Importing after Exporting

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Abstract

In this paper, we uncover a novel fact about the relationship between exporting and importing. Using a comprehensive database of Argentine firms, we find that exporting to a new destination increases the probability of a firm beginning to import from that market within the lapse of one year. In a standard model of importing, we derive predictions on the effect of productivity and import costs on the intensive and extensive margins of importing. Comparing these predictions with the observed effect of reaching new export destinations, we argue that export entry in new markets reduces import fixed costs. We show that this effect is stronger in distant markets and in situations where importing involves non-homogeneous and rarely imported goods. Taken together, our results suggest that firms gain knowledge on -or establish links with- potential suppliers after export entry, which reduces the costs associated with searching for import sources.

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1 Introduction

It is well known that importers and exporters are more productive than non-trading firms. Firms engaged in international trade also use skilled labor and capital more intensively, pay higher wages and are associated with higher quality standards. Firms involved in both activities, i.e. global firms, rate even higher in these measurements (Bernard, Jensen, Redding, and Schott 2012, Kasahara and Lapham 2013, Manova and Zhang 2012). Yet, surprisingly, the research in international trade focuses on either exporting or importing as if they were independent activities.[1] As a consequence, little is known about how exporting and importing interact with each other.[2] In this paper, we aim to clarify how exporting affects import behavior.

We begin our analysis by establishing a novel fact about the relationship between exporting and importing. Using a comprehensive database of Argentine firms for the period of 2003-2008, we find that exporting to a new destination raises the probability that a firm will begin importing from that market within a year (by 66% in our preferred estimation). This fact is intriguing. Why does a new destination for exports become a new source of imports? Why does the exporting effect on importing take time? As both activities are jointly determined by productivity, importing after exporting might be the result of a particular process through which firms become more productive. An alternative potential explanation for this phenomenon is that exporting reduces the cost of importing. Thus, a firm reaching a new export destination may reflect a gain in productivity as well as association with a subsequent fall in fixed import costs.

To explore these alternative explanations, we must clarify how productivity and fixed import costs affect import decisions. In a standard model of importing, we derive predictions on the effects of productivity and import costs on the intensive and extensive margins of importing. We show that productivity and import costs yield contrasting empirical implications.[3] For example, while higher productivity increases imports from every actual import

[1] Redding (2011), Bernard, Jensen, Redding, and Schott (2011), Melitz and Redding (2012) summarize the literature on exporting but there is far less work available about importing. Halpern, Koren, and Szeidl (2009) and Amiti and Konings (2007) find that importing is associated with higher productivity. Goldberg, Khandelwal, Pavcnik, and Topalova (2010) find that importing extends the product scope; Gopinath and Neiman (2011) argue that the reaction of imports is a channel through which a currency crisis negatively affects aggregate productivity. Finally, Blaum, Lelarge, and Peters (2013) and Antras, Fort, and Tintelnot (2014) propose a general model of import behavior.

[2] Exceptions are Kasahara and Lapham (2013) finding a positive association between importing and exporting sunk costs, and Bas and Strauss-Kahn (2011) and Bas (2012) showing that imports increases the probability of becoming an exporter. We discuss these exceptions below.

[3] Our theoretical framework is a model of import behavior with heterogeneous firms that shares the main components and conclusions of any standard model of import behavior (Antras, Fort, and Tintelnot 2014,

source, a lower fixed cost of importing has no effect on the intensive margin of imports for a given source strategy. We also show that productivity affects the extensive margin in many markets simultaneously, whereas the effect of a decline in the import cost is confined to the market in which it takes place. Based on these results, we use the observed effect of reaching a new destination to infer that exporting does trigger imports from new sources through reducing import costs, ruling out productivity as a channel of importing after exporting. This conclusion opens a new set of questions.

Why does exporting reduce the cost of importing? Is it because both activities involve similar operational fixed costs? Are these costs generated by informational barriers? Explaining the nature of these costs constitutes an important aspect of our analysis. We argue that the implications of entering a new export market differ according to whether exporting either reduces operational import fixed costs or eases the search for potential suppliers. For example, on the one hand, if the effect is driven by falling complementary operational costs after export entry, we should observe a non-sequential association between importing and exporting. More precisely, export entry could occur at the same time-or even take place after-importing from a new source. On the other hand, as learning about import opportunities takes time, sourcing from a new export destination should follow a sequential pattern. According to our results, importing from a new source does not trigger exports from the same market. Moreover, if import and export operational fixed costs are merely complementary, then the probability of sourcing from a particular export market should be higher, regardless of whether this market is a new destination or not. After testing this conjecture, we observe that exporting affects the probability of importing only when this destination is new. Finally, if exporting affects the sourcing strategy by overcoming informational barriers, we should find a stronger association between exporting and importing in situations where the firm is poorly informed about the characteristics of the destination market, or when importing involves relatively rare goods. Consistent with the informational costs mechanism, our empirical results show that the effect of exporting on importing is stronger (a) in long-distance destinations; (b) in relatively unknown markets; (c) for non-homogeneous products; and (d) for intermediate goods that are rarely imported by Argentine firms. Taken together, these results suggest that firms gain knowledge on-or establish links with-potential suppliers after export entry, which reduces the costs associated with searching for import sources.

Our work is related to a growing literature on importing at the firm level. For example, Halpern, Koren, and Szeidl (2009) and Amiti and Konings (2007) find that importing is

Blaum, Lelarge, and Peters 2013, Gopinath and Neiman 2011, Halpern, Koren, and Szeidl 2009).

associated with higher productivity. Also, according to Goldberg, Khandelwal, Pavcnik, and Topalova (2010), importing helps firms to extend their product scope. Given the positive effects of importing at the firm level, it is natural to find that importing is indeed positively associated with exporting. For example, Bas and Strauss-Kahn (2011) and Bas (2012) observe that importing intermediate goods-from any source-increases productivity and, thus, increases the probability of export entry to any destination in the future. Our findings are compatible with firms using imported intermediate goods as a way to prepare for new export activities, but we stress different aspects of the import-export interplay. Basically, we see importing after exporting as a completely different phenomenon, which is not driven by productivity, but by complementarities between importing and exporting. Amiti and Davis (2012), Bache and Laugesen (2013) and Kasahara and Lapham (2013) also emphasize complementarities between exports and imports. For example, Kasahara and Lapham (2013) comparing the frequencies of exporting among non-importers with the frequency of exporting among importers, provide evidence which is consistent with complementarity between importing and exporting sunk costs. Importantly, we argue that these complementarities capture aspects of the relationship between exporting and importing that are market-specific and establish a clear direction of the effect between importing and exporting.

Our paper highlights that importing is not a simple activity. In making import decisions, firms must evaluate how imported intermediate goods affect their production costs and weigh this against the fixed costs when dealing with foreign suppliers. However, this decision requires knowledge about products and potential suppliers that is not fully available for firms *ex ante*. Therefore, experience is important to overcome informational barriers to importing. Our results suggest that exporting is a source for such experience. This paper is also related to recent literature on export dynamics that emphasizes the role of export experience in learning about a firm's potential in foreign markets (Albornoz, Calvo Pardo, Corcos, and Ornelas 2012, Defever, Heid, and Larch 2011). Our paper contributes to this literature by analyzing what firms learn when they export to previously unexplored markets. While these papers focus on uncertainty related to the demand and profitability abroad, our paper underlines that firms must also learn about suppliers in foreign markets.

Our results carry important policy implications. According to our calculations, one year after entering a new destination, imports account for 30% of the amount generated by the new exports. Thus, if export promotion policies are motivated by the goal of reducing trade imbalances, our findings warn against the effectiveness of these policies. On the other hand, as access to foreign inputs is usually associated with higher productivity or any other positive

attribute, we show that export entry eases the process of finding and reaching suppliers, which may serve as a novel rationale for export promotion.

The remainder of the paper is organized as follows. In Section 2, we present the data and the preliminary observations. In section 3, we establish the main fact. In section 4, we derive predictions on how productivity and import costs affect the intensive and extensive margins of importing and show how importing after exporting is only empirically consistent with falls in import costs triggered by export entry in new destinations. In section 5, we analyze the mechanism behind our exporting reducing import costs and argue that this effect is associated with learning about potential suppliers. We conclude in Section 6.

2 Facts on importing

In this section, we describe the data, report relevant descriptive statistics, and provide preliminary observations about the relationship between exporting and importing.

2.1 Data

We use Argentine customs data comprising the universe of the country's exports and imports transactions. We focus on Argentine manufacturing firms and restrict imports to intermediate goods (inputs and capital goods). Our database covers the 2003-2008 period and includes annually reported information about the value (in US dollars) of foreign sales and imports for each firm, distinguished by destination and product. New destinations and new origins with a specific country is a rather rare event at the firm level. Hence, the analysis is more meaningful if we aggregate countries into regions, thus reducing the number of potential destinations. In the main analysis, we restrict our attention to 10 regions: ASEAN+3 (ASEAN), Rest of Asia (RAsia), European Union (EU), Rest of Europe(REu), Africa, Australia, Mercosur, Rest of South America (RSA), North America (NA) and Central America (CA).[4] The results are robust to other ways of grouping countries. For example, we have alternatively obtained qualitatively similar results using continents and main trading partners.[5]

We collapse the database to firm-level, yearly frequency and region. Using unique firm identifiers, we have matched this data set to fiscal files generated by the Fiscal Administration of Public Revenue (AFIP) from which we have obtained information on formal employment.

[4] In the Appendix, we describe the main sources and destinations within each region (tables A1 and A2).

[5] For example, we replicate the main results discussed in the next section for a sample that include the 20 top trading partners for Argentina (See table A3 in the appendix).

The main sample consists of a balanced panel of 14,647 firms. The average amount of exports per year within the sample is US$ 19,535 millions, while the average amount of imports is US$ 7,069 million. Table 1 and Table 2 report descriptive statistics by year and by region, respectively. Despite the growth in the value of exports and imports throughout the period, there is no clear trend in terms of the number of new origins and new destinations per year. In a typical year, Argentine firms import from 4,952 new sources and reach 3,742 new destinations. There is a clear hierarchy of export destinations and import sources. Mercosur accounts for 30% of Argentine exports within the period, followed by the Rest of South America (21%), North America (11%), EU (10%) and the Asean region (10%). As to imports, Mercosur is also the main partner with roughly 35% of total imports. The rest of imports is explained by the EU (21%), ASEAN countries (17%), North America (16%) and the Rest of South America (4%). Interestingly, new origins and new destinations are explained by different markets. While most of new imports come from Mercosur (30%), EU(22%) and ASEAN(18%), new destinations are mainly in the western hemisphere (Mercosur, 23%, Rest of South America, 21%, and North America, 13%).

