The role of imports for exporter performance in Peru

Martha Denisse Pierola1 | Ana Margarida Fernandes2 | Thomas Farole3

1Inter-American Development Bank, Washington, DC, USA
2Development Research Group, The World Bank, Washington, DC, USA
3The World Bank, Washington, DC, USA

Funding information
Financial support from Macro and Fiscal Management Global Practice, Latin America Region, is gratefully acknowledged.

1 | INTRODUCTION

Supported by the commodities boom and a raft of policy liberalisations, Peru experienced a decade of unprecedented growth that contributed to substantial poverty reduction. Between 2000 and 2013, Peru’s GDP per capita grew at 4.3% annually, a rate almost three times faster than the global average and six times faster than its average growth in the previous four decades. But as the commodity super-cycle unwinds, Peru faces a significant challenge of sustaining growth. Trade is one potential growth engine that remains significantly under-exploited.

Even during the commodities boom, Peru exported far less than would be predicted by its income level, and its import share of GDP (at 24.2%) was the 12th lowest in the world in 2013. Of course, from a static growth accounting perspective, imports are a drain on growth. But with increasing concentration of non-commodity trade in global production networks or global value chains (GVCs)—where stages of production are separated and dispersed across locations—the role of imported inputs becomes crucial, both as a source of productivity-enhancing technology and as “ticket” to participation in GVCs. Peru remains a substantive laggard, with its participation in GVCs being highly concentrated in forward links to its commodity exports, with limited potential for productivity-enhancing spillovers. Importantly, Peru’s backward links in GVCs—the degree to which it makes use of imported inputs in its export products—are among the lowest in the world. The share of foreign value added embedded in Peru’s total exports stood at 14% in 2011, which is a much smaller percentage than that of other developing countries deeply integrated in GVCs, such as Mexico and Malaysia.1

1The share of foreign value added embedded in a country’s total exports indicates what part of the country’s gross exports consists of inputs produced in foreign countries (and thus is the share of the country’s exports not adding to its gross domestic product). It is shown in Figure A1 for Peru and several comparator countries, based on data from UNCTAD’s Eora database. The database uses information from a multiregion input–output table at the world level to estimate the import content ratio in exportable products and value added in trade for a large number of countries (UNCTAD, 2013). The database is part of the research agenda focusing on the importance of trade in intermediates and on measuring trade in value added whose important contributions are in Koopman, Whang, and Wei (2014) or Johnson and Noguera (2012). Note that this measure of the share of foreign value added differs from the measure of direct imports of intermediates we will use for the analysis in this paper (which is closer to the concept of “importing to export” proposed by Baldwin and Lopez-Gonzalez (2015) measuring foreign intermediates used to produce goods and services that are subsequently exported).
Recognition of the importance of imported inputs for economic growth dates back to the endogenous growth theory, where improvements in technology foster long-term growth and imported inputs are a channel for the diffusion of global technology (Aghion & Howitt, 1998; Grossman & Helpman, 1991; Romer, 1987; Romer, 1990). Gains to productivity also arise from the increased input variety ensuing from the use of imported intermediate inputs, in the presence of imperfect substitution in production across domestic and imported intermediate inputs (Ethier, 1982). Extending initial empirical evidence at the aggregate level that imports of intermediate inputs are positively correlated with aggregate productivity by Coe, Helpman, and Hoffmaister (1997), a growing set of micro-level studies show that manufacturing firms benefit from their access to imported intermediate inputs in terms of significantly higher productivity (e.g., Amiti & Konings, 2007; Castellani, Serti, & Tomasi, 2010; Halpern, Koren, & Szeidl, 2015; Kasahara & Rodrigue, 2008) and higher overall product scope (Goldberg, Khandelwal, Pavcnik, & Topalova, 2010).

Since imported inputs enhance firm productivity, they can also play a critical role for firm export performance. Specifically, selection into exporting determined by firm productivity as in Melitz (2003) can be strengthened by the firm’s access to imported inputs as shown in the heterogeneous firms trade model proposed by Kasahara and Lapham (2013). In this model, importing a larger variety of intermediate inputs increases firm productivity via an increasing returns technology. More productive firms can afford to incur in the sunk costs required to export and still be profitable and thus are more likely to export. Imported intermediate inputs are often—especially for firms in developing countries—of higher quality than domestic inputs. Kugler and Verhoogen (2012) propose a heterogeneous firms trade model where the use of higher-quality intermediate inputs in production increases the quality of a firm’s output, leading to higher demand in export markets (particularly those of high-income countries) and enhancing the firm’s likelihood of exporting and its total exports. Access to lower-priced imported inputs would also reduce costs and increase profits from exporting, allowing firms previously unable to export to now afford the required fixed costs.

In this paper, we test the aforementioned predictions from the literature on the role of imported inputs for the export performance of firms in Peru. The country’s last decade is a particularly interesting context in which to test these predictions given weak productivity growth, declining performance of the export engine and the apparent failure to exploit the import channel which represented a barrier to firm-level productivity, export competitiveness and ultimately economic growth. We use highly disaggregated exporter-level and importer-level customs data for Peru over a long period, from 2000 to 2012, to evaluate the relationship between imported intermediate inputs and export performance for the overall export sector as well as for two leading non-minerals export sectors—agribusiness, where Peru has achieved a strong position in global retail supply chains and apparel, one of Peru’s largest manufacturing export sectors and among the most important sectors traded in GVCs. We estimate premia for exporting firms that are also direct importers relative to those that are not direct importers in a wide range of firm export performance.

---

2See Keller (2005) for a review of the literature on trade as a channel for the international transmission of technology.
3Bas and Strauss-Kahn (2014) extend a simpler version of the model by Kasahara and Lapham (2013) where they assume that the use of imported intermediate inputs explicitly reduces the fixed costs of exporting (in addition to increasing productivity).
4Javorcik and Iacovone (2012) show that firms upgrade the quality of their products (as proxied by unit values) in preparation for entry into export markets. Hallak (2006) shows that consumers in higher-income countries are more willing to pay for product quality, and Verhoogen (2008) proposes a model where firms choose to sell higher-quality varieties to richer destination markets.
measures—export size, export growth, market diversification and export quality (relative unit prices)—controlling for unobserved firm heterogeneity and cyclical effects through firm and year fixed effects. We also examine the effects of specific dimensions of intermediate inputs that capture the degree to which they embody foreign technology and represent increased variety. As a complement to this analysis, we examine briefly the impacts of importing on more general measures of firm performance including productivity, using manufacturing firm-level data. We then explore two factors that may be associated with the relatively limited use of imports by Peruvian exporters—tariffs and non-tariff measures (NTMs), and one factor that may have been beneficial to Peruvian exporters—the reform of the advanced clearance procedure as a modality to clear customs for imports.

Our main findings are as follows. A greater use, variety and quality of imported intermediate inputs are shown to be positively and significantly correlated with a better export performance for firms in Peru, in terms of higher levels and growth of exports, greater market diversification and higher export quality. More generally, we also find that the use of imported inputs is associated with higher productivity at the firm level. The rationale for these benefits is that the higher quality and embodied technology and knowledge in imported intermediate inputs lead to improved firm efficiency and export profitability. In exploring policy-related determinants of importing, we find that increases in tariffs are detrimental to import growth of exporters in Peru and that NTMs correlate with lower import values, and lower numbers of products and varieties imported. The use of an advanced customs clearance procedure is favourable to the import performance of exporter–importers in terms of value and diversification of the import bundle.

