Import Competition, Foreign Inputs, and Labor Adjustment in a Developing Country: Evidence from Colombian Liberalization

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Abstract

We study how import competition and foreign inputs coming from high-income countries affect employment and earnings in less-developed economies. We use administrative data from Colombia, and exploit exogenous tariff reductions that increased Colombian imports from the United States, to derive five conclusions that contrast with previous findings for high-income economies. First, import competition decreases employment in a similar magnitude that foreign inputs increase it. Second, losses in manufacturing employment are driven by substitution with foreign inputs. Third, labor market adjustment among informal workers occurs by decreased earnings rather than employment. Fourth, high-skilled workers experience significant earnings losses, whereas low-skilled do not, and the effect is focused towards the informal, high-skilled jobs. Fifth, isolated regions experience proportionally larger manufacturing losses. Our results show that international trade between countries with different levels of economic development does not create only winners in developing countries, but, instead, has highly heterogeneous responses that contrast with those found within developed economies.

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1. Introduction

Tariff reductions may affect local labor markets directly by increasing import competition, and indirectly by reducing the costs of intermediate goods. Multiple studies find that import competition induced by trade liberalization or by imports from low-wage countries, especially from China, have detrimental effects on local labor markets among low and high income countries.[1] Such negative effects are mostly explained by declines in manufacturing employment, although more recent studies also show that import competition can have positive spillovers on other economic sectors, especially among non-tradable goods.[2]

Most of these results, however, do not account for potential gains due to subsequent reductions in the prices of foreign inputs, which have shown to foster economic development especially in emerging countries.[3] Firms in the developing world benefit from such decreases by increasing productivity and output quality.[4] Furthermore, input linkages affect a larger share of the economy (industries that produce tradable and non-tradable goods) compared to import competition, which exclusively applies to the tradable goods sector.[5] Tariff decreases might be, thus, particularly useful for developing economies, which can leverage the lower prices to import cheaper intermediate goods, most of them inputs of better quality, from more developed countries and increase productivity using foreign technologies.

This topic is particularly important for developing countries, many of whom have adopted policies over recent decades to increase trade with developed countries in an effort to increase

[1]For the effects of trade liberalization see: Dix-Carneiro and Kovak (2017); Hanson and Harrison (1999); and Attanasio, Goldberg, and Pavcnik (2004). For effects among Chinese imports on high-income countries, see Autor, Dorn, and Hanson (2013), Autor, Dorn, Hanson, and Song (2014), Bernard, Jensen, and Schott (2006) and Pierce and Schott (2016). For the effects of Chinese imports among low-income countries, see: Jenkins, Peters, and Moreira (2008); Moreira (2007); and Wood and Mayer (2011).

[2]See: Bloom, Handley, Kurman, and Luck (2019); and Costa, Garred, and Pessoa (2016).

[3]See, for instance Blaum, Lelarge, and Peters (2018), Caliendo, Dvorkin, and Parro (2019) for the effects on France and the United States. For the effects among developing countries see: Goldberg, Khandelwal, Pavcnik, and Topalova (2010); Edmonds and Pavcnik (2006); Topalova and Khandelwal (2011); Amiti and Konings (2007); Bustos (2011); and Halpern, Koren, and Szeidl (2015).

[4]See, among others: Melitz (2003); Melitz and Ottaviano (2008) Fieler, Eslava, and Xu (2018); Eslava, Haltiwanger, Kugler, and Kugler (2004); Pavcnik (2002); Forlani (2017); Halpern, Koren, and Szeidl (2015); Olper, Curzi, and Raimondi (2017); Medina (2018); Bas and Strauss-Kahn (2015); and Egger and Kreickemeier (2009).

[5]For instance, in Colombia, the tradable sectors (agriculture, mining, and manufacturing) account for 14 percent of formal employment. Even in more developed countries, such as France, the tradable sectors represent only 23% of employment (Frocrain and Giraud, 2018).

productivity and employment. Multiple free trade agreements, for instance, have been signed between developing countries and the United States to induce a more dynamic trade. At the same time, tensions over free trade between countries of differing economic development levels have emerged, as evidenced by the U.S.-China tariff wars.

In this paper, we analyze how employment and earnings in Colombia are affected by import competition and foreign inputs, particularly from the United States. In contrast to previous work (such as Autor, Dorn, and Hanson (2013) or Dix-Carneiro and Kovak (2017)) that mainly focus on the competition effect, we analyze separately the effects of import competition and foreign inputs, and we focus specifically on a setting in which imports from a high-wage country affect the local labor market effects of a lower-wage country. We provide an alternative perspective from a vision of international trade as having created "winners" in the developing world and "losers" in the developed world (Pavcnik, 2017). Indeed, our work reveals greater complexity, showing that the effects of imports within the emerging economies can be highly heterogeneous, just as it has been suggested by theoretical papers since the seminal work of Stolper and Samuelson (1941). Even though this paper does not include the estimation of aggregated welfare effects, we do provide reduced form estimates that pose strong evidence about such heterogeneity within developing countries.

Previous literature has struggled to analyze the issue due to two impediments. First, data restrictions have limited the ability to properly link input and competition measures. To surmount such limitations, we use administrative imports registers that allow us to link the level of imports with the level of foreign inputs at the industry level, and compute direct measures of increased import competition and of decreases in the prices of foreign inputs.[6] We then combine the measures of import competition and foreign inputs with the universe of formal employer-employee administrative records from the social security registry, household surveys, and detailed information on Colombian tariffs based on official records. Merging all these data sources allows us to analyze changes in overall (formal and informal) employment and earnings, and to contrast our results across different data sets.

[6]Our measures use industry inputs weights based solely on imports to better exploit the granularity of the data, but we additionally compute measures using a Colombian input-output matrix that account for the full economy. We provide evidence that the results remain unaltered.

Second, empirical difficulties have impeded the identification of import shocks coming from high-income countries. To isolate these effects, we use exogenous variation induced by two unexpected tariff reductions in Colombia. The first reduction, implemented in 2010, unilaterally reduced tariffs charged on the prices of intermediate foreign inputs. The second, which took effect in 2012, decreased the tariffs charged on imports from the United States, as part of the implementation of a free trade agreement between the two countries.[7] Neither of the reforms had an effect on Colombian exports, making it possible for us to isolate the effect of imports from the effects of exports. Furthermore, both tariff reforms exclusively increased imports from the United States, leaving those from other countries mainly unaffected. Most of the identifying shock is therefore driven by imports from a high-income country.

Our empirical strategy combines the unexpected reductions in tariffs in 2010 and 2012 in a differences-in-differences framework to provide reduced form estimates of the effects of import competition and foreign inputs. We use dynamic event-study estimates to test the common-trends assumption, finding balanced point estimates before 2010 in most cases. We do find some small pre-trends in 2008 when we use longitudinal records; these may stem from problems with data quality in that year.[8] We thus implement a matching estimator that eliminates these differences, and show that our results are robust to this. To eliminate potential confounders due to strong fluctuations in oil prices and exchange rate during our period of analysis, we also drop the mining sector of the analysis. Our results are not affected by this.

This study yields five main results. First, we find that a one-percentage-point decrease in Colombian tariffs (i.e., an increase in import competition) *decreases* Colombian employment by an estimated 1.4 percent; by contrast, a one-percentage-point decrease in the prices of foreign inputs *increases* employment by an estimated 1.2 percent. The sum of both effects is not statistically different from zero. While our estimated competition effects are similar to those found by previous studies, we complement them by showing that the decrease in the prices of foreign inputs have comparable employment effects in terms of magnitude.

[7]The free trade agreement mainly reduced Colombian tariffs on manufacturing and service goods. It left in place protections for certain agriculture products for longer periods of time, with protections lasting five years for most products, but continuing for up to 20 years for some products, such as rice.

[8]Reporting has been mandatory since 2008, but not all the firms reported employment in the first six months after implementation of this requirement.

We additionally find differences in the effects depending on the sector, with decreases in employment in manufacturing and increases in employment in services. These results are in line with employment reallocation across industries, that have been documented in previous studies (Bloom, Handley, Kurman, and Luck, 2019; Costa, Garred, and Pessoa, 2016).

Second, we find evidence that decreases in manufacturing employment are especially driven by substitution with foreign inputs. This implies, for example, that shoe producers require fewer workers because of the availability of cheaper, foreign sewing machines rather than just because of the direct competition from cheaper, foreign shoes. We also find that losses in manufacturing employment are explained by decreases in the average size of firms, rather than by decreases in the overall number of firms. This finding adds evidence to our argument that foreign inputs become substitutes for local labor, and echoes the results of Pierce and Schott (2016), who argue that Chinese imports reduce manufacturing employment in the United States by increasing the capital intensity of firms. This result also showcases the relationship between technologies in the United States and the effects of such technologies on the Colombian labor market, as shown by Kugler, Kugler, Ripani, and Rodrigo (2020).

Third, the adjustment to trade liberalization led to decreased monthly earnings but not by decreased employment of informal workers (i.e. workers who do not contribute to health insurance or pension programs). Earnings among informal workers tend to be less rigid than earnings for formal workers, for whom employment is generally regulated through contracts and is bound by the minimum wage. We observe that the informal labor market adjusts mostly by reducing the price of labor (decreasing wages), rather than by reducing the quantities of labor (decreasing employment).

Fourth, we find that workers with at least some college education (we will call them "high-skilled" from here onward) experience significant earnings losses. This effect is particularly large among the informal workers who are high-skilled. Previous studies highlight that competition from low-wage countries substitutes for low-skill labor in labor markets of high-wage countries (Bloom, Handley, Kurman, and Luck, 2019). We find, however, that competition from a high-wage country (the United States) decreases the earnings of the high-skilled workers in a developing country. This result provides evidence about labor substitution of high-skilled

human capital by imports, which are more likely to come from more developed countries.

Fifth, we observe relatively larger employment losses in regions of Colombia that have limited access to international trade. Trade in developing countries is unequally concentrated in certain areas due to geographical isolation, limited infrastructure, and imperfect mobility of workers (Dix-Carneiro and Kovak, 2017; Pavcnik, 2017). Historically, isolated regions of Colombia have not been integrated into the world economy, and the entrance of imports has been negligible. We show that the reduction of tariffs increased the share U.S. imports going to areas of Colombia that previously had limited access to such goods. This, in turn, relatively affected employment in these "low-access" areas, which experienced job losses largely driven by the losses in the manufacturing sector.