Table 1: Descriptive statistics: by year

Year	Imports (millions US$)	Exports (millions US$)	New origins #	New destinations #
2003	3595	11610	5188	3864
2004	4931	14784	4763	3478
2005	6041	17756	5066	4060
2006	7374	18029	5083	3496
2007	9053	23609	4711	3493
2008	11417	31426	4903	4062
Average	7069	19535	4952	3742

Exports and imports values are in millions of US$

Table 2: Descriptive statistics: by region

Region	Imports	Exports	New Origin	New Destination
	% of total	% of total	% of total	% of total
ASEAN	17	10	18	5
RAsia	3	7	11	5
EU	21	10	22	10
REu	4	2	7	6
Africa	1	6	1	5
Australia	0	1	1	3
Mercosur	35	30	15	23
RSA	4	21	16	21
NA	16	11	8	10
CA	0	3	1	9
Total	42411	117213	29714	22453

Total value of imports and exports are in millions of US$.

2.2 Preliminary observations

To take preliminary look at the relationship between exporting and importing, we compute the probability of starting to import from a region conditional on having started to export to that region the previous year. Table 3 reports the conditional and unconditional probability for each region.

Table 3: Probability of starting to import from a new region in t conditional on having started to export to that region in $t-1$

	Pr[NewOrigin$_{ijt}$=1]	Pr[NewOrigin$_{ijt}$=1/NewDest$_{ij,t-1}$=1]	△%
All	2.7	4.9	81
ASEAN	6.1	12.2	100
RAsia	3.2	5.9	84
EU	7.3	12	64
REu	1.6	5.6	250
Africa	0.3	1.9	533
Australia	0.3	2.6	767
Mercosur	4.5	5.6	24
RSA	1.8	2.5	39
NA	4.8	6.6	38
CA	0.2	0.3	50

Table 3 reveals some interesting preliminary observations about the relationship between importing and exporting. First, new exports are positively associated with sourcing new imports within a year. The probability of a firm importing from a market that it exported to the previous year is 81% higher than the unconditional probability. Second, this association is stronger for more distant regions. For example, exporting to the European Union rises the probability of importing from the same region within a year by 64%. The effect is lower for closer regions. For instance, exporting to Mercosur rises the probability of sourcing from Mercosur by only 24%.

In summary, in this preliminary analysis, we observe two important patterns of import behavior. First, the probability of sourcing from a new origin is higher for firms that started exporting in that market the previous year. Second, this association is stronger for more distant markets.

3 The main fact: importing after exporting

In this section, we study the observed association between exporting and importing in further detail. We use OLS to estimate the probability of a firm starting to source from a new region.[6]

[6]Results are robust to non-linear estimations such as Probit or Logit models.

Our basic linear probability model is given by:

$$NewOrigin_{ijt} = \alpha NewDestination_{ij,t-1} + \beta \Delta lnlabor_{i,t} + \{FE\} + \mu_{ijt} \quad (1)$$

where $NewOrigin_{ijt}$ is a dummy indicating whether firm i imported from origin j in year t for the first time, $NewDestination_{ij,t-1}$ indicates whether firm i exported to destination j in t-1 for the first time, and $\Delta lnlabor_{i,t}$ is firm i's growth rate of employment between t and t-1. Since there are other factors that affect a firms decision to start to import from and export to a region, such as specific characteristics of the region, economic shocks in a given year, and a firm's specific characteristics, we take advantage of our data set and include a wide range of fixed effects, $\{FE\}$. In particular, vector $\{FE\}$ includes different combinations of firm, year, and region fixed effects, as well as interactions between them such as firm-year, firm-region and year-region fixed effects.

Importantly, since there can only be one new origin per pair firm-region $'ij'$, when the amount of imports from a region in year t is positive ($imports_{ij,t} > 0$) that pair firm $'ij'$ leaves the sample from $t+1$ onwards. Similarly, as we want to identify the effect of a new export incursion to j on the probability of sourcing from j for those firms without any previous experience as exporters in that market, we drop pair firm $'ij'$ from t onwards whenever exports in t-1 to region j are positive ($exports_{ij,t-1} > 0$). To take into account that errors in different time periods or in different regions for a given firm might be correlated, our standard errors allow for clusters at the firm level in these and all subsequent regressions.[7]

Table 4 reports the estimation results for a series of models based on equation 1. Results provided in all specifications present the main fact: an export incursion to a region increases the probability of sourcing from that region in the following year.[8] Column 1 reports OLS estimation. In column 2, we include year and region fixed effects to control for specific shocks in a given year or region. In column 3, we add firm fixed effects to control for all systematic differences across firms that do not change over time such as the level of firm's productivity. When we include firm, region and year fixed effects we find that an export incursion to a region in t-1 increases the probability of sourcing from that region in t by 0.9 percent points. That is an increase of 33% in the probability of importing with respect to the unconditional probability. Although we control for time-invariant unobserved heterogeneity by using firm fixed effects, it may be that a firm's extensive margin expansion reflects positive idiosyncratic

[7]Main results are robust to different clustering strategies: year-region, firm, firm-year, firm-region.

[8]These result is robust to alternative grouping strategies of the regions. For instance, in table A3 of the appendix me present the main regression for the 30 countries that are the main partners of argentinian's firms.

productivity shocks that induced it to start exporting and importing. In order to address this concern, we adopt three different approaches. First, results reported in column 4, include employment variation as a proxy for productivity together with firm, year and region fixed effects. Second, we include employment variation and year-region dummies as well as firm fixed effects in column 5. Including year-region fixed effects lets us control for all aggregate shocks that affect the general attractiveness of a market such as exchange rate variations or political changes. Third, and more importantly, in column 6 we include firm-year fixed effects that control for all firm characteristics that vary over time but are constant across regions. Arguably, productivity shocks fit under this category since they are specific of a firm for a given year but are less likely to vary across markets. The main coefficient remains positive and significant in all specifications, suggesting that productivity is not driving these results. As expected, the inclusion of firm-year fixed effects in column 6, which rules out much of the productivity correlation, reduces the magnitude of the coefficient from 0.9 percent points to 0.7 percent points.[9] This implies that, once any firm-year specific characteristics (such as productivity shocks) are controlled for, the probability of importing after exporting is 26% higher than the unconditional probability.

Finally, even after including firm-year and region fixed effects, other sources of potentially important heterogeneity remain. For instance, it is common to find firms with strong specific links with a business partner in a specific region. Hence, a firm's decision to import and export from a region might be a joint decision due to a stable specific relationship with a partner abroad. We control for this possibility by including firm-region fixed effects as well as employment variation as proxy for productivity.[10] Results for this specification are displayed in column 7. Notice that we are comparing the same firm decisions for a given region over time (within firm-region variability). As shown in column 7, the effect of a new destination on starting to import withstands these controls. In particular, we find that an export incursion increases the probability of becoming an importer from that region in the following year by 1.8 percent points. In order to have a sense of how relevant the effect is, an increase of 1.8 percent points implies that the probability of importing after exporting is 66% higher than the unconditional probability. Firm-region fixed effects specification is our

[9] As a robustness check, in table A.3 of the appendix we show further evidence that the effect of exporting on importing withstands different proxies for productivity. In particular, we use imports growth and exports growth as alternative controls for productivity. Results show that the importing after exporting effect survives all this controls.

[10] In section 5 we also show that importing and exporting are not simultaneous and that the reverse effect is not statistically significant. This provides further evidence to reject productivity or firm-region specific links as drivers of importing after exporting.

preferred estimation and we adopt it as our baseline estimation in the following sections.[11]

Table 4: Probability of importing from a new destination

	$Pr[NewOrigin_{ijt} = 1]$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$New\ Destination_{ij,t-1}$	0.022***	0.018***	0.009***	0.007***	0.007***	0.008***	0.019***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
$\Delta lnlabor_{i,t}$				0.006***	0.006***		0.001
				(0.001)	(0.002)		(0.001)
Year FE	no	yes	yes	yes	no	no	yes
Region FE	no	yes	yes	yes	no	yes	no
Firm FE	no	no	yes	yes	yes	no	no
Firm-Year FE	no	no	no	no	no	yes	no
Year-Region FE	no	no	no	no	yes	no	no
Firm-Region FE	no	no	no	no	no	no	yes
Observations	589,380	589,380	589,380	361,740	361,740	589,380	361,740
R-squared	0.000	0.022	0.074	0.094	0.101	0.192	0.610

Standard errors in parenthesis are clustered at the firm level. ***,** and * indicates signicance at the level 1%, 5%, and 10% respectively. Columns 4, 5, and 7 have fewer observations because we do not have data on employment variation for 2008.

So far, it is clear that a new destination increases the probability of importing from that market within a year. The fact that reaching a new destination has a sizeable effect on the extensive margin of imports is interesting in its own right but it can only be fully understood when its potential mechanisms are identified. After controlling for firm-year fixed effects (column 4 of table 4), we observe that our variable of interest ($New\ Destination_{ij,t-1}$) is unlikely to be capturing any productivity process. Hence, the impact of exporting on importing should be associated with other forces. Among other possibilities, import costs are a natural candidate. In the next section, we explore how productivity and import costs affect import decisions in a standard models of importing.

[11] All the results in the paper are qualitatively similar once we control for firm-year fixed effects instead of firm-region fixed effects.

4 Importing after exporting as a fall in import costs

In this section, we study a standard model of import decisions to clarify whether importing after exporting is consistent with either productivity gains or with a fall in import costs after a new destination is reached. The model incorporates the main features emphasized by the literature of importing behavior (Antras, Fort, and Tintelnot 2014, Blaum, Lelarge, and Peters 2013). Although the model is not new, we use it to derive theoretical predictions on how productivity and import costs should affect the intensive and extensive margin of importing. Since we are interested on the impact of exporting on importing and not on the determinants of exporting, we take the decision of reaching a new market as given and focus only on the first order determinants of importing: productivity and costs.

