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What Kind of Trade Do They Promote?

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Abstract ♦

Information problems involved in trading differentiated goods are *a priori* acuter than those associated with trading more homogeneous products. The impact of export promotion activities intending to address these problems can be therefore expected to differ across goods with different degree of differentiation. Empirical evidence on this respect is virtually inexistent. This paper aims at filling this gap in the literature by providing estimates of the effect of these activities over firms trading different goods using highly disaggregated export data for the whole population of Costa Rican exporters over the period 2001-2006. We find that trade promotion actions favor an increase of exports along the extensive margin, in particular, in terms of destination countries, in the case of firms that are already selling differentiated goods. However, these actions do not seem to encourage exporter to start exporting these goods. Further, no significant impacts are observed for firms exporting reference-priced and homogeneous goods.

Keywords: Export Promotion, Firms, Costa Rica
JEL-Code: F13, F14, L15, L25, O17, O24, C23.

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1 Introduction

Several developing countries have established (or re-founded) institutions aiming at supporting the expansion of export activities over recent decades. This paper assesses the relative effectiveness of trade promotion actions in a middle income developing country, Costa Rica.[1] Specifically, we estimate the effect of export promotion activities performed by the Costa Rican national agency, PROCOMER, on total exports and the intensive and extensive margins of exports across sub-samples of firms whose export goods have heterogeneous levels of differentiation. In doing this, we use a rich dataset including highly disaggregated export data as well as employment data for virtually the whole population of Costa Rican exporters over the period 2001-2006.

Developing countries lag behind in terms of export diversification. In particular, their exports tend to be concentrated in homogeneous commodities. This is particularly true for Latin American economies. The share of differentiated products in these economies' total exports (excluding Mexico) is just 21.7% compared to 62.3% in the case of developed countries.[2] Diversifying into these more complex goods represents an important challenge. Differentiated goods are heterogeneous both in terms of their characteristics and their quality. This interferes with the signaling function of prices thus making it difficult to trade them in organized exchanges. In short, information problems involved in trading differentiated products are more severe than those faced with when trading more homogeneous goods.[3]

Many export promotion activities aim at ameliorating these information problems. Thus, Costa Rica's national export promotion agency, PROCOMER, provides training and counseling to inexperienced exporters, especially Small and Medium Size Enterprises (SMEs), on the export process; compiles, generates, and disseminates business-relevant statistical information on foreign trade and prepares specific market

[1] Costa Rica is a small open economy, the most developed one among Central American countries. For further information on Costa Rica see, e.g., Granados et al. (2007).

[2] We computed these shares using the COMTRADE database. In order to identify goods as differentiated we applied the classification proposed by Rauch (1999) (see Section 3).

[3] Artopoulos et al. (2007) argue that a firm based in a developing country must undergo product upgrade as well as marketing upgrade to succeed in exporting to developed countries. Properly shaping the marketing strategy is an information-intensive activity. For instance, firms need to learn and understand the preferences of foreign consumers; the nature of competition in foreign markets; the structure of distribution networks, and the requirements, incentives and constraints of the distributors. Although some of these activities also need to be performed when exporting homogeneous goods, these become intrinsically more difficult when differentiated goods are involved.

studies on demand; coordinates and co-finances the participation of Costa Rican firms in international trade missions, fairs, and shows; arranges foreign buyer missions to Costa Rica; and organizes business agendas, in particular; and sponsors the creation of consortia of exporters to strengthen their competitive position in external markets (see Jordana et al., 2010).

These activities may potentially have different effects on export performance over firms exporting good bundles with different degrees of differentiation and thus facing varying levels of information incompleteness. More precisely, trade promotion actions can be expected to have a stronger impact on the extensive margin of firms exporting differentiated goods, i.e., on the introduction of additional differentiated products and/or the incorporation of more countries to the set of destinations these products are exported to. Empirical evidence in this regard is almost inexistent. Our paper aims at filling this gap in the literature.

