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Within-firm spillovers of export promotion agencies

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Abstract

When export promotion agencies target specific products, they can crowd-out exports of other products, if firms focus on exporting the products for which they receive assistance, or foster them, if firms leverage the know-how and contacts acquired from the program. Thus, the net effect on total exports and export composition is theoretically ambiguous. We estimate the effects of Sierra Exportadora, one of Peru's flagship export promotion agencies, on its beneficiaries' exports of non-sponsored products. Using a comprehensive dataset of exporters we show that beneficiary firms exports of non-sponsored products increased by 20%, roughly as much as exports of sponsored products. We show that a large fraction of this change is due to changes in the extensive margins, suggesting that beneficiary firms leveraged contacts and know-how acquired from the program to export new non-sponsored products. We find that the effects are larger for firms with more pre-program experience exporting and higher pre-treatment exports.

JEL codes: F13, F14, L25, O24

Keywords: Export promotion, within-firm spillovers, trade policy

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1 Introduction

Developing countries have small and volatile markets, so exporting is key for firms to grow steadily. Small and inexperienced firms face greater limitations to becoming successful in international markets (Bernard and Jensen, 1999, 2004), mainly because of information-related impediments (Kneller and Pisu, 2007) and fixed costs, which are estimated around half a million dollars for a single firm in Latin America (Das, Roberts, and Tybout, 2007; Morales, Sheu, and Zahler, 2011). To ameliorate this problem, most developing countries conduct export promotion programs that aim at reducing transaction costs, fostering trade (Lederman, Olarreaga, and Payton, 2006). These programs are associated with increased exports, primarily along the extensive margin, both in terms of markets and products (Volpe Martincus and Carballo, 2008).

When export promotion agencies target specific specific products, they can crowd-out exports of other products, if their beneficiary firms focus on exporting the products for which they receive assistance, or foster them, if their beneficiary firms leverage the know-how and contacts acquired from the program. The net effect is ambiguous, and it must be taken into account when estimating program effectiveness. While most of the literature estimates the effects of export promotion programs on exports, no study to our knowledge analyzes program effects on their beneficiary firms' exports of non-sponsored products. To fill this gap, we estimate the impact of Peru's "Sierra Exportadora" (SIEX) export promotion program on their beneficiaries export outcomes. SIEX assists small and medium enterprises in exporting some products from the Peruvian highlands. It started operations in 2007 and due to its perceived success, it has been replicated for the Amazon region ("Selva Exportadora").

To identify program effects we use matching with differences in differences (MDID), as most recent studies in the literature. We match on experience exporting and pre-treatment outcome variables in the two years prior to the start of SIEX's operations. Doing so makes the parallel pre-treatment trends assumption more likely to hold. To avoid selection problems we estimate intent-to-treat (ITT) effects, which are more relevant from a public policy perspective, since they estimate the effect of the program's overall existence.

Our dataset contains annual exports of firm by product, from 1995 to 2015. We matched this information with SIEX's list of sponsored products, and define a firm as treated if it exported at least one of SIEX's sponsored products during the study period. We find that SIEX increased average FOB exports by 19-22%, and FOB exports of non-sponsored products by 18-20%. Consistent with Volpe Martincus, Carballo, and Gallo (2011), an important part of this effect arises from increases in the extensive margin, as the number of exported products increased by 3.1-3.2 (all products) and 2.0-2.7 (non-sponsored products).

To better understand these effects, we undertake heterogeneity analysis by firm pre-program exports and experience. Some studies, like Munch and Schaur (2018) and Volpe Martincus and Carballo (2010a) show that the effects of export promotion programs are stronger among smaller and less experienced firms in Denmark and Chile, likely because the constraints to trade being more to bind in this group. Unlike these studies, we find larger effects among larger firms, while the effects on smaller firms are not statistically significant. The difference with the studies by Munch and Schaur (2018) and Volpe Martincus and Carballo (2010a) may be due to the context. Small firms in Denmark and Chile are better prepared to compete in international markets than their counterparts in Peru. Hence, export promotion programs may not have the desired effects. The confidence intervals associated with the effects for small and less experienced firms are too wide to conclude null effects, suggesting that some of these firms may have resulted worse-off as a consequence of the program.