Studies for Argentina’s manufacturing sector (Bas, 2012) and France’s agrifood sector (Chevas-sus-Lozza, Gaigne, & Mener, 2013) focusing on input tariff liberalisations as well as for Italy’s manufacturing sector (Lo Turco & Maggioni, 2013) focusing on the actual use of imported intermediate inputs show that those increase firms’ propensity to export and firms’ total exports. More recent studies for the manufacturing sectors in France (Bas & Strauss-Kahn, 2014) and China (Bas & Strauss-Kahn, 2015; Feng, Li, & Swenson, 2016) show that the use of imported intermediate inputs leads firms to increase their likelihood of exporting, their export scope or their export quality. The evidence so far has come from studies either on advanced countries or on China, a very special developing country due to its scale and export processing regime in place, described in Bas and Strauss-Kahn (2015). Our study contributes to this literature by providing evidence on the important role of imported intermediate inputs for firm export performance in a developing country that, overall, has failed to integrate deeply into global value chains. By highlighting the positive impacts on export performance and productivity in the few sectors where Peru has managed to achieve backward integration in GVCs, our results provide strong support for the positive sector and firm-specific effects of imported intermediates.

We are aware of reverse causality concerns between the use of imported intermediate inputs and export performance at the firm level. However, the aim of this paper is simply to provide strong evidence on the robust correlations between these firm decisions. With this aim, we are confident that our findings using rich firm panel data add significantly to our understanding of the relationship between imports and export performance within global value chains.

The remainder of the paper is organised as follows. Section 2 describes the data. Section 3 presents the export performance premia for exporter–importers. Section 4 briefly explores the role of policies in explaining why Peruvian exporters do not import more. Section 5 concludes.

Fernandes and Lopez (2015) show similar positive effects focusing on imported technologies—rather than imported intermediate inputs—for firms in Chile.
2 | DATA

Our analysis uses transaction-level customs data for Peru covering the period 2000–12 obtained from Peru’s National Tax Administration (SUNAT) and collected by the Trade and Integration Unit of the World Bank Research Department as part of their efforts to expand the Exporter Dynamics Database, described in Fernandes, Freund, and Pierola (2016). The data cover the universe of Peruvian export and import transactions in the agricultural, mining—excluding HS Chapter 27 (hydrocarbons such as oil, petroleum, natural gas, coal)—and manufacturing sectors. The data include unique firm identifiers that allow us to follow firms over time and to match across export and import transactions so as to generate a final data set at the firm-HS 6-digit product-country (of origin or destination)-year level with information on value and quantity traded (exported or imported). The final data set includes an identifier to differentiate between firms that are only exporters and firms that are exporters and importers simultaneously, that we designate as exporter–importers.6 This exporter–importer status is time-varying. The final data set excludes firms whose annual export values are lower than US$10,000 as such small export flows may represent the shipping of samples rather than merchandise sold as a true export venture.7 We will present our results focusing first on exporting firms across all sectors in Peru (which we designate as overall below) and then on exporting firms in the two specific sectors agribusiness and apparel, whose coverage in terms of HS Chapters or HS 6-digit products is shown in the Appendix.

To focus on the role of imported intermediates for Peruvian firms’ export performance, we follow the recent literature, namely Arkolakis, Costinot, and Rodríguez-Clare (2012) and Feng et al. (2016), and use the United Nations Broad Economic Classification (BEC) to identify which imports by Peruvian firms are of intermediate inputs and capital goods, and we consider only those imports in the rest of the analysis, designating them in what follows as “imports of intermediates” or “imports of intermediate inputs.”8

We consider for each exporting firm a wide range of measures of performance in each year, commonly used in the literature relying on customs data (i.e., Bas & Strauss-Kahn, 2014, 2015; Feng et al., 2016) and that reflect different aspects of the firm’s exporting activity: total exports (in logarithms), growth in total exports (defined as the difference in logarithms between total exports in year $t$ and total exports in year $t - 1$), number of destination countries and relative average unit values (defined as an export share-weighted average of the ratio between the unit value for the firm-HS 6-digit product in a year and the average unit value for that same HS 6-digit product across all firms that export it in the same year). Summary statistics for all variables used in the analysis are provided in Table A2 in the Appendix.

---

6 The data used for this analysis allow the identification of inputs and other goods imported directly by exporters. There may be other inputs and goods imported indirectly through third parties (e.g., distributors and traders); however, these transactions cannot be identified in our dataset. Importing indirectly may be an efficient strategy for small firms and for the import of non-core inputs as it can reduce fixed costs of establishing relationships with international buyers and may confer some scale-related cost benefits. However, for the purpose of analysing the degree of integration of exporters into GVCs, transactions covering direct imports are the most critical—firms that are integrated into GVCs would normally source directly, as these sourcing relationships are critical from a quality and technology spillover perspective. Also, since our focus is on export performance, we eliminate from the final dataset the firms that are importers only.

7 Additional details on the data are provided in the Appendix and in the working paper Pierola Castro, Fernandes & Farolec (2015).

8 We use the BEC classification as provided in United Nations (2011) and concord the BEC categories to the HS 6-digit products imported by Peruvian firms using a concordance provided by the United Nations at http://unstats.un.org/unsd/trade/BEC%20Classification.htm. The BEC categories available are capital goods, intermediate goods, final goods and others. The category others include all HS 6-digit products for which there is no correspondence to either capital, intermediate or final goods.
Figure 1 shows the number and participation of exporter–importers in the total number of exporters (relative to exporters only) over time. While Peru experiences a steady increase in the number of exporter–importers from 2000 to 2012, their share in the total number of exporters declines in importance, especially in apparel but also in agribusiness after 2006. Exporter–importers account for the bulk—more than 85%—of total exports in each year. Figure A2 shows the portfolio of origin countries from which exporter–importers source their inputs as well as the portfolio of destination countries to which they sell.

3 | EXPORT PERFORMANCE PREMIA FOR EXPORTER–IMPORTERS

To investigate the importance of imports of intermediate inputs for Peruvian exporters, we follow the approach—initially proposed by Bernard and Jensen (1999) in studying the productivity advantage of exporters in the USA—of estimating export performance premia regressions given by:

\[ Y_{it} = \beta_{\text{Exp}\_\text{Imp}_t} + I_t + I_i + \varepsilon_{it}, \]

where \( i \) stands for a firm (which may be an exporter only or an exporter–importer), \( t \) stands for a year, \( Y_{it} \) is an export performance measure, \( I_t \) are year fixed effects, and \( \varepsilon_{it} \) is an independent and identically distributed (i.i.d.) error. Importantly, note that Equation (1) includes firm fixed effects \( I_i \) which control for unobserved firm heterogeneity due to time-invariant firm characteristics which might be correlated with performance in export markets but also with the exporter–importer status. In particular, the inclusion of firm fixed effects mitigates the potential concern that an estimated performance premia for exporter–importers could be simply due to those firms’ larger size and higher productivity.\(^9\)

The coefficient of interest in Equation (1) is that on the variable \( \text{Exp}\_\text{Imp} \) which is in our baseline specifications a dummy variable for current exporter–importer status (1 if the firm exports and imports in year \( t \), 0 else).\(^10\) To ensure that the interpretation of the coefficient on the exporter–importer status dummy variable shows how export performance improves when a firm starts to import intermediate inputs—that is, when it switches from being an exporter only to being an exporter–importer premia that we estimate may be biased if unobserved time-varying firm shocks affect both the choice of the firm to import inputs and export performance, we do not have any strong reason to suspect this bias is strong and consider that our results are still relevant.\(^1\)

\(^1\)For export performance measures in logarithms, the exporter–importer premium is computed from the estimated coefficient as \( 100 \times (\exp(\beta) - 1) \) and shows the average percentage difference in a measure between exporter–importers and exporters only.
we drop from the estimating sample for all our specifications firms that stop being an exporter–importer and become an exporter only. However, the results are qualitatively similar if we include those firms in the estimating sample, as seen by comparing Tables 1 and 2 to in Tables A3 and A4.