This paper is then related to two strands in the literature. On the one hand, a few recent studies have assessed the impact of public policies on export performance using firm-level data. Álvarez and Crespi (2000) use a sample of 365 Chilean firms out of a population of 7,479 exporting firms over the period 1992-1996 to examine the impact of the activities performed by Chile's export promotion agency, PROCHILE. They find that instruments managed by this agency had a positive and direct effect on the number of markets and indirectly, after a period of four years, on diversification by products. Bernard and Jensen (2004) show that average state expenditures on export promotion per firm do not have a significant influence on the probability of exporting in a sample of 13,550 US manufacturing plants over the period 1984-1992. More recently, Görg et al. (2008) analyze a sample of 11,730 manufacturing firm-year observations in Ireland over the period 1983-2002 (i.e., an average of 587 firms per year) and conclude that grants aiming at increasing investment in technology, training, and physical capital, when large enough, are effective in increasing total exports of already exporting firms but not in encouraging new firms to enter international markets. Finally, Volpe Martincus and Carballo (2008) assess the effectiveness of export promotion actions by Peru's national agency, PROMPEX, using firm-level data on exports by product and destination markets and employment over the period 2001-2005, as well as information on location and

starting date for the whole population of exporters (i.e., 25,639 firm-year observations). They show that whereas these actions have helped Peruvian firms to increase their exports by facilitating an expansion of the extensive margin, i.e., the number of products exported and the number of countries reached, they do not seem to have had a consistent significant impact on firms' intensive margin of exports.

On the other hand, there are several papers using either product or sector trade data that examine how the relative importance of trade determinants vary over good categories. In particular, Rauch (1999) reports that proximity and sharing a common language and colonial ties are more important for differentiated products than for homogeneous products in matching buyers and sellers. Since Rauch (1999) seminal paper, several studies have extensively documented that factors (trade barriers) reducing (generating) information gaps have a stronger positive (negative) impact on trade of more differentiated products. Thus, estimations by Fink et al. (2002) suggest that the effect of communication costs on trade in differentiated products is one-third larger than that on trade in homogenous products. Further, Rauch and Trindade (2002) show that ethnic Chinese networks by acting as nodes for information exchange are associated with a larger increase of bilateral trade of the former than that of the latter. In addition, Berkowitz et al. (2006) present evidence that countries with good institutions have a comparative advantage (disadvantage) and tend to export (import) more complex (simple) goods. Similarly, Ranjan and Tobias (2006) highlight that contract enforcement matters more for trade in differentiated products. Moreover, Hallak (2006) shows that the propensity of rich countries to import relatively more from countries that produce high-quality goods is more pronounced for differentiated goods. Finally, Volpe Martincus et al. (2007) find that external offices of export promotion agencies favor an increase in the number of differentiated goods that are exported, whereas the presence of a larger number of diplomatic representations in the importer countries seem to be associated with exports of a larger number of homogeneous goods.[4]

[4] Besedes and Prusa (2006) also observe that duration of U.S. imports is 23% shorter for homogeneous goods than for differentiated goods.

In this paper, we contribute to the literature by analyzing, for the first time to our knowledge, the effect of export promotion at the firm level *while* distinguishing across firms according to the degree of differentiation of the goods they export. More specifically, we address one main question: Do export promotion activities have had different effects for Costa Rican firms exporting different kind of goods?

In answering this question, we apply a now standard microeconometric technique, matching difference-in-differences, on a database covering almost all Costa Rican exporters, which includes annual firm-level data on exports disaggregated by product and destination country, assistance status, and employment over the period 2001-2006.

We find that trade promotion activities by PROCOMER are associated with increased exports along the extensive margin, primarily on the destination country dimension, from firms that are already selling differentiated goods abroad, while no significant effects are observed on export performance of firms trading exclusively homogeneous or reference-priced goods. These results are *a priori* consistent with the relative severity of the information problems when exporting goods with different degree of differentiation and along different margins and the purpose of this kind of agencies, i.e., institutional actions aiming at helping firms to deal with information incompleteness are expected to have a larger effect precisely in those export operations involving those goods for which the lack of information is more accentuated, namely, opening a new export market for differentiated goods than exporting more of an homogeneous product to a country, which is already within the group of trading partners. However, assistance by PROCOMER does not seem to encourage exporting firms to diversify into differentiated products. Besides the role that supply factors may play, this might be at least partially related to the fact that PROCOMER does not have an enough large program focused on supporting exporters to compete through differentiation.

The remainder of the paper is organized as follows: Section 2 explains the empirical methodology. Section 3 presents the dataset and descriptive evidence. Section 4 reports and discusses the econometric results, and Section 5 concludes.

2 Empirical Methodology

Causal inference about the effect of public programs requires determining how participants would have performed if they had not participated. Specifically, in order to assess the effectiveness of export promotion in Costa Rica, we need to compare export performance of firms, both overall and along the intensive and extensive margins of trade, under treatment by the national export promotion agency, PROCOMER, with that under no treatment.[5] Since both states cannot be simultaneously observed for the same firm, the individual treatment effect can never be observed. This is the so-called *fundamental problem of causal inference* (see Holland, 1986). The statistical solution to this problem consists of using the population of firms to learn about the properties of the potential outcomes. More specifically, the idea is to compute an average treatment effect.