Uncovering negative effects of export promotion agencies is an issue of vital importance in developing countries, where firms have higher probability of export failure (Besedeš and Prusa, 2011). Using data from Colombia, Mora (2015) shows that export failure is associated with reduced economic performance in the domestic market: firms that fail in exporting have a higher probability of exiting the domestic market, and those that survive have lower domestic revenue growth and lower domestic revenues. The program reduces the probability of export failure over the whole study period among firms with less experience.

We offer a number of contributions to the literature. First, we estimate program effects on non-sponsored products to test for spillovers or crowding-out effects. Second, we use a long panel with the whole population of exporters, allowing to examine effects in the long term. Third, our data also allows to explore changes in the extensive and intensive margins, shedding light on the mechanisms behind the estimated effects. Fourth, we link program participation to export failure, an outcome seldom studied in the literature.

Taken as a whole, our findings suggest that export promotion programs not only increase total exports of their beneficiaries, but also that these programs can have positive within-firm spillovers on the exports of non-sponsored products. Furthermore, these effects arise at least in part from changes in the extensive margin, allowing firms to diversify their portfolio of products. Despite the gains in FOB exports are significant only for larger and more experienced firms, smaller and less experienced firms increased their number of products. As a result, the program reduced the likelihood of export failure among less experienced firms.

The next section describes the study setting and the data at hand. Section 3 outlines our empirical strategy. Section 4 discusses our results, and section 5 concludes.

2 Study setting and data

The "Sierra Exportadora" export promotion program is part of Peru's Ministry of Agriculture and Irrigation. The program started operations in 2007 with the objective to promote exports from small and medium enterprises (SME) located in the highlands (Sierra) by developing and implementing business plans for firms aiming to export Andean products. As part of its activities, the program promotes capacity building to help producers overcome bottlenecks for products with proven international demand. To complement these activities, SIEX implements productive investment projects through public-private partnerships to facilitate the creation of business networks. Its activities revolve around five strategic axes: (i) promotion of direct exporting, (ii) local government support, (iii) development of new Andean products for international markets, (iv) strengthening of public-private partnerships to develop supply chains, and (v) innovation support for Andean firms.

We use data from the National Tax Superintendency provided by PromPeru, an export promotion commission housed in the Ministry of Trade. Our dataset comprehends the universe of exporting firms from 1995 to 2015, at the firm-product level. We matched product data with the list of products sponsored by SIEX, and define firms as treated if at any point during the period they exported at least one product sponsored by SIEX.

Table 1 reports the main descriptive statistics of the sample. There are 36,246 firms, of which 19,144 exported between 1995-2006 and 22,360 exported between 2007-2015. We split the sample this way because the program started in 2007. Around 10% of firms constitute the treatment group. The remaining firms as a whole are labeled the non-treated group. More precisely, the control group will be formed by the non-treated firms that most closely resemble the treated group.[1] Treated firms saw a 16% increase in the number of firms in the second period with respect to the pre-program period. The rest of the exporters group saw a similar increase, of 17% between both periods. Hence, the program does not seem to have created exporting firms at a rate higher than the rest of the economy.

Average FOB exports were USD 2.4 million per year. The mean FOB value of exports increased from 1.42 million to USD 3.23 million in the second period. Among treated firms the increase was of around 51%, while among the rest of exporters the mean FOB value of exports grew by 131% in the second period. However, the standard deviations indicate that distributions are highly skewed, so median values are more informative. Median FOB exports were USD 19,000 in the first period and USD 40,600 in the second period. For treated firms, median FOB exports were USD 10,500 and USD 25,000 in each period. For non-treated firms, the values were USD 18,000 in the first period and USD 38,500 in the