4.1 General Framework

We consider a standard framework of import behavior where firms' import decisions are the solution to a maximization problem. Firms produce final goods and combine in production inputs that can be sourced domestically or from other countries. Since foreign suppliers are more efficient at producing some of the varieties, firms may be willing to demand imported inputs as a vehicle to reduce marginal cost of production.

We assume a standard CES demand with preferences given by $U = \left[\int_w q(w)^{(\sigma-1)/\sigma} dw\right]^{(\sigma/\sigma-1)}$, where $\sigma > 1$ is the constant elasticity of substitution. On the supply side, a measure N of final-good producers each produces a single differentiated product. Firms are characterized by an heterogeneous attribute φ that, for concreteness, is interpreted as productivity. Just like in Melitz (2003), this parameter is exogenously drawn from a probability distribution $g(\varphi)$ and revealed to the firms once they start to produce.

There is a set of intermediate products K (with n elements) and a set of markets j (with m elements) that are potential sources of inputs Z. More specifically, the production function takes the following form:

$$y = q(z) = \varphi \left[\sum_k x_k^{\beta}\right]^{\frac{1}{\beta}} \quad with\ x_k = max[z_{dk}; \eta_{1k} z_{1k}; ...; \eta_{mk} z_{mk}]$$

where η_{jk} represents the quality of input k supplied by market j, z_{jk} denotes the amount of input k sourced from market j and $\beta = \frac{\theta-1}{\theta}$ with $\theta > 1$. Within an intermediate product k, input varieties are perfectly substitutable, so the firm optimally selects only one source for

each intermediate product k.[12] Importing k from j involves a fixed cost (κ_{jk}) and we define $j = d$ for the domestic market. We further assume that firms take the set of prices $[p_{jk}]_{jk}$ as given and that these prices already include variable transport costs. One important aspect of our framework is that fixed import costs are heterogeneous across firms. Hence, each firm can be characterized by a vector $(\varphi, \kappa_{dk}, ..., \kappa_{mk})$. This feature allows for comparative statics at the firm level.

4.2 Firm Behavior

In this section, we analyze the decision to import. It is convenient to define a sourcing strategy Ω as the subset of input varieties (j, k), such that the firm imports positive amounts of these varieties. Notice that in our setting, for each product k, there exists, at most, one active origin.

Solving the equilibrium of the model requires two steps. As a first step, we find the optimal firm behavior conditional on a given sourcing strategy. To do so, given a sourcing strategy we compute a) the intensive margin for each variety included in the sourcing strategy (z^*_{jk}); b) the minimum marginal cost function $c(\Omega)/\varphi$; and optimal prices and revenues. As a second step, we characterize the optimal choice of the sourcing strategy. In particular, the firm solves equation 2 in order to decide which sourcing strategy is optimal given its draw of productivity and fixed costs:

$$\max_{\Omega,p} py - \frac{c(\Omega)}{\varphi} y - \sum_{(j,k)\in\Omega} \kappa_{jk}, \tag{2}$$

which implies the following optimal minimum cost function:

$$\Gamma(\varphi, \Omega, y) \equiv \frac{c(\Omega)}{\varphi} y \equiv \sum_{(j,k)\in\Omega} p_{jk} z^*_{jk}, \tag{3}$$

where $z^*_{jk}(\varphi, \Omega, y)$ is the optimal amount sourced from market j of product k and is given by the solution to:

$$z^*_{jk}(\varphi, \Omega, y) \equiv arg\min_{z_{jk}} \sum_{(j,k)\in\Omega} p_{jk} z_{jk} \text{ s.t } y = \varphi \left[\sum_{(j,k)\in\Omega} (\eta_{jk} z_{jk})^{\beta} \right]^{1/\beta}. \tag{4}$$

[12] However, the firm can import more than one intermediate product from the same origin.

First step: Conditional on the sourcing strategy

a) Marginal costs, prices and revenues Conditional on the sourcing strategy, the intensive margin of imports is fully determined by the solution to the cost function given by equation 4. It can be shown that the optimal amount of input k sourced from market j is given by:

$$z_{jk}(\varphi, \Omega, y) = \frac{y}{\varphi} \frac{\left(\frac{\eta_{jk}^{\beta}}{p_{jk}}\right)^{1/1-\beta}}{\left[\sum_{(j,k)\in\Omega} \left(\frac{{\eta_{jk}}^{\beta}}{p_{jk}}\right)^{\beta/1-\beta}\right]^{1/\beta}} \qquad \forall (j,k) \in \Omega, \tag{5}$$

which implies that the intensive margin of imports from a specific market $j^{'}$ is given by:

$$\sum_{(j',k)\in\Omega} z_{j'k}(\varphi, \Omega, y) = \frac{y}{\varphi} \frac{\sum_{(j',k)\in\Omega} \left(\frac{\eta_{j'k}^{\beta}}{p_{j}'k}\right)^{1/1-\beta}}{\left[\sum_{(j,k)\in\Omega} \left(\frac{{\eta_{jk}}^{\beta}}{p_{jk}}\right)^{\beta/1-\beta}\right]^{1/\beta}} \tag{6}$$

b) Marginal costs, prices and revenues

Once we have the intensive margin of imports for any potential sourcing strategy, it is straightforward to obtain from equation 3 the minimum marginal cost function for a given sourcing strategy.

$$\frac{c(\Omega)}{\varphi} = \frac{1}{\varphi} \left[\sum_{(j,k)\in\Omega} \left(\frac{\eta_{jk}}{p_{jk}}\right)^{\frac{\beta}{1-\beta}}\right]^{\frac{\beta-1}{\beta}}. \tag{7}$$

As in any Melitz-type of model each firm chooses its price to maximize its profits subject to a downward-sloping residual demand curve with constant elasticity of substitution. From the first order condition of profit maximization, the equilibrium price for each variety is a constant mark-up over marginal costs. This constant mark-up implies the typical relationship between productivity and prices. What is new in this framework is that quality improvements of inputs result in lower prices, making prices depend on sourcing strategy. In particular, prices are given by:

$$p = \frac{\sigma}{\sigma - 1} \frac{c(\Omega)}{\varphi}.$$

Thus, revenues are given by,

$$r(\Omega, \varphi) = B \left[\frac{\varphi}{c(\Omega)} \right]^{\sigma-1},$$

where B contains parameters that are homogeneous across firms.

We turn now to the sourcing strategy.

Second step: The sourcing strategy

Notice that for a given sourcing strategy profits are:

$$\pi(\Omega, \varphi) = \frac{r(\Omega, \varphi)}{\sigma} - \sum_{(j,k)\in\Omega} \kappa_{jk}. \tag{8}$$

This expression implicitly contains the basic ingredients to determine the extensive margin of imports. The first term represents variable profits, which are increasing in the quality of the variety within each intermediate product k and also in the number of products k combined in production. Intuitively, quality-differences and love for variety reduce marginal costs, generating incentives to import inputs. The second term corresponds to the fixed costs associated with the sourcing strategy. Thus, if we assume that a high quality source is related to a high fixed costs, each firm faces two important trade-offs when defining its optimal sourcing strategy.[13] First, the firm can reduce (increase) marginal costs (revenues) by improving the quality of varieties within a product class k, provided the associated gains outweigh the increase in fixed costs. Second, the firm can reduce marginal costs of production (and generate more revenues) by increasing the number of products k when doing this outweighs the additional fixed costs incurred. Because we allow fixed costs to vary across firms, it could be the case that (conditional on productivity), a firm generates higher revenues only because it is using a higher quality sourcing strategy.

We can now solve for the optimal sourcing strategy. Formally, we say that a sourcing strategy Ω^* is firm's optimal strategy if and only if $\pi(\Omega^*, \varphi) > \pi(\Omega, \varphi) \forall\ \Omega \neq \Omega^*$. That is,

$$\frac{r(\Omega^*, \varphi)}{\sigma} - \sum_{(j,k)\in\Omega^*} \kappa_{jk} > \frac{r(\Omega, \varphi)}{\sigma} - \sum_{(j,k)\in\Omega} \kappa_{jk} \quad \forall \quad \Omega \neq \Omega^* \tag{9}$$

Hence, relative revenues are given by the following equation:

[13] This assumption is not necessary for our results but allows us to focus in the most interesting cases. If there were an origin with the lowest fixed costs and the highest quality of inputs, then all imports would come from there.

$$\frac{r(\Omega^*, \varphi)}{r(\Omega, \varphi)} = \left[\frac{c(\Omega)}{c(\Omega^*)}\right]^{\sigma-1}$$

This equation exhibits two interesting features. Besides the well-known relationship between relative revenues and relative productivity, the model stresses the key role of the sourcing strategy. Two equally productive firms no longer need to have similar revenues because they may differ in their fixed costs; and thus in their sourcing strategies.

4.3 Implications

The model delivers clear-cut predictions about how productivity and fixed import costs affect the margins of importing. In order to obtain these results, we assume that the economy is in equilibrium and derive the optimal responses to changes in productivity and in the fixed costs associated with importing. How does importing after exporting emerge in this framework? How are fixed costs of importing and productivity related to exporting? On the one hand, it is a established fact that exporting is related to productivity (Redding 2011, Bernard, Jensen, Redding, and Schott 2011, Melitz and Redding 2012). Thus, unobservable productivity shifts can manifest in a correlation between exporting and importing. Even though in previous section we have already control for productivity including firm-year fixed effects or controls for proxies of productivity, it is informative to distinguish what should we expect to observe if the result were driven by productivity shocks. On the other hand, the cost of importing may be due to activities that are also related to export activities. But also, the experience of exporting can reduce informational barriers that result in higher import costs. In both cases, exporting to a new destination can be associated with a reduction in the fixed import costs. So, if exporting reflects either productivity or fixed costs (or both), we can use the predictions in the extensive and the intensive margin as a way to implicitly test whether reaching a new destination is more related to productivity gains or saving fixed costs.

First, we discuss changes in the sourcing strategy (extensive margin). Last, we focus on changes in import values for a given sourcing strategy (the intensive margin).

