DOI: 10.1111/twec.12653

ORIGINAL ARTICLE

WILEY The World Economy

Microeconomic adjustments during an export boom: Argentina, 2003–11

Facundo Albornoz[1] | **Ezequiel García Lembergman**[2] | **Leticia Juarez**[3]

[1]University of Nottingham and CONICET, Nottingham, UK

[2]UC-Berkeley, Berkeley, CA, USA

[3]University of Michigan, Ann Arbor, MI, USA

1 | INTRODUCTION

Between 2003 and 2011, Argentine exports increased 179%. This is one of the longest periods of sustained export growth for this country (Albornoz, 2013) and is characterised by big changes in the macroeconomic environment, with years of low and high real exchange rates and variations in terms of trade. Explanations of this export boom included—on the one hand—external factors, such as improvements in the terms of trade, increasing regional demand and a (temporarily) competitive exchange rate, and—on the other hand—structural changes in the pattern of trade specialisation.[1] In this paper, we study export dynamics at the firm level during these years. By doing this, we contribute not only to the study of this particular export growth episode, but also, and perhaps more importantly, to the understanding of how export dynamics, and its determinants, vary across different exchange rate regimes.

As has been established in the literature, firm heterogeneity explains different responses to trade policy (e.g., Aghion, Burgess, Redding, & Zilibotti, 2008; Bernard, Jensen, Redding, & Schott, 2007; Mayer & Ottaviano, 2008; Melitz, 2003; Melitz & Redding, 2014). However, changes on other aspects of the economic activity also matter and may generate heterogeneous responses at the firm level. For example, depreciation of the exchange rate can give a competitive price to firms that, despite their limited capacities or low productivity, become exporters. Some of these firms will stop exporting once currency appreciates again. Other firms, in turn, will be able to establish lasting links that resist, at least in part, the challenges of currency appreciation.

To take into account variation in price competitiveness associated with changes in the exchange rate, we have divided our study into two phases. Phase I (2003–08) is characterised by a competitive exchange rate that amplified the commercial opportunities for pre-existing exporters and generated an opportunity for less efficient firms to reach foreign markets for the first time. Some of the new

[1]On the determinants of export performance of Argentina at the product level during the period, see Albornoz, Calvo, Coremberg, Heymann, and Vicondoa (2012), Berrettoni and Polonsky (2011), Bianco (2006), Bianco, Porta, and Vismara (2008), Bugna and Porta (2007), Castagnino (2006), and Herrera and Tavosnanska (2011).

exporters were not ready to operate in global markets and they rapidly failed (e.g., Albornoz, Calvo Pardo, Corcos, & Ornelas, 2012; Albornoz, Fanelli, & Hallak, 2016; Eaton, Eslava, Kugler, & Tybout, 2007). Surviving exporters, by contrast, expanded into new markets (Albornoz, Calvo Pardo, et al., 2012) and introduced new products. To the extent that expansion required sunk costs or/and generated learning opportunities (e.g., De Loecker, 2007), exporters reduced part of their sensitivity to the exchange rate and became more resilient. Phase II (2008–11) is associated with a strong currency appreciation that was thought to cause strong declines in exports; in particular, for manufacturing firms.[2] This was not the case, and export growth continued to be positive during this Phase. Our analysis shows that greater sophistication (serving more market with more products) in international markets explains why exports continued to grow despite currency appreciation.

Furthermore, we find that heterogeneous export responses also changed over the years. Firms expanded in international markets by introducing new products as well as serving new destination markets. In particular, we describe the contribution of the different margins of export growth. That is, whether firms increased exports along the intensive margin (more exports of the same product to the same country) or along the extensive margin (new destination markets and/or new products). Importantly, the importance of the different margins and submargins varied between the two phases of the period. First, we show that 89% of export growth in the aftermath of the 2003 depreciation (Phase I, 2003–08) is explained by the intensive margin of exports. However, subextensive margins became more predominant after 2008, during the Phase II. In this phase, export growth was associated with the expansion of firms to new destinations. This is consistent with highly dynamic export growth even in the presence of exchange appreciation. This result suggests that during the period 2003–11, firms did not only increase sales of the same products in known markets, but they also expanded to new markets and that their export performance became more resistant to changes in exchange rates and disruptions in the economic cycle. This is important as it points at microeconomic adjustments that reflect a greater capacity to operate in diverse markets and with multiple goods, which allow exporters to react successfully to changes in the macroeconomic environment.

Another contribution of our analysis is to identify complementarities between exports and imports. In particular, we provide empirical evidence of a strong complementarity between export success and the use of import varieties during production.[3] On this ground, we find that exporting heavily depends on the possibility of importing. This bears important implications and highlight that taking into account the relationship between these two activities is important to understand the dynamic of the firms in international markets. For example, if a large depreciation causes a

[2]It is curious that since, at least 2007, economic policy discussion has centred on maintaining the real exchange rate, which was difficult to determine amid elusive price indexes. It largely ignored analysis of the independent growth of Argentine exports despite the temporary "gift of competitiveness." Frenkel and Rapetti (2007, 2008), for example, discuss the positive effects of a competitive exchange rate for Argentina's growth during 2002–07, and they suggest the necessity for an economic policy in which the central bank aims to maintain a real exchange rate that is competitive in the medium and long term. It is true that the efforts to maintain a high exchange rate revolved around a key element of implicit development strategy that took form after 2007. In fact, the economic policy made an effort and later failed to fix the nominal exchange rate. Later, when the real currency appreciation became inevitable, the need for foreign currency resuscitated a much older policy: import substitution. While we do not aim to engage in a deep discussion of the determinants of productive strategies and development in Argentina, it is nonetheless interesting to underline how the macroeconomic ups and downs, reflected in the real exchange rate, undermined policies for production and greater international insertion.

[3]This result is consistent with recent literature that examines how importing and exporting are inter-related activities. Bas (2012) shows that importing raises the firm's productivity as well as the probability of exporting the next year. Albornoz and Garcia-Lembergman (2015) show that exporting to a region raises the probability of importing from that region the next year, given that, by exporting, the firm acquires relevant knowledge about the market (i.e., potential suppliers), reducing the costs of entering as an importer.

boost in exports, we should also expect an increase on the amount of imports by these firms. Hence, in contrast to standard models that consider exporting and importing as independent activities, once we take into account export–import complementarities, it is possible to observe an increase in imports after a large real depreciation. Blaum (2017) explores the plausibility of this channel for the case of Mexico and provides evidence that in fact aggregate import shares increase after a large depreciation. Taken together, these results imply that restricting imports may harm the possibility of firms to be able to export and reach more destinations. On this ground, this paper contributes to a recent literature that observes that importing intermediate goods increases productivity, and thus, it increases the probability of export entry to any destination in the future (e.g., Bas, 2012; Bas and Strauss-Kahn, 2011; Kasahara and Lapham 2013).[4]

The contribution of this paper goes beyond the interest for this particular episode of Argentinean exports. Our results on the evolving preponderance of different export margins add to a broader literature that has studied the evolution of export growth in different countries. Eaton et al. (2007) analyse Colombian firms from 1996 to 2005 and find that that the intensive margin of exports account for 50% of export growth. This is consistent with our results in Phase I, in which the currency was relatively depreciated. As in our study, Eaton et al. (2007) also show that Colombian firms reach more destinations as their exports grow. For example, a Colombian firm that successfully penetrated the Latin American market has a higher probability of penetrating the OECD markets. In contrast to these results, Bernard, Jensen, Redding and Schott (2009) study US firms from 1993 to 2003 and find that the extensive margin is attributable to most of the trade growth. Arguably, intensive margin ends up being a more important margin of adjustment in developing countries, such as Argentina or Colombia where entering and surviving is harder. This is consistent with Besedes and Prusa (2008), who find important differences between advanced and developing countries. For developing countries most of trade growth is attributable to the intensive margin and export entry exhibits too low survival rates and subsequent expansion to influence trade growth in the long term. Our results show that this is not always the case and that the relevance of different margins of export growth changes over time according to different macroeconomic conditions.

