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China Import Competition and El Salvador Manufacturing Firm Performance*

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ABSTRACT

In this paper, we analyze the impact of Chinese competition on manufacturing firms in El Salvador between 2005 and 2013 using manufacturing survey data and customs transaction data. We find that Chinese import competition in El Salvador has a negative effect on firms' employment, total factor productivity (TFP), and revenue. A 1-percentage-point increase in the measure of Chinese import competition in El Salvador reduces the employment of production workers by 2.27%. The negative impact is mainly reflected in employment at firms with less than 50 employees and those with low capital intensity. A 1-percentage-point-increase in the measure of Chinese import competition in El Salvador reduces low-productivity firms' TFP by 1.851%, and total revenue of the low-revenue firms by 3.241%. Chinese competition in El Salvador export markets increases the production-worker employment at large firms, reduces TFP at medium-productivity firms, reduces the total revenue of low-productivity firms, and increase the total revenue of high-productivity firms. In general, firm offshoring has no effect.

JEL classifications: F14, L25, L60

Key words: Chinese competition, employment, productivity, manufacturing firms in El Salvador

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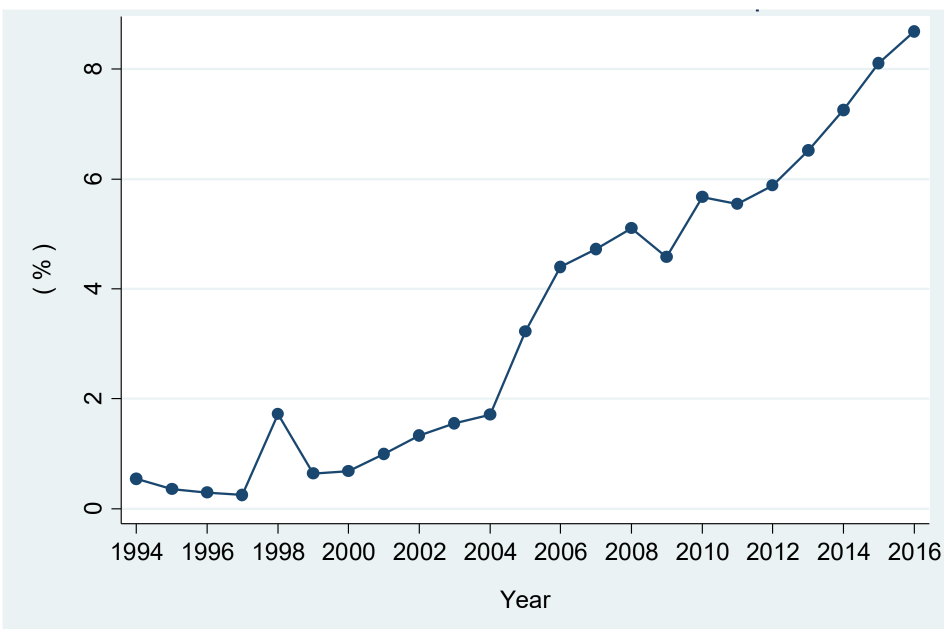
1. INTRODUCTION

Ever since China's 1979 economic reform and the start of the Open Door Policy, it has been enjoying rapid economic growth and an export boom, which have been particularly pronounced over the past 20 years. Between 1990 and 2015, China's GDP increased from US$830 billion to US$8,910 billion, with average growth rate of roughly 9.96% per year. In the same period, Chinese exports grew from US$51 billion to US$2,431 billion,[1] at a staggering average annual growth rate of about 16.71%. China became the world's largest exporter in 2009 and the second-largest economy in the world in 2010.

Like most countries, El Salvador has not been isolated from the effects of China's export boom. Bilateral trade between the two countries has grown rapidly since China joined the World Trade Organization (WTO) in 2001. In 2015, China became the third-largest supplier of El Salvador's imports, after the United States and Guatemala. In 2000, the year before China joined the WTO, it ranked 23rd among El Salvador's trading partners for imports. Figure 1 plots the share of El Salvador's imports from China between 1994 and 2016. Over this period, the share has increased from a low of 0.2% to a high of 8.7%. El Salvador's imports from China are mainly manufacturing products. As shown in figure 2, machinery and textiles are the top two products on the list, while nonmanufacturing products (agriculture and mineral) only account for about 1% of El Salvador's imports from China.

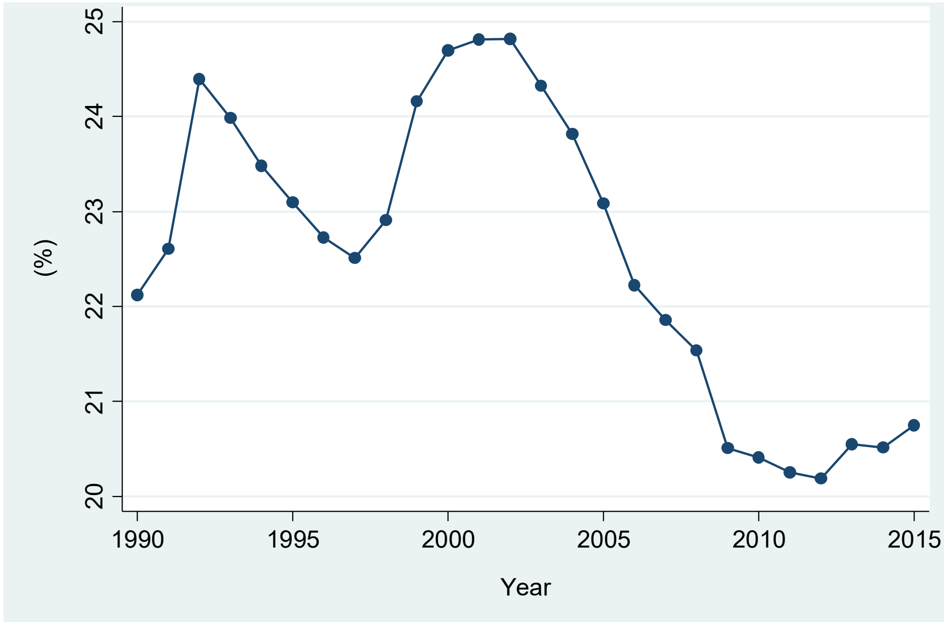
FIGURE 1. CHINA'S SHARE IN EL SALVADOR'S TOTAL IMPORTS



Source: Authors' calculations based on COMTRADE data.

[1] GDP is obtained from World Bank WDI data with constant 2010 US dollar. Export is obtained from World Bank WDI data with current US dollar.

FIGURE 2. EL SALVADOR'S MANUFACTURING VALUE-ADDED (% OF GDP)

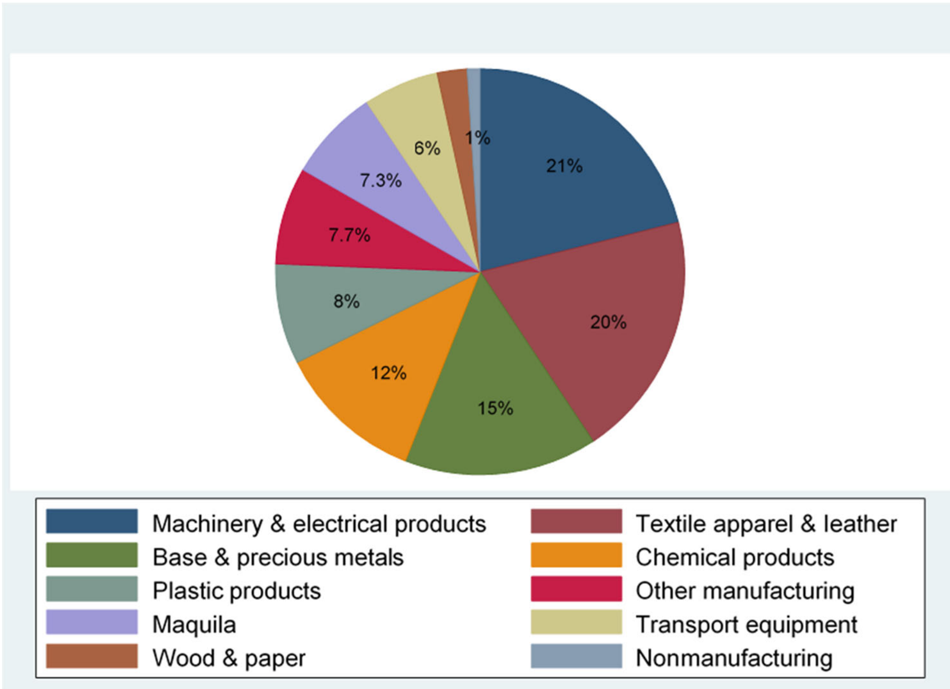


Source: Authors' calculations based on data from Central Reserve Bank of El Salvador.

The expansion in imports from China brings both benefits and challenges for El Salvador. On the one hand, consumers benefit from lower prices, especially for low-tech goods. On the other hand, manufacturing firms, which generally have low levels of technology, face fierce competition from China in both the domestic and export markets and are more likely to be adversely affected. As shown in figure 3, El Salvador's manufacturing value-added as percentage of GDP declined dramatically from 24.8% to 20.2% between 2001 and 2012. Industries that compete with China might shrink, and some firms might even exit the market. El Salvador ranks second among the LAC countries that are most "threatened" by the impact of Chinese competition in world markets,[2] and over 70% of its total exports are under threat (Lall et al., 2005). Labor-intensive manufacturing sectors in which China has comparative advantages—such as textiles, clothing, and apparel industries—are the most negatively affected by China's growth (IMF, 2004; Ghosh and Rao, 2010; Levchenko and Zhang, 2013). One example of the low-technology industry is the maquiladora sector, which has been shrinking in El Salvador. In 2003, the maquiladora sector (in gross terms) accounted for about 13.5% of El Salvador's manufacturing GDP. However, as shown in figure 4, this share has been decreasing since then. In 2015, it only accounted for 8.2%. Utar and Ruiz (2013) find similar trends and report that maquiladoras in all Mexican industries are negatively affected by the competition from China, with plants in unskilled labor-intensive industries suffering the most.

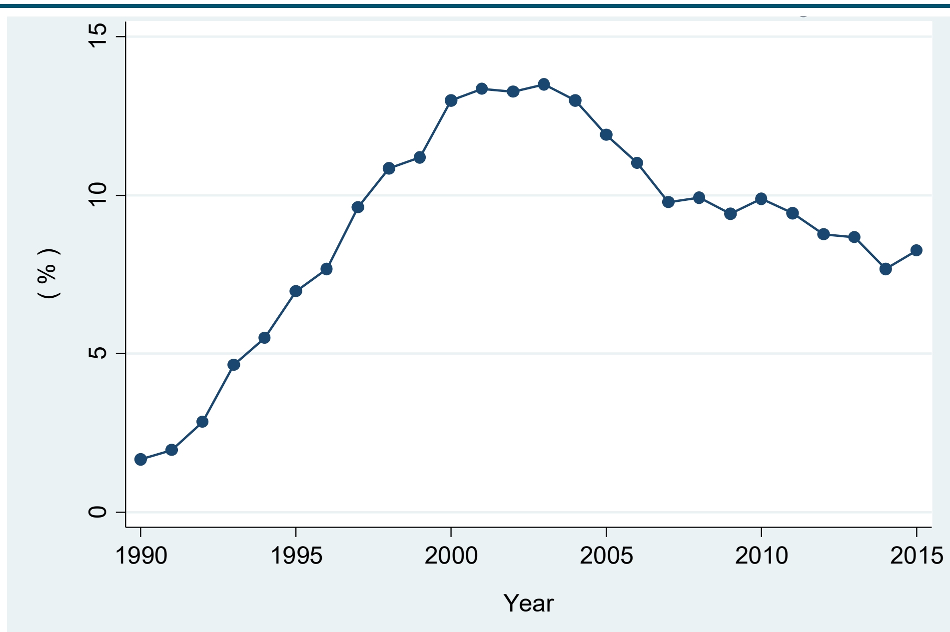
[2] Costa Rica tops the list.