Although a large body of the literature quantifies the effects of international trade on local labor markets, most of this research has focused on analyzing the effects of import competition from developing countries, such as China and Mexico, on high-income countries in North America and Europe.[9] Other analysis that study the labor market effects of international trade on developing countries do not focus on the effect of imports from high income countries. For instance, Dix-Carneiro and Kovak (2017), Dix-Carneiro (2014), and Attanasio, Goldberg, and Pavcnik (2004) study how unilateral liberalization – that applies to imports from every country – decreases employment and earnings in Brazil and Colombia, whereas McCaig and Pavcnik (2018) study the labor market effects of *export* shocks in Vietnam given a liberalization in the United States, and Jenkins, Peters, and Moreira (2008), Moreira (2007), and Wood and Mayer (2011) focus on the effects of Chinese imports.

Ours is the first study to analyse the labor market effects of imports from high-income countries on developing economies. We contribute to the literature in two specific ways. First, we quantify the effects of the decreases in the prices of foreign inputs, and contrast them with the effects of import competition. Our results highlight the importance of studying the inputs price mechanism when assessing the potential effects of trade on the developing world. Second,

[9]The effect on the United States see Autor, Dorn, and Hanson (2013), Autor, Dorn, and Hanson (2015); Pierce and Schott (2016); Autor, Dorn, Hanson, and Song (2014); Feenstra and Hanson (1999); Bloom, Handley, Kurman, and Luck (2019); and Bernard, Jensen, and Schott (2006). For the effect on Europe, see: Bloom, Draca, and Van Reenen (2016); Branstetter, Kovak, Mauro, and Venancio (2019); and Hummels, Jørgensen, Munch, and Xiang (2014)

we study how imported products from high-income countries affect developing economies. Imports for high-income countries, more intensive in high-skilled human capital, can also affect local labor markets in less developed countries, and this relationship has not been previously highlighted.

The rest of the paper is organized as follows: Section 2 presents some conceptual considerations on the substitution of foreign inputs and local employment. Section 3 describes the background and data. Section 4 details the empirical strategy that identifies the casual effect of import competition and foreign inputs on Colombian labor market outcomes. Section 5 presents the results. Section 6 concludes.

2. Conceptual Framework

Consider J economic sectors and a representative firm in each sector $j \in J$. The representative firm combines labor (L_j), and foreign (X_j) inputs to produce a final good Y_j. Foreign inputs are priced with an ad valorem tariff τ, in addition to their regular price. Firms produce using a constant elasticity of substitution (CES) technology:

$$Y_j = \left[\theta L_j^{\frac{\sigma_j - 1}{\sigma_j}} + (1-\theta) X_j^{\frac{\sigma_j - 1}{\sigma_j}} \right]^{\frac{\nu_j \sigma_j}{\sigma_j - 1}},$$

where σ_j corresponds to the input elasticity of substitution in sector j, and $\nu_j < 1$ denotes the degree of homogeneity of the production function with decreasing returns to scale. A profit maximization – where firms chose the amount of labor and foreign inputs– implies that the demand for labor is given by:

$$\ln L_j = \varepsilon_j \ln \nu_j P_j(\tau) + \alpha \ln \left[\theta^{\sigma_j} W_j^{1-\sigma_j} + (1-\theta)^{\sigma_j} Q_j (1+\tau)^{1-\sigma_j} \right] - \sigma_j \ln \left(\frac{W_j}{\theta} \right), \quad (1)$$

where W_j stands for wages, Q_j for the foreign input prices, $\varepsilon_j = \frac{1}{1-\nu_j}$ is the price elasticity of demand, and $\alpha = \frac{\sigma_j - \nu_j \sigma_j - 1}{(1-\nu_j)(1-\sigma_j)}$. Taking the derivative with respect to τ yields:

$$\frac{\partial \ln L}{\partial \tau} = \underbrace{\frac{\varepsilon_j P_j'(\tau)}{\nu_j P_j(\tau)}}_{\text{Competition Shock}} + \underbrace{\left(\sigma_j - \varepsilon_j\right) \frac{(1-\theta)}{(1+\tau)} \left(\frac{X_j}{Y_j^{\frac{1}{\nu_j}}} \right)^{\frac{\sigma_j - 1}{\sigma_j}}}_{\text{Input Shock}}. \tag{2}$$

Equation (2) implies that a decrease in tariffs will affect employment through two mechanisms, regardless of whether we assume perfect or monopolistic competition. Consider first the case of perfect competition in which the firms take the price (P_j) as given. A decrease in tariffs will, first shift the demand of good j down by increasing competition and, thus, reducing prices (i.e. $P_j'(\tau) > 0$ because bigger tariffs imply less competition or, in other words, higher prices). We call this the *competition shock*, that is always negative after a tariff reduction. Second, a reduction in the tariffs charged for foreign inputs will substitute or complement labor with foreign inputs. We call this the *input shock*, and its magnitude depends on the elasticity of substitution (σ_j) – which can range from zero (perfect complements) to infinity (perfect substitutes)– and the price elasticity of demand (ε_j). If labor complements foreign inputs, then an increase in tariffs will decrease the quantity of foreign inputs and labor (i.e. $\sigma \to 0$ and the input shock term is negative). However, if foreign inputs substitute for labor then an increase in tariffs will increase labor (i.e., $\sigma \to \infty$ and the input shock term will be positive).

If we assume monopolistic competition (i.e., firms are able to determine their selling prices), then we will also have the same types of effects. The input shock will again depend on the elasticity of substitution in the same fashion as in the case with perfect competition. Nevertheless, the decrease in tariffs for intermediate goods directly benefits the firm by reducing its production costs, and it also affects the firm indirectly by reducing the costs of its competitors. A reduction in costs generates incentives to substitute labor for imported inputs but also increases the optimal production scale of the firm, which increases the demand for both imported inputs and labor. The effect of competition depends on the relative effect of tariffs on competitors, including competitors that import final goods directly. In equilibrium, costs go down and firms increase their scale, but the size of the increase in scale depends not only on

the elasticity of demand captured by ε but also on how much competition is now faced by the firm.

In this framework we have so far assumed that the labor market adjustment occurs via employment and that wages are non-flexible. In developing countries, this assumption is particularly reasonable for formal jobs (i.e., jobs in which the worker contributes to health insurance and pension plans), in which wages are governed by formal contracts and bounded by minimum salaries. However, a big share of workers in developing countries are employed in informal jobs, in which wages are much more flexible. In these cases, we expect that the labor market adjusts via wages rather than by employment. Thus the equilibrium wage of informal jobs will also depend on the *competition* and *input* shocks, separately, in the same fashion as the demand for labor in Equation (1).

This simple exercise suggests that tariff reductions, on the one hand, increase import competition and decrease employment (or wages, depending on the labor market flexibility), and, on the other hand, decrease the prices of foreign inputs, and either increase or decrease employment. In this paper we casually estimate Equation (1), and evaluate the effect of the increases in import competition and decreases in the prices of foreign inputs. In Section 4 we discuss the details of the empirical implementation.

3. Trade reforms in Colombia

The recent Colombian tariff reductions provide a good setting to study the labor market effects of imports in developing countries. The first reduction was implemented in 2010, with a unilateral tariff decrease, and the second in 2012, under the free trade agreement signed between Colombia and the United States.

Before the Free-Trade Agreement: Over the last decades of the twentieth century, Colombia undergone a liberalization process that reduced tariffs, irrespective of their origin, from around 50 percent in the 1970s to 12 percent in 2006 (Nieto, 2016). From 1970 to 1990, Colombian tariffs decreased continuously, from an average of 50 percent in 1970 to 29 percent in 1989, as part of government efforts to liberalize the country. During the 1990s, the country then

embarked on a second liberalization wave that further reduced the average tariff to around 12 percent.[10] However, from 1995 to 2008 the country did not experience changes in trade policy because it joined the *Comunidad Andina de Naciones* (CAN), which enforced a common tariff scheme for all participating Andean countries.[11] Under this scheme, the members of CAN charged a common tariff that was not altered during this period. The common tariff scheme ended in 2008, allowing Colombia to freely dictate changes in tariffs.

In 2010, a newly elected Colombian government unexpectedly decided to further decrease tariffs on imported products passing from an average of 12 percent to 8.3 percent. The tariff cuts were implemented under the Colombian Decree 4114 of 2010, which was officially implemented on November 5th, 2010. The decree mandated immediate cuts on tariffs for manufacturing imports. The measure aimed to reduce the prices of inputs and, thus, to boost employment, reduce costs, and increase production. The cuts applied to all incoming products irrespective of their country or origin. The agriculture sector remained mostly unaffected as agricultural products were not considered as essential inputs.

The Free Trade Agreement: Since the 1990s, the United States has been Colombia's biggest trade partner, accounting for around 25 to 30 percent of Colombia's imports.[12] Trade between both countries grew remarkably after the beginning of the 1990s, when both countries took measures to facilitate the flow of products. In 1991 the United States, under the Andean Trade Preference Act (ATPA), eliminated tariffs on a large number of Colombian products.[13] At the same time, Colombia's own liberalization decreased tariffs charged to the United States to around 15 percent. Later, in 2006, both countries started negotiations on the free trade agreement, that was approved in 2007 by the Colombian government. Four years later, in 2011, the U.S. Senate approved the agreement. It was legally implemented in May 2012 under

[10] A more detailed discussion about Colombian liberalization in the 1990s can be found in Eslava, Haltiwanger, Kugler, and Kugler (2004).

[11] The CAN is the union of the Andean countries (Colombia, Ecuador, Peru, and Bolivia) who came together to achieve development by the integration of trade in 1995.

[12] Colombian imports from the United States are mainly composed of manufacturing products. Appendix Figure **??**, which plots U.S. imports according to their one-digit sector codes, shows that manufacturing represents 93 percent (6,273 products) of the U.S. products Colombia imports. These products account for 92 percent of the total import dollar value. By contrast, agriculture represents 8 percent of the dollar value (367 products), and mining and services account for less than one percent (126 products).

[13] ATPA was established to promote Colombia's export industries, as well as to help fight drug production. It was continuously renewed after 2002, when it was called the Andean Trade Promotion and Drug Eradication Act (ATPDEA).

the Colombia Decree 730 of 2012.

The free trade agreement renewed the existing tariff exemptions that had been granted to Colombian products under the ATPA. In return, Colombia reduced tariffs on products from the United States. Tariffs were eliminated for most manufacturing, services, and mining products. Some other goods, most of them agricultural products, remained protected for additional years (in most cases for five years, but for some products such as rice, the tariffs were set to continue for an additional 20 years), allowing local producers to adapt progressively to the incoming competition.[14]

Figure I presents the evolution of the tariffs charged by Colombia to the United States (Panel Ia), and the evolution of tariffs charged by the United States to Colombia (Panel Ib). Panel Ia shows that tariffs on manufacturing and service goods decreased after 2010, whereas tariffs on agricultural and mining goods decreased with the free trade agreement. Even though an important share of the agriculture goods remained protected for some additional years, the sector was strongly liberalized in 2012. Panel Ib shows that tariffs for Colombian products entering the United States were minimal, largely renewing the already low tariff rates that had been put in place years before. Nonetheless, these negligible changes were officially referred to as cuts, and were implemented with the agreement in 2012.