Furthermore, we find that the relevance of the different export margins varies across periods characterised by different evolution of the exchange rate. Berman, Martin, and Mayer (2012) show that the reactions to real exchange variations are heterogeneous in the case of French exporters. Our results show that different exchange rate regimes imply different responses of the same firms. Thus, exchange rate changes not only affect firms in a heterogeneous way but also firms' responses vary over time.

This paper is organised as follows: Section 2 briefly discusses the evolution of Argentinian exports. Section 3 studies various aspects of the evolution of Argentine export firms, including their characteristics (Section 3.1), their internalisation trajectories (Section 3.2), the margins of export growth (Section 3.3) and the complementarity between exports and imports (Section 3.4). Section 4 concludes.

[4]The link between import activity and export activity is a fundamental factor relatively overlooked by the literature on export dynamics with important policy implications. In identifying a virtuous association between importing and exporting, our work connects to the debate over import substitution as an industrial development strategy. If importing is a key factor in the export success of a firm, policies that restrict imports with the aim of stopping trade imbalances could work against firms' exporting strategies, aggravating the very same problems of commercial declines that the policies had sought to improve.

2 | EVOLUTION OF ARGENTINE EXPORTS, 2003–12

Before studying its microeconomic aspects, it is necessary to trace the trajectory of Argentine exports during the boom. This period ran from 2003 to 2012. While export growth began in 2002, this take-off was fundamentally related to an abrupt and profound currency devaluation. As suggested by Figure 1, the effects of the competitive exchange rate lasted for much of the period studied here, although it languished for several years. Thus, it is important to divide the exposure period into two distinct phases. The first phase (Phase I) begins in 2003 and ends in 2008. During this phase, exports enjoyed from a relatively high competitive real exchange rate. However, high inflation rates gradually appreciated the real exchange rate over that period. As there is no consensus as to when a definitive break in the real exchange rate occurred, we identify 2008 as the end of Phase I. Since then to, at least, 2011 (Phase II), firms faced an export environment characterised by a less favourable real exchange rate.

As is illustrated in Figure 2, Argentine exports clearly experienced significant growth since 2003, increasing 180% between 2003 and 2011 and rising from 30 billion to 84 billion dollars

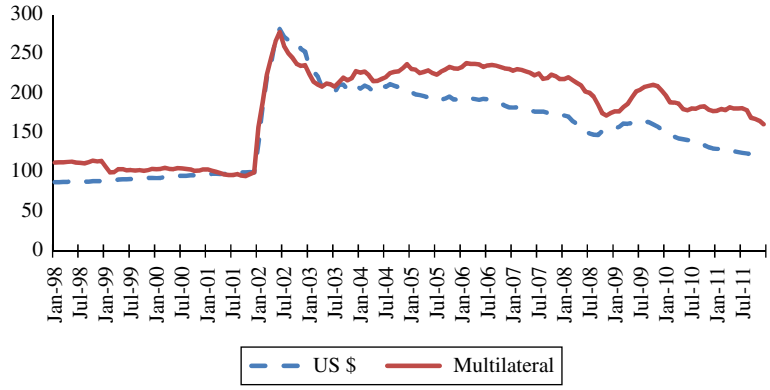

FIGURE 1 Evolution of the real exchange rate (December 2001 = 100)
Source: Illustration by authors using data from BCRA, INDEC and IPC Santa Fe. [Colour figure can be viewed at wileyonlinelibrary.com]

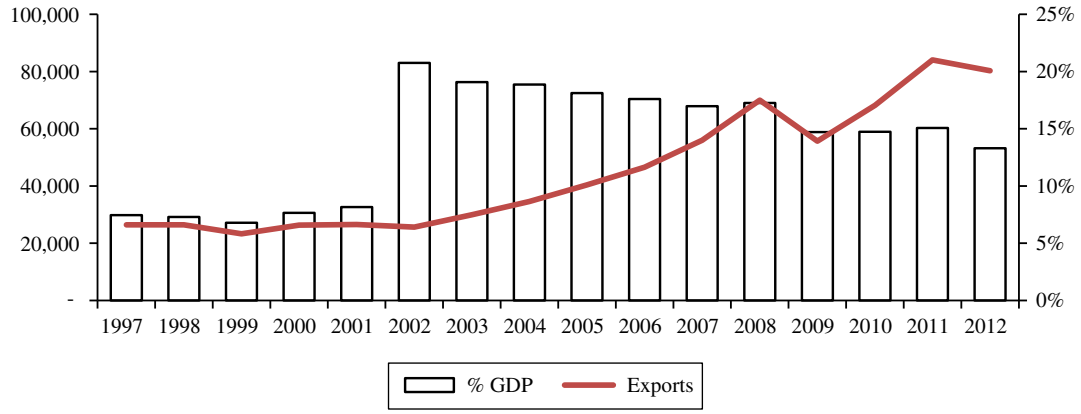

FIGURE 2 Evolution of total exports. Period 1997–2012 (in millions of dollars, current)
Source: Author's illustration based on INDEC data. [Colour figure can be viewed at wileyonlinelibrary.com]

in 2011. Going back in the past, the trajectory of Argentine exports can be broken down into three periods and one episode. First, the value (in dollars) of Argentine exports remained relatively stagnant between 1997 and 2001. Then, in response to the large devaluation in 2002 (which rose 260% in the first 6 months of the year), Argentine exports began their most dynamic period, reaching 133% growth between 2003 and 2008 (at an annual rate of 18.5%). The period between 2008 and 2011 began with a sharp drop in 2009, a setback of 20.5%, which coincided with the rupture created by the global financial crisis at the end of 2008. Finally, Argentine exports rose back to 2008 levels, and in 2010, they continued their expansionary course with about 23% growth.