FIGURE 3. EL SALVADOR'S TOTAL IMPORTS FROM CHINA BY SECTOR, 2015



Source: Authors' calculations based on World Bank WDI data

FIGURE 4. MAQUILA SHARE IN EL SALVADOR'S MANUFACTURING GDP



Source: Authors' calculations based on data from the Central Reserve Bank of El Salvador.

The impact of import competition from low-wage countries, especially China, has been a hot topic in academic research in recent years. Researchers are particularly interested in its impact on unemployment, the wage gap, and labor participation in the United States (Autor et al., 2013; Autor et al., 2014; Bivens, 2013; Ebenstein et al., 2015) and other developed countries (Ashournia et al., 2014; Balsvik et al., 2015; Bloom et al., 2016; Dauth et al., 2014; Mion and Zhu, 2013; Utar, 2014). This strand of literature generally suggests that the impact of Chinese competition on developed

country labor markets is significant. It affects various aspects of the labor market, such as employment, wages, and the labor participation of both skilled and unskilled workers.

Competition from China also impacts productivity and technological progress. Several studies find that Chinese competition leads to increases in productivity (Bernard et al., Bloom et al., 2016; 2006; Ebenstein et al., 2011; Martin and Mejean, 2014; Mion and Zhu, 2013; Utar, 2014). These studies indicate that Chinese competition results in resource reallocations between industries and firms in importing countries. Import competition from China will induce firms to hire more skilled and more educated workers, to innovate and employ production processes with higher technology, and to increase productivity and quality by adopting flatter organizational forms. However, Edwards and Jenkins (2015) show that imports may displace or crowd out domestic production. Rising import competition may cause local firms to lose market shares to imported goods, thus reducing production scales and impacting productivity negatively as firms lose scale efficiency.

All the papers mentioned so far focus on the impact of Chinese competition on developed countries. As microlevel data becomes more available in developing countries, some papers are beginning to study the impact on these as well, such as Moreira et al. (2017) for Brazil; Molina (2017) for Colombia; Álvarez and Claro (2009) for Chile; Blyde and Fentanes (2017), Iacovone et al. (2013), and Utar and Ruiz (2013) for Mexico; Pierola and Sanchez (2018) for Peru; and Doan et al. (2016) for Vietnam. However, no research using firm-level data has ever been done for El Salvador. A study of this sort will be particularly useful for understand the impact of Chinese competition on smaller, poorer Central America countries. Using the newly available data from the El Salvador manufacturing firm survey, this paper attempts to fill this gap in the literature.

The goal of this paper is to uncover the impact of Chinese competition on the performance of Salvadorean firms, including employment, total factor productivity (TFP), revenue, wages, and exports. El Salvador has aggressively pursued liberalization policies that led to the significant expansion of its apparel sector. It devoted most of its resources to developing textile and cloth export structures under the protection of the MFA quota system. Given that this system was removed in December 2004, it now faces increased direct competition from China (Jenkins, 2008, 2010). In poor countries like El Salvador, firms are typically less advanced in technology, have a low level of development, and lack the capacity and resources to innovate and compete with similar imported products. Cheap imports from China may create fierce competition and have potentially negative effects on firms' performances.

We measure the impact of Chinese competition through two different variables. The first is Chinese import penetration in El Salvador's domestic market. The increasing imports of cheap manufacturing goods from China may threaten domestic firm production in El Salvador. The second is Chinese penetration in El Salvador's export market, which may squeeze out El Salvador's exports. Besides these two competition variables, we also study how offshoring affects firm performance. As explained in Mion and Zhu (2013), offshoring is another channel by which low-wage-country imports could affect manufacturing firms in the importing country. Firms can offshore finished goods for immediate sale or intermediate goods for further processing as inputs. Offshoring might benefit firms by increasing competitiveness and profitability.

The rest of this paper is structured as follows: section 2 describes different datasets used in the calculation. Section 3 presents the econometric model used for the analysis. Section 4 discusses the regression results and main findings. Section 5 provides some additional robustness checks that were employed, and section 6 concludes.

2. DATA DESCRIPTION

The main dataset used in this paper is the El Salvador manufacturing firm survey, covering the period from 2005 to 2014.[3] This survey is conducted by the Department for Statistics and Censuses (*Dirección General de Estadística y Censos*) at the Ministry of the Economy (*Ministerio de Economía*). Based on the classifications of economic activities defined by the Central Reserve Bank of El Salvador (*Banco Central de Reserva de El Salvador*), we divide

[3] We have had to discard data for 2014 because it does not contain customs transaction data.

manufacturing firms into seven sectors, which are summarized in table 1 (see end). The survey includes 1,260 firms in total, but most were only surveyed for a couple of years. As shown in table 2, 34% of firms are only surveyed for 5 years or less, and only 33% of firms are surveyed for all 10 years. Of all the surveyed firms, 18% are in the food production sector, 12% in the textile and apparel sector, 11% in the chemical sector, 11% in the mineral product sector, and 16% in the machinery sector. Maquiladora firms account for 10% of all the sampled firms.

The survey includes the numbers of both production and nonproduction workers separately. We add these two figures to generate the total number of workers. We therefore have three measures for firm employment: production workers, nonproduction workers, and total workers. The survey also includes information on production and nonproduction workers' salaries. We divide the corresponding salary by the number of workers to calculate the average wage for production workers, nonproduction workers, and total workers. All wages are deflated using the general consumer price index.[4]

We use two variables to measure firm revenue, total revenue (sales of goods and other general income), and sales of self-produced goods (including inventory). The information is obtained from the Sales and Other Income section of the survey. Both variables are deflated using the industrial price index of each industry.[5]

To measure productivity, we construct the TFP of each firm using the methodology described in Levinsohn and Petrin (2003). The TFP is estimated separately for the seven sectors listed in table 1. As explained in De Loecker et al. (2016), the estimated TFP in this paper is revenue-based TFP and cannot separate the price and the true TFP effects. For example, a decline in TFP could be related to lower prices in periods with higher import competition if the industrial price indices used to deflate firms' revenue could not fully capture lower prices for all firms. For example, De Locker (2011) suggests that revenue-based TFP tends to overestimate the productivity gains from trade shocks. However, the positive correlation between the revenue and quantity-based measures of TFP (Eslava et al. 2013, for instance, set this correlation at 0.7 for the Colombia case) allows us to infer the direction of the impact of China shocks on productivity.

As stated in Levinsohn and Petrin (2003), we need information on capital, intermediate inputs, and electricity to implement the estimation of the TFP. We use electricity to proxy for unobserved productivity shocks.

We use information on firms' fixed assets (property, plant, and equipment) contained in section VI of the survey to measure capital. The survey includes firms' fixed assets at the beginning and end of each year. We calculate the simple average of the two and deflate it using the industrial price index for machinery and equipment. We then construct the measurement of capital by including five components: machinery, production equipment and tools, administrative building, office equipment, and transport equipment.

We measure intermediate inputs through production-related inputs and deflate them using the general industrial price index. Electricity consumed in production (deflated using the consumer price index of water, energy, gas, and other fuels) is used as the proxy for unobserved productivity shocks. Sales of self-produced goods (instead of the firm's total income) are applied to measure output because this is the variable that is most closely linked to productivity.

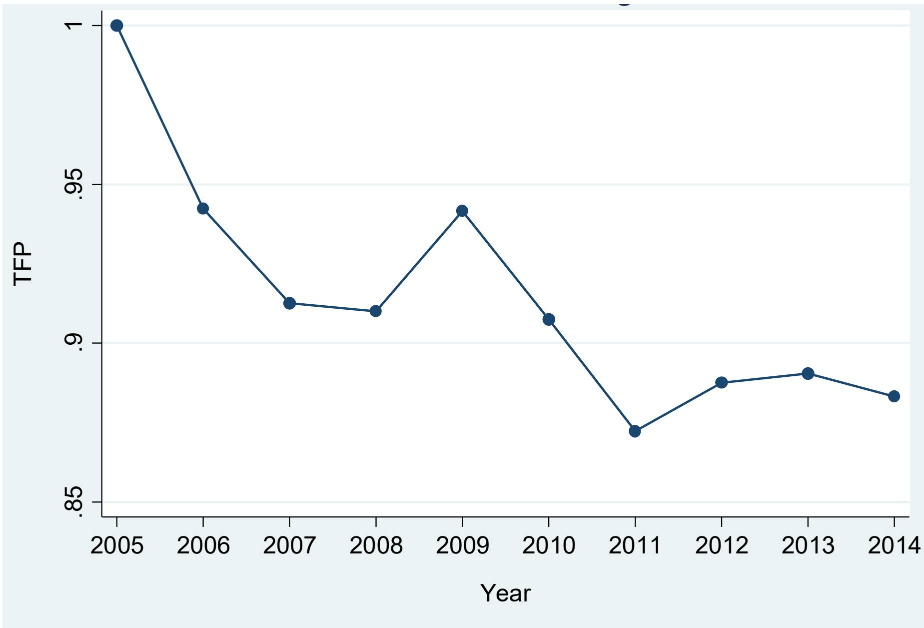
Figure 5 plots the weighted average of the estimated TFP of manufacturing firms in El Salvador between 2005 and 2014. We use each firm's total income as weights. Because entry and exit may be driven by survey design and the survey is not representative, we only include firms that are surveyed for all ten years in this plot. As shown in the graph, the TFP of the balanced panel of firms has been gradually decreasing over the surveyed period. Following Olley and Pakes (1996), we further decompose the aggregate productivity growth in two terms, the unweighted average productivity and a covariance component representing the contribution from the reallocation of market share across plants with different productivity levels within the sector. The decomposition results are reported in table 3. We can see

[4] All the variables in the survey are in current US dollars. The price indexes used to deflate them, which include industrial price, wholesale price, and consumer price indexes, were obtained from the Central Reserve Bank of El Salvador.

[5] In the Production and Sales section of the survey, there is a variable for firm production, which could potentially be used to measure revenue.

that the aggregate productivity drop comes from both the average decline in plant productivity and the reallocation of resources across plants. However, the average decline in plant productivity accounts for most of the aggregate productivity drop.

FIGURE 5. EL SALVADOR MANUFACTURING FIRM TFP



Source: Authors' calculations based on the El Salvador manufacturing firm survey data.