4.3.1 The extensive margin of imports: exporting as a reduction in fixed costs

After inspection of equation 9, the results are summarized as follows:

Proposition **1 (Extensive margin)**

A. The probability that a firm starts to import from market j^* is decreasing on the fixed costs of importing from that market (κ_{j^*}).

B. A reduction in fixed costs of importing from j^* that does not induce new imports from j^* carries no effect on the probability of importing from other sources.

*C. A productivity shock increases the probability of importing from **any** new source; that is, the effect of a productivity shock is not confined to a particular market.*

Proof See Appendix ■

Provided that productivity and fixed costs variations are associated to export activity, Part A. and Part C. of Proposition 1 are compatible with 'importing after exporting'. What allows for distinguishing whether this fact is driven by productivity or shifts in fixed costs, is Part B. and Part C. of Proposition 1 which yield different observable implications. While a productivity driven effect increases the probability of importing from any region independently on whether this was a new destination or not, a fixed costs driven effect should only affect the probability of importing from the market where the new destination took place. We can test these predictions by performing a falsification exercise. Specifically, we estimate the association between export entry to region j in t-1 and starting to import from **any** region k different to j at year t. In particular, for each market j we perform the following regression:

$$NewOrigin_{ikt} = \alpha NewDestination_{i,j,t-1} + \beta \Delta lnlabor_{i,t} + \{FE\} + \mu_{ijt}$$

where $NewOrigin_{i,k,t-1}$ is an indicator that takes value 1 if the firm starts to import from any $k \neq j$ the previous year and takes the value of 0 otherwise. Table 5 provides results for our falsification exercise. It investigates if a new export to k affects the probability of importing from region j within a year, conditional on the firm not importing from k. According to Part B. of Proposition 1, if a new destination reduces fixed costs of importing, we expect that export entry to a region should not affect the probability of becoming an importer from other regions. Results are consistent with Part B. of proposition 1 since an export entry to j that is not followed by an import entry to j does not affect the probability of importing for third markets k.

Table 5: The effect of exporting to region j on importing from any k≠j

	$Pr[NewOrigin_{ikt}=1]$				
	All	**Non-Western hemisphere markets**			
Market j	All	ASEAN	RAsia	EU	REu
New Destination$_{ij,t-1}$	0.010	-0.058	-0.032	0.015	0.024
	(0.008)	(0.035)	(0.035)	(0.020)	(0.07)
$\Delta lnlabor_{it}$	0.032***	0.025***	0.032***	0.012*	0.034***
	(0.007)	(0.007)	(0.008)	(0.007)	(0.008)
Observations	304,699	30,100	31,101	27,033	31,526
		Western hemisphere markets			
Market j		Mercosur	RSA	North Am.	CA
New Destination$_{ij,t-1}$		0.003	-0.000	-0.001	0.001
		(0.007)	(0.003)	(0.004)	(0.001)
$\Delta lnlabor_{it}$		0.014***	0.002**	0.008**	-0.001
		(0.005)	(0.001)	(0.004)	(0.001)
Observations		28,139	31,241	29,328	32,115

All estimations include firm-region and year fixed effects.

Standard errors in parenthesis are clustered at the firm level. ***,** and * indicates signicance at the level 1%, 5% and 10% respectively.

Furthermore, we can also directly test Part C. of the proposition; whether productivity positively affects the extensive margin of imports from every region. We use employment growth as a proxy for productivity and estimate the association between this variable and the probability of becoming an importer. Results are reported in Table 6. Column 1 reports the estimate using the entire sample; column 2 reports results excluding those firms with a new destination the previous year. The remaining coefficients report the effect of productivity on new imports for each region. In contrast to new destinations, productivity shifts matter for all markets. These results are consistent with Proposition 1 Part B, since a productivity shock is associated with higher probability of new imports from any region independent of whether it was a new destination or not.

Table 6: Testing Implication: productivity and the extensive margin

	$Pr[NewOrigin_{ijt} = 1]$					
			Non-Western hemisphere markets			
Market	all	exc. new export destinations	ASEAN	RAsia	EU	REu
$\Delta lnlabor_{it}$	0.008***	0.008***	0.017***	0.010***	0.019***	0.008***
	(0.002)	(0.002)	(0.004)	(0.003)	(0.005)	(0.002)
Observations	304,699	296,679	30,100	31,101	27,033	31,526
			Western hemisphere markets			
Market			Mercosur	RSA	NAme	CA
$\Delta lnlabor_{it}$			0.014***	0.002**	0.008**	-0.001
			(0.004)	(0.001)	(0.004)	(0.002)
Observations			28,139	31,241	29,328	32,115
Firm-region FE	yes	yes	no	no	no	no
Firm FE	no	no	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes

Standard errors in parenthesis are clustered at the firm level. ***,** and * indicates signicance at the level 1%, 5% and 10% respectively.

The empirical results on the extensive margin are consistent with a scenario in which exporting reduces fixed import costs. In addition, we reveal an important aspect of importing after exporting: new imports arise after export entry to the same market. Existing literature on the extensive margin of imports has largely focused on the decision to import and has neglected the importance of the specificity of each sourcing market. Our findings reveal that there are complementarities between exporting and importing costs that are relevant only within the market.

4.3.2 The intensive margin of imports

In this section, we examine how fixed costs and productivity affect the intensive margin of imports. These implications go in different directions whether we consider productivity or fixed costs. Again, testing these predictions implicitly reveals which of a firms' attributes is more likely to drive importing after exporting.

The analysis of equation 6 clarifies how changes in fixed costs and productivity affect the intensive margin of importing. The results hinge on whether changes in productivity and

fixed costs trigger a new sourcing strategy, or not. The next proposition summarizes these results.

PROPOSITION **2 (Intensive margin)**

A. Conditional on the sourcing strategy,

(i) A reduction in fixed import costs does not affect the intensive margin of imports.

(ii) A positive productivity shock increases the intensive margin of imports from every market.

B. Conditional on changing the sourcing strategy,

(i) The net effect of a reduction in fixed import costs on the intensive margin of imports depends on two opposite effects.

- *(Sourcing cost effect) Lower marginal costs induce the firm to increase imports of every variety (j,k) that remain active in the new sourcing strategy.*
- *(Substitution effect) The firm substitutes pre-existent inputs sourced from j' for inputs sourced from other origins, causing a reduction in the total amount of imports from j'.*

(ii) Assuming $\sigma > \theta$, the net impact of a change in productivity on intensive margin is ambiguous:

- *(Direct effect) For those varieties (j',k) that remain active, the intensive margin of imports increases.*
- *(Sourcing cost effect) For those varieties (j',k) that remain active, the direct effect of productivity on intensive margin is augmented by the reduction in marginal costs that the new sourcing strategy implies.*
- *(Substitution effect) For those varieties (j',k) that are substituted for inputs from other origins after the shock, there is a reduction in the intensive margin of imports.*

Proof See Appendix ■

Based on the conjecture that exporting is related to productivity and fixed import costs, we can use these predictions as an alternative method to obtain evidence about whether importing after exporting is driven by increased productivity or a reduction in fixed costs.

According to Part 2.A of Proposition 2, conditional on the sourcing strategy, export entry should affect the intensive margin of imports only as it relates to productivity gains. In other words, if after an export incursion to market k, the firm does not change its sourcing strategy (sourcing from k), then we should not observe a rise in imports from existent sources. By contrast, positive productivity shock would be associated with an increase in imports from every existent source. In order to study how export entry to market k affects imports from existing sources $j \neq k$, we condition on the sourcing strategy and estimate:

$$\Delta imports_{ijt} = \alpha NewDestination_{ik,t-1} + \beta \Delta lnlabor_{i,t} + \delta_{ij} + \delta_t + \mu_{ijt}, \tag{10}$$

where $\Delta imports_{ijt}$ is firm i's growth rate of imports from region j between t and $t-1$, $NewDestination_{ik,t-1}$ in equation 11 is a dummy indicating whether firm i exported to destination k≠j in $t-1$ for the first time, and $\Delta lnlabor_{i,t}$ is firm i's employment growth rate between t and $t-1$; as a proxy for productivity. We also include firm-region fixed effects δ_{ij} and year fixed effects δ_t. Since we are interested in the intensive margin of imports, we only consider observations for those firms that were already importing from j in $t-1$ ($imports_{ij,t-1} > 0$). Standard errors allow for clusters at the firm level.

Results of the estimation of equation 10 are reported in columns 1 through 3 of 7. As Part A of Proposition 2 predicts, an export incursion that is not followed by a new sourcing strategy has no effect on import growth among existing markets. In contrast, results reported in columns 2 and 3 show that, conditional on the sourcing strategy, employment variation (as a proxy for productivity) positively affects import growth. These results are consistent with a decline in fixed costs after exporting.

Table 7: The effect of a new destination in region k on import growth in j

	$\Delta Imports_{ij,t}$			
	Conditional on Sourcing Strategy			Changing sourcing strategy
	(1)	(2)	(3)	(4)
$NewDestination_{ik,t-1}$	0.011		0.039	
	(0.052)		(0.062)	
$ImpAfterExp_{i,t-1}$				-0.458*
				(0.257)
$\Delta lnlabor_{i,t}$		0.391***	0.394***	0.361***
		(0.069)	(0.071)	(0.08)
Firm-region FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
Observations	61,583	48,030	43,174	20,901
R-squared	0.278	0.307	0.336	0.369

Standard errors in parenthesis are clustered at the firm level. ***,** and * indicates significance at the level 1%, 5% and 10% respectively.

Part B of Proposition 2 is more subtle in the sense that the results depend on other factors. When we take into account firms that change their sourcing strategy after export entry, the model's predictions about how productivity and fixed costs affect the intensive margin of imports become ambiguous and the answer is empirical. In particular, Proposition 2 Part B.i predicts that a firm that decides to import after an export entry might change the amount of inputs imported from existent sources. To explore whether this possibility is present in our data, we restrict our sample to firms that change their sourcing strategy after reaching a new export destination and estimate:

$$\Delta imports_{ijt} = \alpha ImpAfterExp_{ik,t-1} + \beta \Delta lnlabor_{i,t} + \delta_{ij} + \delta_t + \mu_{ijt}, \tag{11}$$

where $ImpAfterExp_{ik,t-1}$ indicates whether the firm i started to import after entry in market k. Results are displayed in Column 4 of Table 7. Observe that the coefficient associated with $ImpAfterExp_{ik,t-1}$ is negative and significant. This result suggests that firms are substituting the origin of inputs that were already imported. Intuitively, when the firm decides to change its sourcing strategy after exporting to a new destination, the firm reduces its marginal costs. Since in our model the mark-up is constant, a reduction in marginal costs yields a reduction in the price followed by an increase in the firm's output.