The evidence in Table 1 shows significant premia in all export performance measures for exporters that import intermediate inputs, relative to exporters that do not, overall across all sectors, as well as in the agribusiness and apparel sectors. The only exception is an insignificant premia in export growth for exporter–importers in the agribusiness sector. Exporter–importers are larger in terms of total exports, they grow faster, are more diversified in terms of destination markets, and their exported products have relatively higher quality than average. Specifically, column (1) indicates that exporter–importers have 55% higher total export values than exporters only overall; this advantage is 64% and 65% in the agribusiness and the apparel sectors, respectively. Regarding diversification, column (3) shows that exporter–importers sell on average to almost 1 (0.7–0.9) additional destination country than exporters only.

Not only the fact of importing intermediate inputs per se can help exporters’ performance but the amount imported may also matter. To investigate this question, Table 1 presents in columns (5)–(8) the results from estimating a variant of Equation (1) where instead of the exporter–importer status dummy we include the logarithm of the value of imported inputs.\textsuperscript{11} The estimates show evidence of stronger export performance in terms of higher total exports, faster export growth, larger numbers of destination countries and higher relative unit values for exporting firms that import relatively more intermediate inputs. Again the exception to the pattern is the insignificant export growth premia for exporter–importers in the agribusiness sector.

Importing intermediate inputs at the extensive and intensive margins is associated with significantly better export performance for firms in Peru. But it is important to investigate further these premia and consider several dimensions of intermediate inputs that proxy for the degree to which they embody foreign technology and to which they represent increased variety and quality, some of the key mechanisms predicted by the literature for the growth-enhancing role of imports of intermediates. To address this issue, we estimate another variant of Equation (1) where the exporter–importer status dummy variable is replaced alternatively by, the number of imported HS 6-digit products (in logarithms), the number of imported varieties defined as an HS 6-digit-origin country cell (in logarithms) and a dummy variable for exporter–importers that import more than 50% of their inputs from high-income countries.\textsuperscript{12}

Table 2 shows the results from these specifications which reveal significantly higher export values, larger numbers of destination markets served, and relatively higher export quality than average for the exporter–importers that import more products, more varieties and a larger share from high-income countries. For example, column (9) indicates that exporter–importers with more than 50% of imports of intermediates coming from high-income countries have 29% larger export values than exporter–importers with a lower percentage coming from high-income countries overall across all sectors (this premium is 49% and 34% in the case of agribusiness and apparel respectively).\textsuperscript{13} Considering that imports of intermediates from high-income countries are generally assumed to embody foreign (and more advanced) technology (see, e.g., Keller, 2005), the evidence from these estimates indicates that indeed, imported intermediate inputs from these countries—which can be

\textsuperscript{11}We add one unit to the value of imported inputs for all firms, so as to keep in the estimating sample exporters only whose imports are zero.

\textsuperscript{12}High-income countries are defined based on the World Bank income classification as of year 2010.

\textsuperscript{13}These effects are obtained as 100 \times (\exp(\beta)−1) where $\beta$ is the estimated coefficient.
### TABLE 1 Baseline export performance premia for exporter–importers

|                  | Log (export value) | Export growth | No. of destinat. | Avg. relative unit values of exports | Log (export value) | Export growth | No. of destinat. | Avg. relative unit values of exports |
|------------------|--------------------|---------------|------------------|-------------------------------------|--------------------|---------------|------------------|-------------------------------------|
| **All**          |                    |               |                  |                                     |                    |               |                  |                                     |
| Dummy for exporter–importers | 0.440***         | 0.154***      | 0.718***         | 0.161***                            | 0.054***           | 0.022***      | 0.098***         | 0.021***                            |
|                  | (0.023)            | (0.026)       | (0.062)          | (0.022)                             | (0.002)            | (0.003)       | (0.007)          | (0.002)                             |
| **Observations** | 46,508             | 30,409        | 46,508           | 46,508                              | 46,508             | 30,409        | 46,508           | 46,508                              |
| $R^2$            | .849               | .192          | .846             | .770                                | .851               | .193          | .847             | .770                                |
| **Agribusiness** |                    |               |                  |                                     |                    |               |                  |                                     |
| Dummy for exporter–importers | 0.495***         | 0.056         | 0.776***         | 0.144***                            | 0.053***           | 0.005         | 0.106***         | 0.018***                            |
|                  | (0.062)            | (0.063)       | (0.172)          | (0.035)                             | (0.006)            | (0.006)       | (0.018)          | (0.004)                             |
| **Observations** | 3,703              | 2,589         | 3,703            | 3,703                               | 3,703              | 2,589         | 3,703            | 3,703                               |
| $R^2$            | .801               | .277          | .791             | .764                                | .802               | .277          | .793             | .765                                |
| **Apparel**      |                    |               |                  |                                     |                    |               |                  |                                     |
| Dummy for exporter–importers | 0.503***         | 0.195***      | 0.943***         | 0.312***                            | 0.066***           | 0.026***      | 0.128***         | 0.044***                            |
|                  | (0.059)            | (0.065)       | (0.142)          | (0.060)                             | (0.006)            | (0.007)       | (0.017)          | (0.007)                             |
| **Observations** | 9,113              | 5,722         | 9,113            | 9,113                               | 9,113              | 5,722         | 9,113            | 9,113                               |
| $R^2$            | .832               | .250          | .818             | .789                                | .834               | .251          | .820             | .790                                |

**Notes:** Robust standard errors in parentheses.
Year and firm fixed effects are included in all specifications.
***, ** and * indicate significance at 1%, 5% and 10% confidence levels, respectively.
|                        | Log (export value) | No. of destinat. | Avg. rel. unit values of exports | Log (export value) | No. of destinat. | Avg. rel. unit values of exports | Log (export value) | No. of destinat. | Avg. rel. unit values of exports |
|------------------------|--------------------|-----------------|---------------------------------|--------------------|-----------------|---------------------------------|--------------------|-----------------|---------------------------------|
| **All**                |                    |                 |                                 |                    |                 |                                 |                    |                 |                                 |
| Log no. imported       | 0.273***           | 0.597***        | 0.106***                        |                    |                 |                                 |                    |                 |                                 |
| products               | (0.013)            | (0.039)         | (0.019)                         |                    |                 |                                 |                    |                 |                                 |
| Log no. imported       | 0.268***           | 0.603***        | 0.109***                        |                    |                 |                                 |                    |                 |                                 |
| varieties              | (0.012)            | (0.037)         | (0.016)                         |                    |                 |                                 |                    |                 |                                 |
| Dummy for share of     |                    |                 |                                 | 0.253***           | 0.360***        | 0.073**                        |                    |                 |                                 |
| imports from high      |                    |                 |                                 | (0.020)            | (0.059)         | (0.033)                        |                    |                 |                                 |
| income > 50%           |                    |                 |                                 |                    |                 |                                 |                    |                 |                                 |
| Observations           | 46,508             | 46,508          | 46,508                          | 46,508             | 46,508          | 46,508                          | 46,508             | 46,508          | 46,508                          |
| **R^2**                | .851               | .848            | .770                            | .851               | .848            | .770                            | .848               | .845            | .769                            |
| **Agribusiness**       |                    |                 |                                 |                    |                 |                                 |                    |                 |                                 |
| Log no. imported       | 0.218***           | 0.904***        | 0.153***                        |                    |                 |                                 |                    |                 |                                 |
| products               | (0.037)            | (0.138)         | (0.026)                         |                    |                 |                                 |                    |                 |                                 |
| Log no. imported       | 0.219***           | 0.899***        | 0.151***                        |                    |                 |                                 |                    |                 |                                 |
| varieties              | (0.035)            | (0.135)         | (0.025)                         |                    |                 |                                 |                    |                 |                                 |
| Dummy for share of     |                    |                 |                                 | 0.397***           | 0.640***        | 0.135***                       |                    |                 |                                 |
| imports from high      |                    |                 |                                 | (0.060)            | (0.213)         | (0.039)                        |                    |                 |                                 |
| income > 50%           |                    |                 |                                 |                    |                 |                                 |                    |                 |                                 |
| Observations           | 3,703              | 3,703           | 3,703                           | 3,703              | 3,703           | 3,703                           | 3,703              | 3,703           | 3,703                           |
| **R^2**                | .797               | .795            | .767                            | .798               | .795            | .767                            | .798               | .790            | .763                            |