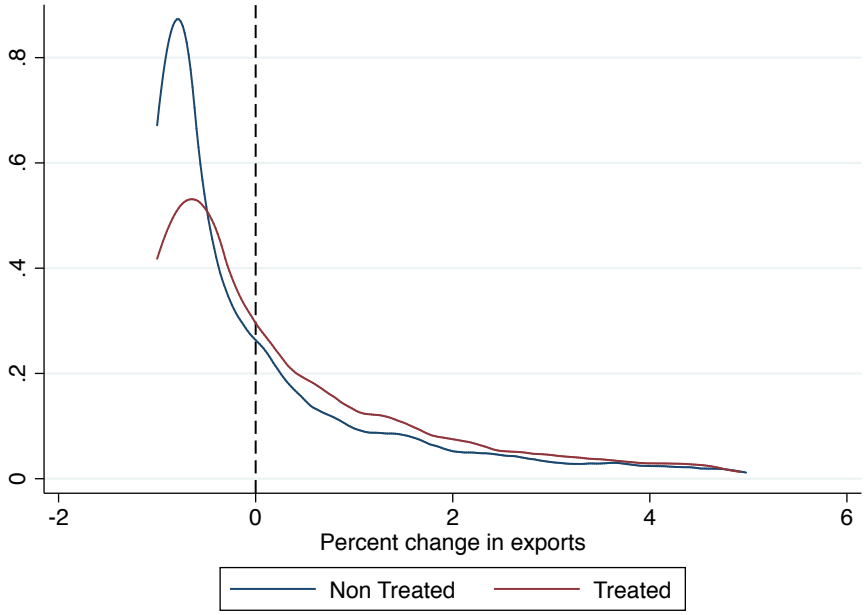
[1] The details of the selection procedure are discussed in the next section.

Table 1: Average exporter characteristics

	Whole Sample	1995-2006	2007-2015
Number of Exporters			
Total	36,246	19,144	22,360
Any Product Sponsored by SE	3,585	2,072	2,400
No Product Sponsored by SE	32,661	17,072	19,960
FOB Exports			
Overall	2.40	1.42	3.23
	(33.30)	(19.73)	(41.38)
Sponsored Products	0.08	0.06	0.09
	(1.36)	(0.93)	(1.64)
Non-sponsored Products	2.32	1.36	3.14
	(33.27)	(19.70)	(41.33)
Number of Products			
Overall	7.56	7.15	7.90
	(16.11)	(14.70)	(17.18)
Sponsored Products	0.17	0.14	0.20
	(0.89)	(0.73)	(1.00)
Non-sponsored Products	7.39	7.01	7.71
	(15.88)	(14.49)	(16.96)

Notes: FOB exports in million USD. Standard deviation in parentheses. Source: National Tax Superintendeny.

Figure 1: Percent change in exports, SIEX beneficiaries vs rest of exporters



second. Thus, median FOB exports increased more rapidly in the treated group.

The last panel in the table shows that firms in the sample exported an average of 7.6 products overall, a figure that increased slightly from 7.2 to 7.9 products in the second period. Among treated firms the increase outgrew the rest of the exporters, at a rate of 43%, compared to 10%. Once again, analyzing the median values is important to get a better sense of these figures. The median treated firm exported one product in each period while the median non-treated firm exported two products in each period. We approximate experience exporting by the number of years a firm had positive exports since 1995. In 2006, the year prior to the start of the program, the average firm had 3.75 years of experience, although the median firm had only 2 years. By construction, experience is truncated at 12 years. This happened for 329 firms that were active in 2006 (6% of firms that were active that year).

Treated firms had a lower rate of export failure than non-treated firms.[2] From the universe of firms that were active in 2006, 33% of non-treated firms had failed exporting by 2010, as opposed to 28% of treated firms. By 2015, the figures were 71% and 60% for treated and non-treated firms, respectively. On average, treated firms exported in 4 years, while non-treated firms exported for 2.5 years from the start of the program.

Figure 1 plots the change in average annual FOB exports between 2008 and 2015 com-

[2]We define as export failure if a firm does not export for two consecutive years.

pared the 2006 values, between treated and non-treated firms.[3] The percentage of firms that reduced FOB exports after the program started was smaller among treated firms than non-treated firms.

3 Empirical strategy

Our empirical strategy follows most of the recent literature on export promotion programs (Volpe Martincus and Carballo, 2008, 2010a,b; Munch and Schaur, 2018). In particular we apply a difference-in-differences matching estimator (Heckman, Ichimura, and Todd, 1997), matching on pre-treatment outcomes, which ameliorates to a considerable degree the issue of unobservable covariates. Not accounting for unobservable characteristics biases treatment effect estimates because differences between treated and control groups are cofounded by differences in said unobservables. However, unobservables are important precisely because they enter the production function of outcomes. If outcomes constitute a function of all these unobservables, matching on outcomes is similar to matching on all these variables with weights determined by the economic process.