The Colombian tariff reductions in 2010 and 2012 provide temporal and industry variation that enables the identification of the effects of increased competition and reduced input prices on employment and earnings. We argue that both reforms were overall unexpected. The tariff reduction in 2010 was implemented by a newly installed government as part of its strategy to boost employment by decreasing input prices. The reductions in 2012 were part of the free-trade agreement that was implemented only after a more than four-year-long wait for the approval of the U.S. Senate. Firms and consumers in Colombia could have hardly predicted whether or when the U.S. Senate would approve the agreement or, even more difficult, when any will implementation would take place.

Tariff reductions considerably increased Colombian imports from the United States. Be-

[14]The main protected products were rice, chicken, milk, cheese, butter, corn, meats, motorcycles (between 1500 and 3000 cc.) paper, ink, iron and steel products, glass, and plastics. The agreement additionally regulated competition, customs, environmental rights, intellectual property, and investment procedures.

tween 2010 and 2014 the value of U.S. products subject to the reduced tariffs grew from approximately 9 billion to 15 billion dollars (USD). After 2014, nonetheless, there was a generalized drop of Colombian imports, irrespective of their origin, triggered by a strong peso devaluation in 2015.[15] Imports coming from the United States also fell, but those products that faced higher tariff cuts experienced significantly smaller decreases that those that did not. Casual estimates of this are presented in Section 5.1.

Isolating imports from exports: Our empirical strategy benefits from the fact that these reforms had no significant effect on Colombian exports. The reduction of 2010 applied only for imported products, and, therefore, had no direct impact on exports. In addition, the implementation of the free-trade agreement in 2012 did not considerably reduce the tariffs placed on Colombian products by United States to Colombian products. We test this and show the results in Appendix Table **??**. We observe small and statistical insignificant effects from the U.S. tariff cuts on Colombian exports to the United States. These results are consistent with the fact that most of the tariffs were already close to zero by the time the free-trade agreement was implemented.

Regional Trade in Colombia: Connectivity and trade among Colombian regions are very limited because train and river transportation is nonexistent, and road infrastructure is very scarce (Duranton, 2015). The Colombian government historically neglected road construction due to geographic limitations and civil conflict in many parts of the country (Bushnell, 1993). As a result, incoming products from the United States affect mainly states with customs ports; such products do not reach isolated areas. In Appendix Figure **??** we present a map of the different customs ports that receive incoming goods from the United States, and the states around these ports. The map also shows the main roads built as of 2010. All of the roads

[15] In Appendix Figure **??** we present the dollar value of imports from the United States by the year of tariff reduction. The solid line depicts products for which tariffs were reduced in both years (3,621 products); the dashed line shows products for which tariffs were reduced as a result of the 2012 free trade agreement (2,716 products). Tariffs for the remaining 150 products either did not change, or decreased only 2010. Tariffs for two products were found to have declined only in 2010, but not in 2012. We observe a continuous increase since the moment of liberalization until 2014, when the value of imports decreases drastically. Such a decrease is explained by a general decrease in Colombia's imports. The decrease was triggered by a strong peso devaluation in 2015. Appendix Figure **??** shows a strong decrease of Colombian imports after 2014. This decrease is primarily explained by a 30 percent appreciation of the U.S. dollar with respect to the Colombian peso led by a strong decrease in international oil prices. Appendix Figure **??** shows the evolution of the exchange rate and oil prices for the analyzed period. The decrease in oil prices affected the peso and, therefore, the price of importing goods from the United States.

shown are two-lane highways (i.e., one lane going in each direction). Red areas highlight municipalities with customs ports, and blue areas highlight the surrounding states. The three red areas within the Colombian mainland correspond to Bogotá, Medellín, and Cali, which are the three biggest Colombian cities with customs offices in international airports. Around the coastline the red areas depict the maritime customs of Buenaventura, Barranquilla, Santa Marta, Cartagena, and Riohacha.

Incoming products from the United States stay primarily in states with customs ports. Around 80 percent of imports from the United States remain in the state where the customs port is located, and 90 percent remain within states that have customs ports. The 10 percent difference stems from goods that move across states that both have customs ports. The majority of the incoming goods stay in the coasts, or reach the heartland by plane. A total of eight states (out of 33) are mainly affected by import competition, while imports in the remaining states are relatively limited.

4. Data and Empirical Strategy

4.1. Data

Our empirical analysis is based on rich administrative data from multiple the Colombian authorities. First, we use official Colombian tariff records to measure the trade reforms. We use the Colombian Decree 4589 of 2006 that stipulated the level of tariffs charged on every incoming product after January 1st of 2007. This decree does not reflect actual tariff changes, but was published to adapt Colombian tariffs to the nomenclature established under the "NANDINA" 2007.[16] We combine this information with data provided under the Colombian Decree 4114 of 2010, which contemplated the unilateral tariff cuts of 2010, and with the Colombian Decree 730 of 2012, that regulated the free trade agreement between Colombia and the United States.[17] The three decrees provide information at the 10-digit product-code

[16]NANDINA nomenclature, which resembles quite closely the harmonized system, was designed by the Andean community of nations to help with the identification and classification of commodities, and to conform with international trade statistics. Decision 653 of the CAN ordered Andean countries to adapt its nomenclature. The Colombian government Decree 4589 of 2006 was adopted for this purpose.

[17]The data for the mentioned decrees can be found in: http://www.suin-juriscol.gov.co

level, and, thus, they constitute a very detailed source of variation. We complement these with information about tariffs charged by the United States to Colombia coming from U.S. International Trade Comission.

Second, we use detailed records on imports and exports from the Colombian Tax and Customs Department (DIAN for its Spanish initials) and the Colombian Central Bank. Imports and exports are measured between 2007 and 2018 at the product level (using 10-digit industry codes), and separately detailed by state where the good was bought in (in the case of imports) or sold (in the case of exports). We complement this information with individual records on every single imported and exported product by firm in 2008. These records link registries of imports at the product level with the industry code of firms. We merge the tariff changes at the product level and collapse the data at the industry level (four-digit industry code) to create a matrix that measures the foreign inputs used by every industry before the tariff reductions took place. This matrix only accounts for imported inputs, thus we use a two-digit input-output matrix built by the Colombian statistical offices as an alternative way of quantifying the the decreases in the prices if inputs. We provide additional details of the construction of these measures in Section 4.2.

Third, we use social security records providing matched employer-employee earnings records from 2008 to 2018. This is an administrative data set that includes the universe of formal workers in the country in any given month. One limitation of the data is that it contains only formal-sector workers, who represent about 60 percent of Colombian workers. A second limitation is that, in 2008, when the data set was begun, firm compliance increased gradually. Therefore, data from that year should be interpreted with caution. We collapse these records at the four-digit industry and state level.

Due to the limitations, we complement the longitudinal records with the Colombian household survey, *Gran Encuesta Integrada de Hogares* (GEIH), which provides additional measures of employment including informal workers. This data set also complements the longitudinal records by making it possible to compute employment by education level. The survey is administered monthly and includes approximately 8.7 million observations between 2008 and 2018. We focus our analysis on the social security records when we break the results

by industry and region, given the limitations in the representativeness of the household survey.

We merge all the data sets, and create four different estimating samples. Two correspond to product-balanced panels built by merging trade and tariff information at the 10-digit level. One sample shows the product-year level, and the other shows the product-state-year level. These data include information of 6,663 imported products observed during 12 years (2008-2018) for 33 states. For the panel at the industry-state-year level we drop cells that do not have registers of trade for the analyzed period.

The other two estimating data sets correspond to four-digit industry-code panels constructed by merging the employer-employee records, the household survey, and the tariffs. They are built at the industry-year level and at the industry-state-year level. This data set follows 416 four-digit ISIC sectors for 11 years. We built this panel by keeping sectors with at least one employee observed or with information about trade (either imports or exports). The panel at the industry-year includes 4,576 observations, but the household survey only had information for 402 industries that correspond to 4,422 observations. Appendix Table **??** presents descriptive statistics for the four samples.

Mining Sector: We drop the mining sector from the analysis because of potential confounders due to variation in oil prices and exchange rates. This sector encompasses 21 industries, including oil and coal, that constitute less than 0.5 percent of Colombia's imports. Including this sector into the estimations does not alter the main conclusions of the paper, but adding it may add certain degree of confounding that may bias the estimations.

4.2. Competition and Input Shocks

The *competition* and *input* shocks quantify the increase in competition and the decrease in the prices of foreign inputs, respectively, induced by the tariff reductions. We define the competition shock as the direct change of tariffs at year t with respect to the value before the reductions of tariffs in industry j. Formally, the competition shock is defined as:

$$\tilde{\tau}_{jt} = \tau_{j,2010} - \tau_{jt}, \tag{3}$$

where τ_{jt} represents the tariff charged by Colombia to imports from the United States of industry j at year t. This measure quantifies the degree of liberalization per industry. Before 2010, $\tilde{\tau}_{jt}$ is equal to zero since the tariffs did not change. After 2010, the tariffs start to decrease continuously.[18] A bigger value for $\tilde{\tau}_{jt}$ implies a larger decrease in tariffs and, therefore, a larger increase in import competition.

We use information on imports per firm at the product (10-digit) level in 2008 to quantify the input shock in industry j. We aggregate the firm-level data to compute the shares of the different imported inputs by industry j, before the tariff reductions. We then multiply the respective share with the tariff reduction of each input k, and sum across inputs. Formally, the input shock is expressed as follows:

$$\tilde{q}_{jt} = \sum_{k} w_{jk}^{2008} \tilde{\tau}_{kt}, \tag{4}$$

where $w_{jk}^{2008} = \frac{X_{jk}^{2008}}{\sum_k X_{jk}^{2008}}$, and X_{kj}^{2008} corresponds to industry j's imports of input k in 2008. The input shock corresponds, therefore, to the weighted decrease in prices of the imported inputs per sector j in year t. We use the weights measured in 2008 to eliminate any potential bias. A bigger value of $\tilde{q}_{jt}$ implies a bigger reduction in the prices of foreign inputs. This measure, however, only includes imported inputs, so we provide an alternative measure that uses a Colombian input-output matrix at the two-digit level to complement our analysis.[19]

These two measures could potentially be considered collinear, affecting the standard errors of the estimations. However, the import competition shock affects mainly the manufacturing and agriculture sector, and is zero among the industries in services. In contrast, the foreign input shock affects all industries. We provide in Appendix Table **??** the average measure of each shock by industry, and we show that the measures do not correlate in a worrisome fashion. In fact, the correlation between both measures is below 0.4.