Formally, let D_{it} be an indicator codifying information on treatment by PROCOMER. Specifically, D_{it} takes the value 1 if firm *i* has been assisted by the agency in year *t* and 0 otherwise. Further, let X_{it} be a vector of covariates corresponding to observable firm characteristics. Let Y_{it} be (the natural logarithm of) firm *i's* total exports in year *t* and Y_{it}^k accordingly be total exports by firm *i* exporting goods *k*, where *k* can be homogeneous goods, reference-priced goods, differentiated goods, and their combination. The presentation hereafter focuses on firms' total exports, but *mutatis mutandis* also applies to measures of export performance along the extensive margin (number of countries to which firms export and number of products exported) and the intensive margin (average exports per country and product, average exports per country, and average exports per product).

Let $E\left(Y_{it}^1 \mid X_{it}, D_{it}=1\right)$ be the expected (average) exports of those firms that have been assisted by PROCOMER, and $E\left(Y_{it}^0 \mid X_{it}, D_{it}=1\right)$ be the expected exports of these firms had they not been assisted by PROCOMER. In this case:

$$\gamma = E\left(Y_{it}^1 \mid X_{it}, D_{it}=1\right) - E\left(Y_{it}^0 \mid X_{it}, D_{it}=1\right) = E\left(\Delta Y_{it} \mid X_{it}, D_{it}=1\right) \quad (1)$$

The parameter γ measures the average rate of change in exports between the actual exports of those firms that have received a service from PROCOMER and the exports of

[5] We will use interchangeably assistance, treatment, and participation throughout the paper.

these had they not received a service from PROCOMER (see Lach, 2002). This is what the evaluation literature calls the *average effect of the treatment on the treated.* Clearly, when $\gamma > 0 \ (= 0)$, the export promotion service stimulates (does not have any impact on) firms' exports.

In order to estimate γ consistently, an unbiased estimate of the expected counterfactual is required. This can be done by averaging exports of some group of firms. The most obvious candidate is the mean exports of those firms that have not been served by PROCOMER. Note, however, that there may be non-random differences between assisted and non-assisted firms that may lead to potentially different exports. Failure to account for these differences would clearly produce a selection bias in estimated impacts (see, e.g., Heckman et al., 1998; Klette et al., 2000). We therefore need to control for firm heterogeneous characteristics to get comparable groups of firms.[6]

Alternative methods have been proposed in the literature to construct the correct sample counterpart for the missing information on the outcomes realized if firms had not been treated when no randomized control groups are available (see, e.g., Heckman et al., 1998; Heckman et al., 1999; Klette et al., 2000; Jaffe, 2002; Blundell and Costa Dias, 2002; Lee, 2005; Smith and Todd, 2005a). In this paper we use the *matching difference-in-differences* approach (see, e.g., Arnold and Javorcik, 2005; Görg et al., 2008).[7]

The main idea behind difference-in-differences estimation is to use repeated observations on individuals, in our case firms, to control for unobserved and unchanging characteristics that are related to both exports and assistance (see Angrist and Krueger, 1999). More concretely, the difference-in-difference estimator is a measure of the difference between the difference in exports after the treatment as compared to exports

[6] In this exercise, we ignore general equilibrium effects so that outcomes for each firm do not depend on the overall level of participation in the activities performed by the agency (see Heckman et al., 1998). In particular, we do not consider information spillovers. It is well known that firms may learn about export opportunities from other firms through employee circulation, customs documents, customer lists, and other referrals (see Rauch, 1996). Evidence on spillovers has been presented in several papers, e.g., Aitken et al. (1997), Greenaway et al. (2004), and Álvarez et al. (2007). Thus, Aitken et al. (1997) and Greenaway et al. (2004) report significant spillovers from multinational enterprises (MNEs) to domestic firms in Mexico and the United Kingdom, respectively. More precisely, MNE activity is positively related to export propensity of local firms. Álvarez et al. (2007) find that the probability that firms introduce given products to new countries or different products to the same countries increases with the number of firms exporting those products and to those destinations, respectively. If these spillovers would be associated with participation in export promotion activities, i.e., untreated firms obtain business information from treated firms, then the treatment effects, as estimated here, would be underestimated.

[7] Matching difference-in-differences does not impose any functional form restriction in estimating the conditional expectation of the outcome variable. This allows avoiding the potential inconsistency associated with misspecification (see Meyer, 1995; Gerfin and Lechner, 2002; Abadie, 2005).

before treatment for assisted firms and the corresponding difference for non assisted firms (see Smith, 2000; Jaffe, 2002).