Figure 2 also displays changes in the export coefficient (ratio of exports to GDP). This indicator experienced an abrupt jump in 2002 due to a decline in GDP, but it steadied in 2003 due to the high growth rate relative to exports. Since then, we observe a slight but gradual decline that set the weight of exports over GDP at a value close to 15%, considerably higher than its values at the end of the 1990s. This suggests that the international insertion of Argentine products was strengthened by the devaluation (Phase I) and maintained relatively high levels despite the appreciation of the real exchange rate during Phase II.[5]

Beyond the remarkable growth in exports and its greater weight in the GDP, it is important to note that this rise coincided with equally strong growth in international trade. As shown by Figure 3, the contribution of Argentine exports to international trade fell from 1995 to 2003 and partially recovered in 2007, staying within a band with a minimum of 0.4 percentage points (between 2002 and 2007) and maximum of around 0.5 percentage points.[6] That is to say, the export boom, beyond its local impact and its importance in terms of the productive activity, has not altered the marginal role Argentina plays in international markets.[7]

A main question is whether the described surge in exports modified the patterns of trade and resulted in a more sophisticated export basket. Different papers have documented that the export basket has not changed significantly at the aggregate level. More specifically, Argentine exports

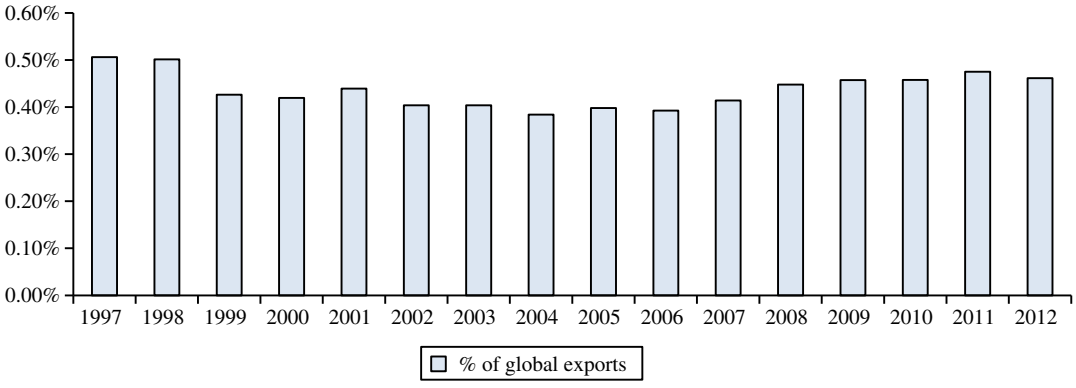

FIGURE 3 Participation of Argentine exports in global exports

Source: Author's illustration based on COMTRADE, UN. [Colour figure can be viewed at wileyonlinelibrary.com]

[5]On this point, see Albornoz, Calvo et al. (2012).

[6]Bianco et al. (2008) underline this fact for the years between 2002 and 2006.

[7]In fact, they maintained levels that were close to those at the end of the 1990s. Bouzas and Pagnotta (2003) show that the highest jump in the share of Argentine exports in the world was between 1992 and 1998, when it rose from 0.25% to 0.50%.

maintained a profile with a preponderance of primary commodities, agricultural manufacturing, industrial commodities and a group of high value-added products (chemicals and metalworking) primarily imported by countries in the region. In Albornoz, García-Lembergman, and Juarez (2017), we show that this process has not increased the share of products with high technological content or induced relative improvements in export complexity (see also Albornoz, Calvo, et al., 2012; Berrettoni & Polonsky, 2011; Bianco, 2006; Bianco et al., 2008; Bugna & Porta, 2007; Castagnino, 2006; Herrera & Tavosnanska, 2011).

However, in a context where exports increase for most of products and markets, the process of scaling up exports may involve relevant productive transformations at the firm level. Exploring this possibility requires us to study the exports at a firm level. We turn to this question in the following section.

3 | EXPORT DYNAMICS AT THE FIRM LEVEL

We use Argentine Customs data comprising the universe of the country's exports and imports transactions. Our database covers the 1994–2011 period for exporters and the 2003–08 period for importers. It includes annually reported information about the value (in US$) of foreign sales and imports for each firm, distinguished by destination and product.

In this section, we explore the dynamics of exporters more closely. First, we briefly describe their main features and their export trajectories (Sections 3.1 and 3.2). Second, we study the different margins of exports and their change over different phases (Section 3.3). Lastly, we establish the complementarity between exports and imports at the firm level (Section 3.4).

3.1 | Characterisation of exporters

Table 1 displays the number of exporters per year. We can see that, while the value of exports increased over the period, the total number of exporters per year actually decreased from 13,711 in 2003 to 12,838 in 2011. This may suggest that exports were concentrated in less firms. Nevertheless, if we focus on "established firms," which is to say, those that exported for at least two

TABLE 1 Descriptive statistics on exports for the period 2003–11

Year	Number of firms	Number of established firms	Exports (US$)	Number of destinations
2003	13,711	8,896	26,561	1
2004	14,093	9,608	33,532	2
2005	14,764	10,431	38,979	2
2006	15,075	11,037	46,480	2
2007	14,444	11,137	61,407	2
2008	14,170	11,118	74,459	2
2009	13,268	10,550	72,158	2
2010	13,145	10,374	84,300	2
2011	12,838	10,268	100,176	2

Source: Table by author using data from Customs.

consecutive years, we can clearly see that these firms increased in number over the years. While in 2003, there were only 8,896 "established" exporters, in 2011, there were over 10,000. Focusing on the dynamics of established exporters will enable us to set aside firms that exported sporadically or that failed quickly in their intent.[8] The evidence suggests that in the Phase I of the export boom, many firms tried to enter export markets and, upon experiencing little success, quickly exited. A possible explanation of this is that the sudden advantage provided by a high exchange rate raised the marginal expected income of exports, and as a result, firms with less export capability ventured into international markets.

Second, we plot the distribution of firms according to their export value for the years 2003, 2008 and 2011 in Figure 4. Indicative of the boom in exports during the first period of our analysis, the distribution of firms in 2008 is to the right of the distribution in 2003. We do not observe significant differences between the distribution in 2008 and 2011.

Beyond monitoring how many export firms were active at any given time, we are also interested in firms' characteristics. The literature suggests that export firms are distinct from other kinds of firms in a number of ways: they are more productive, use skilled labour and capital in a more intensive manner, pay higher salaries and have a tendency to generate more innovation and to produce with greater quality standards (Bernard et al., 2007; Melitz & Redding, 2014; Redding, 2011). To identify different attributes that distinguish exporters, we exploit available data on employment, exports and imports at the firm level. Specifically, we analyse the year 2008, the last year of Phase I, which allows us to increase the dimensions that we take into account, given the available data. In particular, we are interested in distinguishing firms according to the following dimensions: employment, exports and imports.

We define export intensity in three different ways: (i) amount exported in US$; (ii) number of destination countries reached by the firm and (iii) number of products exported. Panel A of Table 2 suggests following: first, most Argentine firms do not export (74%); second, the median export firm (typical, from now on) exported nearly 75,000 dollars and employed twice the number of formal employees than the typical non-export firm; and third, we find that in 2008, export firms

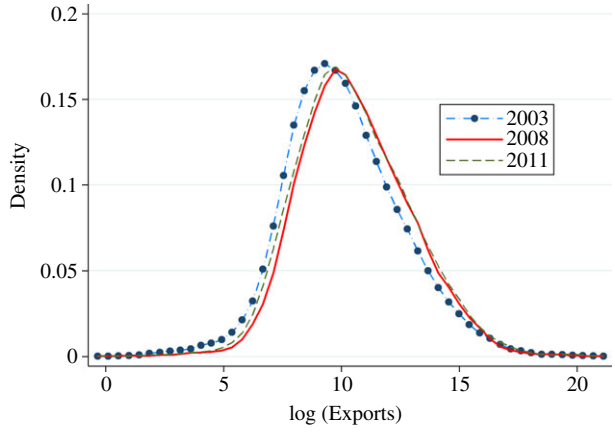

FIGURE 4 Firm distribution of exports: 2003, 2008 and 2001 [Colour figure can be viewed at wileyonlinelibrary.com]

[8]Eaton et al. (2007) show that a large segment of new exporters stopped exporting the following year. Albornoz et al. (2016) provide the evidence of export survival of Argentinean firms.

