one percentage point increase in Chinese import penetration increases productivity by 15.4%. This result is in line with a large body of empirical literature which provides evidence that a decline in input tariffs or imports of intermediate goods leads to productivity gains (Goldberg et al., 2010; Abreha, 2019; Goldberg et al., 2010; Redding et al., 2006; Nocke & Yeaple, 2006; Topalova & Khandelwal, 2011; Topalova, 2007; Amiti & Konings, 2007; Kasahara & Rodrigue, 2008).

6.2 Capacity utilization

In early years of the survey, a greater share of firms reported lack of access to raw materials among the top reasons preventing them from operating at full scale. I find that Chinese imports of intermediate inputs led to a decline in the share of firms reporting lack of access to raw materials as a constraint to operating at full capacity (Table 8), while also increasing firms capacity utilization (Table 9, Column (2)).

6.3 Skills upgrading

Skills upgrading can be a result of pro-competitive or input effect. On the one hand, the literature reports that increased competition may lead to a decline in low-skilled workers, or to higher investments in innovation, which in turn will increase the relative share of skilled workers Mion & Zhu (2013); Grossman & Rossi-Hansberg (2008). On the other hand, trade can lead to skill-biased technological change (Bloom, 2011). I find that Chinese imports of intermediate inputs led to an increase in skilled workers (Table 9, Column (3)). This could suggest that the imported inputs incorporate higher technology that require firms to hire skilled labor, under the assumption that labor and inputs are complementary.

6.4 Within industry reallocation

The trade literature underlines the role of between industry reallocation patterns of manufacturing firms in response to trade shocks (Melitz, 2003; Bernard et al., 2006). In this section, I discuss the within industry entry and exit in response to increased Chinese imports [27]. Table 9, Columns (5) and (6) display the relationship between firm exit and import competition. The reduced form results suggest that Chinese import exposure had no effect on the average rate for firm exit or entry within the industry.

6.5 Heterogeneity

Another way to learn about the underlying mechanisms for Chinese import exposure effects is by identifying how the industry employment effects differ across sub-groups of firms based

[27] In the context of Ethiopia, intra-industry switching of firms is extremely rare.

on certain characteristics. I examine the impact across firms of different sizes, production factor intensity, and ownership status. Firms are classified as either large (employ at least 50 workers) or small (employ less than 20 workers); labor intensive (above the 50th percentile in the labor to capital expenses ratio); private or public. For each subgroup of firms, I aggregate across industries and estimate equation 5, restricting to firms using imported inputs.

The results are presented in Table 12. They provide evidence that the imported inputs disproportionately benefited large firms (Columns 1 and 2). This is consistent with the evidence provided by Abreha (2019) on selection to importing among large Ethiopian firms. Similarly, labor intensive industries benefited more than capital intensive industries (Columns 3 and 4). Columns (5) and (6) indicate that there is no significant difference in how firms of different ownership were affected by Chinese imports of intermediate goods.

7 Conclusion

In Ethiopia, Chinese imports have risen very quickly in the last two decades. This paper evaluates the effect of the increased exposure to Chinese imports on Ethiopian industry-level manufacturing employment. To causally estimate this effect, I instrument Ethoipia's imports from China with imports by other African countries from China and perform a number of robustness checks. I find that Chinese imports have a positive and significant impact on manufacturing employment. Ultimately, Ethiopian industries that faced higher exposure to Chinese imports consequently experienced higher employment.

I then disentangle this impact across two competing channels: the competition and the input channel. I distinguish between the imports of final goods and those of intermediate goods. I find that the inputs channel outweighs the competition channel. In particular, the employment gains are driven by the imports of intermediate goods that are dominated by intermediate goods. The key mechanisms through which these employment gains are occurring is by increasing industry productivity and capacity utilization. The Ethiopian industries using Chinese intermediate inputs improve their productivity and are able to expand their employment.

Compared to existing estimates in the literature, the positive and significant effect of imports on manufacturing employment is a novel result. While most of the empirical literature on Chinese import competition has focused on the competition effects, the broader trade literature emphasizes the important role for intermediate inputs. Decomposing the imports between the final and intermediate goods, and further accounting for input-output linkages across industries, reveals the inputs channel was critical in generating employment gains in Ethiopia.

These results have important policy implications. They suggest that underdeveloped economies which are pursuing industrialization may incur gains from the rise of China through access to relatively cheap high quality inputs into the production process. Government policies that can facilitate access to foreign exchange and more broadly access to intermediate inputs will be important for the growth of the manufacturing sector.

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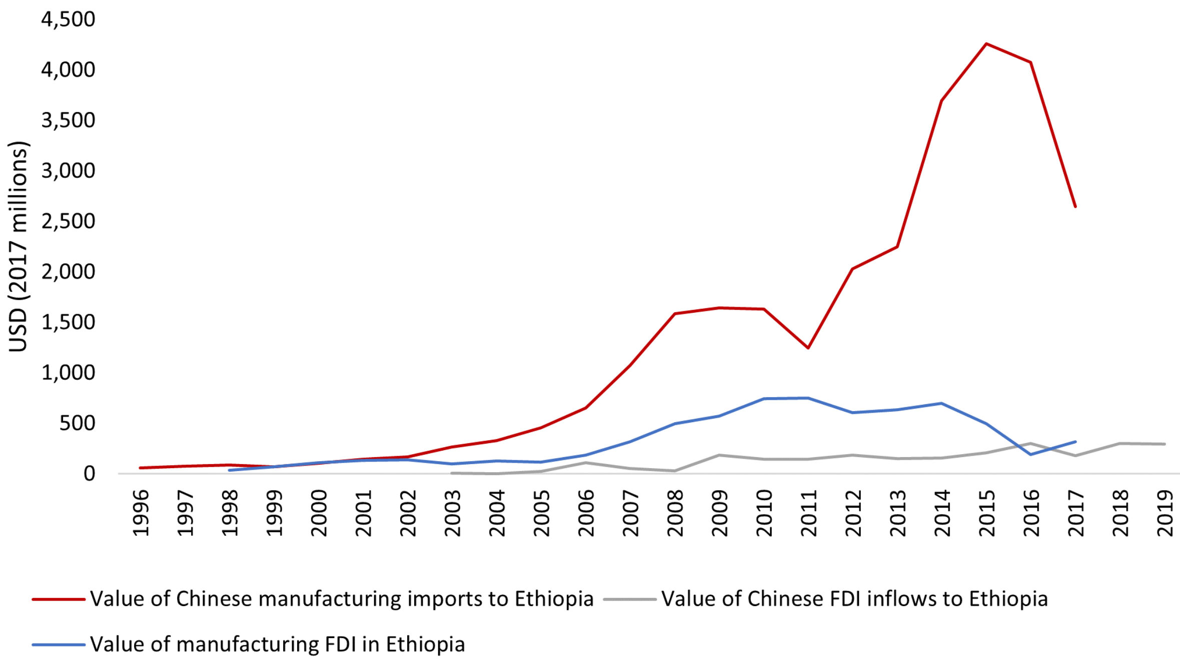
Figures and Tables

Figures

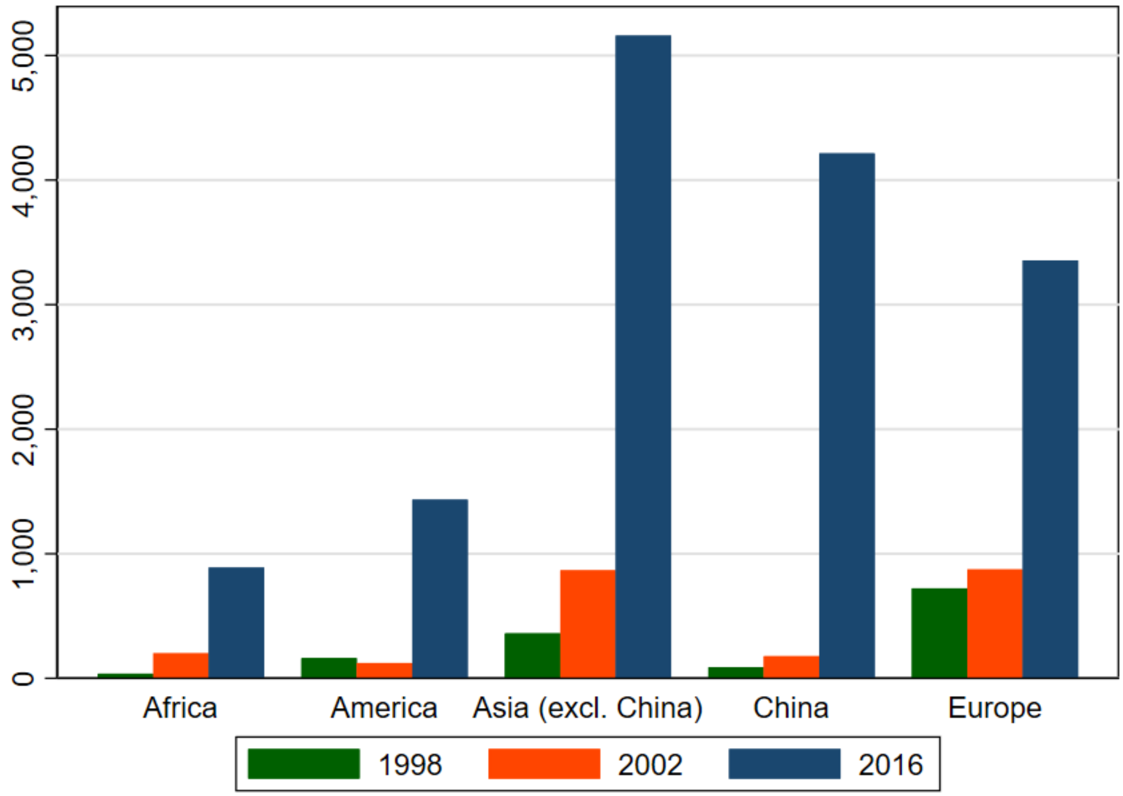
Figure 1: Chinese manufacturing imports and FDI to Ethiopia



Notes: The value of Chinese FDI inflows includes all sectors, not just manufacturing. The value of manufacturing FDI in Ethiopia includes all sources of FDI, not just Chinese.

