Trade Liberalization and International Sourcing of Inputs[*]

Justin R. Pierce
Board of Governors of the Federal Reserve System[†]

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Abstract

A new and evolving literature finds that international sourcing of inputs is associated with improved performance for firms and plants in the form of increased productivity or scope. This paper provides the first comprehensive evidence of how plants adjust their usage of imported inputs in response to a reduction in input tariffs. Using data for Colombian manufacturers I show that the bulk of an increase in imported input use during a period of trade liberalization was associated with plants that were already using foreign inputs prior to the liberalization. In addition, I show that while these already-importing plants increased their use of foreign inputs and the intensity of their foreign input usage in response to lower input tariffs, the tariff reduction did not induce non-importers to begin importing.

JEL Classification: F10, F13, F15

Keywords: Imported Inputs; Trade Liberalization

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[†] Correspondence: 20th Street and C Streets NW, Washington, DC 20551; email: justin.r.pierce@frb.gov; phone: 202-452-2980.

I. Introduction

A recent and evolving line of research has emphasized that international sourcing of inputs is associated with positive outcomes for firms and plants. This literature has generally focused on the role of imported inputs in improving firm performance and scope through expanded input variety, higher quality or embodied technology. But while there is clear evidence that lower inputs tariffs and increased levels of aggregate product-level imports are associated with positive outcomes, virtually no research directly estimates how firms or plants adjust their foreign input usage in response to lower input tariffs. This paper provides the first comprehensive evidence of how plant-level use of foreign inputs responds to a reduction in input tariffs.

Understanding how plants adjust their usage of foreign inputs in response to changes in tariff rates is necessary for evaluating the effects of trade liberalization.[1] For example, the welfare effects of trade liberalization may be different if only certain types of plants respond to reductions in input tariff rates. But thus far, researchers have not had information describing the heterogeneous responses of plants' import usage to changes in tariff rates. In addition, policy-makers may wish to know how the benefits of trade liberalization are distributed. To preview the results, I find that only certain plants respond to a reduction in input tariffs by increasing their foreign input usage—namely those plants that were already using foreign inputs prior to the trade liberalization. This suggests that the benefits of input tariff liberalization accrue primarily to this particular group of plants.

A period of unilateral trade liberalization in Colombia from 1984 to 1991 provides a useful setting for this study. During this period, average tariff rates fell from over 50 percent to just over 20 percent and the real value of foreign input usage by manufacturers increased by 53 percent. I examine the relationship between the reduction in tariffs and foreign input usage using a dataset

[1] Note that I use the terms "foreign input usage" and "importing" interchangeably throughout this paper. In fact, the data records the reported value of foreign inputs used in each plant's production process, and it does not require that the plant be the importer of record.

containing detailed production information for the universe of Colombian manufacturing establishments (plants). Importantly, this dataset contains information on the value of consumption of foreign (imported) inputs or raw materials used by Colombian manufacturers. I refer to this variable as "foreign input usage" and "importing" interchangeably throughout the paper.

I begin to examine the effect of lower tariffs on foreign input usage by Colombian manufacturers by decomposing import growth along several net margins of adjustment and then further decomposing the growth among plants that were already importing prior to the liberalization and those that began importing after tariffs had already begun to fall. This exercise provides the first indications that the reduction in input tariff rates has vastly different effects on different types of plants. In particular, I find that that the majority of import growth occurs at plants that were already importing prior to the trade liberalization period.

Next, I directly estimate the effect of declines in input tariffs on three measure of plant-level foreign input usage—the change in the ratio of foreign inputs to sales, the normalized percentage change in the value of foreign input usage and changes in the plant's importing status. The results show that only certain types of plants are able to benefit from the reductions in import tariffs by increasing their input tariff usage. Specifically, only the group of plants that was already importing prior to the liberalization period responds to the reduction in tariffs by increasing their usage of foreign inputs. In contrast, lower tariffs do not induce plants to begin using foreign imports or induce additional birth of new plants as importers.

This research is related to a group of papers that have examined the effect of lower input tariffs on plant or firm-level performance.[2] Schor (2004) examines the effect of lower tariffs—both

[2] In addition, a large and influential literature including papers by Pavcnik (2002), Bernard, Jensen and Schott (2006), Fernandes (2007) and Khandelwal and Topalova (2011) has examined the effect of changes in output tariff rates on firm and plant-level performance and has consistently shown that output tariffs and productivity are negatively correlated.

input and output—on the productivity of Brazilian manufacturing firms and finds that lower input tariffs are associated with higher productivity. Amiti and Konings (2007) use detailed firm-level Indonesian data to show that the effect of lowering input tariffs on productivity is actually larger than the effect of lowering output tariffs. Moreover, Amiti and Konings (2007) find that the positive effects of lower input tariffs are substantially larger for importing firms than non-importing firms, indicating some direct benefits of using foreign intermediate inputs. In contrast, Muendler (2004) directly includes foreign materials and capital in the production function used to estimate productivity. After finding that coefficient estimates for the foreign input and material variables are not statistically different from zero, he concludes that these variables were not drivers of the higher levels of productivity observed following trade liberalization. None of these papers, however, examines how plants or firms adjust their own importing behavior in response to tariff reductions.