[18] Notice that $\tilde{\tau}_{jt}$ between 2010 and 2012 is equal to the tariff change that applied to all the countries, but, after 2012 it takes the value charged exclusively to the United States.

[19] We use this alternative matrix as a robustness check, and our results remain unchanged although much more imprecise because the merge is done at the two-digit industry code level.

4.3. Earnings per Industry

We exploit the granularity of our data to compute a measure of earnings premia at the industry level to quantify the effects on earnings. The raw average measure of earnings per industry is affected by changes in workforce composition induced by the liberalization. Therefore, to estimate the effects on earnings we follow Dix-Carneiro and Kovak (2017) and compute earnings premia that quantify the log of earnings in an industry controlling by potential selection in workers' composition. We estimate:

$$\ln(Earnings)_{imsjt} = \theta_{jt} + X_{imsjt}\phi_t + \mu_{st} + \mu_{mt} + \varepsilon_{imsjt}, \tag{5}$$

separately for each year $t \in \{2008 - 2018\}$. The dependent variable corresponds to the logarithm of the monthly earnings of individual i, in month m, state s, working in industry j and year t. We condition on state (μ_{st}) and month (μ_{mt}) fixed effects, as well as on a vector of individual-level controls (X_{imrjt}) that includes gender, age, and age-squared. The coefficients attached to the industry identifiers (θ_{jt}) correspond to the industry premia, which we use as a measure of earnings. Equation (5) is estimated separately by year, so the coefficients vary by year and industry, and they quantify changes in earnings adjusting for potential changes in workforce composition. We additionally recover the standard errors of θ_j to efficiency weight our estimations by the inverse of the standard error.

4.4. Identification

Our identification exploits the exogenous timing of the tariff reductions to estimate the effect of the competition and input shocks. We want to estimate such effects, but also to estimate heterogeneous effects by region and to aggregate both shocks into a single comparable measure. In what follows we describe our baseline empirical model, an estimation that accounts for region heterogeneity, and a mechanism to aggregate both shocks into unique measure.

Baseline Model:- We use the sample analogue of Equation (1) to estimate the effects of the increase in competition and the reduction of input prices. Formally, our baseline model takes

the form of:

$$y_{jt} = \beta^c \tilde{\tau}_{jt} + \beta^i \tilde{q}_{jt} + \mu_j + \mu_t + u_{jt}, \tag{6}$$

where y_{jt} refers to the logarithm of an outcome y, which corresponds primarily to employment and earnings. We additionally include industry (μ_j) and year (μ_t) fixed effects to control for observed and unobserved heterogeneity using within-industry variance. The parameters of interest β^c and β^i quantify the effect of the competition and input shocks, respectively, on outcome y. Standard errors are clustered at the industry level.

This model resembles a reduced-form estimation using a difference-in-differences estimator with multiple periods. The consistency of the estimating parameters depends on the validity of the assumption that industries with and without tariff reductions will have evolved in parallel in the absence of the tariff reductions (i.e., the parallel trends assumption). The absence of any additional policies that exclusively affected the industries in which tariffs were reduced strongly supports our identification strategy. Additional empirical support for our strategy stems from the surprising and non-expected decrease in tariffs, and the absence of knowledge about the timing of their implementation.

The parallel-trend assumption is essential to the identification of Equation (6), and, in addition, the effects of tariff changes on local labor markets might significantly vary over time. Therefore, we additionally estimate dynamic effects in an event-study form. We define T_j^c as a dummy that takes the value of one if the tariffs for industry j decreased after 2010 (i.e., if they decreased in 2010 or in 2012). We also define T_j^i as a dummy that takes the value of one if the input prices of sector j decreased after 2010. Using these dummies we estimate:

$$y_{jt} = \sum_{t \neq 2010} \beta_t^c \left[T_j^c \times 1(\text{year=t}) \right] + \sum_{t \neq 2010} \beta_t^i \left[T_j^i \times 1(year = t) \right] + \mu_j + \mu_t + \varepsilon_{jt}, \tag{7}$$

where $1(year = t)$ is a dummy that takes the value of one if the observation is in year t. β_t^c and β_i^c are the time-varying effects of the competition and input shocks, respectively. The rest of the coefficients are the same as in equation (6).

The results of equation (7) are particularly helpful to validate our main results in three

different ways. First, the dummy variables in the pre-period are able to test for potential pre-trends in the treatment assignment. Second, it allows us to dynamically estimate the effect several years after the tariff reduction. Third, as opposed to equation (6), the treatment in equation (7) is constant eliminating potential issues that arise when the constant effect assumption is violated (de Chaisemartin and D'Haultfœuille, 2020; Goodman-Bacon, 2020).

Difference-in-difference estimators may have additional issues even when the parallel trend assumption holds if the outcome levels vary between treated and untreated units (Kahn-Lang and Lang, 2020). Therefore, we additionally estimate equations (6) and (7) in a matched sample that eliminates any preexisting differences in levels between treated and untreated sectors. We do this for the longitudinal data, where we observe significant differences in levels; we do not conduct these additional estimations for the household survey, where we do not observe any differences. Discrepancies between the longitudinal data and the household survey might stem from data quality in the first years that the longitudinal data was compiled (2008). We apply a Mahalanobis distance measure to match treated observations to their nearest control neighbor. The match is performed using employment and earnings in the longitudinal data for 2008, 2009 and 2010. Ryan, Kontopantelis, Linden, and Burgess (2018) show that differences-in-differences in matched samples perform well even when the parallel trend assumption does not hold.

Heterogeneity by Region:- To quantify heterogeneity by region we define an accessibility index as:

$$A_s = 1/h_s,$$

where h_s corresponds to the driving distance from the capital city of state s to the closest international port. This index is then rescaled from zero to one, such that very accessible states take a value of one, and very inaccessible ones states the value of zero.

We then estimate the following model:

$$\tilde{y}_{jst} = (\beta^c \tilde{\tau}_{jt} + \gamma^c \tilde{\tau}_{jt} A_s + \delta^c \tilde{\tau}_{jt} A_s^2) + (\beta^i \tilde{q}_{jt} + \gamma^i \tilde{q}_{jt} A_s + \delta^i \tilde{q}_{jt} A_s^2) + \mu_j + \mu_t + \mu_s + u_{jt}, \quad (8)$$

where $\tilde{y}_{jst}$ corresponds to outcome y in state s, industry j, and year t divided by the outcome in 2008. A_s corresponds to the accessibility index in state s. We additionally include state (μ_s), industry (μ_j), and year (μ_t) fixed effects. γ^c and γ^i estimate the heterogeneous effects of the tariff reduction by regions with different degree of accessibility, and δ^c and δ^i potential non-linearities. The dependent variable is expressed in changes with respect to 2008; therefore, the parameters estimate the relative effects with respect to previous levels of the outcome. The model additionally controls for unobserved state and industry differences because of the inclusion of the fixed effects.

Contrasting the Competition and Input Shocks: The estimators β^c and β^i in equation (6) are not completely comparable because the competition and input shocks have different magnitudes as shown in Table **??**. A simple sum of the parameters β^c and β^i will not correctly contrast both shocks. Therefore, we compute a measure that equals to the weighted sum of both parameters in Equation (6). We weight using the average magnitude of the shock in each sector (displayed in Appendix Table **??**). Formally, this measure is equivalent to:

$$\text{Weighted Sum}_j = \underbrace{\Delta\bar{\tau}_j \times \beta_j^c}_{\text{Competition Shock}} + \underbrace{\Delta\bar{q}_j \times \beta_j^i}_{\text{Input Shock}}, \tag{9}$$

where $\Delta\bar{\tau}_j$ and $\Delta\bar{q}_j$ correspond to the average competition and input shock in industry j. This measure contrasts the magnitudes of both shocks on outcome y, especially because we are able to test the null of the weighted sum equal to zero. Note, however, that these measures do not aggregate the effect of a tariff reduction since this will require a general equilibrium model behind the estimations.

5. Results

5.1. Effect of Tariffs on Imports

The tariff reductions in Colombia increased imports, especially those coming from the United States. Table I presents the results of estimating a differences-in-differences model

using multiple measures of imports as outcomes.[20] In column (1) we present estimates using the logarithm of total imports as outcome. We find that a one percentage point decrease in tariffs increases imports by around 1.5 percent, and, as shown in column (2), there are no differences before and after 2012.

In columns (3) and (4) we use the logarithm of the imports from the United States as the outcome, whereas in columns (5) and (6) we use the percentage of imports from the United States as the outcome. The tariff reductions indeed increased imports from the United States in absolute (measured by the logs) and relative (measured by the percentage) terms, with a remarkable percentage growth after 2012. Columns (7) to (10) present the same estimations but using imports from all other countries different than the United States. In contrast with imports from the United States, we do not observe big increases as a consequence of the tariff reduction, and, indeed, columns (9) and (10) evidence a decrease in the percentage of imports coming from other countries.[21]

5.2. The Effects on Employment and Earnings

We first provide non-casual but compelling evidence in Figure II, which plots the evolution of employment and earnings by industries that did and did not reduce tariffs (panel IIa for employment and panel IIc for earnings), and by two types of industries, those whose input prices were reduced, and those whose input prices were not reduced (panel IIb for employment and panel IId for earnings). We re-scale dividing by the value in 2008 to present relative gains.

Figure IIa shows that, prior to 2012, there were no differences in employment between both types of industries: those in which tariffs were reduced in 2012, and those in which tariffs remain the same. An employment gap between these industries emerges after 2012. Industries in which tariffs were reduced (i.e. industries that received a positive competition shock) display a smaller growth in employment, creating a strong and persistent gap between

[20] We estimate this at the product level to better exploit the variation induced by the free trade agreement. However, the results are very consistent when collapsing the data at the four-digit level.

[21] We additionally present these results in event-study form in Appendix Figure **??** to test for potential pre-trends. We split the estimation by industries that decreased tariffs in 2010 and 2012, and those that decreased only in 2012, and estimate a joint model with both treatments. The comparison group corresponds to those products that did not change tariffs. We do not observe any preexisting trend before 2010, but we do observe an increase in imports from the United States after the tariff reductions.

these industries and those in which tariffs were not reduced. We observe a similar story in Figure IIb, which shows no differences in employment between both industries in which the prices of foreing inputs were reduced and those industries in which the foreign inputs' prices were not reduced. After 2010, however, a gap emerges because of a decrease in employment growth among industries in which the prices of inputs were not reduced.