Sources: (1) BACI database 1996-2017, CEPII; (2) The Statistical Bulletin of China's Outward Foreign Direct Investment covering 2003-2019 published by China's Ministry of Commerce (MOFCOM); (3) Ethiopia Central Statistical Agency's annual survey of Large and Medium Scale Manufacturing (LMSM) 1996-2017

Figure 2: Imports from China and the ROW in USD (2017 millions)



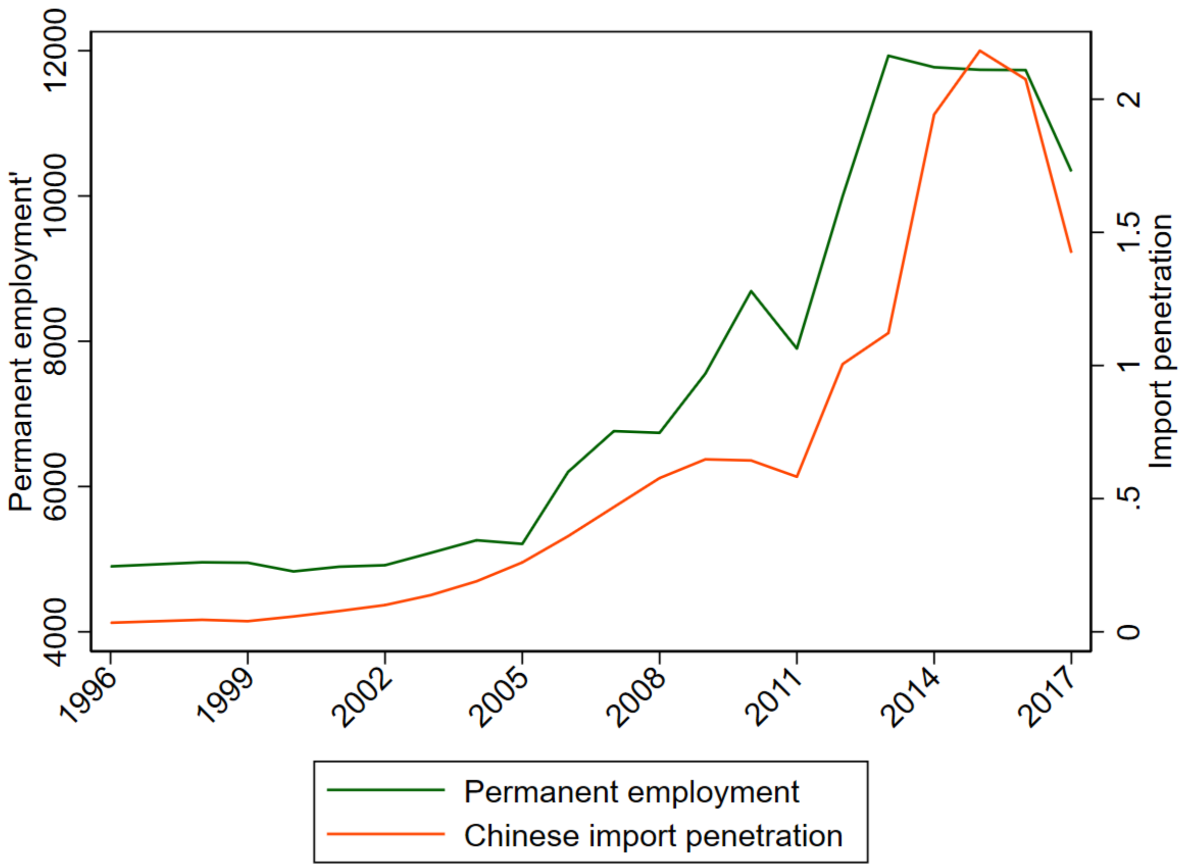
Notes: Each bar represents the total value of imported goods by origin and year. Green bars refer to year 1998, Orange bars to year 2002, and blue bars to year 2016. Graph constructed using data from the BACI database.

Imports share by origin and years

Year	Africa	America	Asia	China	Europe
1998	2.70	11.77	26.09	6.48	52.21
2002	8.93	5.46	38.54	7.89	38.85
2016	5.90	9.56	34.23	27.96	22.26

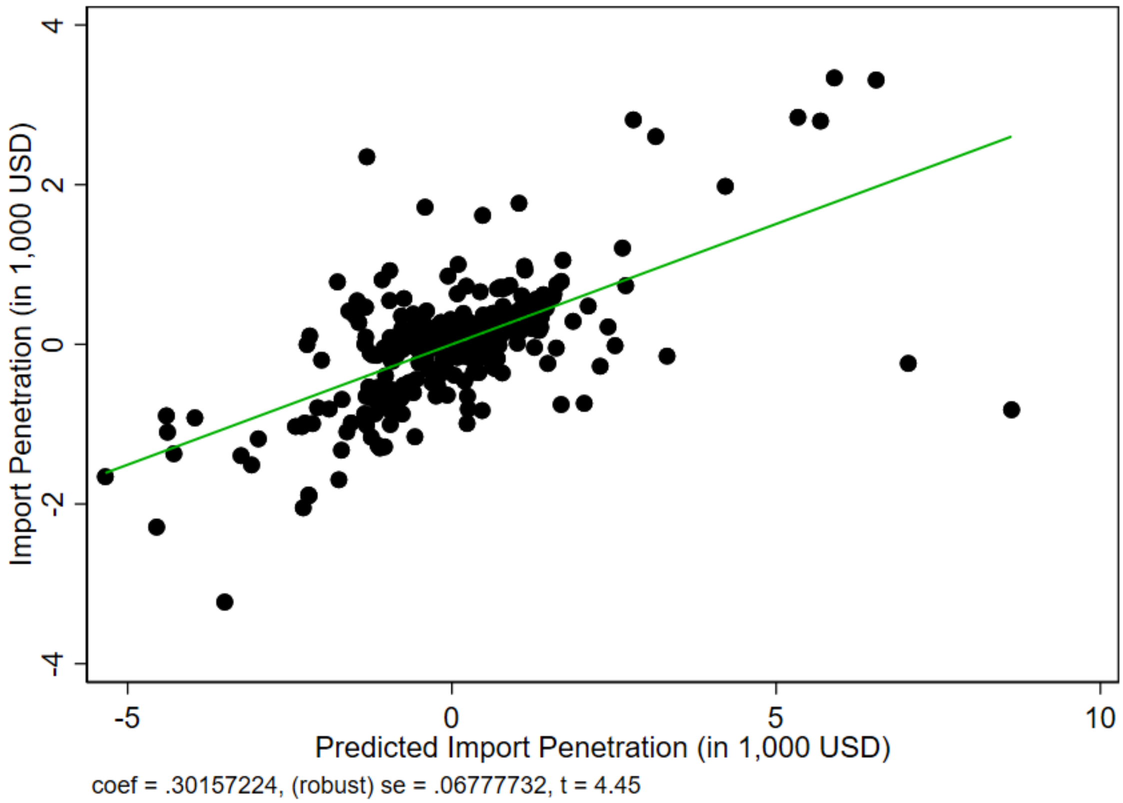
Notes: Each row represents the share of imports from each origin on total imports of the year. Table constructed using data from the BACI database.