Matching consists of pairing each assisted firm with the more similar members of the non-assisted group on the basis of their observable characteristics and then estimating the impact of assistance by comparing the exports of matched assisted and non-assisted firms. This method is based on the main identifying assumption that selection into assistance occurs only on observables (see, e.g., Heckman and Robb, 1985; and Heckman et al., 1998).[8]

In general, due to data limitations, there may be several characteristics that are not observed by the econometrician and, as a consequence, systematic differences between treated and nontreated outcomes may persist even after conditioning on observables. Assuming that selection on the unobservables is zero can therefore be very restrictive. However, selection on an unobservable determinant can be allowed for if matching is combined with difference-in-differences as long as this determinant lies on separable individual and/or time-specific components of the error term (see Blundell and Costa Dias, 2002).[9]

The resulting matching difference-in-differences estimator compares the change in before and after exports of assisted firms with that of matched non-assisted ones, so that imbalances in the distribution of covariates between both groups are accounted for and time-invariant effects are eliminated.[10] This procedure relies for identification on the assumption that there are no time-varying unobserved effects influencing selection and exports (see Heckman et al., 1997; and Blundell and Costa Dias, 2002). Formally, the matching difference-in-differences estimator is given by:

$$\hat{\gamma}^{MDID} = \sum_{i \in \{I^1 \cap S^*\}} \left\{ \Delta Y_{it} - \sum_{j \in \{I^0 \cap S^*\}} W_{ij} \Delta Y_{jt} \right\} w_{ij} \qquad (2)$$

[8] Formally, matching is based on two assumptions. First, conditional on a set of observables *X*, the non-treated exports are independent of the participation status (conditional independence assumption). Second, all firms have a counterpart in the non-treated population and anyone is a possible participant (common support). Both assumptions are called together "strong ignorability". Under these conditions, experimental and non-experimental analyses identify the same parameter. For additional details see, e.g., Rosenbaum and Rubin (1983), Heckman et al. (1998), Heckman et al. (1997), Heckman et al. (1999), Angrist and Krueger (1999), Blundell and Costa Dias (2002), and Caliendo and Kopeinig (2008).

[9] See also Heckman et al. (1997), Heckman et al. (1998), Abadie (2005), and Smith and Todd (2005a).

[10] In this way, in the case of Costa Rica, we are controlling for the trade regime under which firms export, i.e., free trade zone vs. general customs area. This is relevant because an important portion of Costa Rican exports flows under the former regime (see Granados et al., 2007).

where I^0 (I^1) is the set of control (treatment) firms; S^* is the common support; w accounts for the re-weighting that reconstructs the outcome distribution for the treated sample; and W is the weight placed on comparison observation j for individual i, which depends on the cross-sectional matching estimator employed. In implementing these estimators, we use a result from Rosenbaum and Rubin (1983) which allows reducing substantially the dimensionality problem associated with matching on several attributes. Specifically, we perform matching on the propensity to participate given the set of observable characteristics X or propensity score: $P(X_i) = P(D_i = 1 | X_i)$. Thus, non-participant firms are paired with participant firms that are similar in terms of $P(X)$ according to a specific metric. To check the robustness of our estimation results, we consider here three alternative methods using different metrics: the nearest neighbor, the radius, and the kernel estimators.[11]

The propensity score is in fact based on fitting a parameter structure (probit or logit). It is therefore necessary to test whether the estimated propensity score is successful in balancing the values of covariates between matched treatment and comparison groups. We then assess the matching quality using five alternative tests: the stratification test; the standardized differences test; the t-test for equality of means in the matched sample; the test for joint equality of means in the matched sample or Hotelling test; and the pseudo R^2 and likelihood-ratio test testing the null hypothesis of joint insignificance of regressors included in the propensity score specification after matching (see, e.g., Smith and Todd, 2005b; Girma and Görg, 2007; and Caliendo and Kopeinig, 2008).

In order to evaluate the significance of the treatment effect, we first compute analytical standard errors. Note, however, that estimation of propensity scores and matching itself both add variation beyond the normal sampling variation, so these errors may then deviate considerably from their sample counterparts. (see Heckman et al., 1998; and Smith, 2000). We therefore also estimate bootstrapped standard errors based on 500 repetitions.

Finally, our non-parametric approach has the advantage of not restricting impact heterogeneity across individuals. Thus, when estimating the treatment effect, we compare export performance of assisted firms with that of matched control ones both pooling over

[11] See, e.g., Smith and Todd (2005a) for a formal definition of these estimators.

firms and separately for groups of firms exporting different set of goods: only homogeneous goods, only reference-priced goods, only differentiated goods, and their combinations. This minimizes within-group heterogeneity thus allowing for a cleaner estimation of the impact of interest and, importantly, enables us to investigate whether trade promotion activities have different effects on these groups of firms.