As the firm becomes bigger, it has to increase the amount of inputs sourced from every pre-existent source, which yields a positive effect on import growth. However, as the firm imports new varieties it might also decide to substitute pre-existent varieties for new ones from better quality sources. Overall, the effect depends on the magnitude of these opposing forces. Our findings, reported in column 4, suggest that firms are substituting varieties from pre-existent sources for new varieties from the region where they exported and that the substitution effect is higher than the marginal cost effect.

To sum up, our findings suggest that reaching new markets triggers effects consistent with lower import costs. Now we turn to further analysing the mechanisms behind our results.

5 Potential Channels

Our previous analysis suggests that reaching a new export destination affects the probability of importing by reducing fixed import costs. Clearly, fixed import costs play a crucial role in determining the extensive margin of imports (Halpern, Koren, and Szeidl 2009, Amiti and Konings 2007). But, what are these costs? While there is indirect evidence of the existence of fixed costs, little is known about their nature. Fixed import costs may include activities such as setting up intermediate networks, learning about potential suppliers, building commercial relationships, specifying particular attributes of the goods to be acquired, developing the infrastructure to reach foreign markets, among others. It is useful to classify these activities as either operational or information acquisition. For example, opening a new foreign trade division involves operational costs. However, searching for potential new suppliers is information acquisition. Note that both types of costs could also be associated with the activity of exporting. This naturally creates a complementarity between the two activities.[14]

In this section, we examine whether the importing after exporting phenomenon is related to decline in operational or informational costs. In order to discipline the discussion, let us assume that a firm can only trade with one potential foreign market A. We will also assume that exporting reduces import costs as the evidence presented in the previous section suggests. However, as this does not necessarily occur every time a firm reaches a new destination, we assume that exporting in $t-1$ reduces imports fixed costs in year t with probability p.[15] Reductions in import costs can be due to a decline in either informational

[14]Notably, opening a new foreign trade division can also be used for exporting. Also, exploring markets to learn about their demand may also help to find suppliers.

[15]If exporting always involves (valuable) learning about potential imports, the firm could, in principle, internalize this fact and export today, even if this yields negative profits, in order to benefit from a better knowledge about potential suppliers in the future. We contend that this is a rather implausible motive for

costs or operational costs. However, even if a decline in any of them may enhance import activity, we show that the manner in which exporting affects importing differs according to whether it reduces operational or informational costs.

Consider a two-period model in which each producer decides its current prices, export and import status. I^m_{tj} and I^x_{tj} denote the firm's import and export decisions, such that $I^m_{tj} = 1$ if a firm imports in period t from market j, and 0 otherwise, and $I^x_{tj} = 1$ if a firm exports in period t to market j, and zero otherwise. To keep things simple, we restrict the world to one sourcing country; That is, $j = A$. The per-period payoffs can be described as follows:

At $t = 0$, firm's profits are given by,

$$\pi_0 = r(\varphi, I^m_{0A}, I^x_{0A}) - I^x_{0A} f^x_A - I^m_{0A} f^m_A + I^m_{0A} I^x_{0A} L \tag{12}$$

where $r(\varphi, I^m_{0A}, I^x_{0A})$ are marginal revenues, which are derived as in section 4, f^x_j, is the fixed cost of exporting to market j, and f^m_j is the fixed cost of importing from j. The parameter L captures a simultaneous reduction in operational fixed import costs, which imposes a complementarity between exporting and importing.

At $t = 1$, the profits are given by,

$$\pi_1 = r(\varphi, I^m_{1A}, I^x_{1A}) - I^x_{1A} f^x_A - I^m_{1A}.f^m_A\{1 - p(1 - I^m_{0A}) I^x_{0A} g(I_A)\} + I^x_{1A} I^m_{1A} L \tag{13}$$

The function $g(I_A)$ captures the magnitude of the reduction in informational costs after exporting. We assume that $g'(I_A) < 0$ with $g(.) \in [0, M]$ with $M < 1$. I_A is a vector of variables that capture a firm's previous knowledge about market A (which we will discuss in greater detail in the next section), such as distance to the market, degree of differentiation of the inputs in that market, previous experience in that market, among others characteristics. Assuming $g'(I_A) < 0$, implies that the impact of exporting on importing is stronger when the firm is less informed about a particular market. In contrast, operational cost reductions (L) are independent of a firm's previous knowledge about market A. Notice as well that assuming that L occurs simultaneously with exporting implies that extending the extensive margin of exporting should simultaneously effect new import sources.

Provided that $g(I_A)$ and L are positive values, it is trivial to show that exporting increases the probability of importing. However, as we show in the following proposition, the manner in which exporting affects import sourcing depends on whether it induces lower import costs

exporting and exclude it as a possibility. In any case, the model would predict exporting after importing.

through learning ($g(I_A)$) or through the operational complementarity between both activities (L).

PROPOSITION **3** *Given* $I^x_{0A} = 1$,

- *Part A: the probability of importing increases the same year if* $L > 0$.
- *Part B: Provided* $g(I_A) > 0$, *reaching a new destination in* $t = 0$ *increases the probability of starting to import from that market within a year.*
- *Part C: The effect of export entry on import entry the following year decreases with previous knowledge* (I_A).

Proof Define the probability of importing in $t = 1$ as,

$$z_1 = Pr[\pi_1(I^m_{1A} = 1) - \pi_1(I^m_{1A} = 0) > 0] = Pr[(\Delta\pi_1 > 0) \tag{14}$$

First, note that for a non-importer, $\pi_1(I^m_{1A} = 1)$ is increasing in I^x_{0A}, but $\pi_1(I^m_{1A} = 0)$ does not depend on I^x_{0A}. Hence, $\Delta(\Delta\pi_1)/\Delta I^x_{0A} > 0$, which implies that $\Delta z_1/\Delta I^x_{0A} > 0$ and we have the result. ■

Part A captures the effect of exporting on operational costs. Given our assumptions, this effect does not depend on previous knowledge and implies a simultaneous association between new exports to market A and new imports from that market. Part B captures the effect of reaching a new market on finding (or linking to) new suppliers. This effect clearly requires time and depends on the learning potential in the new market ($g(I_A)$). Admittedly, the assumption of L occurring simultaneous to exporting might be arbitrary. Thus, the observed sequence may be due to a lag in declining operational costs. However, Part C yields a clear-cut prediction on where we should observe importing after exporting if the dominant effect is driven by a fall in informational costs. Part C implies that the effect of exporting to a new destination on the probability of starting to import from that market within a year should be stronger the less the firm knows about the sourcing market. As a firm has more to learn about suppliers in more unexplored regions, a new destination raises the probability of importing within a year only if that firm is not already informed about inputs and suppliers available in that region. This offers a stronger distinction between operational and informational costs since it is harder to argue that previous knowledge about the new accessed market should matter if only operational costs were relevant. Moreover, even if

the operational costs were market specific, it is difficult to argue that these costs should be correlated with previous knowledge.

5.1 The role of previous knowledge

In this section, we design different exercises in order to show that importing after exporting is conditional on previous market knowledge in the manner predicted. Our strategy is guided by the results of proposition 3.[16] How do we proxy previous knowledge about potential suppliers in a new destination? First, we want to make sure that exporting triggers new imports shortly after entry. If a firm had previous export experience in a specific market, then exporting after entry should not affect the probability that this market becomes a new source of imports. To explore this conjecture, we estimate $Pr[NewOrigin_{ijt} = 1]$ as a function of whether or not the firm was already exporting in market j in year t or in $t-1$. Table 8 shows that the coefficients associated with $Export_{ij,t}$ and $Export_{ij,t-1}$ are neither positive nor significant. This suggests that only new exports affect future imports. Furthermore, we explore the effect of export re-entries on $Pr[NewOrigin_{ijt} = 1]$. The underlying conjecture is that a firm that re-enters a market profits from previous knowledge and therefore this entry into an export destination should not have any effect on import sourcing. As expected, Column 4 shows that export re-entry ($Re - entrants_{ij,t-1}$) has no effect on new import activities.

[16] If we assume that markets are segmented, extending proposition 3 to multiple firms and destinations follows naturally.

Table 8: Exporting does not affect importing if the export market is not new

	$Pr[NewOrigin_{ijt} = 1]$			
	(1)	(2)	(3)	(4)
$Export_{ij,t-1}$	-0.005			
	(0.004)			
$Export_{ij,t}$		-0.006*		
		(0.004)		
$Export_{ij,t-1}\&Export_{ij,t}$			0.010	
			(0.007)	
$Re-entrants_{ij,t-1}$				-0.021
				(0.021)
Year FE	yes	yes	yes	yes
Firm-Region FE	yes	yes	yes	yes
Observations	372,118	372,416	362,233	368,170
R-squared	0.602	0.602	0.605	0.594

Standard errors in parenthesis are clustered at the firm level. ***,** and * indicates significance at the level 1%, 5% and 10% respectively.

Notice that, implicitly, this evidence goes against the possibility of importing after exporting due to operational costs savings. Should this be the case, the potential decline in importing operational costs due to previous exporting experience would manifest in any export activity, not only in new ones.

Previous information (I_{ij}) should also vary across regions. Argentine firms have more experience with some markets than others.[17] Thus, we should observe that the effect of *New Destination*$_{ij,t-1}$ is only significant in some regions. To explore this, we run our baseline estimation for each selected region j, including firm and year fixed effects, as well as employment growth to control for productivity.[18] The results of these estimations are reported by Table 9. Clearly, the effect of exporting on importing is stronger for Non-Western Hemisphere regions, such as Asean+3, EU, RAsia, while the association between exporting

[17]For example, even if a firm had never exported to Mercosur, we expect that it has good enough information about inputs available there. In contrast, a firm that had never established trade with the European Union or ASEAN+3 might have less information about the region and thus exporting effects may be more relevant.