Figure 3: Manufacturing employment and Chinese import penetration over time



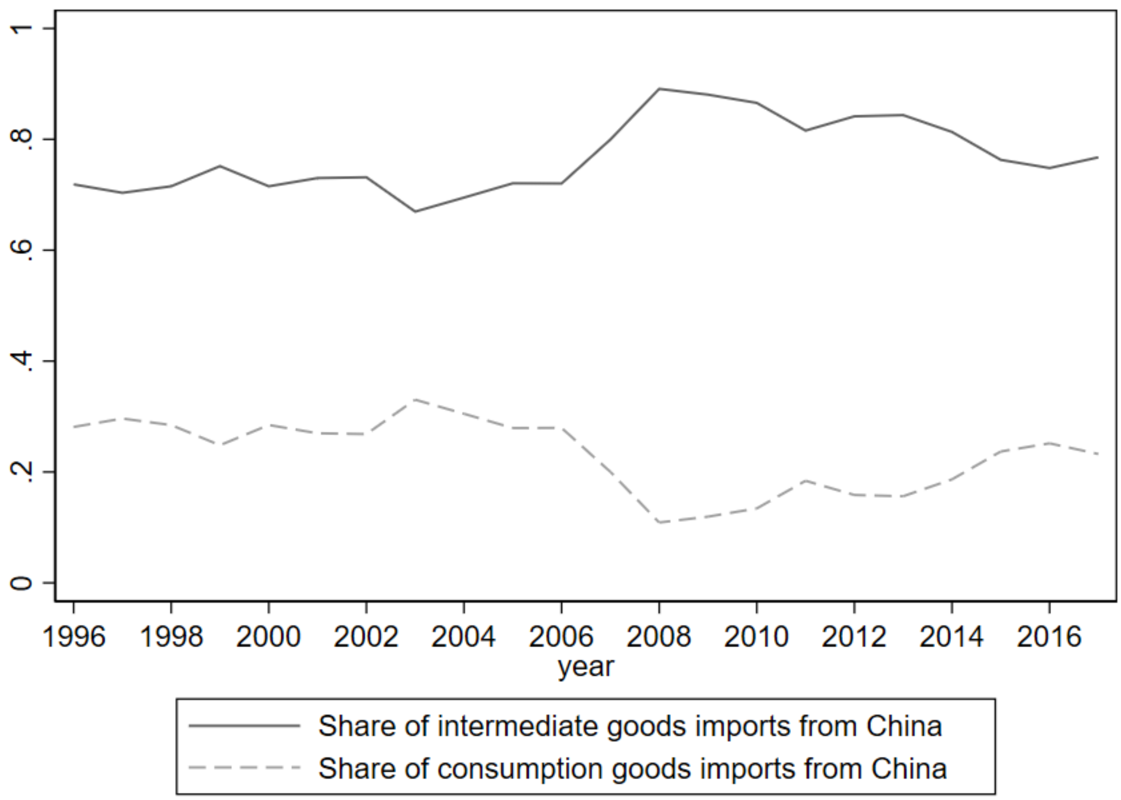
Notes: Green line is manufacturing employment, measured as the yearly permanent employment across all manufacturing industries. It uses the left axis and is measured in thousands 2017 USD. Orange line is the average Chinese import penetration by year. It uses the right axis.

Figure 4: First stage



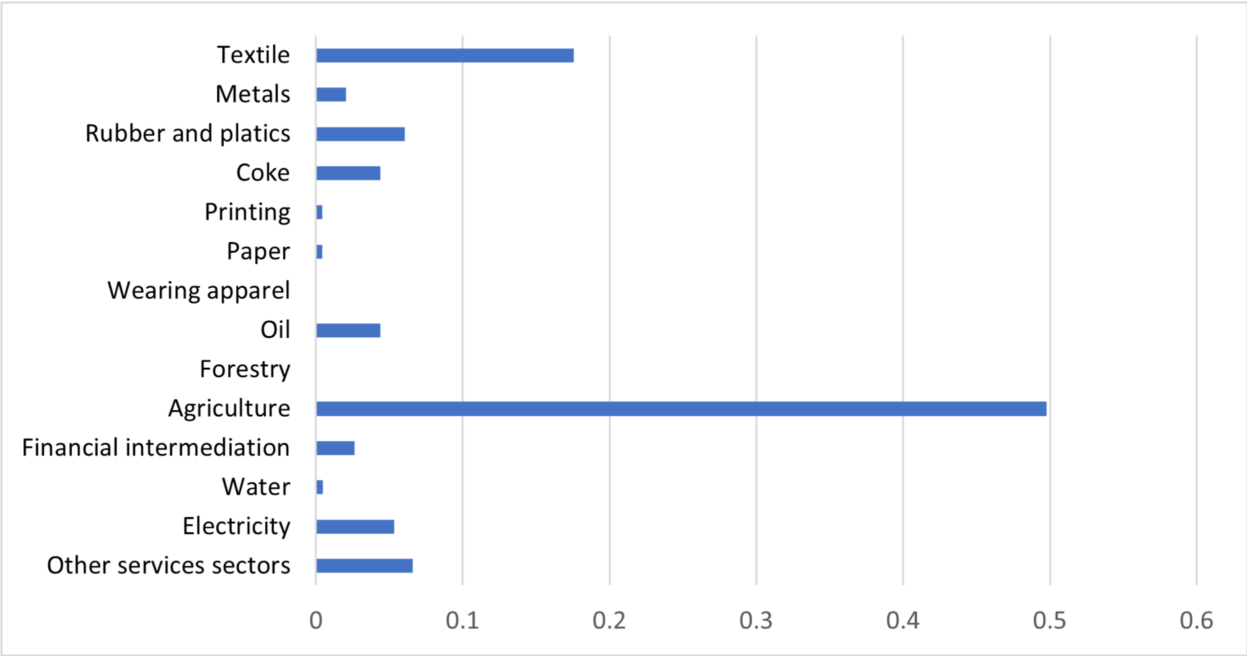
Notes: Graph plots the fitted line of the first-stage regression where the dependent variable is the predicted Chinese import penetration in Ethiopia and the explanatory variable is the Chinese import penetration in African economies. The corresponding Kleibergen-Paap F-statistic is 150.86

Figure 5: Decomposition of Chinese imports across intermediate and consumption goods



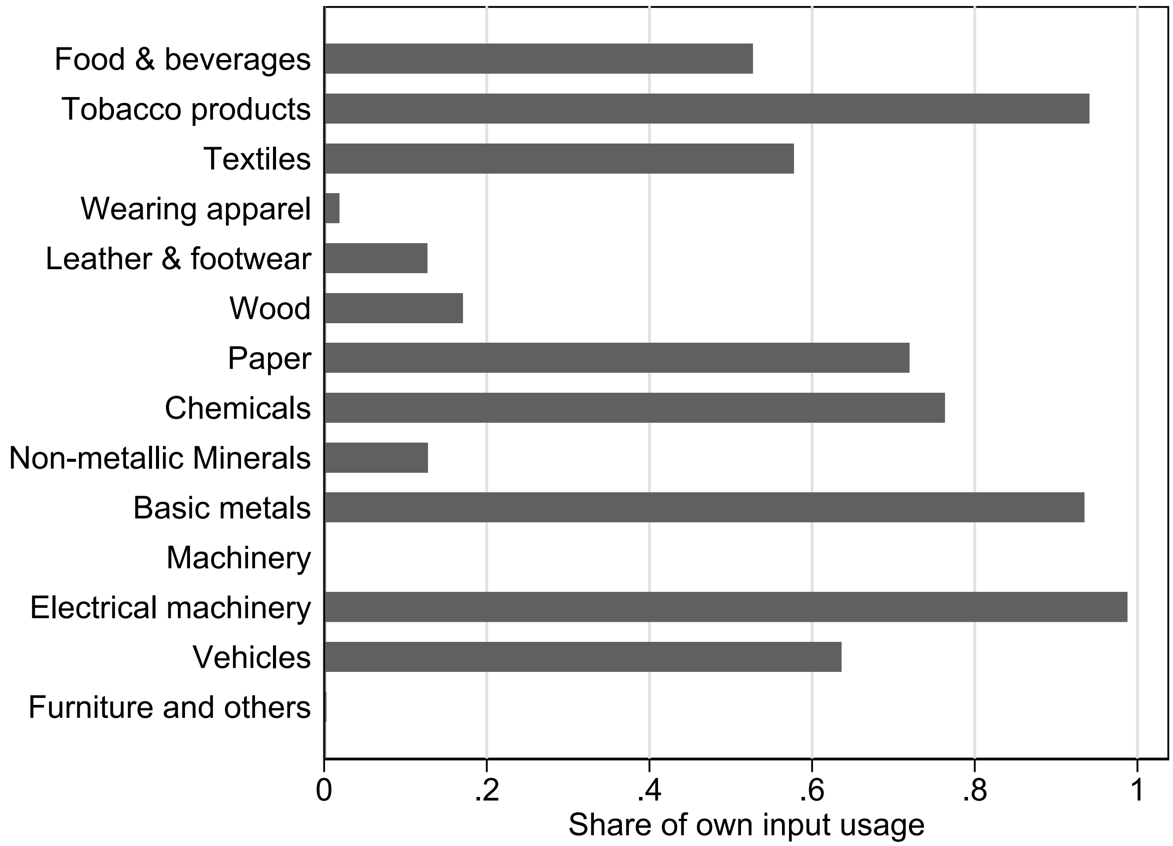
Notes: Each row represents the share of imports from each origin on total imports of the year. Table constructed using data from the BACI database.