We strengthen the identification strategy in two ways. First, we estimate intent-to-treat (ITT) effects, so firm-specific unobservables that determine program participation lose relevance in the estimation of treatment effects. Second, the large number of firms in our dataset allows us to match on outcomes two periods before the program started, making more palatable the assumption of parallel pre-treatment trends. As an alternative approach, we match on FOB exports and number of products exported in 2005 and 2006, the years prior to the start of the program. Results are strongly consistent under both matching strategies.

The matching estimator is:

$$\hat{\delta}_{MDID} = \sum_{i \in \{I^1 \cap S^*\}} w_{ij} \left(y_{it} - \sum_{j \in \{I^0 \cap S^*\}} \omega_{ij} \Delta y_{jt} \right) \tag{1}$$

where y_{it} is outcome for firm i in period t; I^1 and I^0 are the set of treatment and control firms, respectively; S^* is the common support; ω_{ij} is the weight of observation j as a match for observation i, and w_{ij} is a re-weighting factor that reconstructs the outcome distribution for the treated sample. We implement kernel matching. Standard errors are bootstrapped with 1,000 replications, and we report percentile and bias-corrected confidence intervals.

Since the program started in 2007, we remove that year from the analysis. We also remove from the sample firms that were beneficiaries of Ruta Exportadora, a similar export

[3] That is, we calculate $\Delta\%X_{i,\text{post}} = \frac{\left(\frac{1}{8}\sum_{t=2008}^{2015} X_{it}\right) - X_{i,2006}}{X_{i,2006}}$.

promotion program. To prevent our results from being driven by outliers, in each regressions in levels (number of products) we remove observations with three standard deviations above or below the mean outcome. In regressions on percentage change, we trim the top 1% and all firms that had a five-fold increase or more with respect to their 2006 levels.

Since our aim is to estimate the long-term effects of the program, Δy_{it} is the percent change in annual FOB exports (average between 2008 and 2015) with respect to FOB exports in 2006. The outcome variables are total exports, total exports of non-sponsored products, number of products, number of non-sponsored products, and average exports per product (both total and non-sponsored). All monetary dependent variables are in percent changes, while the number of products are changes in levels.

4 Results

Table 2 reports the main outcomes in the paper, SIEX's intent-to-treat effects on exports and number of products exported by its beneficiaries. For each dependent variable, the table reports $\hat{\delta}_{MDID}$, its standard error, the 95% percentile and bias-corrected confidence intervals, and the number of observations. The first panel uses the 2005 and 2006 values of the dependent variable for matching, while the second panel uses 2005 and 2006 FOB value and number of products for matching. The first row in each panel shows that SIEX increased its beneficiary firms' total annual exports by 19-22% on average in the 2008-2015 period, depending on the variables used for matching. The second row shows an increase of 18-20% in exports of non-sponsored products, suggesting sizable within-firm program spillovers.

To better understand the mechanisms behind these changes, in rows (3) and (4) we explore changes in the number of products exported, to unveil potential changes in the extensive margin. SIEX increased the number of products exported by its beneficiaries by 3.1-3.2 products on average. Most of the increase is derived from increased in exports of non-sponsored products, which is estimated between 2.0 and 2.7, depending on the variables used for matching. This suggests that SIEX's beneficiaries leveraged the knowledge and contacts acquired from the program to enter new markets.[4] Matching on both sets of variables produced similar results, but since matching on FOB exports and number of products produced more conservative estimates, to err on the conservative side we use that specification as our main specification in the rest of the paper.

Table 3 analyzes heterogeneity effects by pre-treatment exports. The first panel reports

[4]A better test of this statement would analyze the number of destination countries. If the statement is true, the number of destination countries should not change. Regrettably this variable is not available in our dataset.