(Continues)
### Table 2 (Continued)

|                      | Log (export value) | No. of destinat. | Avg. rel. unit values of exports | Log (export value) | No. of destinat. | Avg. rel. unit values of exports | Log (export value) | No. of destinat. | Avg. rel. unit values of exports | Log (export value) | No. of destinat. | Avg. rel. unit values of exports |
|----------------------|--------------------|-----------------|----------------------------------|--------------------|-----------------|----------------------------------|--------------------|-----------------|----------------------------------|--------------------|-----------------|----------------------------------|
| **Apparel**          |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |
| Log no. imported     | 0.454***           | 1.010***        | 0.324***                         | 0.442***           | 1.037***        | 0.336***                         | 0.289***           | 0.324*          | 0.185***                         |                    |                 |                                  |
| products             | (0.036)            | (0.127)         | (0.047)                          | (0.034)            | (0.121)         | (0.046)                          | (0.056)            | (0.185)         | (0.070)                          |                    |                 |                                  |
| Log no. imported     |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |
| varieties (product-  | 9,113              | 9,113           | 9,113                            | 9,113              | 9,113           | 9,113                            | 9,113              | 9,113           | 9,113                            |                    |                 |                                  |
| country)             |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |
| Dummy for share      |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |
| of imports           |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |
| from high           | 9,113              | 9,113           | 9,113                            | 9,113              | 9,113           | 9,113                            | 9,113              | 9,113           | 9,113                            |                    |                 |                                  |
| income > 50%         |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |
| Observations         | .836               | .824            | .792                             | .836               | .826            | .793                             | .829               | .816            | .788                             |                    |                 |                                  |
| $R^2$                |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |                    |                 |                                  |

**Notes:** Robust standard errors in parentheses.
Year and firm fixed effects are included in all specifications.
Only exporter–importers are included in all the regressions.

***, ** and * indicate significance at 1%, 5% and 10% confidence levels, respectively.
assumed to have a higher degree of sophistication—are beneficial to the export performance of exporter–importers in Peru.

Finally, we discuss briefly some complementary evidence on the role of imported inputs for firm productivity in Peru that we obtained based on firm-level data from the Encuesta Economica Annual (EEA).\textsuperscript{14} The EEA data are a useful complement to our main analysis using the panel exporter-level/importer-level customs data because it allows us to calculate more general measures of firm performance than those focusing just on the export market.\textsuperscript{15} We estimate a variant of Equation (1) for the cross-sections of manufacturing firms in Peru covered by the EEA over the 2008–2012 period where the dependent variable is either firm employment, real output, real capital, real capital–labour ratio or labour productivity.\textsuperscript{16} In the case of labour productivity, the regression also controls for the real capital–labour ratio; hence, the results are proximate to those that would be obtained for a total factor productivity measure.\textsuperscript{17} The regression results shown in Table A4 indicate that importing firms are significantly larger in terms of their employment and output, significantly more capital-intensive and more productive than firms that do not import.\textsuperscript{18} Focusing on the subset of firms in the EEA that are exporters, we find very clear evidence that exporter–importers in Peru are significantly larger in terms of employment and output, they are older and more likely to be foreign-owned, and they are also more capital-intensive and significantly more productive than exporters only.

4 | WHY DON’T PERUVIAN EXPORTERS IMPORT MORE? THE ROLE OF POLICIES

In this section, we describe an exploratory analysis of several policies that may be preventing Peruvian exporting firms from importing more intermediates and getting the ensuing benefits, documented in Section 3. Despite the fact that Peru’s average tariff rates are among the lowest in the region and non-tariff barriers were reduced significantly over the period 2000–12, both policies are known for their obstructing effects on trade—in this case as a barrier to importing, especially in strategic sectors where they may remain. Customs and trade-related infrastructure have been a more significant barrier for exporters seeking to access critical inputs. Peru’s logistics costs—about 32% of product value—are among the highest in Latin America, and customs and trade-related infrastructure rank well behind regional peers like Chile and Mexico. The policies we consider are

\textsuperscript{14}Details on the cleaning and preparation of the EEA are provided in Iacovone and Thu Tran (2015).

\textsuperscript{15}In addition to not providing nearly as much detail as our customs data does on exports and imports by Peruvian firms, the EEA data has several caveats which explain why we do not use it as our main data source. The EEA is not a panel data set covering all manufacturing firms in Peru, rather it has a census component for the largest firms and a sample component for the smaller firms which implies that firms are sampled randomly, as discussed in Iacovone and Thu Tran (2015). Hence, it is not possible to trace firm performance over time, which is fundamental to answering the questions raised in this paper, for any but the largest manufacturing firms.

\textsuperscript{16}Definitions and summary statistics on the variables from the EEA data used in the analysis are provided in the Appendix. Regression results focusing separately on firms in the agribusiness and apparel sectors are shown in the working paper version.

\textsuperscript{17}Since the EEA data that we use consists of cross-sections of firms, it is not possible to obtain firm-level total factor productivity measures based on production function estimation techniques such as those by Olley and Pakes (1996) or Levinsohn and Petrin (2003). Thus, the use of a labour productivity measure while controlling for the capital–labour ratio is the best possible alternative.

\textsuperscript{18}We also considered the subset of the EEA data that is a panel covering only the largest Peruvian firms, as described in Iacovone and Tran (2015). That sample is limited but allows us to estimate the same regressions but controlling for firm fixed effects. Unreported results show that even after controlling for firm fixed effects, firms that import exhibit significantly higher capital–labour ratios and labour productivity (controlling for the capital–labour ratio).
nominal applied tariff rates, NTMs imposed on imports and the use of a special regime to clear import customs in advance (“despacho anticipado”). Given data limitations, we focus on simple correlations between these policies and Peruvian firms’ import outcomes. A more sophisticated analysis of how these policies deter imports of intermediate inputs would require information currently unavailable on domestic intermediate inputs used by Peruvian firms so as to exploit the choice to start importing intermediate inputs that were previously bought domestically.