TABLE 2 Characterisation of export firms (year 2008)

		Expo	Workers		Imports	
	No. firms	US$ Median	*N* Median	Growth (%) Median	US$ Median	Variety Median
Panel A: exporter status						
Does not export	40,556	0	12	33	0	0
Does export	14,170	74,459	24	43	7,102	2
Panel B: amount exported						
Small	4,723	8,874	13	43	1,220	1
Medium	4,724	74,459	19	44	1,555	2
Large	4,723	1,104,161	58	41	4,799	4
Panel C: destination intensity						
Low	6,171	18,604	15	39	0	0
Medium	3,902	74,758	21	42	8,215	1
High	4,097	818,538	53	43	82,012	6
Panel D: product intensity						
One product	4,706	26,452	15	40	0	1
Multiple products	9,464	125,190	29	44	26,885	3

Source: Table by author using data from Customs.

were more dynamic, raising their number of employees by 43% during the 2003–08 period, while the typical non-exporter only did so by 33%.

These differences between exporters and non-exporters are amplified by export intensity. In panels B, C and D, we propose different forms of capturing export intensity. When we examine the largest firms in terms of export value (Panel B), firms that ship to the greatest number of destinations (Panel C) or firms that export more products (Panel D), we find that both employment and employment growth are positively associated with export intensity. As we have already mentioned, the size effect of exporting firms is not only found in Argentina and has been documented in many other countries (Bernard et al., 2007). Nevertheless, the finding that exports have been more dynamic in terms of employment is interesting, as it suggests that firms that have increased their presence in international markets have demanded more work than those that have less participation in foreign markets.

The final column in Panel A of Table 2 illustrates firms' import behaviour in relation to their export behaviour. We can observe that exporters also stand out in their use of imports of capital and intermediate goods. Unlike the typical non-export firm, which does not import, the typical exporter imports by values up to 7,100 dollars and typically require two varieties of inputs.[9] As firms have higher export intensity (Panels B, C and D), they spend more in imported inputs and import from more sources. These observations suggest that there are complementarities between exporting and importing. In Section 3.4, we will examine the underlying dynamics of this finding to understand the relationship between imports and exports.

[9]We define variations as a combination of product and country of origin, with the product classified according to HS6 (see, e.g., Broda and Weinstein, 2006).

3.2 | Internationalisation of export firms

We will now examine the extent to which Argentine firms grew by exporting new or old products destined to new or known (Section 3.2.1) markets, the effect on the concentration of exports (Section 3.2.2) and the initial characteristics of firms associated with greater intensity in export growth (Section 3.2.3). This analysis permits us to verify (at least partially) the existence of microeconomic adjustment that are difficult to observe at greater aggregation.

3.2.1 | Strategies of internationalisation

First, we analyse the number of firms that increased their product range and destination dimension. Table 3 shows the number of firms in each period, categorised by whether they had just begun entering the export market (entering), those that had experience exporting and continued their export activity (continuing) and those that exported at the beginning of the period but stopped exporting by 2011 (outgoing). Observe that the percentage of firms that began to export during Phase I is considerably greater than those that began during Phase II. This concurs with the finding in the previous section in which we argued that expectations of potential export growth generated incentives for firms to enter the international market. Consistent with this interpretation, we can also observe that the number of outgoing firms is greater during the first phase. As for firms that continued their export activity, there is evidence that there were a greater percentage of firms experiencing growth during the first period as compared to the second period. That is, of the firms that exported during each phase, those that were active in the first phase experienced more growth than those that were active in the second phase.

Another interesting exercise to understand firms' evolution during the period consists in identifying the percentage of total firms that increased the number of destinations or the percentage of firms that introduced new products. Table 4 presents these data. The first two columns represent the firms that exported in both 2003 and 2008. Data corresponding to new firms are reported in the third column. During Phase I, 36% of firms reached a new market and around 34% of firms were able to introduce a new product to their export basket. For Phase II, these values are 40% and 44%, respectively. This suggests that, during the export boom, more firms were able to diversify both by reaching new destinations and by diversifying the products that they offered, and thus, they became more resistant to changes in the macroeconomic cycle. During Phase I of the boom, a greater number of firms experienced growth, which is consistent with the notion that export growth during that period involved greater quantities of old products in old destinations, while the export growth that occurred in this phase was characterised by a process of microeconomic adjustment

TABLE 3 Evolution of the number of firms per period

	Continuing			
Phase	**Declining**	**Growing**	**Outgoing**	**Entering**
2003–08	1,636	5,345	6,729	7,278
	23%	77%	32%	35%
2008–11	4,095	4,875	5,289	3,867
	46%	54%	29%	21%

Source: Table by author using data from Customs.

TABLE 4 Number of firms that expanded to new destinations or new products

Period	Continuing		New	Total
	New destinations	New products		
2003–08	4,893	5,118	7,278	14,260
	34%	36%		
2008–11	5,121	5,598	3,867	12,838
	40%	44%		

Source: Table by author using data from Customs.

associated with a greater variety of destinations and products. These qualitative differences between both phases highlight an important impulse towards internationalisation among Argentine firms.

3.2.2 | Effects on the concentration of exports

It is clear that during the period studied firms followed different dynamics when it came to their export development. For this reason, it is necessary to verify whether changes at the microeconomic level can be seen in the concentration levels of exports at the aggregate level. To capture this, we use the Herfindahl (HHI) index and examine the share of the 10 firms with the greatest share of total exports (Share).[10] Table 5 illustrates these alternatives, both at the general level and by sector for years 2003, 2008 and 2011. It can be observed that, according to the HHI, the concentration of total exports decreased, although this tendency was specific to several sectors. While the concentration of exports decreased in foods, beverages and tobacco; and fuel, chemicals, rubber and plastics, the concentration of exports grew in the textile, clothing and leather and the metalworking and electrical appliances sectors. The changes are mediated by our decision to examine the contribution of only the top ten exporting firms. According to this indicator, there were no

TABLE 5 Concentration index, by sector

Sector	HHI 2003	HHI 2008	HHI 2011	Share 2003 (%)	Share 2008 (%)	Share 2011 (%)
Total	0.033	0.032	0.029	49	48	49
Food, drink and tobacco	0.086	0.086	0.066	78	75	71
Textiles, clothing and leather	0.043	0.038	0.049	56	49	56
Fuel	0.255	0.163	0.125	90	93	87
Chemicals, leather and plastics	0.022	0.016	0.018	37	33	36
Metalworking and electrical appliances (autos/equipment)	0.014	0.025	0.040	27	36	40

Source: Table by author using data from Customs.