[18]Results are qualitatively similar if we include firm-year fixed effects. These are available upon request.

and importing disappears in nearby markets such as Mercosur and the rest of the American continent. For example, an export incursion to the European Union rises the probability of starting to import from an European country, within a year by 6,4%. For Mercosur, new export activity has no such effect. Furthermore, if we split the sample into Non-Western Hemisphere regions (Asean, RAsia, EU, REurope,Australia,Africa) and Western Hemisphere Regions (Mercosur, RSA, North America and CA) and perform a separate estimation for each sub-sample, we find that export entry is only associated with new sourcing in non-Western Hemisphere regions over the following year. Under the assumption that Argentine firms face more uncertainty about products available in more distant regions, these findings are consistent with the informational cost hypothesis.

Table 9: Region specific importing after exporting

$Pr[NewOrigin_{ijt}=1]$	**Non-Western Hemisphere**	ASEAN	RAsia	EU	REu
New Destination$_{ij,t-1}$	0.043***	0.064***	0.033**	0.060***	0.026***
	(0.007)	(0.024)	(0.017)	(0.020)	(0.011)
Observations	226,030	34,520	38,065	25,928	39,729
$Pr[NewOrigin_{ijt}=1]$	**Western Hemisphere**	Mercosur	RSA	North America	CA
New Destination$_{ij,t-1}$	0.008	0.008	0.006	0.005	0.003
	(0.006)	(0.008)	(0.005)	(0.013)	(0.003)
Observations	135,710	27,422	34,128	31,254	42,906
Firm FE	no	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes
Firm-Region FE	yes	no	no	no	no
Employment-proxy	yes	yes	yes	yes	yes

Notes: Standard errors in parenthesis are clustered at the firm level. ***,** and * indicates signicance at the level 1%, 5% and 10% respectively.

Although suggestive, this evidence cannot rule out the possibility that these results are being driven by a potential destination-specific complementarity between exporting and importing. For this reason, testing the informational costs hypothesis requires us to identify how knowledgeable firms are before they enter a new destination. We explore other two alternative ways of proxying a firm's previous knowledge. First, we create a dummy variable (*Market Knowledge*$_{i,j,t}$) that takes the value of 1 if the firm belongs to an industry that in

year t-1 imported inputs from a region j for a value above the median across all industries, and 0 otherwise. This definition implicitly assumes that even when a firm had never exported to a particular region, knowledge about potential imports increases as the number of the firm's competitors already sourcing from that region increases.

Formally, N_S denotes the number of firms in industry S. The amount of information about region j at $t-1$ that a firm in industry S has is given by,

$$A_{i,S,j,t-1} = \frac{\sum\limits_{i \in S; k \in K;} z_{i,j,k,t-1}}{N_S}.$$

Then, we say that a market j is known for a firm if,

$$KnownMarket_{i,j,t} = \begin{cases} 1, & \text{if} i \in S \text{ and } \mathrm{A_{i,S,j,t-1}} > \mathrm{Median_{j,t-1}}\left[\mathrm{A_{i,S,j,t-1}}\right] \\ 0, & \text{if} i \in S \text{ and } \mathrm{A_{i,S,j,t-1}} < \mathrm{Median_{j,t-1}}\left[\mathrm{A_{i,S,j,t-1}}\right] \end{cases}$$

Alternatively, we construct another measure of previous knowledge based on the potential information available in Argentina about a particular variety. We proceed in the following way: first, as it is common in the literature (Feenstra 1994, Broda and Weinstein 2006), we define a variety as an region-input pair $'j, k'$; second, we classify varieties as known or unknown according to whether the number of firms importing a variety is above or below the median in the previous year. Intuitively, knowledge available about a particular variety increases with the number of Argentine firms importing that variety. Formally, we define:

Let N_{jk} denote the number of firms that import the variety (j, k). Then, a variety is known in year $t-1$ if:

$$Known\ Variety_{j,k,t} = \begin{cases} 1, & \text{if } N_{jk,t-1} > Median_{t-1}\left[N_{jk}\right] \\ 0, & \text{if if otherwise} \end{cases}$$

We can now use *Known Market*$_{i,j,t}$ and *Known Variety*$_{j,k,t}$ to see whether the effect depends on these different ways to proxy I_{ij}. Table 10 displays the results. In the first two columns, we restrict the sample according to whether the market is unknown for a firm (column 1) or the market is known (column 2) according to *Known Market*$_{i,j,t}$. In columns 3 and 4, we divide the sample according to whether the imported varieties are unknown (column 3) or known (column 4). The results are eloquent. Columns 1 and 2 show that the effect of export entry on the likelihood of importing from that market crucially depends on whether the firm has information about the market or not. In particular new exports are followed by new imports only when the firms are not informed about the sourcing market.

Similarly, columns 3 and 4 show that new imports follow new exports only when the import variety is unknown in Argentina.

Table 10: Importing after exporting: Previous knowledge is important

	$Pr[NewOrigin_{ijt} = 1]$			
	Known Market		Known variety	
	No	Yes	No	Yes
	(1)	(2)	(3)	(4)
New Destination$_{ij,t-1}$	0.019***	0.009	0.006**	0.003
	(0.007)	(0.008)	(0.002)	(0.003)
Year FE	yes	yes	yes	yes
Firm-Region FE	yes	yes	yes	yes
Employment-proxy	yes	yes	yes	yes
Observations	82,870	76,692	174,496	174,484
R-squared	0.629	0.663	0.629	0.603

Standard errors in parenthesis are clustered at the firm level. ***,** and * indicates signifficance at the level 1%, 5% and 10% respectively.

Finally, we exploit the fact that certain types of goods may require previous knowledge about specific suppliers. For example, homogeneous goods do not require an specific supplier and are sold in relatively competitive markets where information is more likely to be conveyed by the price. By contrast, non-homogeneous goods are differentiated across different attributes such as quality, and typically require knowledge about the sellers. Similarly, it is plausible that low-tech goods are easier to acquire than high-tech goods for which knowledge about suppliers may be more valuable. We use the classification proposed by Rauch (1999) to distinguish between Homogeneous and Non-Homogeneous goods. To classify goods according to their technological content, we use OECD (1997) and divide imports into two categories: Medium & High Tech and Low Tech. We then perform our baseline regression for each product category. Results are reported in table 11. We can observe that entering a new export destination triggers new imports in the following year only for Non-Homogeneous (column 1) and relatively high tech (column 3) goods. In contrast, we find no effect when only homogeneous (column 2) or low-tech inputs (column 4) are considered.

Table 11: Product differentiation matters

	$Pr[NewOrigin_{ijt} = 1]$			
	Product Differentiation		Technology Differetiation	
	Non-Homogeneous	Only Homogeneous	Medium and High Tech	Low Tech
	(1)	(2)	(3)	(4)
New Destination$_{ij,t-1}$	0.016***	0.001	0.005***	0.002
	(0.002)	(0.001)	(0.002)	(0.001)
Year FE	yes	yes	yes	yes
Firm-Region FE	yes	yes	yes	yes
Employment-proxy	yes	yes	yes	yes
Observations	359,494	350,422	357,449	353,059
R-squared	0.603	0.616	0.601	0.613

Standard errors in parenthesis are clustered at the firm level. ***,** and * indicates signicance at the level 1%, 5% and 10% respectively.

Taken together, the findings reported in this section highlight that importing is far from a perfect-information activity. Importing requires knowledge about available inputs and capital goods and identifying the best potential suppliers requires information that can be acquired through experience in exportation. Clearly, these results highlight that exporting can be an important means of addressing the uncertainties associated with importing and, thus, can reduce informational import costs.

5.2 More on the effect of operational costs

We show that in order for exporting to have an effect on importing, it has to be the case that it involves a new export destination. Yet, we must consider the possibility that exporting and importing take place within a year (simultaneously). Could the relationship between exporting and importing be bidirectional (where importing precedes exporting)?

In principle, operational and learning costs could both be compatible with a simultaneous effect of exporting on importing. On the one hand, if exporting reduces operational costs, the effect on importing should be independent of timing or order. On the other hand, if a firm can learn quickly, we could observe an effect that takes place within the same year. Hence, the answer is empirical. Table 12 shows that there is not a simultaneous association between reaching a new destination and importing from a new source. In terms of our analysis we could argue that simultaneity is more related to operational costs reductions (L), as learning

usually requires time. Thus, although arguably inconclusive, this evidence suggests that importing after exporting is not driven by savings in operational costs.

Table 12: Importing comes after exporting and not simultaneously

$Pr[NewOrigin_{ijt}=1]$	all	**Non-Western**	Asean	RAsia	EU	REu
	All	**Hemisphere**				
New Destination$_{ijt}$	0.001	0.003	-0.013	0.020	-0.012	-0.002
	(0.003)	(0.006)	(0.021)	(0.016)	(0.016)	(0.010)
Observations	361,740	206,138	34,520	38,065	25,928	39,729
R-squared	0.610	0.581	0.572	0.570	0.625	0.579
$Pr[NewOrigin_{ijt}=1]$		**Western**	Mercosur	RSA	North America	CA
		Hemisphere				
New Destination$_{ijt}$		0.005	0.002	0.002	0.009	0.003
		(0.003)	(0.007)	(0.005)	(0.011)	(0.004)
Observations		117,988	27,422	34,128	31,254	30,115
R-squared		0.638	0.671	0.628	0.628	0.632
Firm FE	no	no	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Firm-Region FE	yes	yes	no	no	no	no
Employment-proxy	yes	yes	yes	yes	yes	yes

Standard errors in parenthesis are clustered at the firm level. ***,** and * indicates signicance at the level 1%, 5% and 10% respectively.

We must also question whether the relationship between the new destinations and new sources is bidirectional, which is to say, whether acquiring a new export destination occurs after having started to import from that region. This possibility would be more likely if the complementarity lied with operational costs rather than knowledge. However, complementarity of knowledge costs would not apply in this sequence of events; that is, it seems less likely that a firm that imports from a new region would make that region more informed about goods produced for export. Thus, determining whether the export to import effect is bidirectional can help us determine which type of cost is best suited to our empirical observations. To check whether the export to import effect is bidirectional or not, we estimate whether a new import source (NewOrigin$_{ij,t-1}$) increases the probability of a firm starting to

export to that destination ($NewDest_{ij,t}$). Table 13 shows that a new source does not affect the probability of a new destination over the following year in any region.