Figure 6: Textile industry I-O input shares



Source: ETH 2005/2006 input-output table

Figure 7: Industry share of own input usage



Source: ETH 2005/2006 input-output table

Tables

Table 1: Industry composition of employment and Chinese imports (2002-2017)

Industry	Employment share	Imports share	Mean Δ Emp.	Mean Δ Imp.
Food & beverages	0.276	0.004	4.86	44.12
Tobacco products	0.007	0.001	–4.14	200.84
Textiles	0.146	0.100	1.53	10.34
Wearing apparel	0.061	0.080	21.40	29.54
Leather & footwear	0.080	0.019	6.38	16.72
Wood	0.016	0.008	12.24	35.98
Paper	0.017	0.006	7.92	18.98
Printing	0.044	0.005	2.44	74.73
Petroleum & fuel	0.000	0.010	.	51.03
Chemicals	0.057	0.054	7.19	18.94
Rubber & plastics	0.069	0.044	9.38	23.38
Non-metallic Minerals	0.093	0.018	11.14	25.34
Basic metals	0.027	0.060	19.13	44.40
Fabricated metals	0.040	0.081	15.95	38.22
Machinery	0.003	0.154	739.39	32.80
Computing machinery	0.000	0.010	–100.00	65.48
Electrical machinery	0.001	0.124	86.60	29.21
Communic. equipment	0.001	0.117	39.21	230.19
Medical equipment	0.000	0.015	206.65	34.24
Vehicles	0.017	0.058	21.73	62.08
Transport equipment	0.000	0.017	.	148.68
Furniture and others	0.045	0.015	7.61	17.02

Notes: Employment average is the average industry employment from 2002 to 2017. Employment share is the average value of industry employment in total manufacturing employment in each year. Imports average is the average industry imports from 2002 to 2017. Imports share is the average value of industry Chinese imports in total manufacturing imports in each year. Imports are expressed in USD (2017 millions), employment values are in thousands. Table constructed using data from BACI and LMSM

Table 2: Summary statistics

VARIABLES	(1) Mean	(2) Sd	(3) N
Panel A: Trade variables			
Chinese imports	86,164	12.06	278
Chine import penetration	0.925	1.485	278
Initial absorption	142,177	138,823	278
Initial sales	86,656	140,139	278
Initial total imports	61,101	65,886	278
Initial total exports	5,580	12,156	278
Imports from America	0.0923	0.150	278
Imports from Asia	0.835	0.768	278
Imports from Europe	0.644	0.718	278
Panel B: Manufacturing variables			
Permanent workers	7,783	9,518	278
Output	243,304	413,897	278
Share of imported inputs	0.591	0.287	278
Capital intensity	5.660	3.894	278
Labor intensity	0.509	2.899	278
Skill intensity	0.310	0.113	278
Ratio permanent workers/total workers	0.935	0.0710	278
Average number of firms	93.70	131.3	278
Average share of large firms	0.397	0.270	278
Entry rate	0.150	0.223	278
Exit rate	0.192	0.300	278

Notes: Monetary values in thousands real USD (base year = 2017). Covers years 2002-2017. Deflator from the WDI MFG value added. Initial refers to year 1998. Per worker measures are computed using permanent workers. Skill intensity is measured as the ratio of non-production workers over production workers (excludes unpaid, apprentice and seasonal). Capital intensity is the ratio of capital to production workers.

Table 3: Impact of total imports on industry employment

	(1) OLS	(2) First stage	(3) 2SLS	(4) RF
Chinese IPP in Ethiopia	0.120***		0.152***	
	(0.034)		(0.050)	
Chinese IPP in SSA countries		0.302***		0.046***
		(0.025)		(0.017)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R^2	0.94	0.82	0.94	0.94
Observations	278	278	278	278
Kleibergen-Paap F-statistic		150.85		
Dep. var Mean	7,783			
SD			0.23	

Notes: Table displays results on Log(employment). The unit of observation is the 2-digits industry by year. The sample includes years from 2002 to 2017. In the 2SLS results, the change in Ethiopian import exposure is instrumented with Chinese imports in other sub-Sahara African economies. RF in Column(4) stands for reduced form. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 4: Industry composition of Chinese imports by end use category (2002-2017)

Industry	Imports average	Average intermediate imports share	Average consumption imports share
Food & beverages	2.92	0.55	0.45
Tobacco products	1.41	0.00	1.00
Textiles	56.02	0.73	0.27
Wearing apparel	80.72	0.00	1.00
Leather & footwear	13.15	0.03	0.97
Wood	7.02	0.98	0.02
Paper	4.27	0.90	0.10
Printing	6.28	0.31	0.69
Chemicals	45.82	0.76	0.24
Rubber & plastics	32.70	0.91	0.09
Non-metallic Minerals	15.21	0.84	0.16
Basic metals	131.14	1.00	0.00
Fabricated metals	71.35	0.97	0.03
Machinery	112.23	0.94	0.04
Computing machinery	8.95	0.99	0.01
Electrical machinery	110.93	0.84	0.16
Communications equipment	98.06	0.93	0.07
Medical equipment	13.18	0.94	0.06
Vehicles	43.93	0.95	0.00
Transport equipment	18.66	0.89	0.11
Furniture and others	9.61	0.23	0.77

Notes: Employment average is the average industry employment from 2002 to 2017. Employment share is the average value of industry employment in total manufacturing employment in each year. Imports average is the average industry imports from 2002 to 2017. Imports share is the average value of industry Chinese imports in total manufacturing imports in each year. Imports are expressed in USD (2017 millions), employment values are in thousands. Table constructed using data from BACI and LMSM

Table 5: Impact of consumption goods imports on industry employment

	(1) OLS	(2) First stage	(3) 2SLS	(4) RF	(5) 2SLS(2)	(6) 2SLS(3)
Chinese consumption IPP in Ethiopia	0.056		0.156		-1.088	0.413**
	(0.105)		(0.139)		(1.141)	(0.166)
Chinese consumption IPP in SSA countries		0.125***		0.020		
		(0.008)		(0.019)		
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.94	0.89	0.94	0.94	0.93	0.97
Observations	278	278	278	278	232	30
Kleibergen-Paap F-statistic		231.15				
Dep. var Mean	7,783					
SD			0.08			

Notes: Table displays results on Log(employment). The unit of observation is the 2-digits industry by year. The sample includes years from 2002 to 2017. In the 2SLS results, the change in Ethiopian import exposure is instrumented with Chinese imports in other sub-Sahara African economies. RF in Column(4) stands for reduced form. Column(5) presents the reduced form results on inputs importing firms aggregated across industries. Column(6) presents the reduced form results on non-importing firms aggregated across industries. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 6: Impact of intermediate goods imports on industry employment

	(1) OLS	(2) First stage	(3) 2SLS	(4) RF
Chinese intermediate IPP in Ethiopia	0.173***		0.241***	
	(0.051)		(0.081)	
Chinese intermediate IPP in SSA countries		0.372***		0.090***
		(0.033)		(0.033)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R^2	0.94	0.81	0.94	0.94
Observations	278	278	278	278
Kleibergen-Paap F-statistic		123.06		
Dep. var Mean	7,783			
SD			0.24	

Notes: Table displays results on Log(employment). The unit observation of is the 2-digits industry by year. The sample includes years from 2002 to 2017. In the 2SLS results, the change in Ethiopian import exposure is instrumented with Chinese imports in other sub-Sahara African economies. RF in Column(4) stands for reduced form. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 7: Impact of intermediate goods imports usage on industry employment

	(1) OLS	(2) First stage	(3) 2SLS	(4) RF	(5) Imported input	(6) Domestic input	(7) Interaction
Chinese interm. IPP usage in Ethiopia	0.099**		0.138**		0.143**	0.091	-0.036
	(0.048)		(0.059)		(0.058)	(0.234)	(0.094)
Chinese interm. IPP usage in SSA		0.616***		0.085**			
		(0.035)		(0.039)			
Share imported inputs * Chinese interm. IPP in SSA							0.345***
							(0.111)
Share imported inputs							0.436**
							(0.186)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.94	0.95	0.94	0.94	0.93	0.82	0.95
Observations	278	278	278	278	275	181	278
Kleibergen-Paap F-statistic		313					
Dep. var Mean	7,782.72						
SD			0.34				
Joint p-value							0.00

Notes: Table displays results on Log(employment). The unit of is the 2-digits industry by year. The sample includes years from 2002 to 2017. In the 2SLS results, the change in Ethiopian import exposure is instrumented with Chinese imports in other sub-Sahara African economies. RF in Column(4) stands for reduced form. Column(5) reports the reduced form results on the sample restricted to the firms using imported inputs. Column(6) reports the reduced form results on the sample restricted to firms that do not use imported inputs. Column(7) reports the reduced form results from the entire sample of firms aggregated at the industry level. The joint p-value corresponds to the p-value of the test that the coefficients on the interaction and Chinese IPP usage are jointly zero. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 8: Impact of intermediate imports usage on shortage of inputs