Table 2: Effects of SIEX on exports of sponsored and non-sponsored products

	$\hat{\delta}_{MDID}$	95% Confidence Interval		Observations
		Lower bound	Upper bound	
Matching variables: '05 and '06 dependent variable				
FOB, total	0.22**	0.08	0.36	2,037
	(0.07)	0.08	0.36	
FOB, non-sponsored products	0.20**	0.07	0.35	2,008
	(0.07)	0.06	0.34	
Number of products, total	3.10**	1.21	5.12	2,143
	(1.01)	1.23	5.13	
Number of non-sponsored products	2.65**	1.04	5.24	2,137
	(0.97)	0.67	4.47	
Matching variables: '05 and '06 FOB and number of products				
FOB, total	0.19**	0.03	0.32	2,037
	(0.08)	0.05	0.35	
FOB, non-sponsored products	0.18**	0.02	0.32	2,008
	(0.08)	0.04	0.33	
Number of products	3.17**	1.30	5.29	2,143
	(1.02)	1.20	5.09	
Number of non-sponsored products	1.98**	0.51	4.54	2,137
	(0.93)	0.06	3.80	

Notes: The outcome variables are percent change in FOB exports and change in number of products (average 2008-2015 with respect to 2006). Matching variables are indicated in each panel. All analysis restricted to common support. Bootstrapped standard errors with 1,000 repetitions. Bias-corrected confidence intervals are reported in the first row and percentile confidence intervals are reported in the second row of each outcome variable. Statistically significant at the 90(*), 95(**), and 99(***)% of confidence.

results for firms with pre-treatment exports below the median. There are no statistically significant changes in FOB exports in this subsample, total or in non-sponsored products. However, the confidence intervals are too wide to conclude null program effects. The lower panel shows that firms with pre-treatment exports above the median increased their total FOB exports by 28%. Exports of their non-sponsored products increased by 27%. Among this group the number of exported products increased by 4.0 with respect to the 2006 value, and the number of non-sponsored products increased by 2.7 on average.

Table 4 analyzes heterogeneity effects by pre-treatment experience exporting. The first panel reports results for firms with pre-treatment exports below the median. Firms below median experience (6 years) did not experience significant gains in exports (overall or of non-sponsored products) during the period, although these firms increased their number of exported products by 3.1 (significant at the 90% of confidence). The number of non-sponsored products increased by 1.5, but the change is not statistically significant. The lower panel shows that firms with pre-treatment exports above the median increased their total FOB exports by 29%. Exports of their non-sponsored products increased by 27%. Among this group the number of exported products increased by 2.4 with respect to the 2006 value, and the number of non-sponsored products increased by 1.8 on average.

Table 5 explores changes in average FOB exports per product, a measure of changes in the intensive margin. The first panel shows that the program increased the value of exports per product by 20% in all products and the 16% in non-sponsored products, significant at the 95 and 90% of confidence, respectively. Heterogeneity analysis shows similar point estimates by pre-treatment FOB exports or experience, although the coefficients are not statistically significant in any subsample. This table suggests that intensive margin gains are not as clear as extensive margin gains reported in the previous tables.

Table 6 shows the effects of SIEX on export failure by 2015. Given its effects on export outcomes, SIEX could reduce the likelihood of failure among its beneficiaries. However, it may also be the case that beneficiary firms enter the international markets before they are mature enough to do so, which could lead to undesired effects like export failure. Effects on firms with more experience and export volumes are not expected since these firms have broader access to resources than their counterparts. However, smaller firms may depend on the program to avoid export failure. The table shows that the program decreased export failure by 8 percentage points among firms with below-median pre-program experience exporting. Despite no statistically significant increase in FOB exports, the increase in the number of products seems to have allowed the smaller firms to diversify their portfolio.

Table 3: Treatment effect heterogeneity by pre-program exports

	$\hat{\delta}_{MDID}$	95% Confidence Interval		Observations
		Lower bound	Upper bound	
Firms with pre-program exports below median				
FOB, total	0.07	-0.17	0.28	1,748
	(0.12)	-0.16	0.29	
FOB, non-sponsored products	0.08	-0.14	0.35	1,742
	(0.12)	-0.17	0.32	
Number of products, total	3.54**	0.45	7.17	1,866
	(1.76)	0.30	7.03	
Number of non-sponsored products	2.46	-0.74	5.74	1,861
	(1.63)	-0.74	5.75	
Firms with pre-program exports above median				
FOB, total	0.28**	0.10	0.46	1,857
	(0.09)	0.12	0.48	
FOB, non-sponsored products	0.27**	0.06	0.45	1,834
	(0.10)	0.08	0.46	
Number of products, total	4.04**	2.30	6.86	1,940
	(1.09)	1.68	5.86	
Number of non-sponsored products	2.68**	1.01	5.37	1,937
	(1.01)	0.43	4.33	