With respect to earnings, we do not observe in Figure IIc any differences among industries that experienced and did not experience tariff reductions; we do not observe any drastic change either before nor after 2010 and 2012. However, we do see (in Figure IId) a differential increase in earnings among workers employed in industries in which inputs prices did not fall. This effect can be explained either by an actual increase in earnings or by changes in the composition of the workforce.

The previous figures provide strong evidence about the validity of our empirical strategy, although they do not present casual estimates. We do not observe any differential patterns in levels between treated and untreated industries in the pre-period. The lack of pre-trends prior to the tariff reductions offers striking evidence about the counterfactual scenario in which Colombia would have not decreased tariffs. However, the estimates presented in these figures are only suggestive.

5.2.1 The Effects of Import Competition and Foreign Inputs on Employment and Earnings

We present casual estimates in Table II, which displays the results of the estimation of Equation 6 using as outcomes different measures of employment (columns 1 to 5) and earnings (columns 6 to 10). We present separate results for the competition shock in panel A, the input shock in panel B, their joint estimation in panel C, and their weighted sum (detailed in Equation 9) in panel D, as well as estimates using the longitudinal data and the household survey.

We observe persistently negative point estimates of the competition shock on employment, and positive, but less precise, effects of the prices of inputs. A one percentage point increase in the competition shock (i.e. a one percentage point reduction in tariffs) reduces (formal and

informal) employment by 1.4 percent. This particular result resembles many previous results in the literature in several other contexts. By contrast, the input shock has positive point estimates when using household survey, but negligible point estimates when using the longitudinal data. On average, a one percentage point decrease in the prices of foreign inputs increases overall employment by around 1.2 percent when using the household survey. The weighted sum yields imprecise estimates in all the specifications; thus we cannot reject the null hypothesis and claim that the magnitude of both shocks is different. We observe very similar results in Appendix Table **??** when we use an input-output matrix that includes all the economic sectors to construct the input shock.

Additionally, we observe a decrease in the earnings of informal workers only. Column 8 shows that a one percentage point decrease in the prices of foreign inputs decreases informal earnings by 0.4 percent. We observe a decrease in earnings of around 2 percent among informal workers when considering the weighted sum. In contrast to formal workers, those employed in informal jobs are less likely to work under rigid contracts and they are not bound by minimum wages. Therefore, their earnings are more adjustable against an adverse shock.

We present similar results in Figure III, which plots the dynamic event study estimates (detailed in Equation 7) for the competition (Panel IIIa and Panel IIIc) and input (Panel IIIb and Panel IIId) shocks. Even though the shocks with the same outcome are estimated jointly, we present their point estimates in separate graphs. We see in Panel IIIa a decline in employment since 2013, after the decrease in tariffs stipulated in the free trade agreement. We do not observe any significant point estimates prior to 2013. In addition, Panel IIIb displays positive point estimates after 2011 among industries in which the prices of foreign inputs were reduced. We again do not observe any differences prior to 2012. We do not find any strong effect on earnings nor evidence of the existence of pre-trends.[22]

Summarizing, these results show that: 1) more import competition decreases employment;

[22]We present event-study estimates for the other measures of employment in Appendix Figure Figure **??** and for the other measures of earnings in Appendix Figure **??**. We observe similar patterns as for the overall employment. However, we observe some pre-trends in 2008 using the longitudinal data. This pre-trend is not observed when using formal workers in the household survey. The difference between data sources might be due to data quality limitations in 2008, which is the first year of collection of the administrative records. The estimation on the matched sample, nonetheless, corrects this imbalance and it shows point estimates that are very similar to those of the other specifications.

2) Reductions in input prices increase employment in a comparable magnitude as the competition shock; 3) Wage adjustments occur among informal workers only, presumably because of their less rigid type of employment. The imprecise result of the input shock is expected if some industries complement and others substitute labor and foreign inputs, as shown in the stylized conceptual framework of Section 2. If this is the case, then the estimated average effects of the input shock on formal employment will be imprecise, even though the effect might be negative or positive in several industries. We provide evidence of this in the next section.

5.2.2 Industry-Specific Effects

We estimate sector-specific effects by interacting the competition and input shocks with sector dummies in agriculture, manufacturing, and services, and present the results in Table III. We observe in column 1 that the competition shock decreases employment in agriculture and manufacturing, and has a positive but insignificant point estimate in services. Surprisingly, we observe similar strong negative results when estimating the effects of the input shock on manufacturing employment (column 2). Such result implies the existence of labor substitution of workers for foreign inputs.

Furthermore, the negative effect of foreign inputs on manufacturing employment dominates the negative effect of import competition, as shown in column 3. Both shocks negatively affect manufacturing employment, but the manufacturing point estimate of the competition shock decreases considerably in magnitude when we estimate both shocks together. By contrast, the manufacturing coefficient on the input shock seems to remain unaffected, although it loses some precision. We observe the same when we restrict to the matched sample in column 4.

When using the household survey data in columns (5) we observe very similar patterns. The input shock dominates the competition shock, although more imprecisely (see Appendix Table **??** for the effects on manufacturing employment when estimating the shocks separately). Moreover, we observe positive and significant point estimates on formal employment in the service sector. Such results contrast with the results in manufacturing that show negative estimates. We do not observe any precise effect on informal employment, but we do observe earnings reductions for informal workers across all economic sectors.

5.2.3 Employment Effects by Two-Digit Industries

The results in Table III showcase a decrease in manufacturing employment, ambiguous effects in agriculture, and positive point estimates on services. These intra-sector effects could also be heterogeneous across sub-industries if some smaller industries have employment gains and others have employment losses that compensate when averaged out. This could also explain the null result of the weighted sum of the shocks in panel D of Table II. Therefore, we exploit the detailed features of the data to estimate the model by two-digit industries in Table IV.[23]

We see three major patterns. First, there is a strong decrease in employment across all manufacturing industries. Second, some service industries experience employment gains whereas some other service industries experiences losses. Certain sectors –such as water transport, hotels and restaurants, travel agencies, and construction– benefit from the input shock, and they increase employment remarkably. By contrast, other service industries –such as recycling, postal communications, and financial activities – experienced employment losses. Third, substitution of labor by foreign inputs is the main driver of the decrease in manufacturing employment.

Two results provide evidence about the substitution of manufacturing labor by foreign inputs. First, we observe consistently that the input shock dominates the competition shock when comparing their point estimates. Second, we consistently observe stronger effects of the input shocks on the average size of firms rather than on the number of them. If labor substitution is the driver, one would expect to see bigger decreases in the average firm size rather than in the number of firms, and we find evidence in support for this.

In general, we see a situation which imports from the United States decrease employment in manufacturing, increases in employment services, and is ambiguous in agriculture. We also observe that the driver of the manufacturing decline and the employment gains in services is the decrease in the prices of foreign inputs rather than the increase in import competition.

[23]For the sake of improved presentation we grouped some of the two-digit industries together to decrease the number of rows in the table. We present results only for the longitudinal data because they are representative of the formal sector by industry. Household survey data might not be representative and therefore such data sources might have noisy point estimates. We, nonetheless, present the results obtained using the household survey in Appendix Table **??**. For the sake of completeness, we additionally present results by two-digit industries on earnings in Appendix Table **??**.

Finally, we observe that the informal labor market adjusts by decreasing earnings rather than by decreasing employment.

5.2.4 Results by Level of Skills

The effects of the competition and input shocks can be heterogeneous by different types of workers, depending on to what degree foreign inputs can substitute for their labor. A special measure of heterogeneity is workers skills. Imports from the United States can vary in intensity of the use of high- or low-skilled human capital. Therefore, the effect of such imports on employment in the importing country can differ by skills. To test for this we use the household survey to estimate the effect between low- and high-skilled employment and earnings, and present the results in Table V. We define high-skilled employment as workers who have at least enrolled in college education.

On the one hand, we find that low- and high-skilled formal employment are affected in a similar fashion, in that, in both cases, we cannot reject the null of the weighted sum of both shocks to be different from zero. A one percentage point increase in the competition shock (or a one percentage point decrease in tariffs) reduces formal high-skilled employment by 1.1 percent and formal low-skilled employment by 1.3 percent. By contrast, we find positive point estimates of the input shock for low- and high-skilled workers. The effects of foreign inputs are larger in magnitude, and significant, for the low-skilled workers. However, when the weighted sum is considered, we are not able to claim that the weighted sum is different from zero nor for the low- nor for the high-skilled workers.

On the other hand, we find that earnings of high-skilled workers decrease whereas earnings of low-skilled workers remain unaffected. This is true especially among informal, high-skilled workers. In fact, we observe a decrease of 1.6 percent in the earnings of high-skilled workers in formal employment and a 3.6 percent in earnings of high-skilled workers employed informally. We do not observe any significant effect among low-skilled workers, neither employed formally of informally.

Imports from the United States can be intensive in high-skilled human capital and can substitute the local Colombian production of goods in high-skilled human capital-intensive

industries. These results suggest that the reductions among the earnings of the informal workers might be particularly driven by the earnings of the high-skilled, informal workers. In terms of employment, nonetheless, we are not able to reject the null hypothesis to claim that the weighted sum of the effects is different from zero neither for low- nor for high-skilled workers.

5.2.5 Heterogeneous Effects by Regions on Employment

We explore differences in the effects of the tariff reduction depending on the degree of accessibility by region using the specification presented in equation (8). To evaluate whether compliance results are heterogeneous, we first use imports as the outcome of interest. The results are presented in Figure IV, which shows (in panel IVa) bigger point estimates among less accessible areas. Recall, however, that these estimations use as the outcome the contemporaneous value of the variable divided by the value in 2008; thus, they quantify the effect relative to the baseline value. The bigger point estimates among less accessible areas are thus mostly explained by the almost negligible extent of imports to these territories in 2008. We additionally show in Figure IVb that such increase is completely driven by an increase of imports from the United States.

In line with these results, we also find that the effects on employment are heterogeneous and stronger, in relative terms, for less accessible areas. Figure V shows these results. Panel Va displays the results of the competition shock; panel Vb displays the results for the input shock; and panel Vc displays the weighted sum of both shocks. We observe negative effects of the competition shock among less accessible areas, and we see that this magnitude decreases with accessibility. Nonetheless, the input shock positively affects less accessible areas. The weighted sum quantifies an employment reduction among less accessible areas.

These results are also heterogeneous by industry, and mainly driven by the manufacturing sector. We present the results disaggregated by sectors in appendix figures **??**, **??**, and **??**. We find again that the input shock drives the negative point estimates among manufacturing sectors, whereas it increases employment in the service sector.

We additionally explore the effects on earnings in Figure VI. We do not observe major, significant results, suggesting that the labor adjustment in formal jobs occurs mainly through

employment and not through wages.