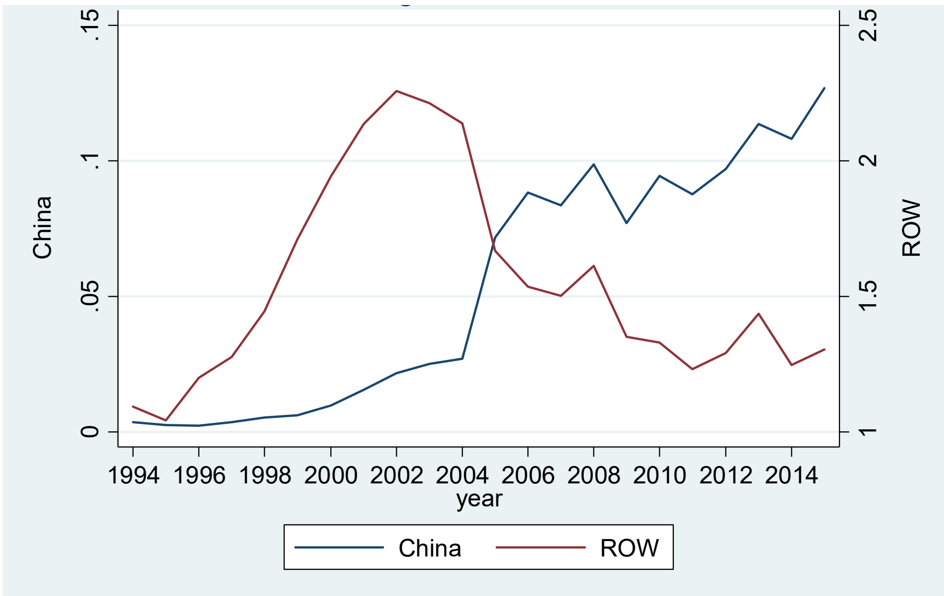
Each firm's exports are obtained from El Salvador's customs transaction data, which covers the period from 2005 to 2013. The value of exports is deflated using the wholesaleprice index of export. We also calculate the number of each firm's export markets and the number of export products. The customs data and the firm survey data are matched through the firm identification number, which is the same classification in both datasets.

To grasp the picture of the evolution of China import penetration in El Salvador over time, we first calculate China import penetration in El Salvador's manufacturing sector at the aggregate level using

$$ChinaPen\_M_t = \frac{M_t^{CHN}}{M_t + Q_t - X_t}, (1)$$

where M_t^{CHN} represents total manufacturing imports in year t from China and M_t total manufacturing imports from all partners. Q_t is El Salvador's domestic manufacturing production in year t. The rest of the world (ROW) import penetration in El Salvador's manufacturing sector is calculated in the same way, i.e. the numerator in equation (1) is total manufacturing imports in year t from ROW. Figure 6 plots these two penetration measures. At the aggregate level, Chinese import penetration has been increasing from 0.0035 in 1994 to 0.1269 in 2015, while the ROW import penetration has been decreasing since 2002. Most of the increase in Chinese import penetration took place in the period after 2000.

FIGURE 6. IMPORT PENETRATION IN EL SALVADOR'S MANUFACTURING SECTOR: CHINA VS. ROW



Source: Authors' calculations based on data from the Central Reserve Bank of El Salvador.

To empirically study the impact of Chinese competition on firms, we need to calculate Chinese import competition at the industry level, where industries are defined as in columns 2 and 3 of table 1. In a few Salvadorean industries (textile, apparel, and fishing), exports are larger than the sum of imports and production. Because of El Salvador's peculiar comparative advantage of low labor costs, firms in these industries import raw materials, which are at lower value, and export final goods, which are at higher value. It is therefore possible for exports to be larger than the sum of imports and production. Import penetration, as defined in Bernard et al. (2006), is negative in these industries. We therefore apply import share as defined in Mion and Zhu (2013) to measure the degree of Chinese import competition in El Salvador. Let $ChinaPen\_M_{jt}$ denote Chinese import competition in El Salvador of industry j in year t,

$$ChinaPen\_M_{jt} = \frac{M_{jt}^{CHN}}{M_{jt} + Q_{jt}}, (2)$$

where M_{jt}^{CHN} represents the value of imports of industry j in year t from China and M_{jt} the value of imports from all partners. Q_{jt} is El Salvador's domestic production of industry j in year t. Because of the lack of detailed data on maquila trade, Chinese competition in the maquila industry could not be calculated. We could not distribute maquila firms by categorizing them among the rest of industries either because the activity information for maquila firms is missing from the dataset. We therefore have to exclude maquila firms from our analysis.

We construct ROW import competition in El Salvador as

$$ROWPen\_M_{jt} = \frac{M_{jt}^{ROW}}{M_{jt} + Q_{jt}}, (3)$$

where M_{jt}^{ROW} is the value of El Salvador imports of industry j in year t from ROW.

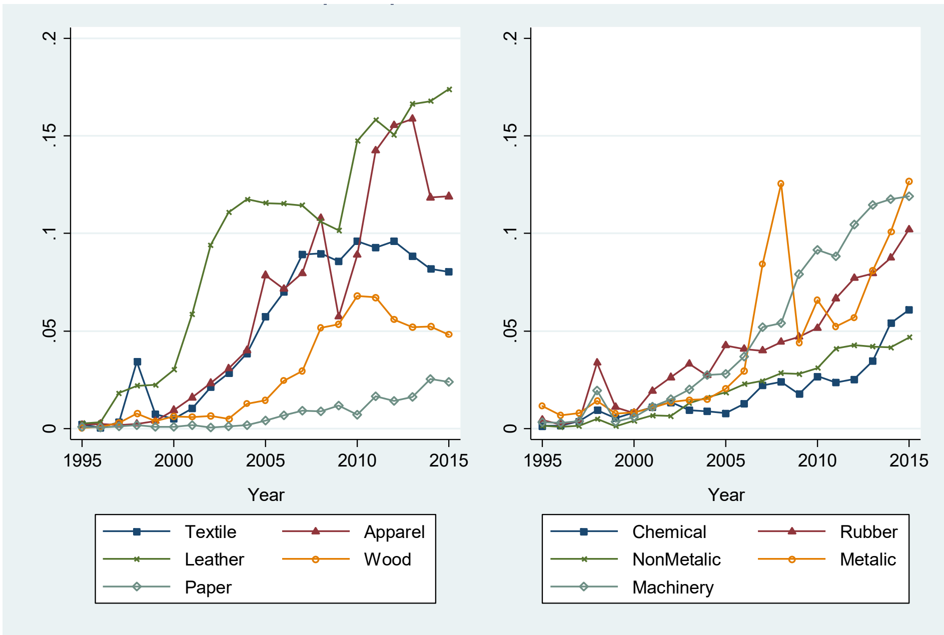
Domestic production data at the industry level is obtained from the Central Reserve Bank of El Salvador. It is measured at constant 1990 prices (in US dollar).[6] There are 22 activities/industries in the manufacturing sector, listed as in table 1. This industry classification is based on ISIC Rev3. Import data at 4-digit ISIC Rev3 is obtained from COMTRADE. We match 4-digit ISIC Rev3 to El Salvador's 22 industries. As production data is evaluated at constant

[6] The production data measured at current price is only available for the period of 1990 to 2006.

1990 prices, we use El Salvador's wholesale price index of import to convert the import value at the current price to constant 1990 prices. The wholesale price index is also obtained from the Central Reserve Bank of El Salvador.

Figure 7 shows the ten sectors with the highest penetration of Chinese imports, which include the textile, apparel, leather, wood, paper, chemical, rubber, nonmetallic, metallic, and machinery industries.

FIGURE 7. CHINESE IMPORT PENETRATION IN EL SALVADOR



Source: Authors' calculations based on data from the Central Reserve Bank of El Salvador.

Chinese competition may appear in a firm's export markets as well. For the export destination country d, we calculate China penetration at the aggregate level as

$$ChinaPen_{dt} = \frac{M_{dt}^{CHN}}{GDP_{dt} + M_{dt} - X_{dt}}, (4)$$

where M_{dt} denotes country d's total imports in year t, X_{dt} denotes country d's total exports in year t, GDP_{dt} denotes country d's GDP in year t, and M_{dt}^{CHN} denotes country d's imports from China in year t.

Firms' export destinations are ranked from high to low using their export values. We then calculate the weighted average of China penetration in firm i's top ten export markets[7] ($ChinaPen\_X\_wavg_{it}$),

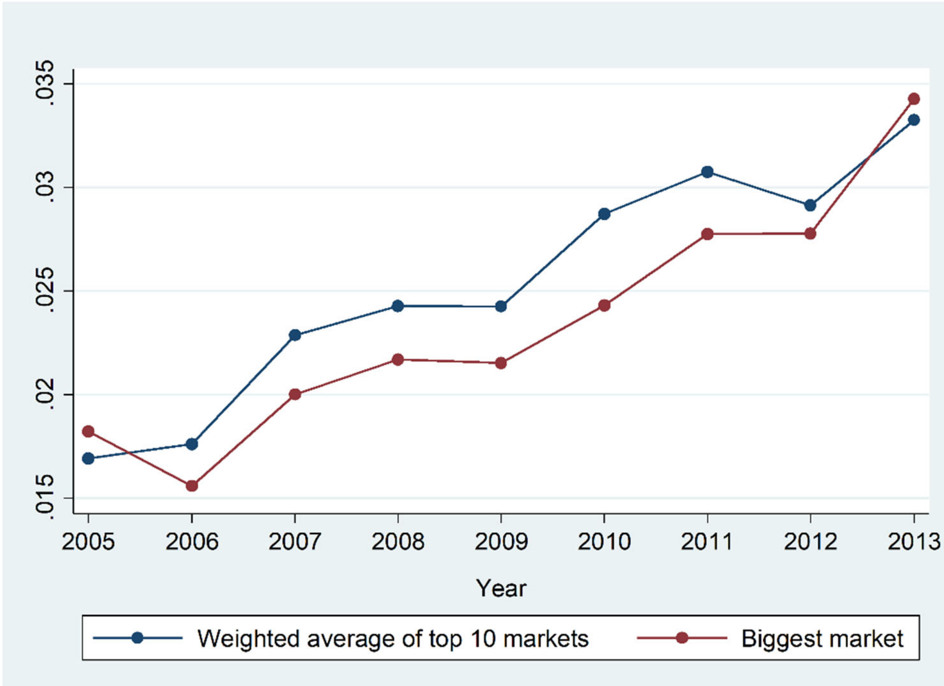
$$ChinaPen\_X\_wavg_{it} = \sum\nolimits_{d \in top10} \left(ChinaPen_{dt} \times \frac{X_{idt}}{\sum_{d \in top10} X_{idt}}\right), (5)$$

where X_{idt} denotes firm i's exports to country d in year t.

In 2013, Guatemala is the biggest export market for 30% of firms, Nicaragua for 28% of firms, and the United States for 17% of firms. Figure 8 shows that China penetration in Salvadorean firms' export markets increased between 2005 and 2013.

[7] In our sample, 90% of the firm×year combinations have 10 or less export destinations.

FIGURE 8. CHINESE PENETRATION IN EL SALVADOR'S EXPORT MARKETS



Source: Authors' calculations based on COMTRADE data, El Salvador Central Bank, and customs data

Chinese competition in the domestic and export markets are not the only channels via which Chinese imports might affect manufacturing firms. Sometimes, manufacturing firms directly import either final goods for immediate sale or intermediate goods for further processing from China (offshoring). This is a rather different type of trade that might benefit many offshoring firms by making them more competitive and profitable. To capture the effect of offshoring on manufacturing firms, we differentiate the offshoring of intermediate goods from that of final goods to capture the different nature of imports of goods that will be further processed as inputs within the firm versus imports of goods that are ready to be sold.