Table 13: Exporting does not follow importing in any market

$Pr[NewDest_{ij,t}=1]$	All	**Non-Western Hemisphere**	Asean	RAsia	EU	REu
$NewOrigin_{ij,t-1}$	0.001	0.006	0.003	0.006	-0.001	0.000
	(0.003)	(0.007)	(0.004)	(0.007)	(0.006)	(0.010)
$Pr[NewDest_{ij,t}=1]$		**Western Hemisphere**	Mercosur	RSA	North America	CA
$NewOrigin_{ij,t-1}$		0.000	-0.016*	-0.011	0.001	-0.012
		(0.005)	(0.010)	(0.013)	(0.007)	(0.030)
Firm FE	no	no	yes	yes	yes	yes
Year FE	yes	no	yes	yes	yes	yes
Firm-Region FE	yes	yes	no	no	no	no
Employment-proxy	yes	yes	yes	yes	yes	yes

Standard errors in parenthesis are clustered at the firm level. ***,** and * indicates signicance at the level 1%, 5% and 10% respectively.

Taken together, these results are not consistent with a scenario in which the main fact of this paper is driven by operational costs savings. In addition, they provide further reason to discard other hypotheses, including the idea that the effect might be driven by a firm's specific relationship with partners abroad or by joint decisions due to favorable region characteristics.

5.3 Are our findings reflecting complementarities between import and export costs?

An alternative story to the fact that importing after exporting only occurs in the same market arises if the destinations associated with low export costs also impose low fixed costs of importing. If this were the case and the region's export market potential is also correlated with the region's potential for cost savings from importing, a positive productivity shock could induce the firms to start exporting and start importing from the same market at the same time. However, this story is not compatible with some of the facts that we have already shown in this paper.

First, we included firm-region fixed effects in our preferred specifications. Including these fixed effects control for any firm-region characteristic that is invariant across time. Hence, exporting after importing could not be explained by the fact that the hierarchical ranking of exporting fixed costs is systematically similar to the hierarchical ranking of importing fixed costs. If this were the case, the effect would disappear after including firm-region fixed effects.

Second, we showed that even when we control for firm-year fixed effects, the effect of exporting on importing is still positive and significant, raising doubts on any story related to productivity.

Third, if this were the case, we should observe that, on average, the easiest destination markets to reach are the same markets that are the easiest for the firms to source from. We can check this by analyzing the characteristics of those firms that start importing from a region and compare them to the characteristics of the firms that start exporting to the same region. If hierarchical ranking of fixed costs of exporting and importing would be systematically correlated, one should observe that firms follow the same hierarchical ladder when they access to new export markets and when they access to new import markets. We can evaluate this possibility in two ways. Table 14 displays the average of the number of export (import) markets to (from) where the firm was exporting (importing) before it started to export to a new region. This gives us a sense of the ranking of difficulty to reach each of the regions as an exporter or importer, respectively. If we compare new exporters by region with new importers by region, it is clear that the order in which firms reach a new destination is very different to the order in which firms start sourcing from a region. For example, on average, before reaching ASEAN+3 as exporter, a firm has to be exporting to five different regions (ranked 6th). In contrast, firms that import from ASEAN+3 only need to import from an average of 2 countries before starting to source from ASEAN+3 (ranked 2nd). Similarly, UE is ranked as the first market from where new importers source, while it is ranked 4th among new exporters.

Alternatively, we can rank the firms according to their size at the moment of reaching a new destination or sourcing from a new origin. In Table 15, we rank firms with respect to their size (employment level) at the time they reach a new market. We can also observe a similar pattern when comparing new exporters to new importers in terms of their average number of employees at the time they reach the same market. Arguably, if on average reaching a market requires many workers, we can say that reaching that market is more difficult, so the destination/origin should be associated with higher fixed costs of entry. We

observe however that markets for new exporters and new importers do not rank similarly. For example, UE is the easiest market to reach as an importer while it is ranked 5th among the exporting markets. Or in other words, even small firms source from UE, while only bigger firms are able to reach UE as exporters.

For the all the discussed reasons, we can fairly assume away the possibility that the observed sequence of new export destination becoming a new import source be due to complementarities between export and import costs.

Table 14: Previous exportimport market experience when a firm reaches a market

Rank	New exporter to	# of previous export markets	Rank	New importer from	# of previous import markets
1	Merc	1.9	1	EU	2
2	RSA	2	2	ASEAN+3	2.3
3	NA	3.3	3	Merc	2.3
4	EU	3.4	4	NA	2.5
5	CentralAm	3.9	5	RAsia	3.2
6	REu	4.8	6	RSA	3.5
7	RAsia	4.9	7	REu	4
8	ASEAN+3	4.9	8	Africa	5.1
9	Africa	5.1	9	Aus	5.3
10	Aus	5.7	10	CA	5.4

Table 15: Employment when a firm reaches a new a region

Rank	New exporter to	# of workers	Rank	New importer from	# of workers
1	Merc	43.8	1	EU	53.5
2	RSA	47.7	2	Merc	73.1
3	NA	98.7	3	NA	75.2
4	CA	121.3	4	ASEAN+3	80.8
5	EU	129.8	5	RAsia	109.6
6	REu	168	6	RSA	154.4
7	RAsia	189.1	7	REu	166.3
8	Africa	193.9	8	Africa	311.9
9	ASEAN+3	215.8	9	CA	357.1
10	Aus	241.9	10	Aus	370.9

6 Conclusion

In this paper we document a novel fact about the interrelationship between exporting and importing. Exporting to a specific market increases the probability of importing from that market within a year. We develop a model that accounts for different aspects of import behavior and allows us to rationalize our main fact. We establish that the mechanism behind importing after exporting is the reduction in fixed costs of importing and is explained neither by variables associated with productivity nor by stable relationships between a firm and its source region. Furthermore, we show that the effect requires time and is more evident in more distant regions, in situations where the firm is less informed about inputs or suppliers available in a region, and when imports involve differentiated inputs. Overall, we contend that these results illustrate a mechanism through which exporters gain knowledge about potential suppliers, and which reduce the costs associated with a lack of knowledge about potential sources.

Our paper sheds new light on import behavior. First, it highlights that importing is not a perfect-market activity. Importing requires knowledge about available inputs and potential suppliers. This knowledge is not readily available and depends on a firm's experience in foreign markets. Our paper underlines that exporting can be an important mechanism to reduce informational costs and minimize uncertainty. Second, our findings suggest that exporting to a region will only increases the probability of importing from that region; it

does not increase the probability of importing from other regions. This finding, which is consistent with complementarities between importing and exporting costs that are specific to a market, will encourage further investigation what aspects of fixed import costs are specific to a sourcing country.

Finally, we establish the existence of a new dimension of the effect of exporting that bears important policy implications. If access to better quality foreign inputs fosters development, exporting eases the process of finding and reaching the right suppliers. However, if policy looks to stimulate or promote exportation with the aim of reducing commercial imbalances, it is important to consider that exporting to new markets has the tendency to result in interest in importing from that same market in the future, resulting in a policy that may be less effective than previously presumed.

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7 Appendix

Tables

Table A1: Main sources within regions

ASEAN+3	%	Rasia	%	EU	%	Reu	%	Africa	%	AUS	%	Merc	%	RSA	%	NA	%	CA	%
CHN	59	IND	47	DEU	29	RUS	54	ZAF	48	AUS	66	BR	95	CHL	59	USA	96	CRI	68
JPN	14	TWN	28	ITA	20	UKR	7	MAR	18	NZL	34	URU	4	MEX	29	CAN	4	BHS	11
KOR	11	PAK	9	ESP	14	ISR	11	EGY	15			PRY	1	VEN	2			GTM	9
				FRA	13									PER	6				
				GBR	6														

Table A2: Main destinations within regions

ASEAN+3	%	Rasia	%	EU	%	Reu	%	Africa	%	AUS	%	Merc	%	RSA	%	NA	%	CA	%
CHN	66	IND	44	DEU	13	RUS	37	ZAF	20	AUS	90	BR	84	CHL	38	USA	91	CRI	11
JPN	12	TWN	10	ITA	14	SVL	12	MAR	10	NZL	9	URU	7	MEX	24	CAN	9	PAN	12
KOR	8	PAK	10	ESP	16	ISR	11	EGY	20			PRY	9	VEN	13			GTM	20
				FRA	11									PER	9			DOM	23
				GBR	9														

Table A3: Probability of importing from a new destination. 20 main countries

	$Pr[NewOrigin_{ij,t}=1]$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
New Destination$_{ij,t-1}$	0.016***	0.016***	0.007***	0.016***	0.007***	0.006***	0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
$\Delta lnlabor_{i,t}$				0.004***	0.004***		0.000
				(0.001)	(0.002)		(0.001)
Year FE	no	yes	yes	yes	no	no	yes
Region FE	no	yes	yes	yes	no	yes	no
Firm FE	no	no	yes	yes	yes	no	no
Firm-Year FE	no	no	no	no	no	yes	no
Year-Region FE	no	no	no	no	yes	no	no
Firm-Region FE	no	no	no	no	no	no	yes
Observations	1,166,677	1,166,677	1,166,677	715,311	715,311	1,166,677	715,311
R-squared	0.000	0.017	0.048	0.018	0.048	0.110	0.497

Table A4: Controlling for intensive margin: different proxy variables for productivity

	$Pr[NewOrigin_{ijt}=1]$		
	(1)	(2)	(3)
New Destination$_{ij,t-1}$	0.019***	0.018***	0.020***
	(0.003)	(0.002)	(0.003)
$\Delta lnlabor_{it}$	0.001**		
	(0.000)		
$\Delta Imports_{it}$		0.003***	
		(0.000)	
$\Delta Exports_{it}$			0.000***
			(0.000)
Year FE	yes	yes	yes
Firm-Region FE	yes	yes	yes
Observations	361,740	589,380	589,380
R-squared	0.610	0.511	0.504

Standard errors in parenthesis are clustered at the firm level. ***,** and * indicates signicance at the level 1%, 5% and 10% respectively.