Goldberg, Khandelwal, Pavcnik and Topalova (GKPT) (2010) also examine the effect of a reduction in input tariffs on firm-level performance, although they focus on the scope of products produced by firms. They find that a reduction in trade costs in India is associated with an expansion in the variety of products imported nationally and with an expansion of firm scope. GKPT's analysis of the effects of lower input tariffs on importing, however, is based on national product-level data, and does not included information on firm-level imports. I find that consideration of firm/plant-level importing is critical to fully understanding the effect of trade liberalization on importing behavior.

Fernandes (2007) provides the only micro-level evidence on the effects of imports on tariffs in an unpublished appendix. In particular, Fernandes (2007) reports correlations between tariff rates and a number of plant-level variables, including a negative correlation between output tariff rates and foreign input usage. The research in this paper differs from that in Fernandes in three ways. First, it examines whether increases in imports are due to existing importers increasing their

inputs or first-time importers. Furthermore, it breaks new importers out into existing plants that become importers and new plants that quickly become importers after entry. Second, it moves beyond correlations by including other plant-level determinants of importing. Third, it estimates the reaction of imports to changes in input tariffs, rather than output tariffs.

Researchers have typically focused on two potential channels for why increased usage of foreign inputs can increase firm or plant-level performance: expanded input variety and higher price-adjusted quality. The variety channel is formally proposed in Ethier's (1982) theoretical model. In this model, a production function incorporating love-of-variety in inputs yields productivity gains as firms increase the variety of inputs used in their production process. Using Indian data, GKPT show that the variety of products imported in India expands during a period of trade liberalization and, in turn, show that expansion in the variety of inputs leads to expansion in the scope of products produced. Fernandes (2007), Amiti and Konings (2008) and Arkolakis et al. (2008) have also discussed how expansions in input variety associated with trade liberalization may increase plant or firm-level productivity.

Fernandes (2007) and Amiti and Konings (2008) also argue that increased usage of foreign inputs can improve firm-level performance if the imported inputs are of a higher-price adjusted quality. Indeed, Kugler and Verhoogen (2009, 2011) provide evidence that inputs sourced from abroad are of a higher quality than their domestic equivalents. Using a detailed dataset of Colombian firm-product-level data they show that importers pay higher prices for imported inputs than domestic inputs in the same product category and that importing firms also purchase higher quality domestic inputs than non-importers.

Halpern, Koren and Szeidl (2011) decompose the productivity gains realized by Hungarian importers due to increased imports of foreign inputs into the portion related to improved input quality and the portion related to expansion of input variety. They find that both effects are

important, with productivity gains due to expanded input variety responsible for 40 percent of the productivity gains associated with increased imports. In addition, they show that foreign-owned firms are better able to translate increased imports of foreign inputs into productivity gains. This paper adds to the evidence relating trade liberalization with improved plant-level performance by directly showing how foreign input usage responds to changes in input tariffs.

The remainder of the paper is structured as follows. Section two describes the data. Section three performs two decompositions of foreign input usage during the trade liberalization period. Section four provides direct estimates of the effect of changes in input tariff rates on plant-level foreign input usage, describes the empirical strategy for obtaining the estimates and provides some discussion of the results. Section five concludes.

II. Data

A. Plant-Level Dataset

I employ a plant-level census of Colombian manufacturers covering the period from 1977 to 1991, collected by the *Departmento Administrativo Nacional de Estadistica* (DANE). This is the same dataset used in Fernandes (2007) and was generously provided by Mark Roberts. The dataset contains information on plant sales, raw material use, energy use, labor use, capital accumulation and investment. It covers between 6,000 and 7,000 plants per year for a total of 100,170 observations. Note that I exclude data from SIC 353 (petroleum refining) because I do not have output deflation data for that industry, as well as SIC 390 (miscellaneous manufacturing).

Data on Colombian industry-level tariff rates were provided by Jorge Garcia-Garcia of the World Bank. These tariff rates are at the three-digit industry level, and correspond to the industries covered in the manufacturing census.