[10]The HHI measures the economic concentration of a market. The higher the index, the more concentrated and less competitive the market. This index takes values between 0 and 1, with 1 being the level of a monopoly.

significant changes at the aggregate level. The top ten firms still account for 50% of total exports. This suggests that, beyond the entry of firms into the export market, which is reflected in the lower HHI, the upper bound remains practically unchanged as the total exports continue to be dominated by the ten firms. There also were no notable changes at the sector level beyond an increased share of the 10 principal exporters in the metalworking and electrical appliances sector.

3.2.3 | Determinants of export growth at the firm level

As we have seen, responses to the boom have been heterogeneous and firms' strategies of expansion have permitted them to reach new destinations and launch new products. It is also important to identify characteristics at the firm level that are associated with export performance. In particular, we want to distinguish between the effect of firm size, as captured by formal employment, and the experience of the firm in international markets, as captured by the initial level of exports and the number of varieties exported. To do this, we estimate the export growth of the firm according to the following linear regression model:

$$varexp_{ipt} = \beta_1 employment_{ip,t-1} + \beta_2 exports_{ip,t-1} + \beta_3 varieties_{ip,t-1} + \gamma_p + \varepsilon_{ip,t}, \quad (1)$$

where $varexp_{ipt}$ represents the variation in the log of exports of the firm i in sector p between the years t and $t-1$. Specifically, t and $t-1$ correspond to the years of the subperiods analysed (2003–11, 2003–08, 2008–11). $employment_{i,t-1}$ is the log of the number of workers in $t-1$. Thus, β_1 accounts for the effect of the size of the firm on export growth. The export experience is estimated by $exports_{ip,t-1}$ (the logarithm of the value of exports at the beginning of the period, $t-1$) and $varieties_{ip,t-1}$ (indicator of the number of varieties exported by the firm in $t-1$). As is common in the literature (e.g., Broda & Weinstein, 2006), a variety is defined as a combination of product and destination. In this way, the model estimate can determine whether the export sophistication is associated with greater sales growth in international markets, or not. Finally, $\varepsilon_{ip,t}$ represents the error term.

Table 6 shows the results of the different estimations of Equation (1). Two regressions are reported (with and without the inclusion of firm employment in $t-1$) for each subperiod: 2003–11, 2003–08 and 2008–11. In all cases, the effects of initial characteristics at the firm level are clear: export growth increases with the size of the firm and is greater the higher the initial level of exports and the quantity of export varieties. The connection between employment and export growth is stronger during the high export growth phase (2003–08). In contrast, initial exports are more strongly associated with export growth during the low phase of the boom. In other words, the larger firms took better advantage of a favourable exchange rate. In the phase in which "price" competitiveness was less relevant, previous experience was of greater importance. On the other hand, the effect of the initial level of varieties appears independent of the cycle.

This section reveals that the process of internationalisation of Argentine companies during the boom of 2003–11 involved multiple strategies and paths of expansion. Beyond export entry, the intensive margin of exports is determined by the initial characteristics of previously existing exporters. Among those characteristics, we underline the importance of firm size and previous exporting experience. This is to say, larger firms with a deeper external insertion at the beginning of the period had the greatest increase in sales in external markets. For this reason, the emergence of new exporters did not imply important changes in the distribution of exports among firms and concentration levels were not significantly altered over the period.

TABLE 6 Variation in exports and specific characteristics of the firms

	Export growth					
Variables	**2003–11**		**2003–08**		**2008–11**	
Employment in $t-1$		0.982***		0.899***		0.487***
		(.071)		(.068)		(.057)
Exports in $t-1$	0.317***	0.153***	0.357***	0.206***	0.493***	0.406***
	(.035)	(.037)	(.033)	(.035)	(.029)	(.031)
Varieties in $t-1$	0.026***	0.015***	0.022***	0.012***	0.017***	0.012***
	(.004)	(.004)	(.003)	(.004)	(.003)	(.003)
Constant	−9.603***	−11.205***	−8.651***	−10.094***	−10.541***	−11.071***
	(.45)	(.47)	(.43)	(.447)	(.407)	(.413)
Fixed effects by sector	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,275	7,024	7,275	7,024	8,682	8,605
R^2	.055	.078	.05	.072	.07	.077

Note: Standard errors in parentheses.
***$p < .01$; **$p < .05$; *$p < .1$.

3.3 | The margins of export growth

To characterise the margins of growth over the period, we now examine contributions along different margins of Argentine export expansion. First, we distinguish between the extensive and intensive margin. The extensive margin includes those firms that entered the international market at some moment during the years considered. The intensive margin includes the export growth of firms that were already exporting when the period began.[11]

Distinguishing again between phases I and II and the whole period, Table 7 reports the contribution of each margin to export growth. For the entire period, 86% is explained by firms that were already exported in 2003. New firms explain the remaining 14%. This suggests that the boom carried through for firms that were already exporters before the period began. This could support the argument that export growth resulted in few changes at the microeconomic level. Nevertheless, concluding our analysis here would be a mistake, as it would discard the potential changes at the firm level that explain this occurrence, which we will demonstrate in the following sections.

For Phase I, total growth was 131%, 89% of which is explained by the intensive margin and 11% by the extensive margin. For Phase II, the intensive (extensive) margin lost (gained) relative shares as it when from explaining 79% (21%) of total growth in exports that was, nonetheless, less than in Phase I (19%). It is possible that the decline in the relative weight of the intensive margin reflects the difficulties imposed by a lower exchange rate. A decelerated intensive margin made export growth depends in large part on the emergence of new export companies and their performance. Given that the quantity of new exporters fell during Phase II, the relative growth of the extensive margin reveals greater average growth among new exporters.

If the value of exports is given an even closer look, the intensive marge can be broken down again into two submargins: the pure intensive margin and the subextensive margin. The pure

[11]The intensive margin takes into account diverse cases at once: firms that were already exporting and that increased the quantity of goods and/or destinations, and those that simply exported more than what they exported before, to an old destination or a new one.

TABLE 7 Export margins

Period	2003–08 (%)	2008–11 (%)	2003–11 (%)
General growth	131	19	175
Continuing	89	79	86
a. Intensive margin	58	9	45
b. New products, old markets	8	21	17
c. Old products, new markets	20	50	18
d. New products, new markets	6	16	9
e. New combination of product–market	19	71	21
f. Stop exporting products or destination	−11	−67	−10
Entering	11	21	14

Source: Table by author using data from Customs.

extensive margin is composed of growth in exports of products that were already exported to known destinations. This is to say, it was growth in exporting "more of the same." The subextensive margin refers to several novelties, among them, new destinations for a product that was already exported, or new products destined to new markets, or new combinations of destinations and products at each firm. Notably, the pure intensive margin explains only 39% of export growth (45% of the 86%) between 2003 and 2011. That is to say, 55% of export growth involved new markets, products or firms. Moreover, continuing firms that reached new markets explain 24% of the boom. The contribution of new export products by these firms is as high as 22%. Finally, new combinations of products and destinations for continuing firms represented 21% of total growth between 2003 and 2011. It is possible to conclude that firms have in fact changed the way they serve international markets. This can also explain why export growth has persisted during times in which the currency appreciated: exports became more sophisticated and were associated with diversified risks and opportunities.