	(1) OLS	(2) First stage	(3) 2SLS	(4) RF
Chinese interm. IPP usage in Ethiopia	-9.473**		-13.845***	
	(3.789)		(4.293)	
Chinese interm. IPP usage in SSA		0.667***		-9.237***
		(0.030)		(3.065)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R^2	0.91	0.94	0.91	0.91
Observations	275	275	275	275
Kleibergen-Paap F-statistic		484.47		
Dep. var Mean	7,350			

Notes: Table displays results on the share of firms within an industry reporting shortage of raw materials as main reason preventing them from operating at full scale. The unit of is the 2-digits industry by year. The sample includes years from 2002 to 2017. In the 2SLS results, the change in Ethiopian import exposure is instrumented with Chinese imports in other sub-Sahara African economies. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 9: Mechanisms of the Impact of Chinese imports - input usage

	(1) TFP	(2) Capacity utilization	(3) Skills intensity	(4) Permanent Labor	(5) Entry	(6) Exit
Chinese interm. IPP usage in SSA	0.154***	0.119*	0.025***	-0.001	-0.032	-0.023
	(0.029)	(0.072)	(0.006)	(0.005)	(0.025)	(0.014)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed effects	No	No	No	No	No	No
Controls	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.85	0.26	0.75	0.33	0.45	0.76
Observations	272	262	275	275	275	275
Dep. var Mean	1.94	0.73	0.31	0.94	0.13	0.17

Notes: Table displays the reduced form results on industry outcomes. The unit of observation is the 2-digits industry by year. The sample includes years from 2002 to 2017. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 10: Correlation between Chinese imports and imports from the ROW

	(1)	(2)	(3)
Share imports from Europe	-0.132	-0.315***	-0.340***
	(0.091)	(0.095)	(0.101)
Share imports from Asia (excl. China)		-0.447***	-0.492***
		(0.074)	(0.080)
Share imports from America			-0.336**
			(0.123)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes
R^2	0.30	0.53	0.55
Observations	599	598	572
Dep. var Mean	0.24		

Notes: Table displays the reduced form results on industry outcomes. The unit of observation is the 2-digits industry by year. The sample includes years from 2002 to 2017. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 11: Correlation between Chinese imports and imports from the ROW - by end use category

	(1) Total	(2) Intermediates	(3) Consumption
Share imports from Europe	-0.340***	-0.645***	-0.455**
	(0.101)	(0.048)	(0.164)
Share imports from Asia (excl. China)	-0.492***	-0.697***	-0.576***
	(0.080)	(0.047)	(0.091)
Share imports from America	-0.336**	-0.611***	-0.348***
	(0.123)	(0.067)	(0.106)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes
R^2	0.55	0.69	0.57
Observations	572	1,765	410
Dep. var Mean	0.24	0.26	0.33

Notes: Table displays the reduced form results on industry outcomes. The unit of observation is the 2-digits industry by year. The sample includes years from 2002 to 2017. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 12: Impact of Chinese imports by industry characteristics - input usage

	(1) Large	(2) Small	(3) Labor intensive	(4) Private	(5) Public
Chinese interm. IPP usage in SSA	0.091*	-0.108**	0.153***	-0.075	0.037
	(0.052)	(0.052)	(0.053)	(0.049)	(0.100)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
R^2	0.89	0.89	0.90	0.92	0.71
Observations	258	256	252	261	215
Dep. var Mean	8.08				

Notes: Table displays the reduced form results on industry Log(employment) across different sub-samples. The unit of observation is the 2-digits industry by year. The sample includes years from 2002 to 2017. Column(1) is restricted on industry large firms (firms employing at least 20 workers). Column(2) is restricted on industry small firms (firms employing less than 20 workers). Column(3) runs on the sample of firms above the 50th percentile of labor intensity, aggregated across industries. Column(4) runs on the sample of firms above the 50th percentile of capital intensity, aggregated across industries. Column(5) restricts on private firms, aggregated across industries. Column(6) restricts on public firms, aggregated across industries. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 13: Lack of raw materials

	(1)	(2)	(3)	(4)
Chinese IPP in SSA countries	-1.625			
	(1.218)			
Chinese consumption IPP in SSA countries		-0.626		
		(1.370)		
Chinese intermediate IPP in SSA countries			-3.174	
			(2.409)	
Chinese interm. IPP usage in SSA				-9.237***
				(3.065)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed effects	No	No	No	No
Controls	Yes	Yes	Yes	Yes
R^2				
Observations	275	275	275	275
Dep. var Mean	77.49			

Notes: Table displays the reduced form results on industry capacity utilization. 2002 data missing Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 14: Consumption and inputs goods together (old)

	(1) OLS	(2) First stage-interm	(3) First-stage-cons	(4) 2SLS
Chinese intermediate IPP in Ethiopia	0.184***			0.313***
	(0.052)			(0.094)
Chinese consumption IPP in Ethiopia	0.127			0.376**
	(0.105)			(0.160)
Chinese consumption IPP in SSA countries		-0.047**	0.122***	
		(0.019)	(0.008)	
Chinese intermediate IPP in SSA countries		0.355***	-0.027*	
		(0.034)	(0.015)	
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R^2	0.94	0.82	0.89	0.94
Observations	278	278	278	278
Kleibergen-Paap F-statistic		109.80	212.85	
Dep. var Mean	7,783			
SD-Intermediate				0.32
SD-Consumption				0.19

Notes:Table displays results on Log(employment). The unit of observation is the 2-digits industry by year. The sample includes years from 2002 to 2017. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 15: Consumption and inputs goods together (new)

	(1) OLS	(2) First stage-interm	(3) First-stage-cons	(4) 2SLS
Chinese intermediate IPP in Ethiopia	0.184***			0.197**
	(0.052)			(0.082)
Chinese consumption IPP in Ethiopia	0.016			-0.029
	(0.013)			(0.051)
Chinese consumption IPP in SSA countries		-0.047**	0.978***	
		(0.019)	(0.067)	
Chinese intermediate IPP in SSA countries		0.355***	-0.217*	
		(0.034)	(0.118)	
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R^2	0.94	0.82	0.89	0.94
Observations	278	278	278	278
Kleibergen-Paap F-statistic		109.80	212.85	
Dep. var Mean	7,783			
SD-Intermediate				0.20
SD-Consumption				-0.12

Notes:Table displays results on Log(employment). The unit of observation is the 2-digits industry by year. The sample includes years from 2002 to 2017. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 16: Consumption and inputs usage together (old)

	(1) OLS	(2) First stage-interm	(3) First-stage-cons	(4) 2SLS
IPP interm - down	0.099**			0.137**
	(0.048)			(0.059)
Chinese consumption IPP in Ethiopia	0.054			0.175
	(0.104)			(0.138)
Chinese consumption IPP in SSA countries		-0.005	0.126***	
		(0.017)	(0.008)	
IPP interm - down (IV)		0.615***	0.014	
		(0.035)	(0.017)	
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R^2	0.94	0.95	0.89	0.94
Observations	278	278	278	278
Kleibergen-Paap F-statistic		310.82	231.39	
Dep. var Mean	7,783			
SD-Intermediate				0.33
SD-Consumption				0.09

Notes:Table displays results on Log(employment). The unit of observation is the 2-digits industry by year. The sample includes years from 2002 to 2017. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 17: Consumption and inputs usage together (new)

	(1) OLS	(2) First stage-interm	(3) First-stage-cons	(4) 2SLS
Chinese interm. IPP usage in Ethiopia	0.099**			0.141**
	(0.048)			(0.064)
Chinese consumption IPP in Ethiopia	0.007			-0.079
	(0.013)			(0.049)
Chinese consumption IPP in SSA countries		-0.005	1.005***	
		(0.017)	(0.066)	
Chinese interm. IPP usage in SSA		0.615***	0.109	
		(0.035)	(0.138)	
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R^2	0.94	0.95	0.89	0.93
Observations	278	278	278	278
Kleibergen-Paap F-statistic		310.82	231.39	
Dep. var Mean	7,783			
SD-Intermediate				0.34
SD-Consumption				-0.31

Notes:Table displays results on Log(employment). The unit of observation is the 2-digits industry by year. The sample includes years from 2002 to 2017. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table 18: Consumption and inputs goods together -inputs usage