B. Calculating Input Tariff Rates

When examining plants' decisions of whether to import intermediate inputs, it is input tariffs—rather than output tariffs—that are the variable of interest. I calculate industry-level input tariffs as a weighted average of output tariffs. Weights are derived from the Colombian input-output table provided in the World Bank Trade and Production Database. Input tariffs are then calculated as follows

$$\tau_{it} = \sum_j s_j tar_{jt}$$

where τ_{it} is the calculated input tariff for industry i in time t, s_j is the share of each industry j in production of a unit of output in industry i and tar_{jt} is the output tariff in industry j at time t.

Note that the input share for each industry is time-invariant due to the availability of input-output data for only a single year. While it would be preferable to have time-varying data on input shares, this data limitation seems relatively innocuous. Although trade liberalization likely impacts the source country of inputs, it seems less likely that it would impact the sector allocation of inputs. Furthermore, other studies have relied on a time-invariant input-output table to calculate input tariffs including Goldberg et al. (2011).

C. Colombian Trade Policy

The period covered by the dataset—1977 to 1991—was characterized by significant fluctuations in tariff rates in Colombia. Colombia's trade policy during these 15 years can be separated into three distinct periods. In an initial liberalization period, from 1977 to 1982, the Colombian government unilaterally cut average tariff rates from 39 percent to 32 percent. The end of a coffee boom and subsequent recession in 1982 led to current account deficits and a return to protectionism. Average industry tariffs rose to 53 percent in 1984. Finally, a structural readjustment policy financed by international financial organizations led to a re-liberalization from 1984 to 1991, with average tariff rates dropping to almost 20 percent. In this paper, I focus on the trade

liberalization period from 1984 to 1991, as this period featured the most substantial reduction in tariff rates. Nonetheless, I use the data for 1977 to 1984 to determine which plants were already using foreign inputs prior to the primary trade liberalization period.

III. Decompositions of Import Growth During a Trade Liberalization

A Preliminary Decomposition: Net Margins

From the beginning of the IMF-mandated liberalization program in 1984, through 1991, the real value of foreign inputs used in the production processes of Colombian manufacturers increased 53 percent, from 106 Million Pesos to 162 Million Pesos.[3] My first step in describing the effect of trade liberalization on the use of foreign inputs is to decompose growth in the value of foreign input usage into several margins of adjustment. This decomposition will report whether the observed growth in foreign input use was due to plants that were already using imported inputs prior to the trade liberalization or due to entry into the import market, either by new plants or by existing plants that were not formerly importing.

Table 1 displays an initial decomposition of growth in foreign input usage for successive durations during the period from 1984 to 1991. In the decomposition, import growth is broken into three net margins. The first margin is composed of continuing importers, i.e. plants that import in 1984 and in the respective end year of the decomposition. The second margin consists of continuing plants—plants that operate in 1984 and the end year—but that either start or stop importing between 1984 and the end year. The last margin tracks plants that imported in 1984 but die by the end year and plants that did not exist in 1984, but are born and are importing by the end year. This decomposition provides useful information about these three net margins of adjustment but, more importantly, will allow me to subsequently further decompose import growth into that

[3] The value of imports is reported in real terms, in 1984 pesos.

due plants that were already importing at the start of the liberalization period and that of plants that started importing after the liberalization period had begun.

This preliminary decomposition indicates that import growth is due overwhelmingly to expansion of imports at continuing importers. Growth along this intensive margin accounts for 97 percent of the expansion of foreign input use between 1984 and 1991. The entry of new plants as importers—net of exiting importers—also contributes to import growth, although at a much smaller magnitude. Examination of import starting and stopping among continuing plants reveals a surprising result. On net, imports shrink along this margin as the decline in imports associated with plants stopping their imports more than offsets the gains from plants that begin using foreign inputs during the trade liberalization period.

A Further Decomposition: Pre-Existing Importers versus New Importers

Using the results of the preliminary decomposition described above, it is now possible to further decompose import growth into that portion due to plants that were already importing prior to the liberalization period and that due to new importers. This information is provided in Table 2. Note that I use the term "pre-existing importer" to refer to plants that had already imported in the period from 1977 to 1984.

I find that the majority of net import growth over the 1984-1991 period—62 percent—was due to plants that were already importing prior to 1984. The remaining 38 percent is associated with plants that were not importing prior to 1984, of which the bulk is from new plants entering as importers between 1984 and 1991 and the remainder is from continuing plants beginning to import.