In line with Mion and Zhu (2003), we define final goods as products that are the same as the main activity of the firm using the 3-digit ISIC Rev3.1 classification. Others are defined as intermediate goods. Although firms' imports and activities are defined using different classifications, both can be matched to ISIC Rev3.1 using UN correspondences.[8] The advantage of this definition is that final and intermediate goods are defined according to the different stage in an individual firm's production process. For example, leather (which would typically be considered an intermediate good) is a finished good for a firm in the leather industry but an intermediate good for apparel firms. However, this definition also has some disadvantages. Based on this definition, we can classify a good as being final rather than intermediate. In real production, a large share of intermediate inputs are from the same 3-digit industry. Indeed, input-output tables typically display large entries along the diagonal. To mitigate this risk and check the robustness of this definition, we use ISIC Rev3.1 4-digit classification to differentiate final goods from intermediate goods as well.

[8] Import data is defined in HS2002 for years 2005 and 2006, HS2007 for years 2007 to 2011, and HS2012 for years 2012 to 2013. UN statistics provide a correspondence from HS2002 and HS2007 to ISIC3, but there is no correspondence from HS2012 to ISIC3. First, we match HS2012 and HS2007 using the correspondence from HS2012 to HS2007. Second, we match HS2002 and HS2007 to ISIC3. Third, we match ISIC Rev 3 to ISIC Rev 3.1. In the Manufacturing Firm Survey, firm activity is defined using ISIC Rev4 classifications. We match firm activity from ISIC Rev4 to ISIC Rev3.1 using UN correspondences. After this procedure, firms' activities and imports are all categorized using the same classification: ISIC Rev3.1.

The index of a firm's offshoring of intermediate goods from China is

$$offsh_{CHN_{interm}} = \frac{IMI_{it}^{CHN}}{T_{it}}, (6)$$

where IMI_{it}^{CHN} is firm i's imports of intermediate goods from China in year t, and T_{it} is firm i's sales of goods that it produced itself. The index of a firm's offshoring of final goods from China is calculated as

$$offsh_{CHN_{final}} = \frac{IMF_{it}^{CHN}}{T_{it}}, (7)$$

where IMF_{it}^{CHN} is firm i's imports of final goods from China in year t.

3. ECONOMETRIC MODEL

In this section, we describe the econometric model applied to study the impact of Chinese competition on manufacturing firms in El Salvador. As defined in the previous section, Chinese competition is measured by $ChinaPen\_M_{jt}$ and $ChinaPen\_X_{it}$. We analyze the impact on seven outcome measures: employment, TFP, revenue, wages, firm exports, number of export markets, and number of export products.

We examine the effects on the level of a variable using the following equation

$$y_{it+1} = \theta_1 \times ChinaPen\_M_{jt} + \theta_2 \times ChinaPen\_X\_wavg_{it} + \theta_3 \times ROWPen\_M_{jt} + V_{it}'\alpha + c + \delta_t + \delta_i + \varepsilon_{it}, (8)$$

where y_{it+1} is the log of the outcome variables of firm i in year $t+1$, δ_t is a vector of year dummies, and δ_i is a vector of firm fixed effects to control for unobserved time-invariant firm characteristics. Firm i is classified as industry j using its main activity, which is defined using ISIC Rev4 classifications. Increased import exposure to China might just reflect more general overall import exposure, not only to China. That is, El Salvador's import exposure to many other countries may be increasing as well. If this is the case, the import variable from China might be capturing the exposure to other countries as well, possibly overstating its effect. We therefore include import competition from ROW in the regression.

V_{it} is a vector of time-varying firm-specific control variables. We include the firm's employment and total revenue to control for the size of the firm, capital per worker to control for the firm's capital intensity, and the ratio of production-worker wages to nonproduction-worker wages to control for the firm's skill intensity. We also control for the firm's productivity and whether it exports.

One potential problem of the empirical model is that if the variable for Chinese competition in the domestic market is highly correlated with the variable for Chinese competition in export markets, the regression may face multicollinearity problems, and the coefficients θ_1 and θ_2 might not be estimated correctly. In table 4, we present the correlations between the two Chinese competition variables, which is only 0.09. Table 4 also presents the correlations between the Chinese competition variables and the two offshoring variables, which are also very small. The problem of potential multicollinearity is thus excluded.

We consider several additional specifications in which we interact Chinese competition measures with the firm characteristics included in V_{it} to analyze the heterogeneity of the impact of Chinese competition across different firms. When two continuous variables are interacted in a regression, interpreting the coefficient is not straightforward. To avoid such difficulties, we first separate firms into three groups—high, medium, and low—using rankings for each firm-characteristic variable. We then interact Chinese competition measures with three dummy variables indicating if the firm belongs to each of the three groups.

In order to solve potential endogeneity problems related to Chinese import competition in El Salvador, we construct the instrument variable (IV) in the spirit of Autor et al. (2013), who use other countries' imports from China in the numerator, and El Salvador's apparent consumption for the previous year in the denominator. We define three country

groups that could be applied in the numerator: a group of comparable countries as established by the World Bank,[9] Latin American countries except El Salvador, and all countries in the world apart from El Salvador and China. This comparable country methodology aims to identify countries of a similar size and/or level of economic development, competitors whose export baskets are similar, or "neighboring" countries within the region, by means of quantitative analysis. In the case of El Salvador, these comparable countries are Albania, Costa Rica, Dominican Republic, Honduras, Jordan, Mauritius, Namibia, and Tunisia. We believe that El Salvador is too small to exert any meaningful change in the overall demand for imports in export markets. We therefore do not instrument Chinese import penetration in its export markets.

We follow Mion and Zhu's (2013) approach to construct two sets of IVs for offshoring of intermediate goods and offshoring of final goods using exchange rates and tariffs, respectively.

4. RESULTS

In this section, we discuss the regression results.

A. Employment

First, we study the impact of Chinese competition on firms' total employment. Table 5 presents the regression results for this. Columns 1 to 4 of table 5 present the regression results using OLS. In column 1, we only include the main variable, Chinese import competition in El Salvador's domestic market. The coefficient is negative but not significant at the conventional level. In column 2, we introduce the time-varying firm-specific control variables. This coefficient is negative and significant at the 5% level, suggesting that Chinese import competition in the domestic market has a detrimental effect on firms' total employment. As for the control variables, firms' total employment is positively related to their size (in terms of total revenue) and negatively related to their productivity and skill intensity the previous year. Employment levels are generally higher at exporting firms than at nonexporting firms. In column 3, we include ROW import competition in the regression. The coefficient is positive but is not significant at conventional levels. However, omitting this variable leads to overestimating the effect of Chinese import competition on domestic markets. It is therefore important to include ROW import competition in the analysis. In column 4, we include Chinese competition in firms' export markets, but the coefficient is not significant at the conventional levels.

Next, we estimate the model using IVs. In column 5, the IV is constructed using a group of comparable countries' imports from China. The coefficient for Chinese import competition in the domestic market is -1.757 and is significant at the 5% level. This indicates that a 1-percentage-point-increase in the measure of Chinese import competition in the domestic market reduces firms' total employment by 1.757%. IVs constructed using imports from LAC countries (excluding El Salvador, column 6) and using imports from the whole world (excluding El Salvador and China, column 7) lead to similar conclusions. It is worth noting that the estimated effect of Chinese import competition on the domestic market is larger when using IVs than OLS. This is not a unique finding—indeed, it is commonly observed in similar contexts, for example, Iacovone et al. (2013), Lileeva and Trefler (2009), or Card (2001).

As the firm survey data allows us to separate production workers and nonproduction workers, we examine whether these two types of workers are affected differently. Columns 8 and 9 of table 5 present these results. The negative impact of Chinese import competition on El Salvador only exists for production workers. A 1-percentage-point-increase in the measure of Chinese import competition in El Salvador's domestic market reduces firms' employment of production workers by 2.27%. The employment of nonproduction workers is not affected by Chinese import competition. These findings are consistent with the literature. For example, Bloom et al. (2016) reveal that low-skilled workers are most negatively affected as they are forced into unemployment or leave the labor force altogether, whereas skilled workers, including college-educated, professional, and technical workers, are modestly affected or not significantly

[9] More information is available at https://mec.worldbank.org/comparator.

affected. This pattern is also found by Utar (2014) for Denmark and Balsvik et al. (2015) for Norway. Utar (2014) finds that less-educated workers are unemployed while college-educated workers retain their jobs.

In the above section, we studied the average impact of Chinese import competition on employment across all firms. In table 6, we examine if the impact on employment is heterogeneous across different groups of firms. In line with the approach taken by El Salvador's Ministry of the Economy, we define firms with up to 50 employees as small, firms with 50 up to 100 employees as medium-sized, and firms with more than 100 employees as large. In 2005, 57% of the surveyed firms were small, 13% were medium-sized, and 30% were large. Instead of one single term of Chinese import competition in the domestic market, we include three interaction terms in equation (8): the variable for Chinese import competition in the domestic market interacts respectively with dummy variables indicating if a firm is large, medium-sized, or small. The coefficient for the first interaction term represents the impact of Chinese import competition on large firms in the domestic market, the second coefficient the impact on medium-sized firms, and the third coefficient the impact on small firms. We also apply similar adjustments to the variable for Chinese competition in export markets. The results in column 1 of table 6[10] show that Chinese import competition in the domestic market has a negative impact on production-worker employment at small firms, but the effect on medium-sized and large firms is not significant at conventional levels. Column 2 shows that the employment of nonproduction workers is not affected by Chinese import competition no matter what size the firm is. As a whole (column 3), total employment at small and medium-sized firms, but not at large ones, is negatively affected by Chinese import competition in the domestic market. Chinese competition in export markets increases production-worker (column 1) and total (column 3) employment at large firms, but not at small and medium-sized ones.

As a robustness check, we use an alternative definition of firm size. We order firms from high employment to low employment and divide them into three groups with an equal number of firms in each. The top third of firms are defined as large firms in employment terms, the second third are medium-sized firms, and the last third are small. The results are presented in columns 4 to 6 of table 6. Employment at the middle third of firms (medium-sized firms) is negatively affected by Chinese import competition. Considering that according to the first definition, around 60% of all firms are small, according to the second, 66% of firms are either small or medium-sized, the two findings are consistent with each other.

In the case of Mexican firms, Iacovone et al. (2013) also find comparable results for Chinese competition in the domestic market and the US market. The reason is that competition from China leads to substantial resource reallocation across Mexican firms. When faced with import competition from China, smaller firms in Mexico decrease further in size and tend to close, whereas larger firms are not significantly affected. Generally speaking, import competition from China benefits larger firms in Mexico but negatively affects the smaller ones.