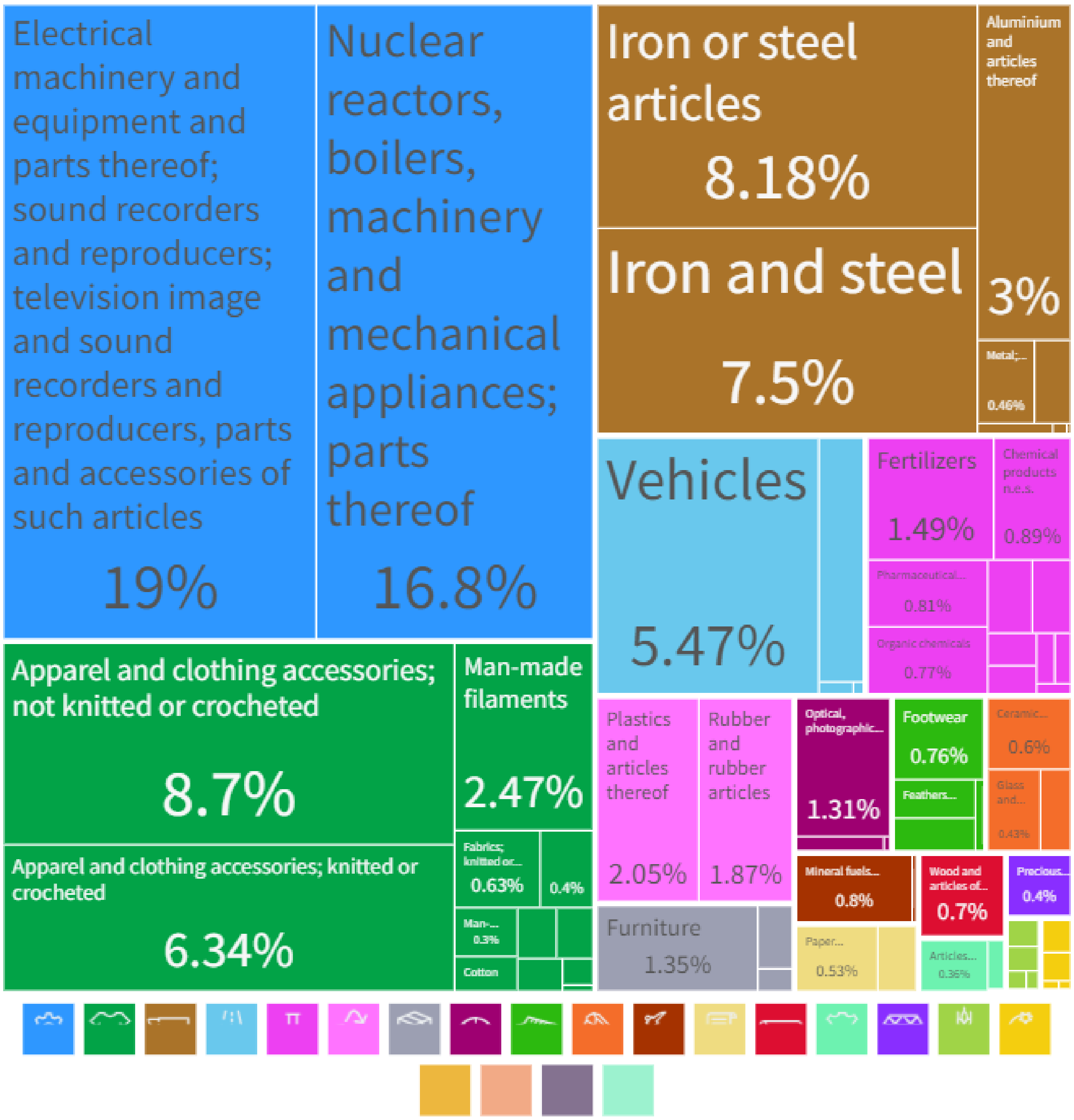
	(1) OLS	(2) First stage-interm	(3) First-stage-cons	(4) 2SLS	(5) RF
IPP interm - down	0.099**			0.137**	
	(0.048)			(0.059)	
Chinese consumption IPP in Ethiopia	0.054			0.000	
	(0.104)			(0.000)	
Chinese consumption IPP in SSA countries		-0.005	0.126***		0.000
		(0.017)	(0.008)		(0.000)
IPP interm - down (IV)		0.615***	0.014		0.087**
		(0.035)	(0.017)		(0.039)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
R^2	0.94	0.95	0.89	0.94	0.94
Observations	278	278	278	278	278
Kleibergen-Paap F-statistic		310.82	231.39		
Dep. var Mean	7,783				
SD				0.34	

Notes:Table displays results on Log(employment). The unit of observation is the 2-digits industry by year. The sample includes years from 2002 to 2017. Standard errors in parentheses are clustered at 2-digit industries in all specifications. All regressions include years, industry fixed effects and the industry controls. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

A Appendix

A.1 Figures

Figure A.1: Composition of Chinese imports in Ethiopia (2016)



Source: The Observatory of Economic Complexity (OEC)
oec.world/en/profile/bilateral-country/chn/partner/eth

Figure A.2: Industry total manufacturing employment and Chinese import penetration