IV. Empirical Strategy and Results

In the previous section, I showed that the majority of the increase in the value of imports during Colombia's period of trade liberalization was due to plants that were already importing before tariffs began to fall. These results, however, are merely suggestive, because they do not directly

estimate the relationship between tariffs and importing behavior. In this section, I estimate the effect of changes in the input tariffs described above on changes in three measures of importing behavior: the value of imports as a share of total shipments, the real value of imports and an indicator of importing. Each of these measures of importing behavior is described in more detail below in the discussion of the results.

Other variables, in addition to input tariffs, may affect a plant's decision of whether to import and how intensively to use imports in its production process. While there is not a well-developed literature examining the plant-level characteristics that may be involved in the decision of whether to import foreign intermediates, the literature on entry into the export market provides useful parallels. For example, fixed costs associated with identifying overseas customers and suppliers and conducting transactions in foreign currencies would be incurred by both exporters and importers. Similarly, it is likely that plant-level characteristics related to workforce sophistication may affect the decision of whether to import foreign intermediate inputs, as it would affect the export entry decision. As a result, I include several plant-level control variables in my estimating equations that are commonly used in the literature on export into the export market including plant size (measured by employment), capital intensity (capital-labor ratio), average wage and the share of skilled employees in total employment.[4]

I estimate the effect of changes in input tariffs on importing behavior by examining a long difference between two three-year periods, a beginning period covering the years 1983 to 1985, which roughly corresponds to a pre-liberalization period and a post-liberalization period covering the years 1989 to 1991. This setup provides two benefits. First, the long difference will capture the effects of changes in tariff rates, even if importing behavior adjusts to the lower tariffs with a lag. Second, because trading is lumpy—with plants moving in and out of the import market and

[4] See, for example, Bernard and Wagner (2001).

adjusting their import volumes substantially from year to year—incorporating three years in the pre and post periods helps smooth out higher-frequency fluctuations that are unrelated to changes in tariff rates.

With this setup, I estimate the following equation:

(1) $\Delta IMP_p = \alpha + \beta_1 \Delta InpTar_i + \beta_2 X_p + u_p$

The dependent variable is the change in each of the three measures of importing activity at plant p between the beginning and end period. $\Delta InpTar_i$ is the change in input tariffs and X_p represents the set of plant-level control variables described above.

Next, because the decompositions described above suggest that plants that were pre-existing importers may have reacted differently to the reduction in input tariffs than plants that were not already importing, I augment Equation (1), as follows:

(2) $\Delta IMP_p = \alpha + \beta_1 \Delta InpTar_i + \beta_2 X_p + \beta_3 PRE_p * \Delta InpTar_i + \beta_4 PRE_p + u_p$

Here, the coefficient β_3 estimates the effect of an interaction of the change in input tariffs with an indicator variable, PRE_p that equals 1 if the plant was already importing in the beginning period, and zero otherwise.

Lastly, there may be heterogeneous effects of changes in input tariffs across plants with different characteristics, as measured by the control variables. For example, it may be that larger plants or more capital-intensive plants respond differently to changes in tariff rates than their smaller, less capital-intensive counterparts. To examine this possibility, I estimate a final equation:

(3) $\Delta IMP_p = \alpha + \beta_1 \Delta InpTar_i + \beta_2 X_p + \beta_3 PRE_p * \Delta InpTar_i + \beta_4 PRE_p + \beta_5 \Delta InpTar_i * X_p + u_p$

This equation adds additional interaction terms between the change in input tariffs and each of the four plant characteristics represented by X_p.

I discuss estimation results for each of the three measures of importing behavior, for each of the three equations, immediately below. Results are reported in Tables 3-5.

The Effect of Changes in Input Tariffs on Foreign Input Intensity

The first measure of importing behavior I consider is the intensity of foreign input usage in a plant's production process, which I measure as the ratio of the value of foreign input usage to the value of sales. Table 3 presents estimates of the effect of changes in input tariffs on changes in the intensity of foreign input usage, using the three specifications described above.

Columns 1 and 2 of Table 3 present unweighted and employment-weighted results, respectively, for equation 1. I find that, on average, decreases in input tariffs are associated with increases in the intensity of foreign input usage, as expected. In particular, a reduction in input tariff rates of 1 percentage point increases the intensity of foreign input usage by 0.3 to 1.0 percentage points.

Turning to Columns 3 and 4, however, it is apparent that only certain types of firms are able to benefit from lower tariffs by increasing the intensity of their input usage. Once the interaction term $PRE_p * \Delta InpTar_i$ is included in the specification show in equation (2), the estimate of the effect input tariffs in levels loses statistical significance. Instead, it is only the coefficient on the interaction term that is negative and significant. This means that while pre-existing importers respond to decreases in input tariffs by using imports more intensively in their production process—and reaping the potential benefits of higher quality or increased variety—other plants do not. This result holds both with and without employment weighting.