Notes: The outcome variables are percent change in FOB exports and change in number of products (average 2008-2015 with respect to 2006). Matching variables are FOB exports and number of products exported in 2005 and 2006. All analysis restricted to common support. Bootstrapped standard errors with 1,000 repetitions. Bias-corrected confidence intervals are reported in the first row and percentile confidence intervals are reported in the second row of each outcome variable. Statistically significant at the 90(*), 95(**), and 99(***)% of confidence.

Table 4: Treatment effect heterogeneity by pre-program export experience

	$\hat{\delta}_{MDID}$	95% Confidence Interval		Observations
		Lower bound	Upper bound	
Firms with pre-program exporting experience below median				
FOB, total	0.19	-0.02	0.43	1,769
	(0.11)	-0.05	0.39	
FOB, non-sponsored products	0.14	-0.08	0.34	1,763
	(0.11)	-0.06	0.37	
Number of products, total	3.11**	0.08	5.96	1,873
	(1.53)	-0.11	6.22	
Number of non-sponsored products	1.53	-1.00	4.61	1,869
	(1.43)	-1.16	4.45	
Firms with pre-program experience above median				
FOB, total	0.29**	0.14	0.51	1,802
	(0.09)	0.10	0.46	
FOB, non-sponsored products	0.27**	0.10	0.50	1,781
	(0.10)	0.07	0.45	
Number of products, total	2.40*	-0.15	4.38	1,898
	(1.29)	0.46	5.57	
Number of non-sponsored products	1.75	-0.83	3.72	1,894
	(1.18)	-0.14	4.26	

Notes: The outcome variables are percent change in FOB exports and change in number of products (average 2008-2015 with respect to 2006). Matching variables are FOB exports and number of products exported in 2005 and 2006. All analysis restricted to common support. Bootstrapped standard errors with 1,000 repetitions. Bias-corrected confidence intervals are reported in the first row and percentile confidence intervals are reported in the second row of each outcome variable. Statistically significant at the 90(*), 95(**), and 99(***)% of confidence.

Table 5: Program effects on FOB exports per product

	$\hat{\delta}_{MDID}$	95% Confidence Interval		Observations
		Lower bound	Upper bound	
All firms				
FOB per product	0.19**	0.00	0.38	1,676
	(0.10)	0.00	0.38	
FOB per non-sponsored product	0.16*	-0.04	0.37	1,652
	(0.10)	-0.03	0.37	
Firms with pre-program exports below median				
FOB per product	0.19	-0.11	0.50	1,453
	(0.15)	-0.12	0.49	
FOB per non-sponsored product	0.19	-0.12	0.52	1,447
	(0.17)	-0.17	0.50	
Firms with pre-program exports above median				
FOB per product	0.19	-0.02	0.44	1,530
	(0.12)	-0.04	0.42	
FOB per non-sponsored product	0.19	-0.04	0.44	1,512
	(0.12)	-0.07	0.43	
Firms with pre-program exporting experience below median				
FOB per product	0.20	-0.08	0.45	1,475
	(0.13)	-0.03	0.48	
FOB per non-sponsored product	0.10	-0.21	0.34	1,466
	(0.14)	-0.17	0.40	
Firms with pre-program exporting experience above median				
FOB per product	0.14	-0.10	0.43	1,479
	(0.13)	-0.11	0.41	
FOB per non-sponsored product	0.23	-0.04	0.48	1,466
	(0.14)	-0.03	0.49	

Notes: The outcome variables are percent change in FOB exports and change in number of products (average 2008-2015 with respect to 2006). Matching variables are FOB exports and number of products exported in 2005 and 2006. All analysis restricted to common support. Bootstrapped standard errors with 1,000 repetitions. Bias-corrected confidence intervals are reported in the first row and percentile confidence intervals are reported in the second row of each outcome variable. Statistically significant at the 90(*), 95(**), and 99(***)% of confidence.