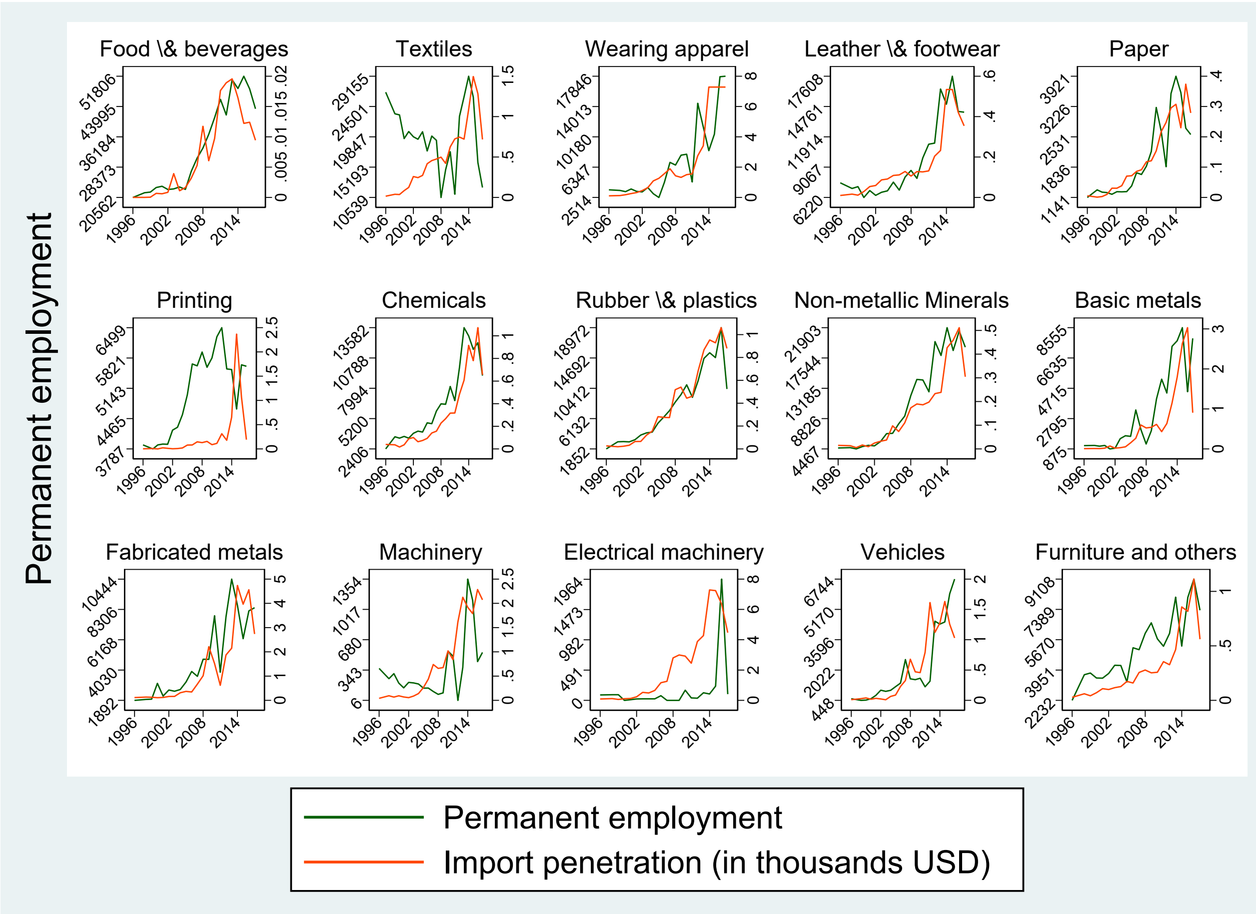
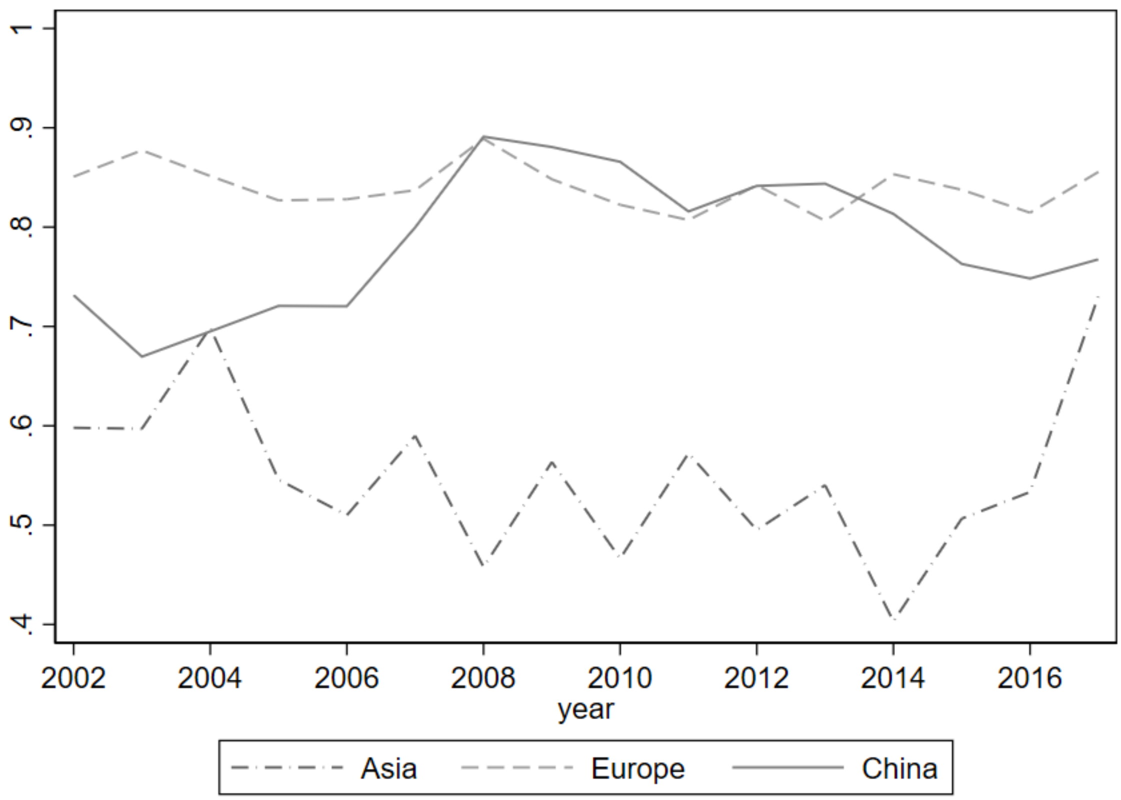
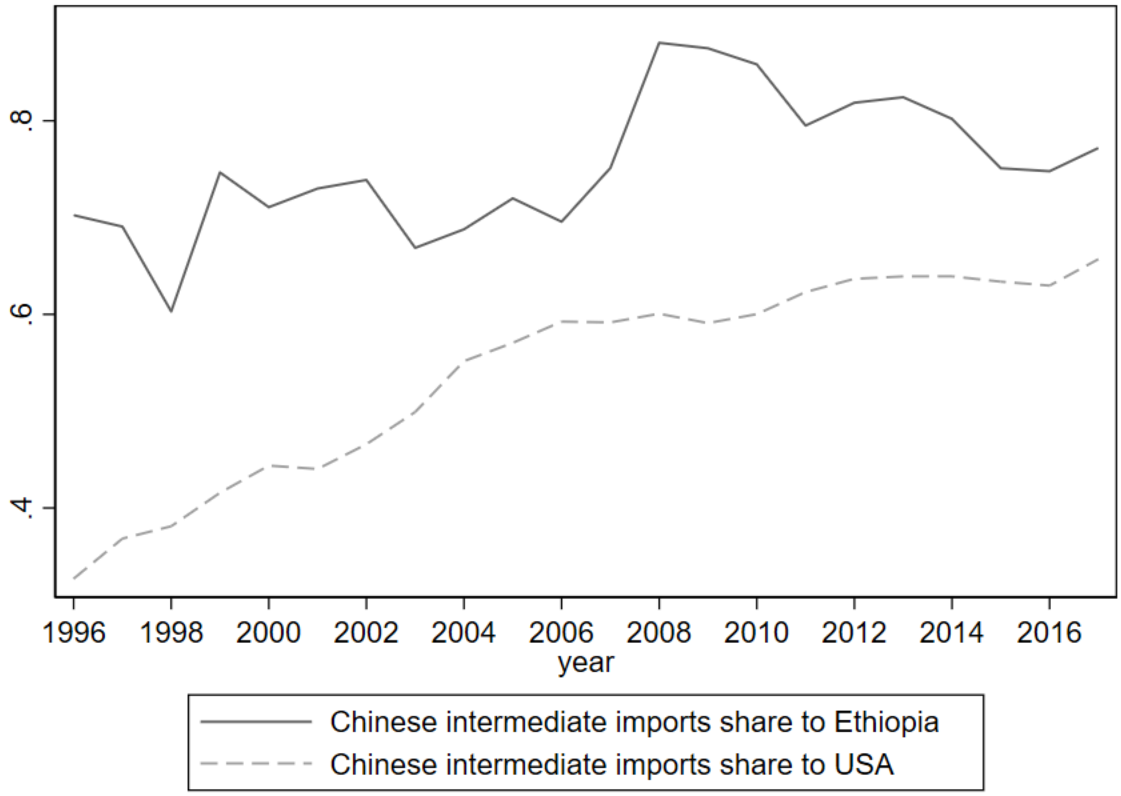


Figure A.3: Intermediate imports share from China and the Rest of the World



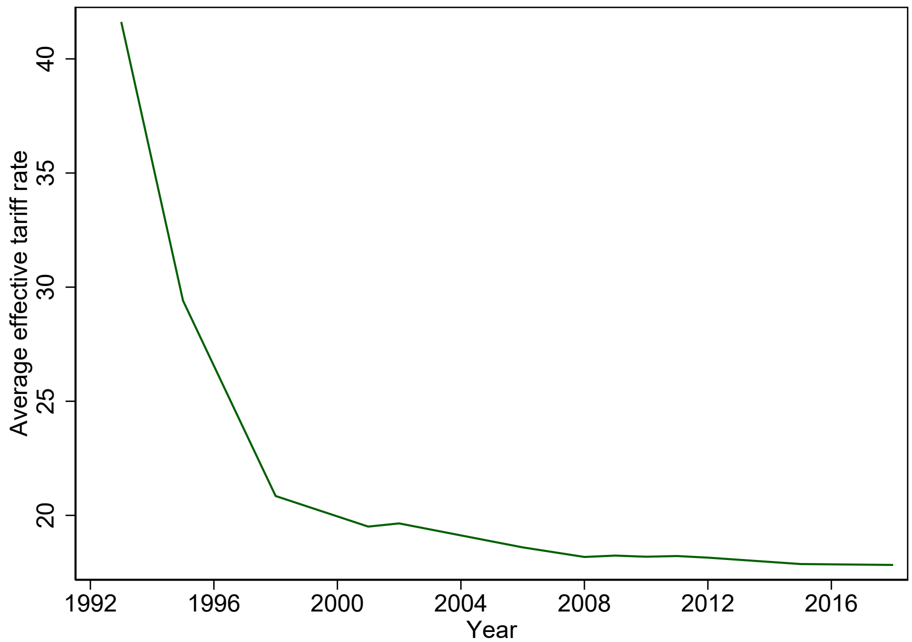
Notes: Figure graphs the share of intermediate imports by origin. Dash dots line shows the share of intermediate goods imports out of total imports from Asia (excluding China). Dash line shows the share of intermediate goods imports out of total imports from Europe. Solid line shows the share of intermediate goods imports out of total imports from China.

Figure A.4: Intermediate Chinese imports share to Ethiopia and USA



Notes: Figure graphs the share of intermediate imports by destination. Dash line shows the share of intermediate goods imports out of total imports from China to USA. Solid line shows the share of intermediate goods imports out of total imports from China to Ethiopia.

Figure A.5: Average effective tariff in Ethiopia over time



Source: Bigsten et al. (2016) using data from the Ethiopia's Ministry of Finance and Economic Development

A.2 Tables

Table B.1: Industry control variables

	(1)	(2)	(3)	(4)
Chinese IPP in Ethiopia	0.164***	0.165***	0.153***	0.152***
	(0.048)	(0.048)	(0.051)	(0.050)
Log(Imports from America)		-0.019	-0.014	-0.029
		(0.042)	(0.042)	(0.042)
Log(Imports from Asia-C)			-0.065	-0.083
			(0.063)	(0.062)
Log(Imports from Europe)				0.182***
				(0.070)
Number of Obsevations	279	278	278	278
Year Fixed effects	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes

Note: Standard errors clustered at the 2-digits industry level. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table B.2: Industry control variables

	(1)	(2)	(3)	(4)	(5)	(6)
Chinese IPP in Ethiopia	0.164***	0.165***	0.153***	0.152***	0.160***	0.160***
	(0.048)	(0.048)	(0.051)	(0.050)	(0.056)	(0.056)
Log(Imports from America)		-0.019	-0.014	-0.029	-0.037	-0.037
		(0.042)	(0.042)	(0.042)	(0.042)	(0.042)
Log(Imports from Asia-C)			-0.065	-0.083	-0.090	-0.090
			(0.063)	(0.062)	(0.063)	(0.063)
Log(Imports from Europe)				0.182***	0.194***	0.194***
				(0.070)	(0.072)	(0.072)
Log(Initial Employment)					1.165***	1.012***
					(0.096)	(0.075)
Log(Initial capital intensity)						0.190**
						(0.090)
Number of Obsevations	279	278	278	278	267	267
Year Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered at the 2-digits industry level. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table B.3: Correlation between initial employment and future Chinese imports