We can observe that one of the differences in terms of the composition of growth can be found in pure intensive margin. In Phase I, these exports represented 58% of the total intensive margin, while, during Phase II, they only made up 9%. On the one hand, it is possible that the effect of currency appreciation generated greater challenges for firms that increased sales with already established commercial relations, resulting in less sales by the possible loss of competitive price imposed by appreciation. On the other hand, the greater part of firm growth during Phase II involved new combinations of products and markets (71%).

In either case, the introduction of new destinations and new products was of heightened importance during Phase II. New destinations for ongoing exporters explain 24% (2003–11), 23% (2003–08) and 52% (2008–11) of total growth. At the same time, new products introduced by ongoing exporters explain 22% (2003–11), 12% (2003–08) and 29% (2008–11) of the same. In particular, we can see evidence of a strong effect in firms that brought old products to new markets (50% of the growth of the ongoing exporters in Phase II, while their relative importance in Phase I was only 20%). This means that geographic expansion dominated as a strategy to expand the export basket, which may reflect a limited capacity in the multiproduct dimension.

3.4 | Complementarity between imports and export performance

In this section, we provide evidence the relationship between export success and the introduction of new import varieties. First, we examine the complementarity between export intensity and

import intensity, and then, we examine the association between import intensity and the persistence of firms in export markets.

3.4.1 | Evolution of exports in relation to the evolution of firms' import behaviour

We now examine the link between exporting and importing in more detail. To do this, we must assess the dynamics of exporting firms and how their performance is related to new varieties of imports.

Since exporting firms tend to be larger, it is of little surprise that (in Section 3.1) we found that the firms that export the most are also spending more on imported products. However, there are other more revealing issues underpinning this correlation between export intensity and imports. If the size of the firm was the only explanation, it would not be clear why the firms that export to more locations are importing more and are also using more varieties of import inputs in their production. One possible explanation is that when a firm seeks to intensify their exports and reach new markets they must improve the quality of their product or lower marginal costs of production. If the necessary inputs to achieve these objects are not locally available, it is reasonable that they would seek out imported options. For example, Bas (2012) finds a positive effect of new imports of intermediate goods on the capacity of firms to enter new export markets. On the other hand, in Albornoz and Garcia-Lembergman (2015), we have argued that exporting allows a firm to acquire relevant information about potential suppliers of inputs abroad. By consequence, exporting to a region can generate new imported inputs from that region in future.

To investigate the existence of complementarity, we rely on difference in different regressions, in which we can compare how the same firm which raised its export intensity during the period behaved in terms of import intensity. This allows us to compare changes in the same firm over two periods of time, purging any explanation related to the firm's features that do not change over time, including initial productivity, initial size, firm's age, among others. More formally, we estimate the following regression:

$$ExpIntensitiy_{it} = \sum_{j=1}^{6} \beta_j ImportVarieties_{it} + \ln(L)_{it} + \gamma_i + \gamma_t + \varepsilon_{it},$$

where i, t denotes firm i in period t and t can be 2003 or 2008. $ExpIntensitiy_{it}$ denotes the three measures of export intensity that we previously defined. To capture non-linearity in the effect, we define six categories for import varieties: 1 variety, from 2 to 4, from 5 to 9, from 10 to 14, from 15 to 19, and 20 or more varieties. We control for firm's employment in period t and include firm and year fixed effects to control for shocks specific to the year and time-invariant characteristics of the firm. As we have two periods, we can interpret the coefficients as the effect of a change in import intensity between 2003 and 2008 on the change in export intensity.

As a first glance, we summarise in Figure 5 the results. All panels reflect the relationship between the rise in import varieties between 2003 and 2008 and the rise in the intensity of exports during those same years. We can observe that for all measures of export intensity, those firms that most increased their import varieties are those that achieved greater growth in export markets. Panel A shows that the firms that did not incorporate new varieties did not reach (on average) new destination markets. By contrast, we can see that there is a positive relationship between new varieties and new destinations. The same pattern can be observed for those firms that increased the

products that they exported (Panel B) and for those firms that increased the amount (Panel C). No matter the measure of export intensity, there is no doubt that the firms that developed a more complex production function increased their import varieties.

While the three previous panels controlled for any characteristic that did not vary over time, it is evident that a great part of the growth, both in import variety and in exports, can be attributed to the growth in the size of the firm between 2003 and 2008. To see the relationship between these two variables in a more precise way and to control for fixed effects by firm and by year, we added a natural logarithm of firm size as a proxy variable to capture changes in firm employment and productivity.[12] Table 8 reports the results. While the effect is attenuated when controlling for employment, the firms that increased their import varieties are, on average, those that most increased their export intensity both in terms of the value of exports and in terms of exporting to more markets or introducing more products into the export market. For example, the firms that raised only one variety during the period had a 13.7% higher probability of reaching a new destination as compared to those that did not increase their import varieties. The firms that increased their import variety by more than 20% are those with greater probability of reaching new destinations, introducing new products, and/or are those that most increased their exports.

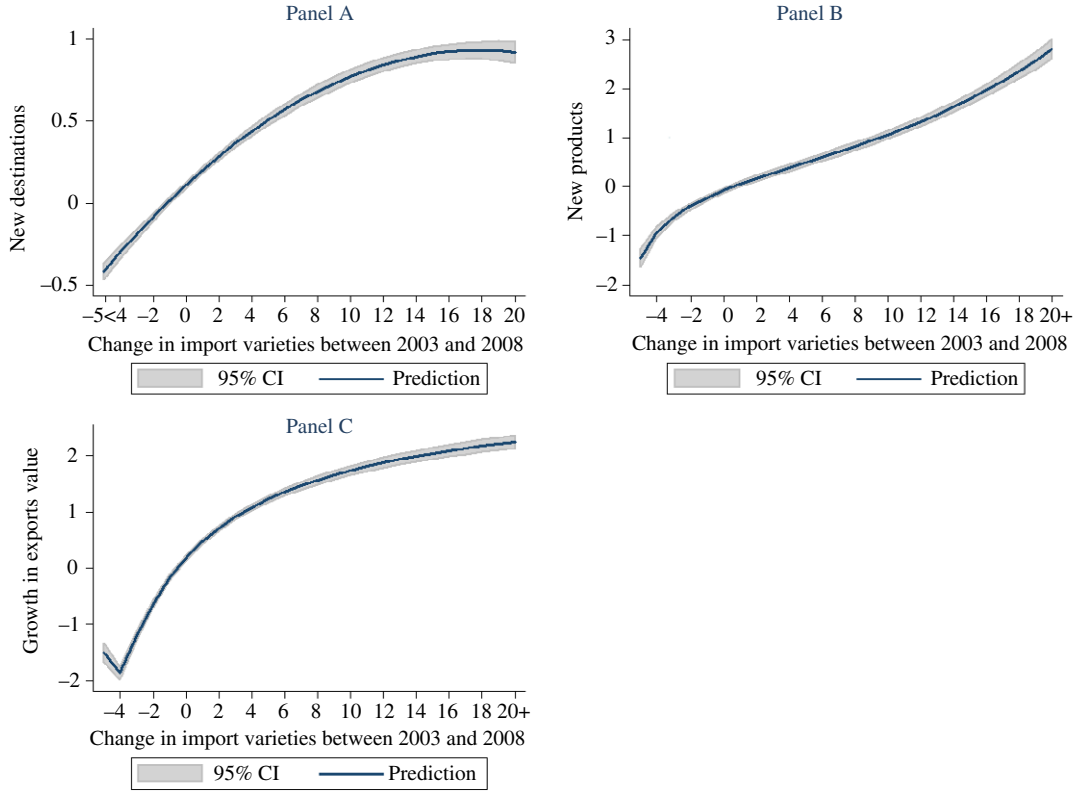

FIGURE 5 Changes in export intensity and changes in imported varieties

Source: Table by author using data from Customs. [Colour figure can be viewed at wileyonlinelibrary.com]

[12]When there are two periods, the regression with fixed effects by firm and year is the same as the regression of variables taking initial differences.