First, we study the correlation between tariffs and Peruvian firms’ import choices. Using data on nominal applied tariff rates at the firm-level, we estimate the effects of applied tariff rates on firm imports of intermediates based on regressions in levels or in first-differences controlling for firm fixed effects, year fixed effects, and HS 2-digit sector fixed effects shown in Appendix D.19 The firm fixed effects in the first-differences regressions allow for heterogeneity across firms in their rates of import growth. The key pattern emerging is a significant negative short-term effect of higher levels of tariffs and higher growth in tariffs on imports of intermediate inputs by Peruvian exporter–importers. While simple, these reduced-form specifications provide magnitudes of responses of import flows to tariffs for Peruvian firms that are not too different from those obtained from sophisticated structural trade models by Bernard, Eaton, Jensen, and Kortum (2003) or Spearot (2013).

Second, we consider correlations between two types of NTMs and Peruvian firms’ import choices: sanitary and phytosanitary measures (SPS) and technical barriers to trade (TBT). Data on NTMs for Peru are available for 2012 only.20 We estimate the correlation between the share of imports of intermediate inputs that are subject to each of two firm-level NTM measures and firm-level import value, the number of imported products or the number of imported varieties, as shown in Appendix D. The results indicate a clear negative correlation between the share of imported intermediates under either of the two types of NTMs and both total imports and numbers of products and varieties imported for Peruvian firms.

Third, we consider the role of the advance customs clearance procedure (SADA) available as a modality to clear customs for imports in Peru since the late 1990s. The procedure consists in pre-arrival clearance of imported goods; that is, the import declaration is registered and the cargo manifest is electronically transmitted before the means of transport arrives. Once the corresponding formalities are completed, release for the cargo may be granted at the point of arrival within 48 hr of unloading. With the enactment of the New General Customs Law and its Regulations in 2008–09, SUNAT reformed the advance clearance procedure in the context of a general programme of trade facilitation reforms aimed at reducing customs release times and costs of trading in Peru. The reform resulted in an expansion in the use of advance clearance by seeking to make it the rule rather than the exception for customs clearance. Total imports of intermediate inputs entering Peru

---

19 Data on applied tariffs at the transaction level are provided by SUNAT. We calculate for each firm-year an applied tariff rate as the ratio of total ad valorem tariff duty paid by the firm in that year over the total value imported by the firm in that year. Yearly averages of applied tariffs on intermediates are shown in the working paper Pierola et al. (2015). Fixed effects at the HS 2-digit product level correspond to the main HS 2-digit product imported by the firm which may differ across years for a given firm.

20 The data on NTMs are taken from the Trade Analysis and Information System (TRAINS) developed by the United Nations Conference on Trade and Development (UNCTAD). For each of the two types of NTMs, we make the simplifying assumption that if at least one HS tariff line at the 10-digit level within an HS 6-digit product is subject to an NTM as of 2012, the entire HS 6-digit product is categorised as being subject to that NTM. Then, for each firm in 2012, we calculate the share of its imports of intermediates that is accounted for by HS 6-digit products subject to each of the two types of NTMs. Averages of NTMs are shown in the working paper version.
under the advance clearance procedure increased considerably after the implementation of the new law and regulations in 2010.\textsuperscript{21} We estimate a premium regression as in Equation (1) where the dependent variable is one among several firm-level import outcomes—import value, import growth, the number of imported products, or the number of imported varieties—and the main variable of interest is a time-varying firm-specific indicator of whether the firm uses the advance customs clearance procedure for some of its imports of intermediate inputs. The regressions control for firm fixed effects, year fixed effects and HS 2-digit sector fixed effects. Controlling for firm fixed effects is particularly important to control for the fact that among exporter–importers in Peru, the main users of the advance clearance procedure are the larger firms.\textsuperscript{22} The results show that exporter–importers using the advance customs clearance procedure exhibit significantly higher imports of intermediates, which grow faster and are more diverse in terms of the numbers of products and varieties. Additional results suggest that the import levels of firms using the procedure increased even more after the reforms to the procedure. All in all, the evidence suggests that exporters who import intermediate inputs using this modality import more and import a more diversified bundle of inputs than those that do not use it.

5  |  CONCLUSION

Using highly disaggregated firm-level customs data for imports and exports in Peru over more than a decade, this paper explores the relationship between imports of intermediate inputs and firm export performance. In line with a growing body of recent literature, we find that a greater use, variety and quality of imported intermediate inputs are significantly correlated with higher exports, faster export growth, greater diversification of export markets and higher-quality exports (as measured by relative unit prices) at the firm level. This relationship is robust and persistent to controls for unobserved firm heterogeneity and year fixed effects. A complementary analysis using data from a manufacturing census supports these findings, showing that the use of imported inputs is associated with higher productivity at the firm level.

If imported inputs have such a positive impact on firm performance, why do Peruvian firms, on average, import so little relative to other countries within the same income group? To understand this fact, we explore the correlations between specific trade policy and trade facilitation variables/measures and the import performance of exporters that are direct importers. We find that firms exposed to higher tariffs and NTMs import less and (in the case of NTMs) exhibit lower variety in their imported inputs. On a more positive note, we also find that the use of the advance clearance procedure as the modality to clear customs for imports is favourable to the import performance of exporter–importers.

These findings lend support to the policy of extensive trade liberalisation pursued by Peru over the past decade. Firms that take advantage of the favourable policy environment for importing see substantial gains to their productivity and export performance. The findings of significant differences in imports across products with different tariff and NTM levels show, however, that even with low average levels, firms remain sensitive to higher levels of those trade policy barriers. Finally, the findings underscore the importance of effective de facto implementation of trade policy measures and efficient trade facilitation procedures and to ensuring that these are widely available to firms across size categories and sectors. Indeed, the high sensitivity of firms to the policy regimes assessed in this paper, perhaps most importantly to the expedited customs clearance

\textsuperscript{21}Further details on the advance customs clearance procedure are provided in the working paper Pierola et al. (2015).

\textsuperscript{22}For the purposes of this analysis, SUNAT provided us with a variable which indicates for each exporting firm its size category based on total sales (domestic and foreign), as described in more detail in the working paper Pierola et al. (2015).
modality, may reflect that despite efforts to further liberalise, trade policy barriers matter and the same time, that there is a lot of potential to gain from reducing wider barriers that exist in the trade facilitation environment. This may also suggest that the battleground for improving trade performance may need to shift increasingly from trade policy to trade facilitation.

ACKNOWLEDGEMENTS

This paper was prepared as a background paper for the Peru Flagship Study for the Annual Meetings 2015 Peru. Building on Success: Boosting Productivity for Faster Growth. The authors would like to thank Norman Loayza, Ekaterina Vostoknutova and Javier Roca for helpful discussions. We also thank Aldo Bortoluzzi for his invaluable help with the customs data and Reyes Aterido, Trang Tran and Cinthya López for help with other data. We are grateful for the support of the IFC and the Governments of UK, US and Canada through the Investment Climate Impact Program. Research for this paper has in part been supported by the World Bank’s Multidonor Trust Fund for Trade and Development and the Strategic Research Program on Economic Development. The findings expressed in this paper are those of the authors and do not necessarily represent the views of the institutions they are affiliated with.