	(1) ΔIPP 2002-2017	(2) ΔIPP 2002-2017	(3) Log(Employment)
Initial employment	-0.000***		
	(0.000)		
1996-2002 Employment growth		-0.004***	0.023***
		(0.000)	(0.001)
IPP			0.165***
			(0.058)
Initial employment*trend			-0.008*
			(0.004)
Log(Imports from America)			-0.034
			(0.060)
Log(Imports from Asia-C)			-0.080
			(0.050)
Log(Imports from Europe)			0.161***
			(0.042)
Number of Obsevations	267	462	267
Year Fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes

Note: Clustered standard errors in parentheses (at the industry level). All regressions include years and industry fixed effects. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table B.4: Overidentification test of instruments

	(1) First stage	(2) 2SLS	(3) 2SLS Overident
IPP(IV)	0.302***		
	(0.025)		
IPP		0.152***	0.143***
		(0.050)	(0.043)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed effects	Yes	Yes	Yes
Controls	Yes	Yes	Yes
R^2	0.82	0.94	0.94
Observations	278	278	226
Kleibergen-Paap F-statistic	150.85		
Overidentification tests p-values			
J-Statistic			0.69
Sargan test			0.10
Basmann test			0.18

Note: Clustered standard errors in parentheses (at the industry level). All regressions include years and industry fixed effects. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table B.5: Impact of total Chinese imports using AADHP's instrument

	(1) OLS	(2) First stage	(3) 2SLS	(4) Reduced form
IPP	0.120**		0.197	
	(0.047)		(0.136)	
IPP (IV)		3.461		0.680
		(3.524)		(0.881)
Number of Obsevations	278	278	278	278
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
F-statistic		0.96		
Mean Dep.var	8.09			

Note: Clustered standard errors in parentheses (at the industry level). All regressions include years and industry fixed effects. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table B.6: Impact of consumption goods imports using AADHP's instrument

	(1) OLS	(2) First stage	(3) 2SLS	(4) Reduced form
IPP	0.056		-0.083	
	(0.114)		(0.244)	
IPP (IV)		2.890***		-0.240
		(0.582)		(0.739)
Number of Obsevations	278	278	278	278
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
F-statistic		24.67		
Mean Dep.var	8.09			

Note: Clustered standard errors in parentheses (at the industry level). All regressions include years and industry fixed effects. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table B.7: Impact of intermediate goods imports usage using AADHP's instrument

	(1) OLS	(2) First stage	(3) 2SLS	(4) RF	(5) Imported input	(6) Domestic input	(7) Interac
IPP interm - down	0.099		0.276^{***}				
	(0.113)		(0.093)				
IPP interm - down (IV)		24.611^{***}		6.792^{**}	6.021^{*}	7.671	3.986
		(5.659)		(2.550)	(3.353)	(6.279)	(4.683)
share_imported							0.330
							(0.595)
interac_interm							7.579^{*}
							(4.009)
Number of Obsevations	278	278	278	278	272	231	278
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-statistic		18.92					
Mean Dep.var	8.09						

Note: Clustered standard errors in parentheses (at the industry level). All regressions include years and industry fixed effects. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table B.8: Impact of total Chinese imports using New Zealand, Spain, and Iceland

	(1) OLS	(2) First stage	(3) 2SLS	(4) Reduced form
IPP	0.120^{**}		0.117^{**}	
	(0.047)		(0.058)	
IPP (IV)		43.085^{***}		5.022
		(12.903)		(3.624)
Number of Obsevations	278	278	278	278
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
F-statistic		11.15		
Mean Dep.var	8.09			

Note: Clustered standard errors in parentheses (at the industry level). All regressions include years and industry fixed effects. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table B.9: Impact of consumption goods imports using New Zealand, Spain, and Iceland

	(1) OLS	(2) First stage	(3) 2SLS	(4) Reduced form
IPP	0.056		0.033	
	(0.114)		(0.148)	
IPP (IV)		24.385***		0.801
		(1.676)		(4.020)
Number of Obsevations	278	278	278	278
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
F-statistic		211.78		
Mean Dep.var	8.09			

Note: Clustered standard errors in parentheses (at the industry level). All regressions include years and industry fixed effects. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table B.10: Impact of intermediate goods imports usage using New Zealand, Spain, and Iceland

	(1) OLS	(2) First stage	(3) 2SLS	(4) RF	(5) Imported input	(6) Domestic input	(7) Interac
IPP interm - down	0.099		0.276***				
	(0.113)		(0.093)				
IPP interm - down (IV)		24.611***		6.792**	6.021*	7.671	3.986
		(5.659)		(2.550)	(3.353)	(6.279)	(4.683)
share_imported							0.330
							(0.595)
interac_interm							7.579*
							(4.009)
Number of Obsevations	278	278	278	278	272	231	278
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-statistic		18.92					
Mean Dep.var	8.09						

Note: Clustered standard errors in parentheses (at the industry level). All regressions include years and industry fixed effects. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

A.3 Further robustness tests results

Table C.11: Exclude one industry each time

	(1) Textile	(2) Leather	(3) Machinery	(4) Chemicals	(5) Coke	(6) Computing	(7) Wood	(8) Food
Chinese IPP in Ethiopia	0.145***	0.149***	0.136***	0.154***	0.152***	0.152***	0.156***	0.150***
	(0.050)	(0.052)	(0.039)	(0.053)	(0.050)	(0.050)	(0.052)	(0.053)
Log(Imports from America)	-0.022	-0.034	0.005	-0.030	-0.029	-0.029	-0.035	-0.031
	(0.043)	(0.045)	(0.033)	(0.044)	(0.042)	(0.042)	(0.044)	(0.044)
Log(Imports from Asia-C)	-0.103	-0.090	-0.065	-0.088	-0.083	-0.083	-0.072	-0.088
	(0.063)	(0.066)	(0.048)	(0.065)	(0.062)	(0.062)	(0.069)	(0.066)
Log(Imports from Europe)	0.151**	0.197***	0.168***	0.180**	0.182***	0.182***	0.187**	0.190**
	(0.076)	(0.073)	(0.055)	(0.074)	(0.070)	(0.070)	(0.077)	(0.074)
Number of Obsevations	262	262	262	262	278	277	262	262
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep.var	8.09	8.09	8.09	8.09	8.09	8.09	8.09	8.09

Note: Standard errors clustered at the 2-digits industry level. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table C.12: Results using different data samples

	(1) Post 2002	(2) All years	(3) ISIC excl	(4) Restrict1	(5) Restrict2	(6) Restrict3
Chinese IPP in Ethiopia	0.152***	0.088**	0.165***	0.138***	0.137***	0.147***
	(0.039)	(0.040)	(0.055)	(0.034)	(0.048)	(0.044)
Log(Imports from America)	-0.029	0.021	-0.035	-0.005	-0.053	-0.058
	(0.057)	(0.044)	(0.073)	(0.046)	(0.052)	(0.067)
Log(Imports from Asia-C)	-0.083*	-0.068	-0.040	-0.079	-0.080*	-0.070
	(0.050)	(0.064)	(0.076)	(0.056)	(0.048)	(0.058)
Log(Imports from Europe)	0.182***	0.173**	0.271***	0.173***	0.158***	0.197***
	(0.053)	(0.071)	(0.063)	(0.050)	(0.052)	(0.066)
Number of Obsevations	278	356	237	277	272	278
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Column(1) excludes observations before 2002. Column(2) includes all years (1996-2017). Column(3) excludes the following industries due to lack or negligible imports and/or employment data: Tobacco products, Wood, Petroleum and nuclear fuel, Computing machinery, Communication equipment, and Medical equipment. Column(4) excludes firms where employment varies inconsistently (by more than 5*average over time). Column(5) Excludes firms that only show up once in the data. Employment and Imports are winsorized at 1%. Clustered standard errors in parentheses (at the industry level). All regressions include years and industry fixed effects. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table C.13: Alternative definitions of imports exposure

	(1)	(2)	(3)	(4)
IPP_absorption	0.152***			
	(0.050)			
IPP_employment		0.021***		
		(0.006)		
IPP_sales			0.045***	
			(0.013)	
Total imports (10,000 USD)				0.016**
				(0.007)
Number of Obsevations	278	267	267	278
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Note: Clustered standard errors in parentheses (at the industry level). All regressions include years and industry fixed effects. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table C.14: Using lagged values of imports

	(1)	(2)	(3)	(4)
IPP_absorption	0.094***			
	(0.033)			
IPP_employment		2.060***		
		(0.579)		
IPP_sales			4.534***	
			(1.334)	
Total imports (10,000 USD)				0.014**
				(0.007)
Number of Obsevations	278	267	267	278
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Note: Clustered standard errors in parentheses (at the industry level). All regressions include years and industry fixed effects. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

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