Table 6: Program effects on export failure

	$\hat{\delta}_{MDID}$	95% Confidence Interval		Observations
		Lower bound	Upper bound	
All firms				
Export Failure by 2015	-0.02	-0.07	0.04	1,446
	(0.03)	-0.08	0.04	
Firms with pre-program exports below median				
Export Failure by 2015	-0.03	-0.13	0.05	1,279
	(0.05)	-0.12	0.06	
Firms with pre-program exports above median				
Export Failure by 2015	-0.00	-0.10	0.06	1,305
	(0.04)	-0.08	0.07	
Firms with pre-program experience below median				
Export Failure by 2015	-0.08**	-0.15	-0.00	1,314
	(0.04)	-0.15	-0.00	
Firms with pre-program experience above median				
Export Failure by 2015	0.10	-0.02	0.19	1,249
	(0.05)	-0.01	0.20	

Notes: The outcome variable is an indicator of export failure, defined as at least one episode of two consecutive years without exports between 2008 and 2015. Matching variables are FOB exports and number of products exported in 2005 and 2006. All analysis restricted to common support. Bootstrapped standard errors with 1,000 repetitions. Bias-corrected confidence intervals are reported in the first row and percentile confidence intervals are reported in the second row of each outcome variable. Statistically significant at the 90(*), 95(**), and 99(***)% of confidence.

5 Conclusions

We estimate the intent-to-treat (ITT) effects of Sierra Exportadora (SIEX), an export promotion program in Peru, on its beneficiaries' exports. We find that SIEX increased average FOB exports by 19-22% in 2008-2015 compared to pre-program values, and FOB exports of non-sponsored products by 18-20% with respect to pre-treatment volumes, suggesting that the spillover effects are as roughly large as the direct effects on the program's sponsored products. Consistent with Volpe Martincus, Carballo, and Gallo (2011), an important part of this effect arises from increases in the extensive margin, as the number of exported products increased by 3.1-3.2 (all products) and 2.0-2.7 (non-sponsored products). Failure to account for these spillover effects would underestimate program effectiveness.

Heterogeneity analysis revealed stronger effects on FOB exports among larger and more experienced firms, while the effects on smaller, less experienced firms are not statistically significant. This finding stands against evidence in other contexts, like Munch and Schaur (2018) and Volpe Martincus and Carballo (2010a), and it may point to the existence of additional barriers to trade faced by small firms in Peru compared to their larger counterparts or to small firms in Denmark and Chile. On the other hand, SIEX increased the average number of exported products for all types of firms, suggesting improvements on the extensive margin across the distribution of firms.

Importantly, we find that SIEX reduced the probability of export failure among less experienced firms in the 2008-2015 period. This is likely a consequence of the increased diversification in product portfolio of these firms discussed in the preceding paragraph. Export failure is an understudied outcome, which can have notoriously negative consequences for firms in developing countries. Using data from Colombian exporters Mora (2015) shows that firms that experience export failure are more likely to go out of business and decrease domestic sales. These effects are stronger among financially constrained firms, which is generally the case for small firms in Peru. Thus, eductions in the likelihood of export failure are an important effect that should be taken into account when analyzing the effectiveness of export promotion programs.

The main limitations of our study are the small number of covariates available per firm, and the lack of data on performance in domestic markets. A small number of covariates may lead to overestimate treatment effects (Munch and Schaur, 2018), although our focus on ITT estimates should ameliorate this concern. Second, without data on domestic performance it is not possible to detect if firms reallocate sales from the domestic market to exports instead of increasing capital or labor demand (Ahn and McQuoid, 2012; Nguyen and Schaur, 2012; Soderbery, 2014). Thus, our findings are not sufficient to assess the program's cost-

effectiveness.

Taken as a whole, our findings suggest that export promotion programs can have strong, positive within-firm spillovers on the exports of non-sponsored products. Furthermore, these effects arise at least in part from changes in the extensive margin, allowing firms to diversify their portfolio of products. Despite the gains in FOB exports are significant only for larger and more experienced firms, smaller and less experienced firms increased their number of products. As a result, the program seems to have reduced the likelihood of export failure among less experienced firms.

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