6. Conclusion

In this paper we explore how import competition and foreign inputs from high-income countries affect employment in developing economies. We focus on the labor adjustment effects of sudden increases in imports coming from the United States in Colombia. We show a heterogeneous story in which increased import competition decreases manufacturing employment and decreases the earnings of high-skilled workers. By contrast, reductions in the prices of foreign inputs increase employment in services industries, but also decreases employment in manufacturing industries.

We take advantage of exogenous tariff reductions in Colombia that decreased the prices of foreign inputs and increased import competition from the United States. We combine these reductions into a differences-in-differences framework, that enables the estimation of reduced form casual effects. We provide strong evidence about the non-existence of preexisting differences across affected and unaffected industries, and show event study estimates, which validate our results against additional biases posed by potential variation in treatment timing (de Chaisemartin and D'Haultfœuille, 2020; Goodman-Bacon, 2020).

We use administrative records that link competition and inputs at the industry level, as well as to track employment using household surveys and social security records. The detailed features of the employment data allow us to estimate effects at industry and region levels, and to analyze the effects in formal and informal employment. We overcome the limitations of the household survey data and the social security records by estimating our results using both data sources and contrasting with one another. Each data set has particular limitations but also particular advantages. Regardless of which data set we use, our results are similar.

We show five main findings. First import competition has a negative employment effects, while reduction in the prices of foreign inputs has a positive one. Both shocks are very simliar in magnitude. We also observe evidence of reallocation of employment from manufacturing to services industries. Second, the decrease in manufacturing employment is mainly driven

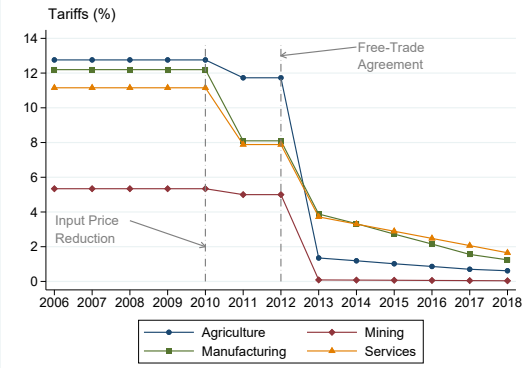
by substitution with foreign inputs rather than by competition with imported products. This result contrasts with previous findings by suggesting that the decreases in manufacturing employment in the developing world might be caused by the adoption of foreign technologies. Third, the adjustment in the informal job market to competition and input shocks takes place through decreased earnings rather than through decreased employment. The effect on informal employment, which is prevalent in developing countries, is expected because it is less rigid than formal employment, which is governed by contracts and minimum wages. Fourth, high-skilled workers experience significant earnings losses, whereas low-skilled workers do not. Such effect is particularly big for the informal, high-skilled workers. This result contrasts with previous findings, in that we show that imports from more developed countries can be intensive in high-skilled human capital and therefore can affect the high-skilled labor in developing economies. Finally, relative manufacturing employment losses emerge in less accessible areas; these losses are driven by the substitution of labor by foreign inputs, and are explained by the fact that foreign goods were previously unavailable in these areas prior to the tariff reforms.

This paper provides evidence of the heterogeneity of the effects of international trade with high-income countries within developing countries. This view contrasts with previous studies that have suggested that international trade provides benefit to people in developing countries while negatively affecting low-skilled workers in developed countries (Pavcnik, 2017). Our analysis concludes that international trade benefits some while harming others within countries, not just between them, just as previously suggested by Stolper and Samuelson (1941). It also sheds light on the relationship between globalization and the reallocation of workers across economic sectors. The questions regarding the aggregated welfare effects, the longer term effects of this reallocation on specific workers, and the labor market implications of decreases in the returns to college education, remain mainly unanswered and should motivate future research on the topic.

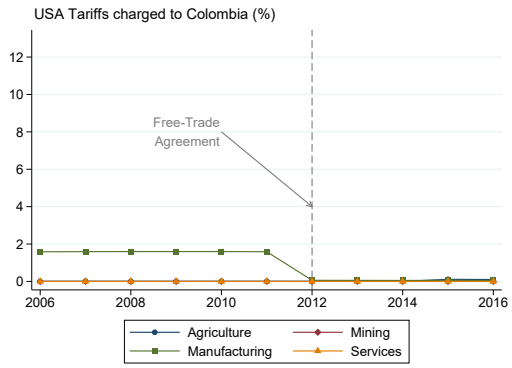
Figures

FIGURE I
Tariffs Charged by Country

(a) Colombia



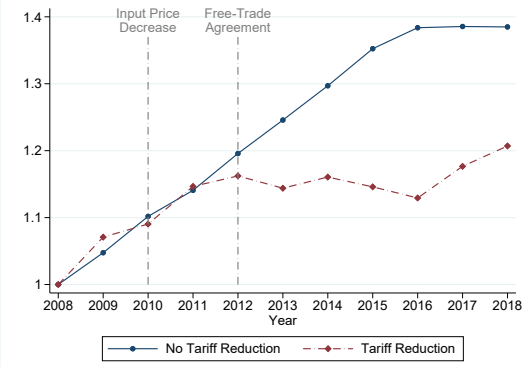
(b) United States



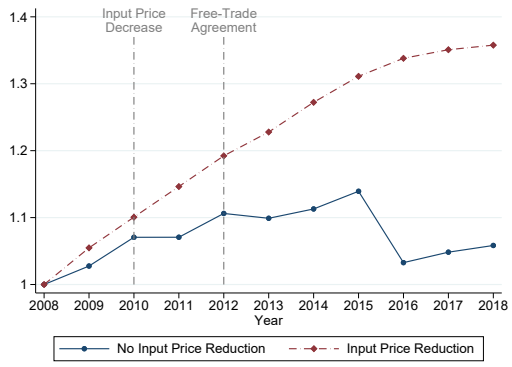
Notes: These graphs present the average tariffs charged by Colombia and the United States by, roughly, one-digit industry codes. These industries correspond to agriculture, manufactures, mining, and services. The left panel presents the historical tariffs that Colombia charged on products from the United States. The right panel plots the historical tariffs charged by the United States on incoming imports from Colombia.

FIGURE II
Evolution of Employment and Earnings

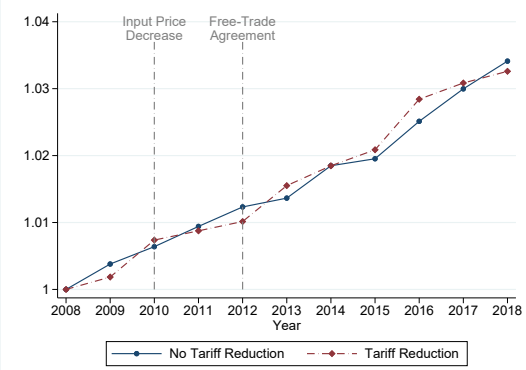
(a) Employment by Changes in Tariffs



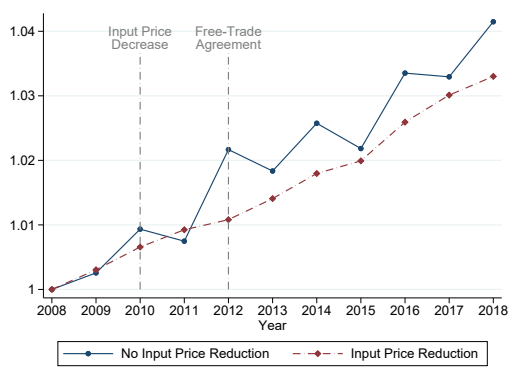
(b) Employment by Changes in Input Prices



(c) Earnings by Changes in Tariffs



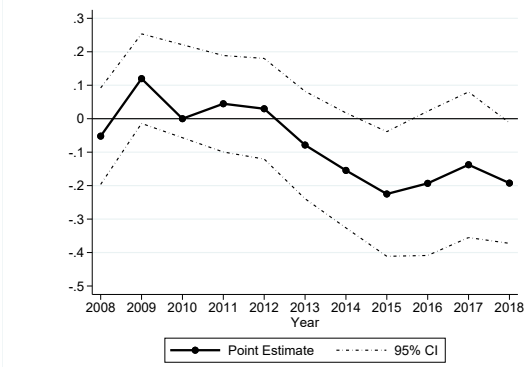
(d) Earnings by Changes in Input Prices



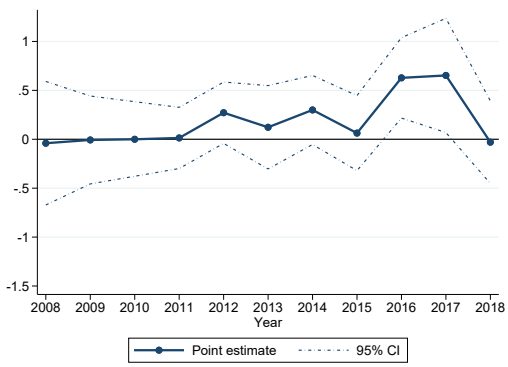
Notes: These graphs present the evolution of overall (formal and informal) employment and earnings with respect to 2008. Panel IIa and panel IIc present separate results by industries that did and did not reduce tariffs. Panel IIb and panel IId present separate results by industries that did and did not reduce the price of inputs. The graphs use household survey data from 2008 to 2018, and divide by the value of the variable in 2008.