Columns (5) and (6) display the results of estimating equation (3), which includes interactions of the change in input tariffs with each of the plant-level control variables. The results are broadly similar to those in columns (3) and (4), although the coefficient estimate for the

interaction of the pre-existing importer dummy with the change in input tariffs loses significance in the specification with employment weighting.

Coefficient estimates for the plant-level control variables generally take the expected signs, when statistically significant. In four out of the six specifications, foreign input intensity increases with plant size. Furthermore, in every case in which the two measures of workforce skill—average wage and the share of skilled employees in total employment—are statistically significant, I find that higher workforce skill is associated with high input usage. The negative relationship between capital intensity and foreign input usage is somewhat unexpected, but could be due to, for example, highly capital intensive plants producing more of their own inputs, and thus not having to rely on imports.

The Effect of Input Tariff Changes on the Value of Foreign Inputs Used

The second measure of importing behavior is the plant-level percentage change in the value of foreign inputs used in the production process. To allow consideration of plants that import in one period, but not the other, I calculate percentage change using the normalization described in Davis, Haltiwanger and Schuh (1996). That is, I define percentage change as follows:

$$(4)\quad \%\Delta IMP_p = \frac{(IMP_{END} - IMP_{BEG})}{0.5*(IMP_{END} + IMP_{BEG})}$$

With this normalization, plants that do not import in the beginning period receive a normalized percentage change value of 2 and plants that import in the beginning period, but not the end, receive a value of -2. Estimates of the effect of changes in input tariffs on the normalized percentage change in the value of foreign inputs are displayed in Table 4.

The results again indicate that it is only pre-existing importers that are able to capitalize on Colombia's trade liberalization by increasing their foreign input usage. As shown in Columns (1) and (2), I find no overall effect of the change in input tariffs on the value of foreign input usage. But as is apparent from the negative and significant coefficient on the interaction $PRE_p * \Delta InpTar_i$,

in columns 3 – 6, I again find that pre-existing importers increase their input usage as tariffs fall in Colombia. I do note that for this measure of importing behavior—normalized percentage change in the value of foreign inputs—the effect is only detected in employment-weighted regressions.

The Effect of Changes in Input Tariffs on Changes in Importing Status

By examining the previous two measures of importing behavior, we have found that it was only plants that were already importing that reacted to reductions in tariffs by increasing their foreign input usage. Because these measures of importing behavior were based on the value of imports, however, they may not effectively capture changes with low values, such as when a small plant begins to import a small value for the first time. To examine this possibility, I estimate the effect of changes in input tariffs on changes in the importing status of plants, where a plant is considered an importer if it reports any positive value of foreign input usage. Results using this measure of importing activity are displayed in Table 5. I find that lower input tariffs had no effect on changes in importer status among Colombian plants, a result that holds across all six specifications in the table. This result provides additional evidence that reductions in input tariffs primarily affected plants that were already importing prior to the liberalization period. In particular, it shows that lower input tariffs did not induce non-importing plants to begin using foreign inputs.

Discussion

The previous sections showed that only certain plants responded to lower tariff rates by increasing their foreign input usage—namely, those plants that were already importing prior to the liberalization period. While this result may seem surprising, it is also consistent with models of trade with heterogeneous firms. Note that the reduction in tariffs does not affect fixed costs of importing, such as identifying overseas suppliers and filing customs forms. Plants that are unable to pay the fixed costs of importing prior to trade liberalization, therefore, will also find themselves shut out of the import market after liberalization. In contrast, plants that have already incurred the fixed

costs associated with importing will be able to increase their foreign input usage as the variable costs of using foreign inputs associated with tariffs fall.

These results have a number of implications for researchers and policy-makers. First, the results make clear that trade liberalization does not have a uniform effect on all plants. Therefore, estimates of the benefits associated with increased availability of foreign inputs during a trade liberalization, such as increased product variety or higher input quality must account for the fact that not all plants will receive these benefits. In particular, not all plants should be expected to experience the gains in productivity or product scope associated with the greater availability of inputs.

Second, the results suggest that trade liberalization alone is not enough to induce plants to become importers. If policy-makers wish to encourage existing plants to begin importing, or wish to encourage the entry of new plants as importers, it may be necessary to design programs that lower the fixed costs associated with importing, such as reducing the complexity of the customs process or by sharing information on suppliers of foreign inputs.

V. Conclusion

While a growing literature has shown that reductions in input tariffs are associated with positive outcomes for plants, no research has directly examined how these tariff reductions affect plants' importing behavior. Using a dataset containing the population of Colombian manufacturing plants, this paper examines the effect of a unilateral trade liberalization on the foreign input usage of Colombian manufacturers.