REFERENCES

Aghion, P., & Howitt, P. (1998). Endogenous growth theory. Cambridge, MA: MIT Press.
Amiti, M., & Konings, J. (2007). Trade liberalization, intermediate inputs, and productivity: Evidence from Indonesia. The American Economic Review, 97(5), 1611–1638.
Arkolakis, C., Costinot, A., & Rodríguez-Clare, A. (2012). New trade models, same old gains? The American Economic Review, 102(1), 94–130.
Baldwin, R., & Lopez-Gonzalez, J. (2015). Supply-chain trade: A portrait of global patterns and several testable hypotheses. The World Economy, 38(11), 1682–1721.
Bas, M. (2012). Input-trade liberalization and firm export decisions: Evidence from Argentina. Journal of Development Economics, 97(2), 481–493.
Bas, M., & Strauss-Kahn, V. (2014). Does importing more inputs raise exports? Firm level evidence from France. Review of World Economics, 150(2), 241–275.
Bas, M., & Strauss-Kahn, V. (2015). Input-trade liberalization, export prices and quality upgrading. Journal of International Economics, 95(2), 250–262.
Bernard, A., Eaton, J., Jensen, J., & Kortum, S. (2003). Plants and productivity in international trade. The American Economic Review, 93(4), 1268–1290.
Bernard, A., & Jensen, J. (1999). Exceptional export performance: Cause, effect, or both? Journal of International Economics, 47(1), 1–25.
Castellani, D., Serti, F., & Tomasi, C. (2010). Firms in international trade: Importers’ and exporters’ heterogeneity in Italian manufacturing industry. The World Economy, 33(3), 424–457.
Cebeci, T. (2012). A concordance among harmonized system 1996, 2002 and 2007 classifications (World Bank mimeo). Retrieved from World Bank website: http://econ.worldbank.org/exporter-dynamics-database
Cebeci, T., Fernandes, A., Freund, C., & Pierola, M. (2012). Exporter dynamics database (World Bank Policy Research Working Paper No. 6229). Retrieved from The World Bank website: http://documents.worldbank.org/curated/en/285981468149080997/Exporter-dynamics-database
Chevassus-Lozza, E., Gaigne, C., & Mener, L. (2013). Does input trade liberalization boost downstream firms’ exports? Theory and evidence. Journal of International Economics, 90(2), 391–402.
Coe, D., Helpman, E., & Hoffmaister, A. (1997). North-south R&D spillovers. Economic Journal, 107(440), 134–49.
Ethier, W. (1982). National and international returns to scale in the modern theory of international trade. The American Economic Review, 72(3), 389–405.
Feng, L., Li, Z., & Swenson, D. (2016). The connection between imported intermediate inputs and exports: Evidence from Chinese firms. Journal of International Economics, 101, 86–101.
Fernandes, A., Freund, C., & Pierola, M. (2016). Exporter behavior, country size and stage of development: Evidence from the exporter dynamics database. *Journal of Development Economics, 119*, 121–137.

Fernandes, A., & Lopez, R. (2015). Imported technology and firm exporting: The case of Chile. Chapter 17. In O. Morrissey, R. Lopez & K. Sharma (Eds.), *Handbook on trade and development* (pp. 329–350). Cheltenham: Edward Elgar Publishing.

Goldberg, P., Khandelwal, A., Pavcnik, N., & Topalova, P. (2010). Imported intermediate inputs and domestic product growth: Evidence from India. *Quarterly Journal of Economics, 125*(4), 1727–1767.

Grossman, G., & Helpman, E. (1991). *Innovation and growth in the world economy*. Cambridge, MA: MIT Press.

Hallak, J. (2006). Product quality and the direction of trade. *Journal of International Economics, 68*(1), 238–265.

Halpern, L., Koren, M., & Szeidl, A. (2015). Imported inputs and productivity. *The American Economic Review, 105*(12), 3660–3703.

Iacovone, L., & Thu Tran, T. (2015). Firm-level convergence of productivity in Peru. Background paper prepared for World Bank report Peru. Building on Success: Boosting Productivity for Faster Growth. Unpublished mimeo.

Javorcik, B., & Iacovone, L. (2012). Getting ready: Preparation for exporting. CEPR Discussion Paper No. 8926.

Johnson, R., & Noguera, G. (2012). Accounting for intermediates: Production sharing and trade in value added. *Journal of International Economics, 86*(2), 224–236.

Kasahara, H., & Lapham, B. (2013). Productivity and the decision to import and export: Theory and evidence. *Journal of International Economics, 89*(2), 297–316.

Kasahara, H., & Rodrigue, J. (2008). Does the use of imported intermediates increase productivity? Plant-level evidence. *Journal of Development Economics, 87*(1), 106–118.

Keller, W. (2005). International technology diffusion. *Journal of Economic Literature, 42*(3), 752–782.

Koopman, R., Whang, Z., & Wei, S.-J. (2014). Tracing value-added and double counting in gross exports. *The American Economic Review, 104*(2), 459–494.

Kugler, M., & Verhoogen, E. (2012). Prices, plant size, and product quality. *Review of Economic Studies, 79*(1), 307–339.

Levinsohn, J., & Petrin, A. (2003). Estimating production functions using inputs to control for unobservables. *Review of Economic Studies, 70*(2), 317–341.

Lo Turco, A., & Maggioni, D. (2013). On the role of imports in enhancing manufacturing exports. *The World Economy, 36*(1), 93–120.

Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica, 71*(6), 1695–1725.

Olley, S., & Pakes, A. (1996). The dynamics of productivity in the telecommunications equipment industry. *Econometrica, 64*(6), 1263–1297.

Pierola Castro, M. D., Fernandes, A. M., & Farolec, T. (2015). The role of imports for exporter performance in Peru (World Bank Policy Research Working Paper No 7492). Retrieved from The World Bank website: http://documents.worldbank.org/curated/en/315231468197968602/The-role-of-imports-for-exporter-performance-in-Peru

Romer, P. M. (1987). Growth based on increasing returns due to specialization. *American Economic Review, 77*(2), 56–62.

Romer, P. (1990). Endogenous technological change. *Journal of Political Economy, 98*(5), 71–102.

Speareot, A. (2013). Variable demand elasticities and tariff liberalization. *Journal of International Economics, 89*(1), 26–41.

UNCTAD (2013). *Global Value Chains and Development: Investment and Value Added Trade in the Global Economy*. Geneva: UNCTAD.

United Nations (2011). *Revision of the Classification by Broad Economic Categories (BEC)*.

Verhoogen, E. (2008). Trade, quality upgrading and wage inequality in the Mexican manufacturing sector. *Quarterly Journal of Economics, 123*(2), 489–530.

---

**How to cite this article:** Pierola MD, Fernandes AM, Farole T. The role of imports for exporter performance in Peru. *World Econ*. 2018;41:550–572. [https://doi.org/10.1111/twec.12524](https://doi.org/10.1111/twec.12524)
APPENDIX A

FOREIGN VALUE ADDED SHARE IN GROSS EXPORTS

![Intermediate Value Added as Share of Gross Exports](wileyonlinelibrary.com)

**FIGURE A1** Upstream and downstream intermediate value added as a share of gross exports

*Source:* Authors’ calculations based on data from UNCTAD Eora data set. [Colour figure can be viewed at wileyonlinelibrary.com]

APPENDIX B

EXPORT AND IMPORT CUSTOMS DATA DETAILS

The raw exporter-level and importer-level customs data for Peru were subjected to uniform reformatting and to a series of cleaning procedures detailed in Cebeci, Fernandes, Freund, and Pierola (2012). The starting point is Peru’s raw export and import daily transactions data that are aggregated to the annual level so as to measure total exports or total imports of a given product-country for a given firm over an entire year. Exporting and importing firms are identified by their actual names (and their tax identification numbers in some years) which allows us to create a panel of exporting and importing firms and to actually identify the exporting firms that are also importing firms. Regarding product nomenclatures, we use a time-consistent “consolidated” Harmonized System (HS) classification at the 6-digit level that concords and harmonises product codes across the HS 1996, 2002, 2007 and 2012 versions that are used in the different years of the 2000–12 sample period for Peru (Cebeci, 2012). Export values are Freight on Board (FOB) figures, and import values are cost, insurance and freight (CIF) measured in US dollars converted from local currency using the corresponding official exchange rates from the IMF’s *International Financial Statistics.* To focus on true entrepreneurial ventures in export markets, we drop from the sample firms whose total annual export values are lower than US$10,000. Further details are provided in the Appendix to the working paper Pierola et al. (2015).