FIGURE III
Event Study Estimates

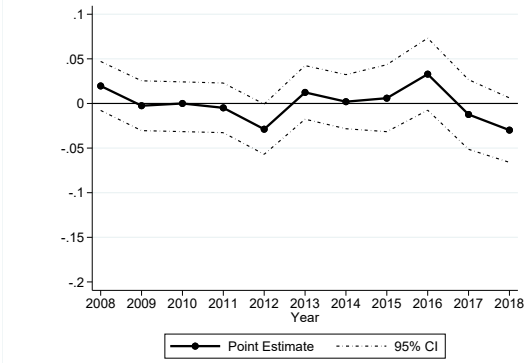
(a) *Competition Shock on Employment*



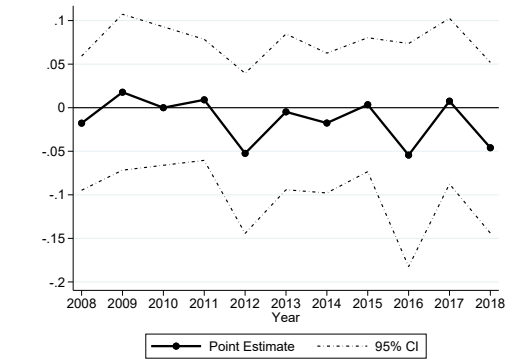
(b) *Input Shock on Employment*



(c) *Competition Shock on Earnings*



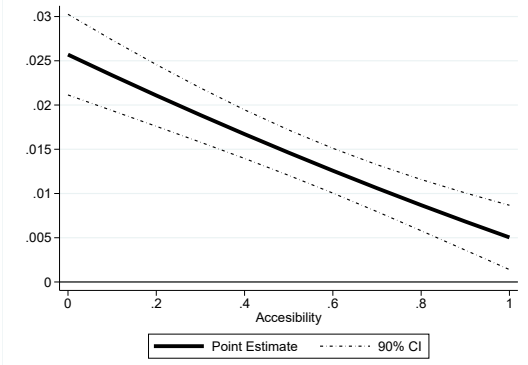
(d) *Input Shock on Earnings*



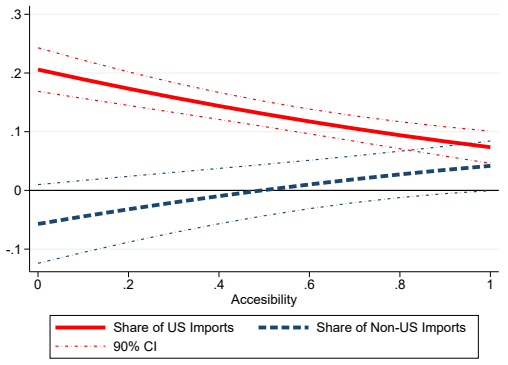
Notes: N = 4,222 for panels (IIIa) and (IIIb), and N = 4,324 in panel (IIIc) and (IIId). These graphs plot the point estimates and the 95 percent confidence interval of the estimation in equation (7) using overall employment (panels A and B) and industry wage premia (panels C and D) as outcomes. We use 2010 as year of reference. Estimations done in the household survey data. Panels (IIIa) and (IIIc) present the coefficients attached to the competition shock T_j^c, and panels (IIIb) and (IIId) the coefficients attached to the input shock T_j^i. The estimation includes industry and year fixed effects, and the standard errors are clustered at the industry level.

FIGURE IV
Tariff Reduction on Trade by Accessibility

(a) log(U.S. Imports)

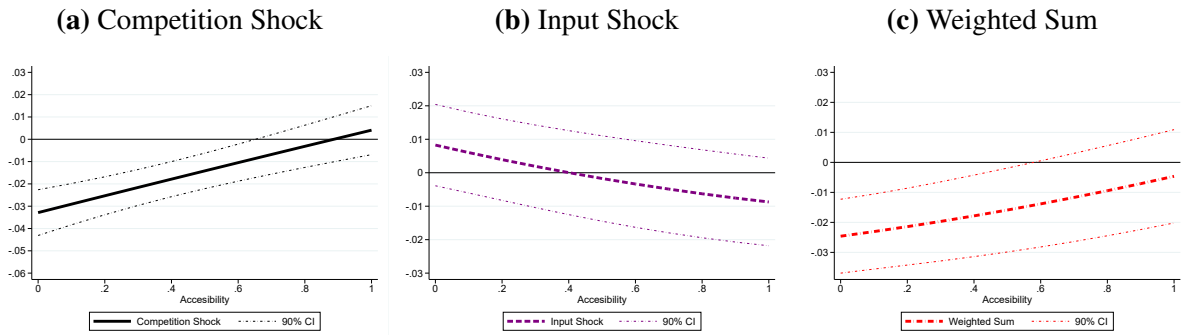


(b) Share of US and Non-US Imports



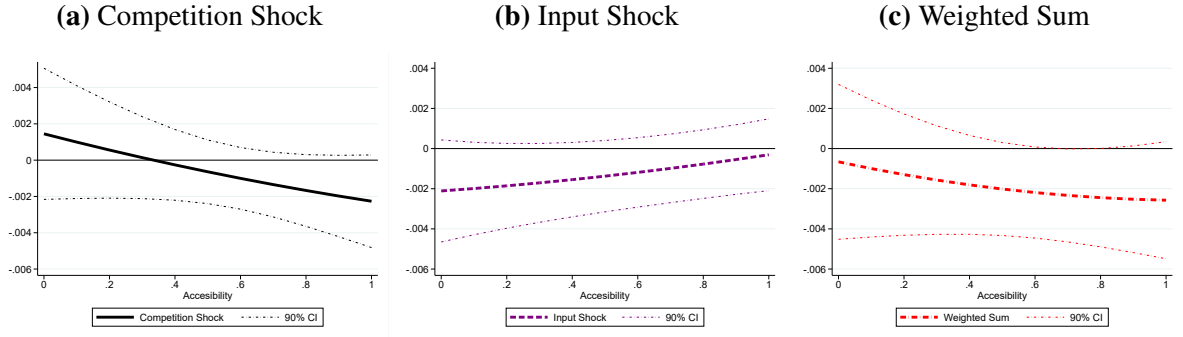
Notes: N = 982,884. Point estimates gathered from estimating equation (8) on imports in year t divided by imports in 2008, using the product-state-year panel. We only estimate the effect of the competition shock. Panel (IVa) uses the *log* and panel panel (IVb) the percentage of U.S imports as dependent variable. The estimation includes industry, state, and year fixed effects. Standard errors are clustered at the industry level, and 90% confidence intervals are provided.

FIGURE V
Competition and Input Shocks on Employment by Accessibility



Notes: N = 134,728. Point estimates gathered from estimating equation (8) on employment in year t divided by employment in 2008, using the industry-state-year panel. Panel (Va) presents the competition shock and panel (Vb) the input shock. The weighted sum is computed using equation 9. The estimation includes industry, state, and year fixed effects. Standard errors are clustered at the industry level, and 90% confidence intervals are provided.

FIGURE VI
Competition and Input Shocks on Earnings by Accessibility



Notes: N = 116,369. Point estimates gathered from estimating equation (8) on earnings premia in year t divided by earnings premia in 2008, using the industry-state-year panel. Panel (VIa) presents the competition shock and panel (VIb) the input shock. The weighted sum is computed using equation 9. The estimation includes industry, state, and year fixed effects. Standard errors are clustered at the industry level, and 90% confidence intervals are provided. Industry wage premia computed controlling by age, age-squared, gender, and month indicators. Observations are efficiency weighted by the inverse of the standard error of the estimated industry wage premia.

Tables

TABLE I
Tariff Reduction on Imports

	Total		*U.S. Imports*				*Non U.S. Imports*			
	Log		Log		Percentage		Log		Percentage	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Δ Import Competition ($\tilde{\tau}$)	0.015***		0.016***		0.242***		0.006		-0.177***	
	(0.005)		(0.005)		(0.030)		(0.004)		(0.038)	
$\tilde{\tau} * 1(2010 < t \leq 2012)$		0.016***		0.026***		0.144***		0.010*		-0.117**
		(0.005)		(0.006)		(0.045)		(0.005)		(0.056)
$\tilde{\tau} * \times 1(t > 2012)$		0.015***		0.015***		0.253***		0.005		-0.184***
		(0.005)		(0.005)		(0.032)		(0.005)		(0.040)
Observations	79,956	79,956	79,956	79,956	79,956	79,956	79,956	79,956	79,956	79,956
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the results of estimating equation (6) using imports as an outcome, and excluding the input shock. Columns (1) and (2) use the log of total imports, columns (3) and (4) use the log of imports from the U.S, columns (5) and (6) the percentage of import from the U.S, columns (7) and (8) the log of non-U.S imports, and columns (9) and (10) the percentage of non-U.S. imports. Odd columns present the linear effect, wheras even columns split the effect before and after 2012. *** p<0.01, ** p<0.05, * p<0.1

TABLE II
Competition and Input Shocks on Employment and Earnings

	Employment					Earnings				
	HH-Survey			*Longitudinal*		*HH-Survey*			*Longitudinal*	
	Overall	*Formal*	*Informal*	*Full*	*Matched*	*Overall*	*Formal*	*Informal*	*Full*	*Matched*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
A) Competition Shock										
Δ Import Competition ($\tilde{\tau}$)	-0.012***	-0.010**	-0.011*	-0.009**	-0.007	-0.000	0.001	-0.001	-0.000	0.001
	(0.005)	(0.005)	(0.006)	(0.004)	(0.005)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
B) Input Shock										
Δ Foreign Inputs ($\tilde{q}$)	0.008	0.008	0.005	-0.002	-0.011	-0.001	-0.000	-0.004**	0.001	0.002
	(0.006)	(0.007)	(0.007)	(0.005)	(0.008)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
C) Both Shocks										
Δ Import Competition ($\tilde{\tau}$)	-0.014***	-0.012**	-0.012**	-0.009**	-0.005	-0.000	0.001	-0.001	-0.000	0.000
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Δ Foreign Inputs ($\tilde{q}$)	0.012*	0.012*	0.008	0.001	-0.009	-0.001	-0.000	-0.004**	0.001	0.002
	(0.006)	(0.007)	(0.007)	(0.005)	(0.008)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
D) Weighted Sum										
$\Delta\tilde{\tau} * \beta^c + \Delta\tilde{q} * \beta^i$	0.021	0.024	0.008	-0.021	-0.052	-0.006	-0.000	-0.020**	0.004	0.011
	(0.029)	(0.031)	(0.033)	(0.024)	(0.036)	(0.007)	(0.008)	(0.010)	(0.008)	(0.011)
Observations	4,422	4,422	4,422	4,576	3,674	4,324	4,277	4,125	4,565	3,674
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the results of estimating equation (6) using employment (columns (1) to (5)) and wage premia (columns (6) to (10)) as outcomes. Columns (1)-(3) use employment measured in the household survey, columns (4)-(5) in the longitudinal data, columns (6)-(9) use the premia measured in the household survey, whereas columns (10)-(11) in the longitudinal data. Columns (5) and (10) perform the estimation in a matched sample that uses mahalanobis nearest neighbor using employment and wage premia in 2008, 2009 and 2010 as matching variables. Estimates in panel A) does not condition on the input shock, whereas estimates in panel B) does not condition on the competition shock. Observations in columns (5) to (10) are efficiency weighted by the inverse of the standard error of the estimated wage premia. Standard errors clustered at the industry level. *** p<0.01, ** p<0.05, * p<0.1