TABLE 8 Export growth dependent on import varieties growth between 2003 and 2008

	(1) Destinations	(2) Exported products	(3) ln(exports)
Import varieties			
1	0.137**	0.273*	0.642***
	(0.062)	(0.150)	(0.127)
2–4	0.196***	0.488***	0.850***
	(0.057)	(0.146)	(0.118)
5–9	0.316***	0.593**	1.030***
	(0.088)	(0.244)	(0.167)
10–14	0.378***	0.810***	1.305***
	(0.122)	(0.303)	(0.208)
15–19	0.537***	1.313***	1.463***
	(0.127)	(0.406)	(0.218)
20+	0.762***	2.483***	1.976***
	(0.122)	(0.515)	(0.216)
ln(employment)	0.476***	0.754***	1.121***
	(0.046)	(0.123)	(0.089)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	60,380	60,380	60,380
R^2	.920	.864	.852

Note: Robust standard errors clustered at the firm level.
***, **, * denote significance to 1%, 5% and 10% levels, respectively.

3.4.2 | Exporter persistence according to export or import intensity

For the strong export growth period 2003–08, we have shown that firms not only grew in their extensive margin and subextensive margin of exports but that their growth was accompanied by a strong rise in imports, both in terms of value and in terms of the number of varieties imported. Thus, since 2008, a significant portion of export firms exhibited a strong integration in international markets. In this section, we examine the characteristics of firms exporting in 2008 that were able to persist in international markets by 2009, when the earnings from a favourable exchange rate were diminishing.

Tables 9 and 10 show how export intensity—in terms of destinations reached—and import intensity—in terms of import varieties—influenced firms' persistence in export markets after 2008. While the first table focuses on all firms that actively exported in 2008, the second table only considers those firms that did not export in 2003 and did export in 2008. That is, the second table allows us to analyse the evolution of those firms that entered the international market as exporters when the exchange rate presented advantages. We will call these exporters "new exporters."

The first stylised fact that emerges from Tables 9 and 10 is that the firms that were globally integrated (importers and exporters) in 2008 had a greater rate of survival during Phase II. This is true for all firms that exported in 2008 and for new firms that emerged from 2003 and 2008.

TABLE 9 Exporter persistence between 2009 and 2011 of exporters in 2008

Exporter persistence (%)	Export intensity						Exporters total	
	Low			High				
Import intensity	0	Low	High	0	Low	High	Imports = 0	Imports > 0
2009	52.5	54.4	56.3	82.9	90.4	93.8	66.2	79.8
2010	44.6	49.3	53.5	74.7	84.9	91.2	58.2	76.4
2011	37.4	43.1	49.3	67.4	80.6	87.2	50.9	72.1
Firms in 2008	3,317	962	1,892	2,718	1,399	3,882	6,035	8,135

Source: Table by author using data from Customs.

TABLE 10 Exporter persistence between 2009 and 2011: Firms that did not export in 2003 and did export in 2008

Exporter persistence (%)	Exporter intensity						Exporters total	
	Low			High				
Importer intensity	0	Low	High	0	Low	High	Imports = 0	Imports > 0
2009	49.6	52.0	54.0	79.0	85.7	87.0	60.5	69.0
2010	41.7	45.2	48.0	68.3	79.0	83.2	51.5	63.4
2011	35.0	40.2	43.5	62.9	73.6	77.1	44.6	58.2
Firms in 2008	2,452	776	1,072	1,433	629	860	3,885	3,337

Source: Table by author using data from Customs.

Second, there is a marked difference between the export persistence of those firms that exported to more than one destination (high intensity) in 2008 and those firms that only exported to one destination (low intensity). For example, looking at Table 9, only 37% of the total non-importing firms that exported to only one destination in 2008 survived to 2011 (column (1)), while 67.4% of those firms that exported in 2008 to more than one destination (column (4)) survived to the same year. Similarly, Table 10 shows that, of the newly active exporters in 2008, only 35% of those that did not import in 2008 and only reached one destination survived to 2011, while the percentage rises to 62.9% for those non-importers that exported to more than one destination.

Third, a firm's import intensity in 2008 also increased its chances of survival in subsequent years, although the effect was less powerful.

Fourth, those firms with high global integration (firms with high export and import intensity) achieved greater stability after 2008. It is interesting that most of the new exporters (Table 9) that integrated as both exporters and importers by 2008 survived the real currency appreciation. Specifically, 77% of the 860 firms that exhibited high export and import intensity in 2008 were still exporting in 2011.

Finally, it is important to underline that the new exporters had a lower survival rate in almost every category. This reflects that the permanence export values in Table 9 are, in general and for all categories, lower than those in Table 10, which considers all of the firms and not only those that emerged during the boom.

4 | CONCLUSION

In this paper, we examined export growth in Argentina between 2003 and 2011 and focused on firm export dynamics. Despite the absence of substantial changes in the country's specialization, we find that exporters increased their sales abroad by intensifying their previous exports in pre-existing markets, but they expanded by reaching new destination markets and incorporating new products into their export baskets. While in the first phase of the boom (2003–08), the intensification of exports was substantial, during the second phase, we find evidence of Argentine exporters expanding their horizons, reaching new destinations and offering new products. This expansion suggests that firms did not only take advantage of a temporary competitive exchange rate to intensify their sales in known markets, but that they were also able to diversify destinations and scope.

We find that the importance of the different export margins changes overtime. While the currency depreciated, the intensive margin explains most of export growth. However, the subextensive and extensive margins become relatively more important when the currency appreciates. At the same time, this work has emphasised the positive impact of imports in exporter success. We document a strong complementarity between imported variety and firm development. We show how firms increasing exports, whether it be by selling more of the same or by expanding to new markets, are those that have increased the quantity of imported varieties used in their productive process.

Our results have implications for the design of development policy. For example, the discussion surrounding economic policy in Argentina that arose after 2007 centred on maintaining artificial high exchange rates. By not correctly identifying changes at the firm level (documented in this work), the "competitive" exchange rate has been considered the key element to development strategy (Frenkel & Rapetti, 2007, 2008), and as a result, economic policies tried, and later failed, to set a nominal exchange rate. We see this experience as an example of how macroeconomic needs subordinate a sound strategy of industrial development. Later, around 2011, when the appreciation of the real exchange rate became inevitable, currency needs revived an old development strategy: import substitution. Without understanding those microeconomic transformations emphasised in this paper, the macroeconomic changes expressed in the real exchange rate imposed restrictive policies that ended up affecting firm opportunities, including their access to imported inputs that were necessary for their success on the international stage (both to expand exports and to continue operating as exporters). Therefore, the restriction of imports, thought to solve growing trade imbalances, can in fact sabotage its own aims by adversely affecting exports, the source of sustainable trade balances.