First, by decomposing import growth into gains due to pre-existing importers and gains due to new importers, I show that the majority of growth in foreign input usage during a period of trade liberalization in Colombia is due to pre-existing importers. Next, I directly estimate the effect of lower input tariffs on three measures of importing behavior. I find that the only plants that increase

their foreign input usage in response to lower input tariffs are plants that were already importing prior to the liberalization period. Moreover, reductions in input tariff rates do not induce plants to become importers. As a result, the benefits associated with increased availability of foreign inputs, such as increased productivity and expanded product scope accrue solely to the set of plants that were already importing before tariffs fell.

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Figure 1: Import Tariff Rates Over Time in Colombia

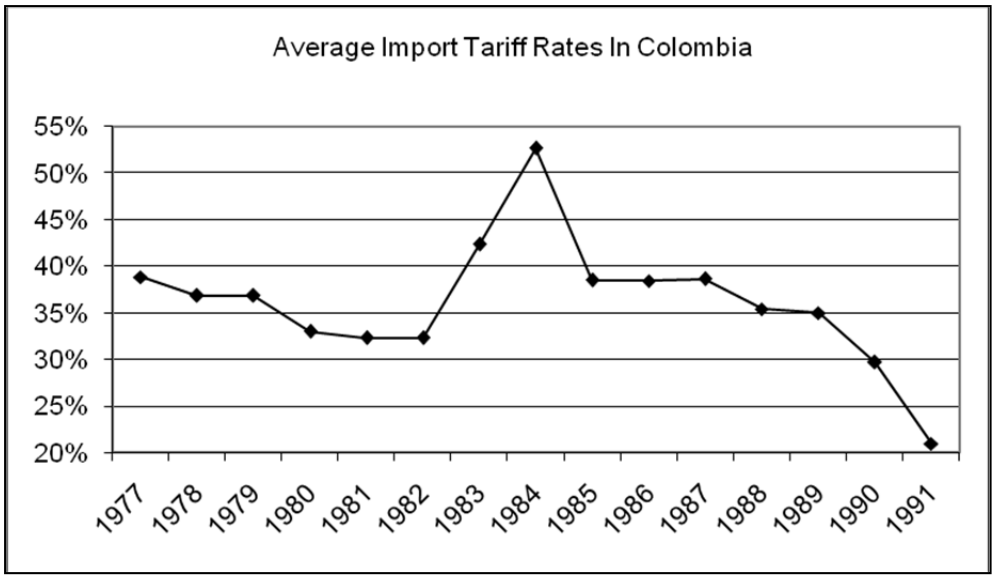

Table 1: A Decomposition of Colombian Imports by Margin of Adjustment

	Import Growth, Millions of Colombian Pesos (Real 1984 Pesos)						
Margin	1984-1985	1984-1986	1984-1987	1984-1988	1984-1989	1984-1990	1984-1991
Growing Continuing Importers	21,741	30,231	47,875	72,911	77,023	71,140	66,960
Shrinking Continuing Importers	-11,256	-11,628	-12,247	-12,136	-13,865	-14,290	-12,525
Net Continuing Importers	**10,485**	**18,603**	**35,628**	**60,775**	**63,158**	**56,850**	**54,435**
% of Total Import Growth	**89%**	**100%**	**89%**	**92%**	**91%**	**91%**	**97%**
New Importers, Continuing Plants	478	748	873	1,020	1,411	1,331	1,295
Exiting Importers, Continuing Plants	-354	-867	-1,425	-1,968	-2,025	-3,176	-3,815
Net New and Exiting Importers	**124**	**-119**	**-552**	**-948**	**-614**	**-1,845**	**-2,520**
% of Total Import Growth	**1%**	**-1%**	**-1%**	**-1%**	**-1%**	**-3%**	**-4%**
Plant Birth	2,809	5,496	11,364	15,138	16,479	17,899	19,823
Plant Death	-1,636	-5,331	-6,299	-8,927	-9,769	-10,617	-15,669
Net Plant Birth and Death	**1,173**	**165**	**5,065**	**6,211**	**6,710**	**7,282**	**4,154**
% of Total Import Growth	**10%**	**1%**	**13%**	**9%**	**10%**	**12%**	**7%**
Total Import Growth by Manufacturers	**11,782**	**18,649**	**40,141**	**66,038**	**69,254**	**62,287**	**56,069**

Notes: Table displays a decomposition of the value of imports by Colombian manufacturers. Each column represents a decomposition over a different time period, extending from one year to seven years. Continuing importers are plants that import in both the beginning and end year of the decomposition. New (exiting) importers are plants that are active in the beginning and end year, but only import in the end (beginning) year. Plants that are born (die) are only active in the end (beginning) year.