Proofs

Proof: proposition 1.A Assume a fixed costs draw $\kappa = \{\kappa_d, \kappa_1, ..., \kappa_{j^*}, ..., \kappa_m\}$ such that the firm's optimal sourcing strategy (Ω_{-j^*}) does not include market j^*. Then, by definition, we know that the optimal sourcing strategy (Ω_{-j^*}) yields higher benefits than Ω_{j^*} for any strategy that contains j^* as a sourcing market. This implies:

$$\frac{r(\Omega_{-j^*}, \varphi)}{\sigma} \left\{ \left[\frac{c(\Omega_{-j*})}{c(\Omega_{j^*})} \right]^{\sigma-1} - 1 \right\} < \sum_{(j,k)\in\Omega_{j^*}} \kappa_{jk} - \sum_{(j,k)\in\Omega_{-j^*}} \kappa_{jk}$$

Now assume a new fixed costs draw $\hat{\kappa} = \{\kappa_d, \kappa_1, ..., \hat{\kappa_{j^*}}, ..., \kappa_m\}$ where only fixed costs of importing from j^* are lower; $\kappa_{j^*} > \hat{\kappa_{j^*}}$. Since for $\hat{\kappa}$ the right-hand side is lower than for κ, the probability that the firm chooses a new optimal strategy Ω_{j^*} which includes source j^* is higher. ■

Proof: proposition 1.B Assume that for a given fixed costs draw $\kappa = \{\kappa_d, \kappa_1, ..., \kappa_{j^*}, ..., \kappa_m\}$, the optimal sourcing strategy is Ω_{-j^*}. Now assume that for a new fixed costs draw $\hat{\kappa} = \{\kappa_d, \kappa_1, ..., \hat{\kappa_{j^*}}, ..., \kappa_m\}$ where $\kappa_{j^*} > \hat{\kappa_{j^*}}$, the optimal sourcing strategy is Ω'_{-j^*}. Assume that non of these optimal sourcing strategies include the market j^*. Also assume that there is a unique profit maximizing sourcing strategy. This implies that for the draw κ we have

$$\frac{r(\Omega'_{-j^*}, \varphi)}{\sigma} \left\{ \left[\frac{c(\Omega'_{-j^*})}{c(\Omega_{-j^*})} \right]^{\sigma-1} - 1 \right\} \leq \sum_{(j,k)\in\Omega'_{-j}} \kappa_{jk} - \sum_{(j,k)\in\Omega_{-j^*}} \kappa_{jk},$$

and for the draw $\hat{\kappa}$,

$$\frac{r(\Omega'_{-j^*}, \varphi)}{\sigma} \left\{ \left[\frac{c(\Omega'_{-j^*})}{c(\Omega_{-j^*})} \right]^{\sigma-1} - 1 \right\} \geq \sum_{(j,k)\in\Omega'_{-j}} \kappa_{jk} - \sum_{(j,k)\in\Omega_{-j^*}} \kappa_{jk}.$$

Since $j^* \notin \Omega_{-j^*}$ and $j^* \notin \Omega'_{-j^*}$, and since there is a unique profit maximizing strategy, the two inequalities above holds only if $\Omega_{-j^*} = \Omega'_{-j^*}$. ■

Proof: Proposition 1.C. Assume two different draws of productivity $\varphi\prime > \varphi$. Consider two sourcing strategies Ω and $\hat{\Omega}$. Assume that Ω is optimal for a firm with productivity φ. Then, the extensive margin condition (9) implies:

$$\frac{r(\Omega,\varphi)}{\sigma}\left\{\left[\frac{c(\Omega)}{c(\hat{\Omega})}\right]^{\sigma-1}-1\right\}<\sum_{(j,k)\in\hat{\Omega}}\kappa_{jk}-\sum_{(j,k)\in\Omega}\kappa_{jk}$$

Consider a shock that increases the productivity from φ to $\varphi\prime$. First we show that, all else equal, $c(\Omega)$ is decreasing in productivity. If $c(\hat{\Omega})>c(\Omega)$, LHS decreases since $\left\{\left[\frac{c(\Omega)}{c(\hat{\Omega})}\right]^{\sigma-1}-1\right\}<0$. Thus, if a sourcing strategy $\hat{\Omega}$ has higher marginal costs and is not optimal for φ, then it is not optimal for $\varphi\prime$ either. Now we show that if $c(\hat{\Omega})<c(\Omega)$, then higher productivity increases the probability of changing the sourcing strategy. In this case, LHS increases since $\frac{r(\Omega,\varphi\prime)}{\sigma}>\frac{r(\Omega,\varphi)}{\sigma}$ and $\left\{\left[\frac{c(\Omega)}{c(\hat{\Omega})}\right]^{\sigma-1}-1\right\}>0$. Hence, higher productivity can induce the firm to select a new sourcing strategy $\hat{\Omega}$ whenever doing this reduces marginal costs. ■

Proof: proposition 2.A.i and 2.B.i Consider a firm with productivity φ and a vector of fixed costs $\kappa=\left\{\kappa_d,\kappa_{j'},...,\kappa_m\right\}$ that optimally chooses sourcing strategy Ω. The total amount of imports sourced from market $j^{'}$ is given by:

$$\sum_{j'k\in\Omega}z_{j'k}=\varphi^{\sigma-1}Y\left(P\rho\right)^{\sigma}\sum_{j'k\in\Omega}\frac{\left(\frac{\eta_{j'k}^{\beta}}{p_{j'k}}\right)^{1/1-\beta}}{c(\Omega)^{\sigma-\theta}}.$$

Now assume a new draw of fixed costs $\hat{\kappa}=\left\{\kappa_d,\hat{\kappa_{j'}},...,\kappa_m\right\}$ where $\hat{\kappa_{j'}}<\kappa_{j'}$ while the fixed costs of importing from other countries is equal.

1. Conditional on the sourcing strategy, it is straight-forward to show that the equation above remains unchanged with the new configuration of fixed costs.

2. If with the new configuration of fixed costs the firm changes its sourcing strategy to $\hat{\Omega}$, provided $\sigma>\theta$, the firm increases imports of every variety $(j^{'}k)\in\Omega\cap\hat{\Omega}$ because, as shown before, it must be true that $c(\hat{\Omega})<c(\Omega)$.

3. If with the new configuration of fixed costs the firm changes its sourcing strategy to $\hat{\Omega}$, it can substitute inputs previously imported from $j^{'}$ for inputs sourced from other origins or inputs sourced from other origins for inputs sourced from $j^{'}$. Formally, define $\hat{\Omega}_{j'}=\left\{(j^{'}k)\in\hat{\Omega}\right\}$ and $\Omega_{j'}=\left\{(j^{'}k)\in\Omega\right\}$. Then, if the new configuration of fixed costs induces a new sourcing strategy such that $\hat{\Omega}_{j'}\subset\Omega_{j'}$, the substitution effect can yield to a reduction in the intensive margin of imports. In contrast, if the new configuration of

fixed costs induces a new sourcing strategy such that $\hat{\Omega}_{j'} \supseteq \Omega_{j'}$, then the firm increases the amount of imports even further.

■

Proof: proposition 2.A.ii and 2.B.ii Consider a firm with productivity φ and a vector of fixed costs $\kappa = \left\{\kappa_d, \kappa_{j'}, ..., \kappa_m\right\}$ that optimally chooses sourcing strategy Ω. It can be shown that firm's optimal output y is given by: $y = Y\left[\frac{c(\Omega)}{P\rho}\right]^{-\sigma}\varphi^{\sigma}$. Where P is the ideal price index and Y is total output. Plugging y into intensive margin condition (6), the total amount of imports from market j' is given by:

$$\sum_{j'k\in\Omega} z_{j'k} = \varphi^{\sigma-1}Y\left(P\rho\right)^{\sigma}\sum_{j'k\in\Omega}\frac{\left(\frac{\eta_{j'k}^{\beta}}{p_{j'k}}\right)^{1/1-\beta}}{c(\Omega)^{\sigma-\theta}}.$$

Consider two different productivity draws where $\varphi^{'} > \varphi$. Given sourcing strategy Ω, we define as $Z^{'}_{j'k}$ and as $Z_{j'k}$ the intensive margin of imports from $j^{'}$ for a firm with productivity $\varphi^{'}$ and φ, respectively. Furthermore, $\hat{Z^{'}}_{j'k}$ represents the intensive margin of imports from $j^{'}$ for a firm with optimal sourcing strategy $\hat{\Omega}$ and productivity $\varphi^{'}$. Provided $\sigma > 1$, then:

1. Conditional on the sourcing strategy (Ω), it is straightforward to show that $\varphi^{'} > \varphi \Longrightarrow Z^{'}_{j'k} > Z_{j'k}\ \forall(j^{'},k) \in \Omega$.

2. Whenever the firm changes it's sourcing strategy to $\hat{\Omega}$:

   - Provided $\sigma > \theta$, $\hat{Z}_{j'k} > Z_{j'k}\forall(j^{'},k) \in \Omega \cap \hat{\Omega}$ since, as shown before, $c(\hat{\Omega}) < c(\Omega)$. Hence, the direct impact of higher productivity (1) on intensive margin is augmented: $\hat{Z^{'}_{j'k}} > Z^{'}_{j'k} > Z_{j'k}$.
   - It can substitute inputs previously sourced from $j^{'}$ for inputs sourced from other origins or the other way round. Formally, define $\hat{\Omega}_{j'}$ as a partition of $\hat{\Omega}$ that includes only varieties imported from j': $\hat{\Omega}_{j'} = \left\{(j^{'}k) \in \hat{\Omega}\right\}$. Define $\Omega_{j'}$ as a partition of Ω that includes only varieties imported from j': $\Omega_{j'} = \left\{(j^{'}k) \in \Omega\right\}$. Then, if a productivity shock induces a new sourcing strategy such that $\hat{\Omega}_{j'} \subset \Omega_{j'}$ we can observe a reduction in the amount of imports from $j^{'}$. In contrast, if a productivity shock induces a new sourcing strategy such that $\hat{\Omega}_{j'} \supseteq \Omega_{j'}$, the positive effects of productivity on the intensive margin of imports are augmented.

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