The two specific sectors used in the analysis are defined by the HS products listed in the table below. An exporting firm is defined to be part of the agribusiness sector or part of the apparel sector if and only if the firm is an intensive exporter of the sector, that is, if the firm’s exports of products from that sector account for 50% or more of the firm’s total exports in a given year.
**FIGURE A2** Portfolios of sourcing and destination markets for exporter–importers in Peru. Panel (a). Portfolio of sourcing markets. Panel (b). Portfolio of destination markets [Colour figure can be viewed at wileyonlinelibrary.com]

**TABLE A1** Definition of sectors

| Sector       | Description                                                                 |
|--------------|----------------------------------------------------------------------------|
| Agribusiness | Grapes, Asparagus (fresh and frozen), Avocados, Coffee, Cacao, Quinoa, Mangos, Bananas, Paprika, Tangerines and Mandarins (HS 080610, 080440, 070920, 071080, 090111, 180100, 100850, 100890, 080450, 080310, 080300, 080390, 090421, 090420, 090422, 080520) |
| Apparel      | Chapters 60–63 of HS classification                                         |
The summary statistics for the variables used for the premia regressions in Tables 2 and 3 are shown above. Note that the number of observations included in the regressions is actually smaller than that shown here due to the fact that the STATA command used for the regressions *reghdfe* now dropping singletons (firms present in the sample in a single year) from the number of observations.

### TABLE A2 Summary statistics for key dependent and independent variables from customs data for all firms

| Variable                                      | Obs   | Mean | SD   | Min   | Max   |
|-----------------------------------------------|------|------|------|-------|-------|
| Dummy for exporter-importers                  | 53,881 | 0.42 | 0.49 | 0.00  | 1.00  |
| Log (import value +1)                         | 53,881 | 5.14 | 6.34 | 0.00  | 20.41 |
| Log (Export value)                            | 53,881 | 12.08| 2.06 | 9.21  | 22.06 |
| Export growth                                 | 33,663 | 0.10 | 0.98 | −6.53 | 9.59  |
| No. of destinations                            | 53,881 | 3.33 | 4.76 | 1.00  | 77.00 |
| Avg. rel. unit values of exports              | 53,881 | 1.15 | 2.78 | 0.00  | 213.57|
| Log No. imported products                     | 53,881 | 0.96 | 1.52 | 0.00  | 6.60  |
| Log No. imported varieties (Product-country)  | 53,881 | 1.07 | 1.69 | 0.00  | 7.93  |
| Dummy for share of imports from high income > 50% | 53,881 | 0.27 | 0.45 | 0.00  | 1.00  |
**TABLE A3** Baseline export performance premia for exporter–importers including switchers to exporter only

|                      | Log (export value) | Export growth | No. of destinat. | Avg. relative unit values of exports | Log (export value) | Export growth | No. of destinat. | Avg. relative unit values of exports |
|----------------------|--------------------|---------------|-----------------|--------------------------------------|--------------------|---------------|-----------------|--------------------------------------|
|                      | (1)               | (2)           | (3)             | (4)                                  | (5)               | (6)           | (7)             | (8)                                  |
| **All**              |                   |               |                 |                                      |                    |               |                 |                                      |
| Dummy for exporter–importers | 0.440***         | 0.157***      | 0.721***        | 0.164***                             | 0.0539***         | 0.0216***     | 0.0975***       | 0.0210***                            |
|                      | (0.020)           | (0.024)       | (0.055)         | (0.020)                              | (0.002)           | (0.002)       | (0.006)         | (0.002)                              |
| Log (import value +1)|                   |               |                 |                                      |                    |               |                 |                                      |
| Observations         | 47,296            | 30,990        | 47,296          | 47,296                               | 47,296            | 30,990        | 47,296          | 47,296                               |
| $R^2$                | .849              | .192          | .846            | .769                                 | .851              | .193          | .847            | .770                                 |
| **Agribusiness**     |                   |               |                 |                                      |                    |               |                 |                                      |
| Dummy for exporter–importers | 0.492***         | 0.05          | 0.809***        | 0.152***                             | 0.0527***         | 0.00          | 0.110***        | 0.0190***                            |
|                      | (0.056)           | (0.059)       | (0.156)         | (0.031)                              | (0.005)           | (0.006)       | (0.017)         | (0.003)                              |
| Log (import value +1)|                   |               |                 |                                      |                    |               |                 |                                      |
| Observations         | 3,779             | 2,653         | 3,779           | 3,779                                | 3,779             | 2,653         | 3,779           | 3,779                                |
| $R^2$                | .808              | .280          | .797            | .772                                 | .809              | .280          | .799            | .774                                 |
| **Apparel**          |                   |               |                 |                                      |                    |               |                 |                                      |
| Dummy for exporter–importers | 0.500***         | 0.201***      | 0.930***        | 0.298***                             | 0.0655***         | 0.0263***     | 0.125***        | 0.0420***                            |
|                      | (0.052)           | (0.059)       | (0.126)         | (0.053)                              | (0.006)           | (0.006)       | (0.016)         | (0.006)                              |
| Log (import value +1)|                   |               |                 |                                      |                    |               |                 |                                      |
| Observations         | 9,241             | 5,812         | 9,241           | 9,241                                | 9,241             | 5,812         | 9,241           | 9,241                                |
| $R^2$                | .831              | .250          | .818            | .788                                 | .833              | .252          | .820            | .790                                 |

**Notes:** Robust standard errors in parentheses. Year and firm fixed effects are included in all specifications. ***, ** and * indicate significance at 1%, 5% and 10% confidence levels, respectively.
|                  | Log (export value) | No. of destinat. | Avg. Rel. unit values of exports | Log (export value) | No. of destinat. | Avg. Rel. unit values of exports | Log (export value) | No. of destinat. | Avg. Rel. unit values of exports |
|------------------|-------------------|-----------------|---------------------------------|-------------------|-----------------|---------------------------------|-------------------|-----------------|---------------------------------|
| **All**          |                   |                 |                                 |                   |                 |                                 |                   |                 |                                 |
| Log no. imported products | 0.270***          | 0.593***        | 0.108***                        |                   |                 |                                 |                   |                 |                                 |
|                  | (0.012)           | (0.035)         | (0.018)                         |                   |                 |                                 |                   |                 |                                 |
| Log no. imported varieties (product-country) |                   |                 | 0.265***                        | 0.598***          | 0.110***        | (0.011)                         | (0.033)           | (0.015)         |                                 |
| Dummy for share of imports from high income > 50% |                   |                 |                                 | 0.259***          | 0.371***        | 0.0814***                      | (0.018)           | (0.053)         | (0.030)                         |
| Observations    | 47,296            | 47,296          | 47,296                          | 47,296            | 47,296          | 47,296                          | 47,296            | 47,296          | 47,296                          |
| \( R^2 \)       | .850              | .847            | .770                            | .851              | .848            | .770                            | .848              | .845            | .769                            |
| **Agribusiness**|                   |                 |                                 |                   |                 |                                 |                   |                 |                                 |
| Log no. imported products | 0.219***          | 0.889***        | 0.150***                        |                   |                 |                                 |                   |                 |                                 |
|                  | (0.033)           | (0.126)         | (0.024)                         |                   |                 |                                 |                   |                 |                                 |
| Log no. imported varieties (product-country) |                   |                 | 0.219***                        | 0.885***          | 0.148***        | (0.031)                         | (0.122)           | (0.023)         |                                 |
| Dummy for share of imports from high income > 50% |                   |                 |                                 | 0.375***          | 0.588***        | 0.126***                       | (0.055)           | (0.195)         | (0.036)                         |
| Observations    | 3,779             | 3,779           | 3,779                           | 3,779             | 3,779           | 3,779                           | 3,779             | 3,779           | 3,779                           |
| \( R^2 \)       | .805              | .801            | .775                            | .805              | .801            | .776                            | .805              | .796            | .771                            |