Table 2: A Decomposition of Colombian Imports by Pre-Existing Versus New Importers

	Import Growth, Millions of Colombian Pesos (Real 1984 Pesos)						
	1984-1985	1984-1986	1984-1987	1984-1988	1984-1989	1984-1990	1984-1991
Pre-Existing Importers							
Growing Continuing Importers	21,741	30,231	47,875	72,911	77,023	71,140	66,960
Shrinking Continuing Importers	-11,256	-11,628	-12,247	-12,136	-13,865	-14,290	-12,525
Exiting Importers, Continuing Plants	-354	-867	-1,425	-1,968	-2,025	-3,176	-3,815
Plant Death	-1,636	-5,331	-6,299	-8,927	-9,769	-10,617	-15,669
Sub-Total, Pre-Existing Importers	**8,495**	**12,405**	**27,904**	**49,880**	**51,364**	**43,057**	**34,951**
% of Total Import Growth	**72%**	**67%**	**70%**	**76%**	**74%**	**69%**	**62%**
New Importers							
New Importers, Continuing Plants	478	748	873	1,020	1,411	1,331	1,295
Plant Birth	2,809	5,496	11,364	15,138	16,479	17,899	19,823
Sub-Total, New Importers	**3,287**	**6,244**	**12,237**	**16,158**	**17,890**	**19,230**	**21,118**
% of Total Import Growth	**28%**	**33%**	**30%**	**24%**	**26%**	**31%**	**38%**
Total Import Growth by Manufacturers	**11,782**	**18,649**	**40,141**	**66,038**	**69,254**	**62,287**	**56,069**

Notes: Table displays a decomposition of the value of imports by Colombian manufacturers. Each column represents a decomposition over a different time period, extending from one year to seven years. Continuing importers are plants that import in both the beginning and end year of the decomposition. New (exiting) importers are plants that are active in the beginning and end year, but only import in the end (beginning) year. Plants that are born (die) are only active in the end (beginning) year.

Table 3

Variables	(1)	(2)	(3)	(4)	(5)	-6
Δ Input Tariff	-0.0003*	-0.0010**	0.0003	-0.0002	0.0028	-0.0039
	0.0002	0.0004	0.0004	0.0010	0.0082	0.0162
x Pre			-0.0026**	-0.0016*	-0.0027**	-0.0008
			0.0010	0.0009	0.0011	0.0016
Pre			-0.0878***	-0.0686***	-0.0889***	-0.0632***
			0.0089	0.0094	0.0094	0.0121
Employment	0.0003	0.0016	0.0075***	0.0080***	0.0107***	0.0081*
	0.0010	0.0018	0.0018	0.0022	0.0029	0.0041
x Δ Input Tariff					0.0004	-0.0000
					0.0003	0.0004
Average Wage	0.0007	-0.0001	0.0108**	0.0122	0.0104	0.0224
	0.0038	0.0073	0.0041	0.0084	0.0065	0.0164
x Δ Input Tariff					-0.0000	0.0014
					0.0006	0.0016
Skilled Share	0.0227***	0.0272**	0.0250***	0.0374**	0.0153	-0.0104
	0.0059	0.0117	0.0067	0.0136	0.0105	0.0263
x Δ Input Tariff					-0.0010	-0.0069
					0.0014	0.0041
Log K/L	-0.0018*	-0.0013	0.0006	0.0001	-0.0019	-0.0073*
	0.0010	0.0020	0.0011	0.0021	0.0022	0.0040
x Δ Input Tariff					-0.0003	-0.0009***
					0.0002	0.0003
Constant	0.0018	-0.0093	-0.1480***	-0.1738**	-0.1247*	-0.1895
	0.0385	0.0606	0.0431	0.0768	0.0714	0.1488
Weighting	No	Employment	No	Employment	No	Employment
Observations	11,074	11,074	11,074	11,074	11,074	11,074
R-squared	0.002	0.004	0.078	0.058	0.079	0.062

Notes: Table displays the results of ordinary least squares regressions of the change in foreign inputs as a share of total sales on the change in input tariffs, change in input tariffs interacted with an indicator for pre-existing importers ("pre", defined as plants that were already importing prior to 1984), plant characteristics and plant characteristics interacted with the change in input tariffs. Columns (1) and (3) are unweighted, while columns (2) and (4) are employment-weighted.