TABLE III

Competition and Input Shocks on Employment and Earnings by Sector

	Employment							Earnings						
	Longitudinal				*HH-Survey*			*Longitudinal*				*HH-Survey*		
	Full			*Matching*	Overall	Formal	Informal	*Full*			*Matching*	Overall	Formal	Informal
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Δ Imp. Competition*1(Agric.)	-0.010**		-0.013*	-0.009	-0.022	-0.011	-0.020	-0.002		-0.006	-0.009	-0.004	-0.001	-0.005
	(0.005)		(0.007)	(0.007)	(0.031)	(0.032)	(0.034)	(0.002)		(0.005)	(0.010)	(0.003)	(0.003)	(0.004)
Δ Imp. Competition*1(Manuf.)	-0.010**		-0.001	0.001	-0.001	0.008	-0.005	-0.000		-0.001	-0.000	0.002	0.001	0.001
	(0.004)		(0.006)	(0.006)	(0.009)	(0.008)	(0.011)	(0.001)		(0.001)	(0.001)	(0.002)	(0.001)	(0.003)
Δ Imp. Competition*1(Serv.)	0.012		0.010	0.014	-0.016	-0.027***	-0.002	0.003**		0.003**	0.004**	0.001	-0.002	-0.000
	(0.013)		(0.013)	(0.014)	(0.011)	(0.006)	(0.014)	(0.001)		(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Δ Foreign Inputs*1(Agric.)		-0.005	0.007	-0.004	0.037	0.040	0.045		0.004	0.009	0.016	0.005	-0.003	-0.001
		(0.010)	(0.012)	(0.011)	(0.054)	(0.055)	(0.059)		(0.004)	(0.008)	(0.016)	(0.004)	(0.005)	(0.005)
Δ Foreign Inputs*1(Manuf.)		-0.014**	-0.013*	-0.019*	-0.007	-0.018	-0.003		0.001	0.002	0.003	-0.005	-0.001	-0.007
		(0.006)	(0.008)	(0.010)	(0.012)	(0.012)	(0.016)		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)
Δ Foreign Inputs*1(Serv.)		0.004	0.004	-0.005	0.016**	0.018**	0.010		0.001	0.001	0.001	-0.001	-0.000	-0.004**
		(0.005)	(0.006)	(0.008)	(0.007)	(0.007)	(0.007)		(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
$\Delta\bar{\tau}_A * \beta_A^c + \Delta\bar{q}_A * \beta_A^i$			-0.023	-0.049	0.054	0.104	0.090			0.010	0.025	0.004	-0.016*	-0.022*
			(0.034)	(0.041)	(0.093)	(0.094)	(0.103)			(0.014)	(0.024)	(0.009)	(0.009)	(0.012)
$\Delta\bar{\tau}_M * \beta_M^c + \Delta\bar{q}_M * \beta_M^i$			-0.068**	-0.086*	-0.040	-0.036	-0.046			0.004	0.012	-0.010	0.004	-0.024*
			(0.032)	(0.045)	(0.039)	(0.041)	(0.048)			(0.013)	(0.016)	(0.011)	(0.012)	(0.014)
$\Delta\bar{\tau}_S * \beta_S^c + \Delta\bar{q}_S * \beta_S^i$			0.017	-0.019	0.067**	0.076**	0.043			0.003	0.007	-0.004	-0.002	-0.018**
			(0.024)	(0.036)	(0.030)	(0.032)	(0.030)			(0.007)	(0.010)	(0.005)	(0.006)	(0.008)
Observations	4,576	4,576	4,576	3,674	4,422	4,422	4,422	4,565	4,565	4,565	3,674	4,324	4,277	4,125
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the results of estimating equation (6) using employment (columns (1) to (7)) and earnings premia (columns (8) to (14)) as outcomes. We interact the input and competition shocks with one-digit sector dummies. Columns (1)-(4) use employment measured in the longitudinal data, columns (4)-(7) in the household survey, column (8)-(11) use wage premia in the longitudinal data, and columns (12)-(14) use wage premia computed in household surveys. Column (1) and (8) include only the competition shock. Column (2) and (9) include only the input shock. Column (4) and (11) performs the estimation in a matched sample that uses mahalanobis nearest neighbor using employment and wage premia in 2008, 2009 and 2010 as matching variables. Industry wage premia computed controlling by age, age-squared, gender, and region and month indicators. Estimates in the bottom panel correspond to the weighted sum in equation (9). Standard errors clustered at the industry level. *** p<0.01, ** p<0.05, * p<0.1

TABLE IV

Competition and Input Shocks on Employment, Number of firms, and Firm Size by Two-Digit Sectors

		Full			*Matched*				
		$\tilde{\tau}$	$\tilde{q}$	Sum	$\tilde{\tau}$	$\tilde{q}$	Sum	N. of Firms	Av. Firm Size
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A) Agriculture	Forestry and logging	0.004	0.023***	0.104***	0.002	0.012	0.038	0.223***	-0.248***
	Fishing and aquaculture	-0.041***	0.104***	0.085**	-0.041***	0.097***	0.057	-0.066	0.111***
	Crop and animal production	-0.014	0.002	-0.040	-0.010	-0.010	-0.081*	-0.054	0.019
B) Manufacturing	Wearing apparel and leather	0.012	-0.016	0.008	0.010	-0.017	-0.020	-0.038	0.055
	Tobacco products	-0.008***	-0.074***	-0.628***	-0.008***	-0.078***	-0.661***	-0.538***	-0.176***
	Coke and refined petroleum products	-0.047***	-0.034*	-0.222***	-0.055***	-0.035*	-0.248***	-0.113**	-0.107
	Office, communication, electrical and medical equipment	-0.013	-0.023	-0.175***	-0.016	-0.027	-0.205***	-0.048	-0.159**
	Textiles	-0.000	-0.018	-0.146**	0.003	-0.026	-0.188**	-0.068	-0.020
	Chemicals, rubber, plastic, and non-metallic minerals products	-0.009	-0.007	-0.075*	-0.002	-0.024	-0.113*	0.008	-0.146***
	Vehicles, furniture, and other	-0.007	-0.001	-0.039	-0.001	-0.014	-0.070	0.015	-0.058
	Foods and bevarages	0.002	-0.012*	-0.037	0.000	-0.013*	-0.062	0.041	-0.109**
	Wood, paper, printing, and recorded media	-0.033	0.035	-0.005	-0.042	0.042	-0.007	0.017	0.002
C) Services	Wages and sewage disposal		0.080***	0.303***				0.284***	0.021
	Water transport		0.078***	0.171***		0.071***	0.156***	0.173***	0.020
	Hotels and restaurants		0.035***	0.155***		0.032*	0.046*	0.192***	-0.028
	Construction		0.030*	0.148*		0.017	0.087	0.191**	0.020
	Travel agencies and support activities for transportation		0.029***	0.135***		0.040**	0.144**	0.166**	-0.041
	Education and health		0.034**	0.072**		0.016	0.022	0.029	0.064*
	Real estate activities	-0.138***	0.013	0.047	-0.129***	-0.003	-0.039	0.065	0.013
	Land transport		0.010	0.045		0.028***	0.132***	-0.028	0.049
	Air transport		0.006	0.011		-0.027	-0.059	-0.110	0.067
	Electricity, gas and water supply		0.002	0.011		-0.010	-0.045	0.086	-0.019
	Recycling		-0.076***	-0.316***		-0.095***	-0.349***	-0.428***	-0.013
	Financial and insurance activities		-0.021*	-0.074*		-0.029**	-0.055**	-0.045	-0.001
	Postal and telecommunications		-0.020	-0.071		-0.011	-0.020	-0.040	-0.042
	Arts, entertainment and recreation	0.025	-0.004	-0.007	0.020	-0.005	-0.011	0.025	0.034
	Activities of households as employers and organizations		-0.002	-0.007		0.200***	0.549***	0.024	-0.038
	Retail and vehicle repair	0.018***	-0.001	-0.000	0.029***	-0.020*	-0.086	-0.003	0.027

Note: N = 4,576 for full sample and N=3,674 for matched sample. This table presents the results of estimating equation (6) using employment as an outcome in the longitudinal data, and interacting the input and competition shocks with two-digit sector dummies. Columns (1)-(3) use the full longitudinal data, whereas columns (4)-(6) used the matched sample. Columns (7) and (8) use the number of firms and the average firm size, respectively, from the longitudinal data. Estimates in columns (1) and (4) correspond to the competition shock. Estimates in columns (2) and (5) correspond to the input shock. Estimates in columns (3), (6), (7) and (8) correspond to the weighted sum in equation (9). Standard errors clustered at the industry level. *** p<0.01, ** p<0.05, * p<0.1

TABLE V

Competition and Input Shocks on Employment and Earnings By Skills

	Employment			*Earnings*		
	Overall	*Formal*	*Informal*	*Overall*	*Formal*	*Informal*
	(1)	(2)	(3)	(4)	(5)	(6)
A) High-Skilled Workers						
Δ Import Competition ($\tilde{\tau}$)	-0.011**	-0.011*	-0.006	-0.004**	-0.003**	-0.007**
	(0.005)	(0.006)	(0.006)	(0.002)	(0.001)	(0.003)
Δ Foreign Inputs ($\tilde{q}$)	0.009	0.010	0.010	-0.002	-0.002	-0.004
	(0.008)	(0.008)	(0.007)	(0.002)	(0.001)	(0.003)
$\Delta\bar{\tau} * \beta^c + \Delta\bar{q} * \beta^i$	0.014	0.019	0.033	-0.018**	-0.016**	-0.036***
	(0.035)	(0.036)	(0.033)	(0.008)	(0.007)	(0.013)
Observations	4,422	4,422	4,422	4,191	4,134	3,798
B) Los-Skilled Workers						
Δ Import Competition ($\tilde{\tau}$)	-0.013**	-0.012**	-0.008	-0.000	0.000	-0.001
	(0.005)	(0.005)	(0.006)	(0.001)	(0.001)	(0.002)
Δ Foreign Inputs ($\tilde{q}$)	0.018**	0.018**	0.006	-0.000	-0.001	-0.001
	(0.008)	(0.008)	(0.007)	(0.001)	(0.001)	(0.002)
$\Delta\bar{\tau} * \beta^c + \Delta\bar{q} * \beta^i$	0.049	0.052	0.008	-0.002	-0.002	-0.005
	(0.034)	(0.034)	(0.035)	(0.006)	(0.007)	(0.008)
Observations	4,422	4,422	4,422	4,219	4,131	3,903
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the results of estimating equation (6) using low and high skilled employment (columns (1) to (3)) and earnings premia (columns (4) to (6) as outcomes in the household survey. Panel A) presents estimates on skilled workers, whereas panel B) on unskilled workers. We define a skilled worker as a person with college education or more. Standard errors clustered at the industry level. Industry wage premia computed controlling by age, age-squared, gender, and region and month indicators. Observations in columns (4) to (6) are efficiency weighted by the inverse of the standard error of the estimated industry wage premia.*** p<0.01, ** p<0.05, * p<0.1.

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