Second, we test if the impact of Chinese competition is heterogeneous across firms in terms of capital intensity. To do so, we first rank firms from high to low capital intensity. The top third are firms with high capital intensity, the second third are firms with medium capital intensity, and the final third are firms with low capital intensity. The results in column 1 of table 7 show that Chinese import competition only has a negative impact on production-worker employment at firms with low capital intensity. This finding is consistent with Federico (2014), who finds that the negative effect on employment is significantly lower for the more capital-intensive sectors, using data for the Italian manufacturing sector. Again, the pattern of impact on total employment is similar (column 3) and there is no impact on the employment of nonproduction workers no matter of what capital intensity the firm is (column 2).

Third, we test if the impact is heterogeneous in terms of firms' skill intensity. The results in column 4 of table 7 show that production-worker employment at all firms is negatively affected by Chinese import competition in the domestic market. The magnitude of the negative effect is at a similar level for high- and medium-skill-intensive firms but is slightly larger for low-skill-intensive firms. Chinese competition in export markets increases nonproduction-worker employment at high-skill-intensive firms (column 5).

[10] Control variables are included in all the regressions. We omit them in the results table to save space.

Last, we test if the impact is heterogeneous in terms of productivity. The results in column 7 show that the negative impact of Chinese import competition on production-worker employment in the domestic market is only statistically significant among low-productivity firms. The impact on the medium- and high-productivity firms is not significant at the conventional level. This finding is consistent with Bloom et al. (2016), who provide evidence that Chinese import competition decreases employment at low-technology firms and the probability of their surviving, whereas high-technology firms are somewhat "shielded" from the competition effect.

B. Productivity

Next, we study the impact of Chinese competition on firms' productivity. As explained in section 2, we measure productivity by TFP. Table 8 presents the regression results. According to the coefficients in column 2, the TFP of higher-skill-intensive firms tends to be lower the following year. The TFP of exporting firms tends to be higher the following year. Import competition from ROW has a negative effect on firms' productivity.

On average, Chinese import competition in the domestic market has a negative impact on firms' productivity. The OLS estimation (column 2) is not significant at the conventional level, but the IV estimation is significant at the 10% level if we use comparable countries' imports from China to construct the IV (column 3). Further dividing firms into low-, medium-, and high-productivity groups reveals that it is the low-productivity firms that are adversely affected by Chinese import competition in the domestic market. According to the IV estimation (column 7), a 1-percentage-point-increase in the measure of Chinese import competition in the domestic market reduces the TFP of low-productivity firms by 1.851%.[11] As shown in Edwards and Jenkins (2015), imports displace or crowd out domestic production. With rising import penetration, local firms may lose market share such that their production scales shrink, leading to the loss of scale efficiency. Firm productivity is therefore adversely affected by imports. We calculate the TFP growth rate and the revenue growth rate of each firm. For the firms whose TFP growth rate is negative, the correlation between TFP growth and revenue growth is 0.24. This positive correlation means that firms with negative TFP growth tend to have negative revenue growth as well, which validates the loss of the efficiency channel through which import competition affects productivity. Aghion, Redding, et al. (2005) suggest that technologically advanced firms are more likely to respond to the threat of importing firms entering the market by investing in modern technologies and production processes. High-productivity firms are therefore less affected by Chinese competition.

Chinese competition in El Salvador's export markets is negatively related to firms' TFP for the following year, but it is only statistically significant at the 10% level (column 3 to 5). Further analysis after dividing firms into groups according to their TFP levels (column 7) shows that Chinese competition in El Salvador's export markets reduces the TFP of medium-productivity firms but not that of low-productivity ones.

As a robustness check, we construct a narrower measurement of capital by including only the two components that are most closely related to production: machinery, and production equipment and tools. Using this narrower definition of capital, we calculate the corresponding TFP and regress it using equation (8). As shown in columns 8 and 9, the negative impacts of Chinese competition are not affected by how capital is measured.

C. Revenue

Next, we study the impact of Chinese competition on firm revenue. We focus first on firms' total revenue. As shown in columns 2 to 5 of table 9, Chinese import competition in both domestic and export markets does not have a statistically significant impact on firms' total revenue no matter which estimation method is used. The same is true for import competition from the ROW. However, if we divide firms into high-, medium-, and low-revenue groups using total revenue, we find that Chinese import competition in the domestic market reduces the revenue of low-revenue firms by 3.241% (column 7). Chinese competition in El Salvador's export markets reduces the total revenue of small firms by 3.638%, but it increases the total revenue of large firms by 7.522%. Iacovone et al. (2013) explain the logic of these

[11] We also test if the impact is heterogeneous in terms of firm size, capital intensity, and skill intensity, but no heterogeneity was revealed by these analyses. To save space, we therefore do not report these regression results.

findings in the case of Mexican firms. They find that competition from China leads to substantial resource reallocation across Mexican firms. When facing import competition from China, smaller Mexican firms decrease further in size and tend to shut down, whereas larger ones are not significantly affected. Generally speaking, import competition from China benefits larger firms in Mexico but negatively affects smaller ones. We also test if the impact is heterogeneous in terms of firms' capital intensity, skill intensity, and productivity, but no heterogeneity is revealed by these analyses.

Besides total revenue, we employ another measure of revenue to test the robustness of the above findings: income from self-produced products. The difference between the two measures is firms' income from providing industrial and nonindustrial services. The results are reported in columns 8 and 9. The magnitude of the impact is very similar to that of total revenue.

D. Wage

Table 10 presents the impact of Chinese competition on wages. As with employment, we use three measures for wages. We study total worker wages in columns 1 and 2, production-worker wages in columns 3 to 4, and nonproduction-worker wages in columns 5 to 8. On average, Chinese competition does not impact any of the three measures for wages. After dividing firms into high-, medium-, and low-productivity groups, we find that nonproduction-worker wages at high-productivity firms increase by 3.694% if there is a 1-percentage-point-increase in Chinese import competition in El Salvador's domestic market (column 8).[12] This finding is also in keeping with the literature. Bivens (2013) argues that low-skilled workers in the United States lose out from trade, and that the gains from trade are concentrated among college-educated, nonproduction, and supervisory workers. Autor et al. (2014) conclude that the effects of Chinese import competition on employment are heterogeneous not only among regions and industries with different levels of exposure to this competition, but also at the worker level. High-wage workers can adjust better, which results in lower earning losses. In addition, they are more capable of switching employer and more likely to move out of manufacturing. In contrast, low-wage workers mostly stay in manufacturing and suffer increased earning losses. Utar (2014) indicates that in the face of increased competition from China, importers and producers of multifiber arrangement (MFA) goods in Denmark experience an increase in the wages of skilled workers, including college-educated, professional, and technical employees.

E. Exports

Table 11 presents the impact of Chinese competition on exports. Chinese import competition in the domestic market has a negative impact on firms' exports, but this is only significant at the 10% level (columns 1 to 3). Chinese competition in export markets increases firms' exports. The number of export products and the number of export markets are not affected by Chinese competition in the domestic market nor in export markets (columns 4 to 9). When testing whether the impact is heterogenous by firm size, capital intensity, skill intensity, and productivity, we do not find any statistically significant results.

F. Offshoring

In table 12, we study the relationship between offshoring and firm performance. The only significant result is that offshoring intermediate goods to China reduces workers' wages if we instrument offshoring using the exchange rate (shown in column 8).[13] We therefore conclude that offshoring does not affect firm performance in general. This finding seems contrary to the widespread fear that firm offshoring may threat firm performance, but it is consistent with the

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[12] We tested if the impact on the wage of total workers and the wage of production workers is heterogeneous by firm size, capital intensity, skill intensity, and productivity, and if the impact on the wage of nonproduction workers is heterogeneous by firm size, capital intensity, skill intensity as well. We omit those regression results because no meaningful heterogeneity in the impact are revealed.

[13] We also estimate the regressions using the IV constructed using tariffs. The coefficients of offshoring are not significant either. To save space, we did not report these results.

literature. For example, Mion and Zhu (2013) find that "the big picture is that most coefficients are not significant and/or small" when they study the impact of firm offshoring.

As explained in section 2, final goods are defined as products in the same category as the firm's main activity using ISIC Rev3.1 3-digit classification. As a robustness check, we distinguish final goods from intermediate goods using the ISIC Rev3.1 4-digit code. We do not find any significant effect for offshoring, either.[14]

G. Growth rate

Both Bernard et al. (2006) and Mion and Zhu (2013) study the impact of Chinese competition on the growth rate of employment. In a similar vein, we examine the effect on the growth of each outcome measure as a robustness check using the following regression:

$$\Delta y_{it+1} = \theta_1 \times ChinaPen\_M_{jt} + \theta_2 \times ChinaPen\_X_{it} + \tau \times y_{it} + V_{it}'\alpha + c + \delta_t + \delta_i + \varepsilon_{it}, (9)$$

where the dependent variable Δy_{it+1} is the growth rate of employment, TFP, wages, revenue, and firm exports.

Table 13 presents the regression results. We omit the coefficients for the control variables and only keep the Chinese competition variables of interest to save space. Most findings at the level of outcome measures also apply to growth. Chinese competition in El Salvador has a negative impact on the growth rate of production-worker employment, especially small firms with low productivity and low capital intensity. It also has a negative effect on the growth rate of productivity at low-productivity firms. The effect on the growth rate of total revenue is not significant. Chinese import competition in the domestic market increases the growth rate of nonproduction workers' wage at high-productivity firms. It reduces the growth rate of firms' exports, especially that of small firms.

Chinese competition in export markets increases the growth rate of production employment and the total revenue of large firms and reduces the growth rate of productivity at high- and medium-productivity firms.

Because our sample size is relatively small when it comes to estimating the production function, the TFP we calculate may not be precise. We also compute productivity growth using the Tornqvist index. Explanations on theoretical properties and issues concerning measuring productivity through the Tornqvist index can be found in Diewert (1978, 1980), Christensen (1975), Capalbo and Antle (1988), and Coelli et al. (2005). To implement the calculation, we assume that each firm only produces one product. Because we do not have price information for each input, we use the deflated value for each input in the calculation. As explained in section 2, we deflate the value of each input and output using the corresponding price index. If we assume the price deflator used can account for all price changes over time, the growth of the deflated value is the same as the growth in quantity. The Tornqvist index of productivity growth is therefore calculated as

$$\ln\left(\frac{TFP_{t+1}}{TFP_t}\right) = 0.5\ln\left(\frac{Y_{t+1}}{Y_t}\right) - 0.5\sum_i (S_{i,t+1} + S_{i,t})\ln\left(\frac{X_{i,t+1}}{X_{i,t}}\right), (10)$$

where Y_t is the deflated value of output in year t, $Xi,_t$ is the deflated value of input i in year t, $S_{i,t}$ is the share of input i in total input cost, and i is labor, capital, and intermediate goods, respectively.

We then use the computed Tornqvist index as the left-hand-side variable equation (10). The regression results are presented in table 14. In keeping with the findings for TFP using Levinsohn and Petrin's approach, we find that Chinese import competition in the domestic market reduces the productivity growth of low-productivity-growth firms. However, it increases the productivity growth of high-productivity-growth firms, which does not show up in the previous results.

H. Robustness check

In all the above regressions, the standard errors are clustered by firm. We relax this specification by clustering the standard errors by industry to test if the significance level of our findings is affected. The results of the levels of firm

[14] The results are omitted here to save space.

performance variables are reported in table 15. In table A1, we summarize the main findings of our paper. Comparing the two tables, it is evident that clustering standard errors by industry does not alter the significance level of our results. Comparing table 16 with table 13 reveals that the results for growth rate are not affected by the standard errors cluster.