Table 4

Variables	(1)	(2)	(3)	(4)	(5)	-6
Δ Input Tariff	-0.0127	-0.0174	0.0063	0.0812**	0.1158	-0.2587
	0.0118	0.0165	0.0177	0.0369	0.2162	0.5012
x Pre			0.0023	-0.0926**	-0.0013	-0.0911**
			0.0178	0.0377	0.0198	0.0339
Pre			-2.2191***	-2.5748***	-2.2458***	-2.5820***
			0.1228	0.2502	0.1255	0.2388
Employment	0.0859**	0.1047***	0.3184***	0.2297***	0.3564***	0.2451***
	0.0314	0.0289	0.0275	0.0238	0.0766	0.0499
x Δ Input Tariff					0.0040	0.0003
					0.0080	0.0074
Average Wage	0.0793	-0.0143	0.0405	0.0118	-0.0144	0.3366
	0.0664	0.1289	0.0779	0.1669	0.2122	0.4129
x Δ Input Tariff					-0.0054	0.0439
					0.0240	0.0605
Skilled Share	1.0683***	0.5842**	0.5793***	0.5223	-0.0017	-0.7582
	0.2230	0.2465	0.1871	0.3139	0.4352	0.7402
x Δ Input Tariff					-0.0776	-0.1863
					0.0494	0.1208
Log K/L	-0.0433	0.0317	0.0381	0.0791**	0.0115	-0.0055
	0.0355	0.0453	0.0240	0.0378	0.0638	0.0973
x Δ Input Tariff					-0.0036	-0.0102
					0.0074	0.0127
Constant	-1.1308	-1.0221	-0.9780	-0.3691	-0.0159	-2.8381
	0.7006	1.0841	0.8329	1.7282	1.8799	3.5203
Weighting	No	Employment	No	Employment	No	Employment
Observations	2,890	2,890	2,890	2,890	2,890	2,890
R-squared	0.019	0.020	0.377	0.219	0.379	0.225

Notes: Table displays the results of ordinary least squares regressions of the change in the percent change in the value of foreign input usage on the change in input tariffs, change in input tariffs interacted with an indicator for pre-existing importers ("pre", defined as plants that were already importing prior to 1984), plant characteristics and plant characteristics interacted with the change in input tariffs. Columns (1), (3) and (5) are unweighted, while columns (2), (4) and (6) are employment-weighted.

Table 5

Variables	(1)	(2)	(3)	(4)	(5)	-6
Δ Input Tariff	-0.0008	-0.0001	0.0001	-0.0020	-0.0042	-0.0998
	0.0008	0.0014	0.0030	0.0059	0.0327	0.0922
x Pre			0.0047	0.0045	0.0063	0.0072
			0.0039	0.0042	0.0079	0.0079
Pre			-0.3998***	-0.3235***	-0.3906***	-0.3091***
			0.0462	0.0641	0.0700	0.0834
Employment	-0.0012	0.0002	0.0451***	0.0429***	0.0492**	0.0329
	0.0041	0.0055	0.0104	0.0101	0.0227	0.0197
x Δ Input Tariff					0.0004	-0.0014
					0.0024	0.0020
Average Wage	0.0004	-0.0221	0.0615***	0.0499	0.0864***	0.1652**
	0.0143	0.0274	0.0127	0.0338	0.0256	0.0611
x Δ Input Tariff					0.0030	0.0145
					0.0023	0.0091
Skilled Share	0.1284***	0.1022*	0.1412***	0.1632**	0.0889	-0.0203
	0.0377	0.0509	0.0421	0.0613	0.0704	0.1274
x Δ Input Tariff					-0.0056	-0.0262
					0.0080	0.0231
Log K/L	-0.0081**	0.0018	0.0082*	0.0142	-0.0130*	-0.0247*
	0.0037	0.0058	0.0047	0.0087	0.0069	0.0140
x Δ Input Tariff					-0.0026***	-0.0046***
					0.0007	0.0011
Constant	0.0463	0.1858	-0.9169***	-0.8944***	-0.9527***	-1.6431***
	0.1456	0.2437	0.1371	0.3200	0.3058	0.5829
Weighting	No	Employment	No	Employment	No	Employment
Observations	11,074	11,074	11,074	11,074	11,074	11,074
R-squared	0.003	0.001	0.184	0.130	0.185	0.134

Notes: Table displays the results of ordinary least squares regressions of the change in an indicator variable for use of foreign inputs on the change in input tariffs, change in input tariffs interacted with an indicator for pre-existing importers ("pre", defined as plants that were already importing prior to 1984), plant characteristics and plant characteristics interacted with the change in input tariffs. Columns (1) and (3) are unweighted, while columns (2) and (4) are employment-weighted.