(Continues)
### Table A4 (Continued)

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Log (export value) | No. of destinat. | Avg. Rel. unit value of exports | Log (export value) | No. of destinat. | Avg. Rel. unit value of exports | Log (export value) | No. of destinat. | Avg. Rel. unit value of exports |
| Apparel | | | | | | | | |
| Log no. imported products | 0.447*** | 0.989*** | 0.314*** |
| (0.033) | (0.115) | (0.043) |
| Log no. imported varieties (product-country) | | | | | | | | |
| 0.436*** | 1.015*** | 0.326*** |
| (0.031) | (0.110) | (0.041) |
| Dummy for share of imports from high income > 50% | | | | | | | | |
| | | | | | | | | |
| Observations | 9,241 | 9,241 | 9,241 | 9,241 | 9,241 | 9,241 | 9,241 | 9,241 | 9,241 |
| $R^2$ | .835 | .824 | .792 | .836 | .825 | .793 | .829 | .815 | .788 |

Notes: Robust standard errors in parentheses. Year and firm fixed effects are included in all specifications. Only exporter–importers are included in all the regressions. ***,** and * indicate significance at 1%, 5% and 10% confidence levels, respectively.
EEA DATA DETAILS

In the EEA data, firm-level real output is measured as total output sold by the firm deflated by a four-digit industry price deflator, real capital is constructed according to the perpetual inventory method and labour productivity is measured as value added reported in the EEA (total production minus costs of intermediate inputs (goods + services)) per employee, all defined as in Iacovone et al. (2015). Summary statistics for all variables from the EEA data used in the analysis are shown in the working paper Pierola et al. (2015). Table A4 shows the results from performance premia regressions estimated based on the EEA data.

| TABLE A5 | Performance premia for importers based on EEA data |
|---|---|---|---|---|---|
| (a) Sample of all manufacturing firms | | | | | |
| | Log (employment) (1) | Log (real output) (2) | Log (capital/employment) (3) | Log (labour productivity) (4) |
| Dummy for importers | 0.829*** | 1.074*** | 0.422*** | 0.164*** |
| | (0.037) | (0.039) | (0.039) | (0.018) |
| Log (capital/employment) | | | | 0.243*** |
| | | | | (0.004) |
| Year fixed effects | Yes | Yes | Yes | Yes |
| Industry (ISIC three-digit) Fixed effects | Yes | Yes | Yes | Yes |
| Observations | 12,076 | 12,533 | 12,018 | 11,645 |
| $R^2$ | .122 | .196 | .194 | .452 |
| (b) Sample of all manufacturing exporting firms | | | | | |
| | Log (employment) (1) | Log (age) (2) | Foreign owned dummy (3) | Log (real output) (4) | Log (capital/employment) (5) | Log (labour productivity) (6) |
| Dummy for exporter-importers | 0.776*** | 0.232*** | 0.058*** | 0.837*** | 0.362*** | 0.086*** |
| | (0.049) | (0.023) | (0.008) | (0.050) | (0.045) | (0.024) |
| Log (capital/employment) | | | | | | 0.308*** |
| | | | | | | (0.007) |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry (ISIC three-digit) Fixed effects | Yes | Yes | Yes | Yes | Yes |
| Observations | 5,884 | 6,071 | 6,071 | 6,045 | 5,869 | 5,667 |
| $R^2$ | .133 | .174 | .132 | .206 | .243 | .482 |

Notes: Robust standard errors in parentheses. Only exporting firms are included in all the regressions in Panel B. ***,** and * indicate significance at 1%, 5% and 10% confidence levels, respectively.
## APPENDIX D

### RESULTS ON CORRELATIONS WITH POLICIES

| TABLE A6 | Tariffs, SPS and TBT measures and imported intermediates |
|-----------|---------------------------------------------------------|
|           | Log (import value) (1) | Import growth (2) | Log (import value) (3) | Log (no. imported) (4) | Log (no. imported) (5) | Log (import value) (6) | Log (no. imported) (7) | Log (no. imported) (8) |
| All       | -3.286*** (0.637)     |                 | 4.072*** (0.690)     |                       |                       |                       |                       |                       |
| Change in applied tariff rate | -4.072*** (0.690) |                 |                       |                       |                       |                       |                       |                       |
| Share of imports under TBT | -2.021*** (0.229) | -1.811*** (0.112) | -1.860*** (0.131) |                       |                       |                       |                       |                       |
| Share of imports under SPS |                       |                       |                       | 2.261*** (0.262) | -2.257*** (0.126) | -2.321*** (0.152) |                       |                       |
| Year fixed effects | Yes | Yes |                       |                       |                       |                       |                       |                       |
| Firm fixed effects | Yes | Yes |                       |                       |                       |                       |                       |                       |
| Main HS 2-digit fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 22,522 | 14,062 | 1,729 | 1,729 | 1,729 | 1,508 | 1,508 | 1,508 | 1,508 | 1,508 | 1,508 | 1,508 | 1,508 | 1,508 | 1,508 |
| $R^2$ | .912 | .303 | .206 | .266 | .237 | .214 | .346 | .310 | .310 | .310 | .310 | .310 | .310 | .310 | .310 |

Notes: Robust standard errors in parentheses. Only exporter–importers are included in all the regressions. ***indicates significance at the 1% confidence level.
| TABLE A7  Advanced customs clearance procedure and imported intermediates |
|-------------|----------------|----------------|----------------|----------------|----------------|
|             | Log (import value) | Import growth (imported products) | Log (no. imported varieties) | Log (import value) |
| All         | (1)              | (2)                        | (3)                      | (4)                      | (5)                      |
| Dummy for advance clearance procedure user | 0.428*** (0.026) | 0.132*** (0.033) | 0.207*** (0.016) | 0.226*** (0.016) | 0.177*** (0.030) |
| Dummy for post-reform period (2010–2012) |                |                            |                          | 0.496*** (0.023) |
| Dummy for advance clearance procedure user* |                |                            |                          | 0.395*** (0.043) |
| Dummy for post-reform period (2010–2012) |                |                            |                          |                     |
| Year fixed effects | Yes | Yes                        | Yes                      | Yes                      | Yes                      |
| Firm fixed effects | Yes | Yes                        | Yes                      | Yes                      | Yes                      |
| Main HS 2-digit Fixed effects | Yes | Yes                        | Yes                      | Yes                      | Yes                      |
| Observations | 22,522 | 14,062 | 22,522 | 22,522 | 22,865 |
| $R^2$ | .913 | .278 | .896 | .908 | .906 |

Notes: Robust standard errors in parentheses. Only exporter–importers are included in all the regressions. ***,** and * indicate significance at 1%, 5% and 10% confidence levels, respectively.