Next, we control industry fixed effect instead of firm fixed effect in all the regressions. The results of the levels are reported in table 17 and the results of the growth rates are contained in table 18. Most findings for the level of our IVs still hold, but the findings for the growth rate do not.

5. CONCLUSION

In this paper, we analyze the impact of Chinese competition on manufacturing firms in El Salvador between 2005 and 2013 using manufacturing survey data and customs transaction data. We find that Chinese import competition in El Salvador has a negative effect on firms' employment levels, TFP, and revenue. A 1-percentage-point-increase in the measure of Chinese import competition in El Salvador reduces production-worker employment by 2.27%. The negative impact is mainly reflected in employment at firms where employment levels and capital intensity are low. A 1-percentage-point-increase in the measure of Chinese import competition in El Salvador reduces low-productivity firms' TFP by 1.851% and the total revenue of the low-revenue firms by 3.241%. It increases nonproduction workers' wages at high-productivity firms by 3.694%.

Chinese competition in El Salvador's export markets increases production-worker employment at large firms, reduces the TFP of medium-productivity firms, reduces the total revenue of low-productivity firms, and increases the total revenue of high-productivity firms. In general, firm offshoring has no effect.

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TABLE 1. EL SALVADOR'S MANUFACTURING SECTORS: DEFINITION

Sector	Industry code	Industry name
Food	3.1	Meat and related products
	3.2	Milk products
	3.3	Fishing products
	3.4	Bakery and milling products
	3.5	Sugar
	3.6	Other processed food products
	3.7	Beverages
	3.8	Tobacco manufactures
Apparel	3.9	Textiles and textile products made of textile materials (except clothing)
	3.10	Apparel
	3.11	Leather and related products
Wood & Paper	3.12	Wood and related products
	3.13	Paper and cardboard related products
	3.14	Printing products and related industries
Chemical	3.15	Chemicals products
	3.16	Refined oil products
	3.17	Rubber and plastic products
Mineral	3.18	Nonmetallic manufactured mineral products
	3.19	Metallic mineral products
Machinery	3.20	Machinery, equipment, and supplies
	3.21	Transport supplies and diverse manufacturing products
Maquila	3.22	Maquila (assembly and re-export)

TABLE 2. FIRM AGE AND SECTOR

No. of years firm has existed	Food	Apparel	Wood&Paper	Chemicals	Mineral	Machinery	Maquila	Total
1	0%	0%	0%	0%	0%	1%	0%	2%
2	3%	1%	2%	1%	1%	2%	2%	11%
3	2%	1%	1%	0%	1%	1%	1%	8%
4	1%	1%	2%	1%	1%	1%	1%	7%
5	0%	1%	2%	1%	1%	1%	0%	6%
6	1%	1%	2%	1%	0%	1%	1%	7%
7	2%	2%	5%	1%	1%	4%	4%	20%
8	0%	0%	1%	0%	1%	1%	0%	3%
9	1%	0%	1%	0%	0%	0%	0%	3%
10	7%	5%	6%	6%	4%	4%	1%	33%
Total	18%	12%	23%	11%	11%	16%	10%	1260

TABLE 3: PRODUCTIVITY GROWTH DECOMPOSITION

Year	Aggregate Productivity	Unweighted productivity	Reallocation term
2005	0.000	0.000	0.000
2006	-0.058	-0.072	0.014
2007	-0.087	-0.068	-0.019
2008	-0.090	-0.091	0.001
2009	-0.058	-0.076	0.017
2010	-0.093	-0.087	-0.006
2011	-0.128	-0.112	-0.015
2012	-0.112	-0.091	-0.022
2013	-0.110	-0.114	0.004
2014	-0.117	-0.100	-0.016

TABLE 4. EXPLANATORY VARIABLE CORRELATIONS

	ChinaPen_M	ChinaPen_X_wavg	offsh_CHN_interm_3d	offsh_CHN_final_3d
ChinaPen_M	1.00	0.09	0.04	0.10
ChinaPen_X_wavg	0.09	1.00	0.03	0.06
offsh_CHN_interm_3d	0.04	0.03	1.00	0.01
offsh_CHN_final_3d	0.10	0.06	0.01	1.00

TABLE 5. EMPLOYMENT LEVEL

	Total							Production	Nonproduction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	FE	FE	FE	FE	IV-CMPT	IV-LAC	IV-WLD	IV-CMPT	IV-CMPT
ChinaPen_M	-0.753	-0.824**	-0.748*	-0.752*	-1.757**	-1.643**	-1.453*	-2.270**	-0.183
	(0.460)	(0.416)	(0.426)	(0.427)	(0.805)	(0.751)	(0.783)	(1.008)	(1.266)
ChinaPen_X_wavg				0.943	0.978	0.974	0.967	1.144	2.173*
				(1.000)	(1.004)	(1.001)	(1.001)	(1.718)	(1.314)
ROWPen_M			0.177	0.177	0.130	0.135	0.144	-0.066	0.292
			(0.159)	(0.160)	(0.161)	(0.158)	(0.162)	(0.203)	(0.195)
lg_rv		0.295***	0.295***	0.294***	0.294***	0.294***	0.294***	0.303***	0.227***
		(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.058)	(0.060)	(0.059)
lg_k_pw		-0.007	-0.007	-0.007	-0.008	-0.008	-0.008	-0.016	-0.016
		(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.018)	(0.016)
lg_tfp		-0.039*	-0.032	-0.032	-0.039	-0.038	-0.037	-0.102***	0.043
		(0.022)	(0.024)	(0.024)	(0.024)	(0.024)	(0.025)	(0.030)	(0.030)
wage_prod_adm		-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.010***	-0.004**
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
dmy_exporter		0.060*	0.060*	0.039	0.037	0.037	0.037	0.054	0.003
		(0.035)	(0.035)	(0.039)	(0.039)	(0.039)	(0.039)	(0.058)	(0.050)
Obs.	4,111	4,111	4,111	4,111	4,111	4,111	4,111	4,082	4,082
R-squared	0.952	0.957	0.957	0.957	0.957	0.957	0.957	0.944	0.917
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Weak Identification F Test					104.9	306.6	353.1	104.3	103.7

Robust standard errors clustered by firm in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

TABLE 6: EMPLOYMENT LEVEL, BY FIRM SIZE

	(1)	(2)	(3)	(4)	(5)	(6)
	By size1			By size2		
	Prod	Nonprod	Total	Prod	Nonprod	Total
	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT
ChinaPen_M_big	-1.543	0.960	-1.323	-1.416	1.532	-0.962
	(1.386)	(1.988)	(1.123)	(1.152)	(1.616)	(0.908)
ChinaPen_M_medium	-1.536	-1.139	-1.523*	-2.258**	-0.485	-1.780**
	(1.125)	(1.296)	(0.914)	(1.056)	(1.209)	(0.822)
ChinaPen_M_small	-2.485**	-0.130	-1.609**	-1.663	-0.688	-1.275
	(1.028)	(1.181)	(0.797)	(1.131)	(1.224)	(0.877)
ChinaPen_X_big	3.806**	3.531	4.025***	5.032***	2.902	4.072***
	(1.792)	(2.372)	(1.542)	(1.814)	(2.228)	(1.448)
ChinaPen_X_medium	-0.972	3.455	0.056	1.624	2.658	1.547
	(1.701)	(2.159)	(1.191)	(1.416)	(1.891)	(1.031)
ChinaPen_X_small	-0.734	-1.558	-2.395	-1.427	0.824	-1.252
	(2.600)	(1.617)	(1.614)	(2.182)	(1.459)	(1.283)
Obs.	4,082	4,082	4,111	4,082	4,082	4,111
R-squared	0.944	0.917	0.957	0.944	0.917	0.957
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
S.E. cluster	Firm	Firm	Firm	Firm	Firm	Firm
Weak identification F test	18.62	18.66	18.74	23.60	23.55	23.69

Robust standard errors clustered by firm in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

TABLE 7. EMPLOYMENT LEVEL, INTERACTION

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	By k_inty			By skill_inty			By tfp4		
	Prod	Nonprod	Total	Prod	Nonprod	Total	Prod	Nonprod	Total
	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT
ChinaPen_M_high	-1.633	1.459	-0.789	-2.293**	-0.661	-1.899**	-1.613	-1.264	-1.673
	(1.139)	(1.531)	(0.916)	(1.029)	(1.244)	(0.821)	(1.336)	(1.371)	(1.088)
ChinaPen_M_medium	-1.860*	-0.055	-1.437*	-2.171**	0.045	-1.695**	-1.686	-0.607	-1.475
	(1.079)	(1.344)	(0.840)	(1.034)	(1.279)	(0.842)	(1.200)	(1.240)	(0.966)
ChinaPen_M_low	-2.891***	-1.257	-2.533***	-2.553**	0.393	-1.690**	-2.358**	0.071	-1.709**
	(1.056)	(1.169)	(0.852)	(1.066)	(1.430)	(0.842)	(1.030)	(1.416)	(0.828)
ChinaPen_X_high	0.347	1.758	0.489	0.272	2.764**	0.648	1.574	1.828	1.225
	(2.177)	(1.450)	(1.402)	(1.856)	(1.262)	(1.172)	(1.644)	(1.784)	(1.240)
ChinaPen_X_medium	1.633	2.070	1.092	1.462	1.949	1.275	2.012	2.757	1.949
	(1.703)	(1.481)	(1.013)	(1.687)	(1.557)	(1.060)	(1.920)	(1.979)	(1.286)
ChinaPen_X_low	1.689	2.686	1.496	1.675	1.123	0.782	0.136	2.149	0.086
	(1.792)	(2.245)	(1.469)	(1.842)	(1.625)	(1.112)	(2.432)	(1.594)	(1.536)
Obs.	4,082	4,082	4,111	4,082	4,082	4,111	4,082	4,082	4,111
R-squared	0.944	0.917	0.957	0.944	0.917	0.957	0.944	0.917	0.957
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Weak identification F test	26.49	26.40	26.63	28.95	28.89	29.05	37.63	37.57	38.04

Robust standard errors clustered by firm in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

TABLE 8. TFP LEVEL

	Broad definition of capital							Narrow definition	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	FE	FE	IV-CMPT	IV-LAC	IV-WLD	FE tfp4	IV-CMPT tfp4	IV-CMPT	IV-CMPT tfp5
ChinaPen_M	-0.397	-0.681	-1.881*	-3.643***	-4.128***			-2.454**	
	(0.387)	(0.430)	(1.058)	(1.330)	(1.364)			(1.181)	
ChinaPen_M_high						0.335	-0.109		-0.379
						(0.544)	(0.771)		(0.873)
ChinaPen_M_medium						0.352	0.041		0.134
						(0.447)	(0.705)		(0.793)
ChinaPen_M_low						-0.868*	-1.851**		-1.939**
						(0.465)	(0.829)		(0.914)
ChinaPen_X_wavg		-3.203*	-3.207*	-3.212*	-3.213*			-3.746*	
		(1.830)	(1.829)	(1.833)	(1.835)			(2.134)	
ChinaPen_X_high						-3.607	-3.716		-3.799
						(2.251)	(2.260)		(2.652)
ChinaPen_X_medium						-2.967**	-3.136**		-3.300**
						(1.378)	(1.360)		(1.485)
ChinaPen_X_low						-1.119	-0.187		-0.584
						(1.405)	(1.402)		(1.537)
ROWPen_M		-0.735**	-0.775**	-0.834***	-0.851***	-0.707**	-0.720**	-0.932**	-0.857**
		(0.304)	(0.305)	(0.299)	(0.300)	(0.309)	(0.307)	(0.370)	(0.375)
Obs.	3,999	3,999	3,999	3,999	3,999	3,999	3,999	3,884	3,884
R-squared	0.885	0.888	0.887	0.885	0.884	0.888	0.888	0.899	0.900
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Weak Identification F Test			111	315.8	352.8		60.69	108.6	59.02