ORCID


Facundo Albornoz http://orcid.org/0000-0001-8123-0550

REFERENCES

Aghion, P., Burgess, R., Redding, S. J., & Zilibotti, F. (2008). The unequal effects of liberalization: Evidence from dismantling the License Raj in India. *The American Economic Review*, *98*(4), 1397–1412. https://doi.org/10.1257/aer.98.4.1397

Albornoz, F. (2013). *The history of Argentinean exports of manufactures*. University of Nottingham, UK: Mimeo.

Albornoz, F., Calvo, P., Coremberg, A., Heymann, D., & Vicondoa, A. (2012). *Patrones de acumulación, comercio exterior y evolución industrial en la Argentina* (Boletín Informativo Techint N°339), pp. 1–29. Retrieved from: http://boletintechint.com/pages/home.aspx

Albornoz, F., Calvo Pardo, H. F., Corcos, G., & Ornelas, E. (2012). Sequential exporting. *Journal of International Economics*, *88*(1), 17–31. https://doi.org/10.1016/j.jinteco.2012.02.007

Albornoz, F., Fanelli, S., & Hallak, J. C. (2016). Survival in export markets. *Journal of International Economics*, *102*, 262–281. https://doi.org/10.1016/j.jinteco.2016.05.003

Albornoz, F., & Garcia-Lembergman, E. (2015). *Importing after exporting*. University of Nottingham, UK: Mimeo.

Albornoz, F., García-Lembergman, E., & Juarez, L. (2017). *Dimensiones microeconómicas del Crecimiento Exportador: Argentina 2003–2011*. University of Nottingham, UK: Mimeo.

Bas, M. (2012). Input-trade liberalization and firm export decisions: Evidence from Argentina. *Journal of Development Economics*, *97*(2), 481–493. https://doi.org/10.1016/j.jdeveco.2011.05.010

Berman, N., Martin, P., & Mayer, T. (2012). How do different exporters react to exchange rate changes? *The Quarterly Journal of Economics*, *127*(1), 437–492. https://doi.org/10.1093/qje/qjr057

Bernard, A. B., Jensen, J. B., Redding, S. J., & Schott, P. K. (2007). Firms in international trade. *Journal of Economic Perspectives*, *21*(3), 105–130. https://doi.org/10.1257/jep.21.3.105

Bernard, A. B., Jensen, J. B., Redding, S. J., & Schott, P. K. (2009). The margins of US trade. *American Economic Review*, *9*(2), 487–493. https://doi.org/10.1257/aer.99.2.487

Berrettoni, D., & Polonsky, M. (2011). Evolución del comercio exterior argentino en la última década: Origen, destino y composición. *Revista del CEI. Comercio Exterior e Integración*, *19*, 81–99.

Besedeš, T., & Prusa, T. J. (2011). The role of extensive and intensive margins and export growth. *Journal of Development Economics*, *96*(2), 371–379. https://doi.org/10.1016/j.jdeveco.2010.08.013

Bianco, C. (2006). *Metodologías de estimación del contenido tecnológico de las mercancías: su pertinencia para la medición de la internacionalización de la tecnología* (Documento de Trabajo N°29, Centro Redes). Retrieved from: http://www.centroredes.org.ar/

Bianco, C., Porta, F., & Vismara, F. (2008). Evolución reciente de la balanza comercial argentina. El desplazamiento de la restricción externa. In B. Kosacoff (Ed.), *Crisis, recuperación y nuevos dilemas. La economía argentina 2002–2007* (pp. 107–148). Buenos Aires, Argentina: CEPAL.

Blaum, J. (2017). Importing, exporting and aggregate productivity in large devaluations. Unpublished Manuscript, Brown University.

Bouzas, R., & Pagnotta, E. (2003). *Dilemas de la política comercial externa argentina*. Buenos Aires, Argentina: Siglo XXI.

Broda, C., & Weinstein, D. E. (2006). Globalization and the gains from variety. *The Quarterly Journal of Economics*, *121*(2), 541–585. https://doi.org/10.1162/qjec.2006.121.2.541

Bugna, C. F., & Porta, F. (2007). *III. El crecimiento reciente de la industria argentina. Nuevo régimen sin cambio estructural*. Crisis, recuperación y nuevos dilemas. La economía argentina 2002–2007, 63. Retrieved from: https://repositorio.cepal.org/bitstream/handle/11362/4234/S2007021_es.pdf

Castagnino, T. (2006). Contenido tecnológico y diferenciación de producto en las exportaciones Argentinas. *Revista del CEI. Comercio Exterior e Integración*, *5*, 102–122.

De Loecker, J. (2007). Do exports generate higher productivity? Evidence from Slovenia. *Journal of International Economics*, *73*(1), 69–98. https://doi.org/10.1016/j.jinteco.2007.03.003

Eaton, J., Eslava, M., Kugler, M., & Tybout, J. (2007). *Export dynamics in Colombia: Firm-level evidence* (NBER Working Paper w13531). National Bureau of Economic Research. Retrieved from: http://www.nber.org/papers/w13531

Frenkel, R., & Rapetti, M. (2007). *Argentina's monetary and exchange rate policies after the convertibility regime collapse*. Washington, DC: Center for Economic and Policy Research.

Frenkel, R., & Rapetti, M. (2008). Five years of competitive and stable real exchange rate in Argentina, 2002–2007. *International Review of Applied Economics*, *22*(2), 215–226. https://doi.org/10.1080/02692170701880734

Herrera, G., & Tavosnanska, A. (2011). *La industria argentina a comienzos del siglo XXI* (pp. 103–122, Revista CEPAL N°104). Retrieved from: https://www.cepal.org/es/publicaciones/tipo/revista-cepal

Kasahara, H., & Lapham, B. (2013). Productivity and the decision to import and export: Theory and evidence. *Journal of International Economics*, *89*(2), 297–316. https://doi.org/10.1016/j.jinteco.2012.08.005

Mayer, T., & Ottaviano, G. I. (2008). The happy few: The internationalisation of european firms. *Intereconomics*, *43*(3), 135–148. https://doi.org/10.1007/s10272-008-0247-x

Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, *71*(6), 1695–1725. https://doi.org/10.1111/1468-0262.00467

Melitz, M. J., & Redding, S. J. (2014). Heterogeneous firms and trade. *Handbook of International Economics, 4*, 1–54. Elsevier.

Redding, S. J. (2011). Theories of heterogeneous firms and trade. *Annual Review of Economics*, *3*(1), 77–105. https://doi.org/10.1146/annurev-economics-111809-125118

How to cite this article: Albornoz F, García Lembergman E, Juarez L. Microeconomic adjustments during an export boom: Argentina, 2003–11. *World Econ*. 2018;41:2129–2148. https://doi.org/10.1111/twec.12653