Robust standard errors clustered by firm in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

TABLE 9. REVENUE LEVEL

	Total revenue							Revenue from self-produced goods	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	FE	**FE**	**IV-CMPT**	**IV-LAC**	**IV-WLD**	**FE**	**IV-CMPT rev**	**IV-CMPT**	**IV-CMPT rev**
ChinaPen_M	-0.610	-0.184	-1.372	-0.620	0.256			-1.640	
	(0.520)	(0.472)	(0.968)	(0.954)	(0.971)			(1.052)	
ChinaPen_M_high						1.038**	0.092		-0.194
						(0.493)	(1.049)		(1.174)
ChinaPen_M_medium						0.021	-0.529		-0.966
						(0.519)	(0.933)		(1.066)
ChinaPen_M_low						-2.681***	-3.241***		-3.203**
						(0.877)	(1.125)		(1.248)
ChinaPen_X_wavg		1.190	1.242	1.209	1.170			1.690	
		(1.184)	(1.194)	(1.186)	(1.183)			(1.394)	
ChinaPen_X_high						7.299***	7.522***		7.661***
						(2.104)	(2.158)		(2.223)
ChinaPen_X_medium						0.897	1.131		1.705
						(1.451)	(1.503)		(1.604)
ChinaPen_X_low						-3.603**	-3.638**		-2.972*
						(1.455)	(1.479)		(1.574)
ROWPen_M		0.135	0.079	0.115	0.156	0.072	0.040	0.221	0.188
		(0.209)	(0.214)	(0.215)	(0.219)	(0.198)	(0.202)	(0.252)	(0.244)
Obs.	4,112	4,112	4,112	4,112	4,112	4,112	4,112	4,058	4,058
R-squared	0.969	0.971	0.971	0.971	0.971	0.972	0.972	0.966	0.966
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Weak Identification F Test			103.8	310.5	352.2		19.97	98.73	19.28

Robust standard errors clustered by firm in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

TABLE 10: WAGE LEVEL

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total workers		Production workers		Nonproduction workers			
	FE	IV-CMPT	FE	IV-CMPT	FE	IV-CMPT	FE tfp4	IV-CMPT tfp4
ChinaPen_M	0.126	0.830	0.140	0.309	0.220	1.169		
	(0.322)	(0.749)	(0.394)	(0.847)	(0.596)	(1.157)		
ChinaPen_M_high							1.644*	3.694**
							(0.972)	(1.467)
ChinaPen_M_medium							0.396	1.940
							(0.653)	(1.202)
ChinaPen_M_low							-0.202	0.825
							(0.664)	(1.249)
ChinaPen_X_wavg	0.359	0.332	-0.129	-0.135	-0.675	-0.708		
	(0.869)	(0.866)	(1.088)	(1.087)	(1.626)	(1.619)		
ChinaPen_X_high							1.095	0.842
							(1.681)	(1.737)
ChinaPen_X_medium							-1.846	-2.031
							(1.694)	(1.702)
ChinaPen_X_low							-1.959	-1.688
							(2.303)	(2.343)
ROWPen_M	-0.258*	-0.225	-0.037	-0.029	-0.118	-0.070	-0.073	0.006
	(0.152)	(0.152)	(0.134)	(0.136)	(0.219)	(0.214)	(0.224)	(0.219)
Obs.	4,088	4,088	4,038	4,038	3,946	3,946	3,946	3,946
R-squared	0.718	0.718	0.575	0.575	0.683	0.683	0.685	0.684
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Weak identification F test		103.5		102		100.1		35.75

Robust standard errors clustered by firm in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

TABLE 11. EXPORTS LEVEL

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Exports			No. of export products			No. of export markets		
	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT
ChinaPen_M	-4.813*	-5.056*	-4.943*	2.003	1.957	1.995	-0.605	-0.630	-0.617
	(2.756)	(2.768)	(2.750)	(1.680)	(1.683)	(1.679)	(1.121)	(1.117)	(1.118)
ChinaPen_X_wavg		15.122***			2.852			1.571	
		(4.006)			(2.004)			(1.282)	
ChinaPen_X_big			7.494***			0.459			0.720
			(2.404)			(1.254)			(0.749)
ROWPen_M	-0.026	-0.061	-0.065	0.359	0.352	0.356	-0.183	-0.186	-0.187
	(0.452)	(0.448)	(0.446)	(0.346)	(0.346)	(0.346)	(0.162)	(0.163)	(0.162)
Obs.	2,199	2,199	2,199	2,199	2,199	2,199	2,199	2,199	2,199
R-squared	0.945	0.946	0.945	0.894	0.894	0.894	0.906	0.906	0.906
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Weak identification F test	126.4	126.5	126.8	126.4	126.5	126.8	126.4	126.5	126.8

Robust standard errors clustered by firm in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

TABLE 12. OFFSHORE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Total employment		Productivity (broad)		Total revenue		Total worker wage		Exports	
	IV-CMPT	IV-CMPT EXCH	IV-CMPT	IV-CMPT EXCH	IV-CMPT	IV-CMPT EXCH	IV-CMPT	IV-CMPT EXCH	IV-CMPT	IV-CMPT EXCH
ChinaPen_M	-1.766**	-1.662**	-2.191**	-2.137**	-1.347	-1.298	0.833	0.790	-5.079*	-4.679
	(0.806)	(0.827)	(1.013)	(1.020)	(0.965)	(0.994)	(0.750)	(0.764)	(2.764)	(3.595)
ChinaPen_X_wavg	1.021	0.783	-3.262*	-3.342*	1.297	0.803	0.319	0.273	15.144***	12.525*
	(1.007)	(1.080)	(1.833)	(1.815)	(1.205)	(1.374)	(0.868)	(0.926)	(4.010)	(6.602)
offsh_CHN_interm_3d	0.007	0.616	0.057	-0.012	-0.211	0.131	0.004	-0.794**	0.101	2.497
	(0.076)	(0.573)	(0.081)	(0.268)	(0.255)	(0.406)	(0.044)	(0.336)	(0.138)	(3.794)
offsh_CHN_final_3d	0.180	-1.056	-0.159	-0.592	0.154	-1.809	-0.060	0.112	0.235	-12.187
	(0.144)	(1.863)	(0.340)	(1.528)	(0.263)	(2.844)	(0.161)	(1.015)	(0.235)	(25.324)
Obs.	4,111	4,111	3,959	3,959	4,112	4,112	4,088	4,088	2,199	2,199
R-squared	0.957	0.955	0.891	0.890	0.971	0.970	0.718	0.702	0.946	0.908
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Weak identification F test	104.8	0.395	104.1	0.234	103.8	0.401	103.5	0.437	127	0.0714

Robust standard errors clustered by firm in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

TABLE 13. GROWTH, FIRM FE, SE CLUSTER FIRM

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Production employment					Productivity (broad)		Total revenue	Nonproduction wage	Exports	
	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT
		def	emp	k_inty	tfp4		tfp4	rev	tfp4		emp
ChinaPen_M	-1.970**					-1.295				-4.950**	
	(0.957)					(0.881)				(2.376)	
ChinaPen_M_high/big		-1.508	-1.560	-1.437	-1.317		-1.378	-1.523	3.558**		-1.612
		(1.301)	(1.081)	(1.082)	(1.282)		(1.039)	(0.954)	(1.406)		(2.726)
ChinaPen_M_medium		-1.434	-2.100**	-1.589	-1.434		-0.600	-1.212	1.836		-3.995*
		(1.078)	(1.005)	(1.024)	(1.140)		(0.925)	(0.780)	(1.142)		(2.304)
ChinaPen_M_low/small		-2.128**	-1.035	-2.517**	-1.952**		-1.943**	-1.325	0.794		-6.656**
		(0.996)	(1.152)	(1.010)	(0.970)		(0.960)	(0.875)	(1.198)		(2.832)
ChinaPen_X_wavg	0.692					-3.109*				4.765*	
	(1.659)					(1.886)				(2.664)	
ChinaPen_X_high/big		2.700	3.459*	0.037	1.631		-5.075*	4.653**	0.779		1.843
		(1.769)	(1.811)	(2.106)	(1.565)		(2.613)	(2.258)	(1.650)		(4.751)
ChinaPen_X_medium		-1.094	1.222	1.078	1.500		-3.866**	0.455	-2.215		6.527**
		(1.699)	(1.377)	(1.682)	(1.845)		(1.542)	(1.420)	(1.623)		(3.182)
ChinaPen_X_low/small		-0.376	-1.025	1.196	-0.867		-0.273	-2.129*	-2.233		4.903
		(2.610)	(2.240)	(1.714)	(2.229)		(1.462)	(1.292)	(2.173)		(3.154)
Obs.	4,082	4,082	4,082	4,082	4,082	3,833	3,833	4,112	3,946	2,087	2,087
R-squared	0.491	0.493	0.493	0.491	0.492	0.607	0.609	0.466	0.563	0.542	0.545
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Weak identification F test	103.7	18.76	23.57	26.47	37.33	91.13	32.47	19.55	36.41	119.5	17.72

Robust standard errors clustered by firm in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

TABLE 14, TFP GROWTH TORNQVIST INDEX, FIRM FE

	(1)	(2)	(3)	(4)
	TFP Tornqvist Index			
	IV-CMPT	IV-CMPT tfpindex	IV-CMPT	IV-CMPT tfpindex
ChinaPen_M	-0.033		-0.033	
	(0.500)		(0.555)	
ChinaPen_M_high		1.758**		1.758***
		(0.797)		(0.546)
ChinaPen_M_medium		-0.510		-0.510
		(0.487)		(0.438)
ChinaPen_M_low		-2.483***		-2.483***
		(0.544)		(0.482)
ChinaPen_X_wavg	-0.312		-0.312	
	(1.109)		(0.767)	
ChinaPen_X_high		2.977*		2.977***
		(1.556)		(0.845)
ChinaPen_X_medium		0.537		0.537
		(1.017)		(0.641)
ChinaPen_X_low		-2.443*		-2.443***
		(1.215)		(0.675)
Obs.	4,091	4,091	4,091	4,091
R-squared	0.397	0.537	0.397	0.537
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
S.E. cluster	Industry	Industry	Firm	Firm
Weak identification F test	12.52	4.110	102.8	33.07

Robust standard errors clustered in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE 15. LEVEL, FIRM FE, SE CLUSTER INDUSTRY

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) Total revenue	(9) Nonproduction wage	(10)
	Production employment					Productivity (broad)				Exports
		def	emp	k_inty	tfp4		tfp4	rev	tfp4	
	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT
ChinaPen_M	-2.270**					-1.881*				-5.056*
	(0.844)					(0.992)				(2.557)
ChinaPen_M_high/big		-1.543	-1.416	-1.633*	-1.613		-0.109	0.092	3.694**	
		(1.045)	(1.000)	(0.879)	(1.100)		(0.932)	(1.882)	(1.704)	
ChinaPen_M_medium		-1.536	-2.258***	-1.860**	-1.686*		0.041	-0.529	1.940**	
		(1.055)	(0.779)	(0.766)	(0.838)		(0.893)	(1.465)	(0.916)	
ChinaPen_M_low/small		-2.485**	-1.663	-2.891***	-2.358**		-1.851**	-3.241*	0.825	
		(1.038)	(1.089)	(0.918)	(0.966)		(0.767)	(1.663)	(1.096)	
ChinaPen_X_wavg	1.144					-3.207				15.122***
	(1.959)					(2.352)				(4.020)
ChinaPen_X_high/big		3.806*	5.032**	0.347	1.574		-3.716	7.522***	0.842	
		(2.064)	(2.073)	(2.342)	(1.366)		(2.818)	(2.395)	(2.130)	
ChinaPen_X_medium		-0.972	1.624	1.633	2.012		-3.136	1.131	-2.031	
		(1.768)	(1.776)	(2.119)	(2.717)		(1.940)	(1.876)	(1.444)	
ChinaPen_X_low/small		-0.734	-1.427	1.689	0.136		-0.187	-3.638*	-1.688	
		(2.707)	(2.324)	(1.713)	(2.387)		(1.638)	(1.946)	(2.273)	
Obs.	4,082	4,082	4,082	4,082	4,082	3,999	3,999	4,112	3,946	2,199
R-squared	0.944	0.944	0.944	0.944	0.944	0.887	0.888	0.972	0.684	0.946
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry
Weak identification F test	11.76	2.645	2.856	3.290	3.932	12.43	7.438	2.771	3.746	7.563

Robust standard errors clustered by Industry in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE 16. GROWTH, FIRM FE, SE CLUSTER INDUSTRY

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Production employment					Productivity (broad)		Total revenue	Nonproduction wage	Exports	
	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT
		def	emp	k_inty	tfp4		tfp4	rev	tfp4		emp
ChinaPen_M	-1.970**					-1.295*				-4.950**	
	(0.788)					(0.657)				(2.341)	
ChinaPen_M_high/big		-1.508	-1.560	-1.437	-1.317		-1.378*	-1.523	3.558**		-1.612
		(1.046)	(1.022)	(0.881)	(1.088)		(0.772)	(1.570)	(1.655)		(2.153)
ChinaPen_M_medium		-1.434	-2.100**	-1.589**	-1.434*		-0.600	-1.212	1.836**		-3.995
		(0.971)	(0.744)	(0.741)	(0.825)		(0.685)	(0.941)	(0.856)		(2.529)
ChinaPen_M_low/small		-2.128*	-1.035	-2.517***	-1.952**		-1.943**	-1.325	0.794		-6.656**
		(1.057)	(1.117)	(0.851)	(0.866)		(0.890)	(0.876)	(0.971)		(2.956)
ChinaPen_X_wavg	0.692					-3.109				4.765	
	(1.927)					(2.472)				(3.446)	
ChinaPen_X_high/big		2.700	3.459	0.037	1.631		-5.075	4.653*	0.779		1.843
		(2.187)	(2.076)	(2.340)	(1.193)		(3.300)	(2.661)	(1.982)		(4.924)
ChinaPen_X_medium		-1.094	1.222	1.078	1.500		-3.866*	0.455	-2.215*		6.527
		(1.876)	(1.799)	(2.078)	(2.644)		(2.159)	(1.859)	(1.277)		(4.089)
ChinaPen_X_low/small		-0.376	-1.025	1.196	-0.867		-0.273	-2.129	-2.233		4.903
		(2.804)	(2.473)	(1.715)	(2.165)		(1.722)	(1.611)	(1.915)		(3.598)
Obs.	4,082	4,082	4,082	4,082	4,082	3,833	3,833	4,112	3,946	2,087	2,087
R-squared	0.491	0.493	0.493	0.491	0.492	0.607	0.609	0.466	0.563	0.542	0.545
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry
Weak identification F test	11.68	2.649	2.850	3.282	3.896	11.10	3.723	2.755	3.774	7.411	1.302

Robust standard errors clustered by Industry in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE 17. LEVEL, INDUSTRY FE, SE CLUSTER INDUSTRY

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Production employment					Productivity (broad)		Total revenue	Nonproduction wage	Exports
		def	emp	k_inty	tfp4		tfp4	rev	tfp4	
	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT
ChinaPen_M	-2.038					-1.033*				-4.509
	(1.726)					(0.537)				(4.988)
ChinaPen_M_high/big		-1.622	0.749	-3.868	-0.815		2.988**	6.069***	3.660*	
		(2.469)	(1.848)	(2.244)	(2.040)		(1.238)	(1.910)	(1.866)	
ChinaPen_M_medium		0.122	0.184	-1.823	-2.088		0.302	3.837*	2.718*	
		(1.364)	(1.089)	(1.940)	(1.831)		(0.933)	(1.837)	(1.325)	
ChinaPen_M_low/small		-0.819	-3.180**	-1.388	-1.725		-1.297*	-4.424*	1.784	
		(1.108)	(1.440)	(1.463)	(1.756)		(0.694)	(2.358)	(1.275)	
ChinaPen_X_wavg	2.840					-3.562**				37.533***
	(3.721)					(1.537)				(8.700)
ChinaPen_X_high/big		13.029**	17.291***	2.322	4.809		1.301	21.223***	2.839	
		(4.934)	(4.367)	(4.381)	(4.525)		(2.813)	(4.484)	(2.141)	
ChinaPen_X_medium		-3.581	2.325	4.406	3.572		-4.035*	-2.053	1.810	
		(2.697)	(3.197)	(3.896)	(3.757)		(2.219)	(2.589)	(2.773)	
ChinaPen_X_low/small		-6.975**	-8.523***	3.338	0.289		-6.678**	-16.970***	1.271	
		(2.850)	(2.654)	(2.451)	(3.156)		(2.896)	(3.784)	(3.214)	
Obs.	4,082	4,082	4,082	4,082	4,082	3,999	3,999	4,112	3,946	2,199
R-squared	0.825	0.832	0.837	0.825	0.825	0.744	0.757	0.882	0.391	0.681
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry
Weak identification F test	12.88	4.080	4.064	4.018	4.221	12.30	12.42	3.966	4.116	8.558

Robust standard errors clustered by Industry in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE 18. GROWTH, INDUSTRY FE, SE CLUSTER INDUSTRY

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Production employment					Productivity (broad)		Total revenue	Nonproductio n wage	Exports	
	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT
		def	emp	k_inty	tfp4		tfp4	rev	tfp4		emp
ChinaPen_M	-0.577					0.715				-1.214	
	(0.730)					(1.159)				(2.296)	
ChinaPen_M_high/big		-0.726	-0.459	-1.140	-0.225		1.376	-1.156	3.041*		-1.451
		(0.935)	(0.908)	(0.744)	(0.937)		(1.594)	(0.816)	(1.638)		(2.254)
ChinaPen_M_medium		-0.300	-0.445	-0.659	-0.596		0.891	-0.911	2.021*		-0.342
		(0.868)	(0.668)	(0.756)	(0.743)		(1.122)	(0.797)	(1.123)		(2.557)
ChinaPen_M_low/small		-0.299	0.188	-0.364	-0.344		0.733	-0.316	1.412		-1.156
		(0.733)	(0.906)	(0.792)	(0.796)		(1.106)	(0.923)	(1.078)		(2.448)
ChinaPen_X_wavg	-1.173					-2.824*				-0.766	
	(1.676)					(1.412)				(2.482)	
ChinaPen_X_high/big		0.822	1.335	-1.779	0.772		-1.353	0.924	0.959		1.603
		(2.348)	(2.316)	(1.912)	(1.481)		(1.975)	(1.181)	(1.257)		(3.380)
ChinaPen_X_medium		-2.895*	-1.358	-0.519	-1.275		-3.604**	-0.459	0.001		0.405
		(1.397)	(1.561)	(1.649)	(1.708)		(1.606)	(0.802)	(1.713)		(3.560)
ChinaPen_X_low/small		-1.706	-2.412	-0.325	-3.056**		-3.556*	-3.151**	-0.816		-3.535*
		(1.713)	(1.667)	(1.474)	(1.257)		(2.016)	(1.318)	(2.068)		(1.920)
Obs.	4,082	4,082	4,082	4,082	4,082	3,833	3,833	4,112	3,946	2,087	2,087
R-squared	0.129	0.131	0.133	0.130	0.131	0.265	0.268	0.037	0.298	0.124	0.126
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry
Weak identification F test	12.87	4.082	4.060	4.010	4.220	12.24	4.032	3.942	4.134	8.345	2.574

Robust standard errors clustered by Industry in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE A1. LEVEL, FIRM FE, SE CLUSTER FIRM

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Production employment					Productivity (broad)		Total revenue	Nonproduction wage	Exports
		def	emp	k_inty	tfp4		tfp4	rev	tfp4	
	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT	IV-CMPT
ChinaPen_M	-2.270**					-1.881*				-5.056*
	(1.008)					(1.058)				(2.768)
ChinaPen_M_high/big		-1.543	-1.416	-1.633	-1.613		-0.109	0.092	3.694**	
		(1.386)	(1.152)	(1.139)	(1.336)		(0.771)	(1.049)	(1.467)	
ChinaPen_M_medium		-1.536	-2.258**	-1.860*	-1.686		0.041	-0.529	1.940	
		(1.125)	(1.056)	(1.079)	(1.200)		(0.705)	(0.933)	(1.202)	
ChinaPen_M_low/small		-2.485**	-1.663	-2.891***	-2.358**		-1.851**	-3.241***	0.825	
		(1.028)	(1.131)	(1.056)	(1.030)		(0.829)	(1.125)	(1.249)	
ChinaPen_X_wavg	1.144					-3.207*				15.122***
	(1.718)					(1.829)				(4.006)
ChinaPen_X_high/big		3.806**	5.032***	0.347	1.574		-3.716	7.522***	0.842	
		(1.792)	(1.814)	(2.177)	(1.644)		(2.260)	(2.158)	(1.737)	
ChinaPen_X_medium		-0.972	1.624	1.633	2.012		-3.136**	1.131	-2.031	
		(1.701)	(1.416)	(1.703)	(1.920)		(1.360)	(1.503)	(1.702)	
ChinaPen_X_low/small		-0.734	-1.427	1.689	0.136		-0.187	-3.638**	-1.688	
		(2.600)	(2.182)	(1.792)	(2.432)		(1.402)	(1.479)	(2.343)	
Obs.	4,082	4,082	4,082	4,082	4,082	3,999	3,999	4,112	3,946	2,199
R-squared	0.944	0.944	0.944	0.944	0.944	0.887	0.888	0.972	0.684	0.946
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
S.E. cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Weak identification F test	104.3	18.62	23.60	26.49	37.63	111	60.69	19.97	35.75	126.5

Robust standard errors clustered by firm in parentheses.

*** p<0.01, ** p<0.05, * p<0.1