3 Data and Descriptive Evidence

In our empirical analysis we use two databases. On the one hand, we have annual firm-level export data disaggregated by product (at the 10-digit HS level) and destination country over the period 2001-2006. The sum of the firms' exports almost adds up to the total merchandise exports as reported by the Central Bank of Costa Rica, with the difference being explained by exports of "Gold Coffee", which, due to administrative reasons, are registered separately.[12] Hence, our data cover virtually the whole population of exporters. Along with these data, there is a binary variable identifying which firms have been assisted by PROCOMER in each year. This database has been kindly provided by PROCOMER. On the other hand, we have annual firm-level employment data for the exporter companies over the same period.[13] This dataset has been generously provided by the CCSS (Caja Costarricense de Seguro Social).[14] Both data are reported in terms of compatible firms' ID (exporter ID and employer ID), so the databases could be easily merged.

Table 1 presents basic aggregate export and treatment indicators. Costa Rican exports have grown 63.5% between 2001 and 2006. Although the total number of destination countries and that of products have increased over these years (9.0% and 12.2%, respectively), a large fraction of this aggregate export growth has been due to significant expansions along the intensive margin, i.e., larger average exports per country and larger average exports per product. The number of firms selling their products abroad has also risen substantially, almost 40.0% from 2001 to 2006. The fraction of these firms that

[12] The difference between the sum of the firms' exports as reported in our database and the corresponding figure published by the Central Bank of Costa Rica does never exceed 4% per year.
[13] The empirical literature suggests that other firm-level time-varying factors (e.g., innovation activities) may also contribute to explain firm's exports. Unfortunately, we do not have data on these additional factors in our datasets.

have received assistance from PROCOMER has fluctuated between 3.5% and 13.2%, reaching 7.2% in 2006.

Table 2 presents a characterization of the average Costa Rican exporter over the sample period. The exporting firms have on average 99 employees and are mostly located in San José (more than 60%), the capital and largest city in the country. In recent years, average size has declined, which is due to the fact that a larger fraction of smaller firms have entered international markets. The average exporter sells 7.1 products to 3.3 countries. The former figure is lower than those corresponding to the United States in 2000 and to Peru in 2005, 8.9 and 7.5, respectively, while the latter is again smaller than that of the United States, 3.5, but larger than that observed in Peru, 2.6 (see Bernard et al., 2005; and Volpe Martincus and Carballo, 2008).

Figure 1 provides a detailed visual representation of the distribution of firms' exports for the final sample year, 2006. Figure 1 clearly shows that most Costa Rican firms export just a few products to a few markets. More specifically, in 2006 46.7% of the firms exported to just one country –regardless the number of products-. This proportion is higher than that reported for French manufacturing firms, 34.5%-42.6% (see Eaton et al., 2004; and Mayer and Ottaviano, 2007), and that informed for Irish firms, 34.0% (see Lawless, 2007), but lower to those of the United States and Peru, which are about 60.0% (see Bernard et al., 2005; and Volpe Martincus and Carballo, 2008). Further, no firm export to more than 36 countries. In Peru, three exporters trade with more than 50 countries, i.e., 0.5% of the total number of exporters, whereas in France, firms with such a geographically diversified export pattern accounted for 1.5% of the exporting companies (see Eaton et al., 2004; Volpe Martincus and Carballo, 2008). Moreover, 35.0% of the Costa Rican exporters just sell one product abroad –regardless the number of destination countries-. This proportion is similar to those registered in the United States and Peru (see Bernard et al., 2005; Volpe Martincus and Carballo, 2008). Furthermore, almost 25.0% of the firms exported just one product to one country, almost 60.0% just less than 5 products to less than 5 countries, and approximately 80.0% less than 10 products to less than 10 markets. These figures are remarkably similar to those

[14] These data can be then seen as census of formal Costa Rican employment. There is of course some risk of misreporting, which would generate measurement errors. As long as these are systematic across firms, they will be eliminated by the time differentiation implemented in the estimation method.

observed in Peru (see Volpe Martincus and Carballo, 2008). Notice, on the other hand, that the main diagonal of Figure 1 is almost empty, meaning that there are only a few firms that simultaneously export many products to many markets.

Table 3 shows basic average export performance indicators along with assistance information for subsets of firms exporting goods with different degree of differentiation and across size categories. In presenting these data, we use the classification proposed by Rauch (1999). Thus, we distinguish among homogeneous goods, which are internationally traded in organized exchanges; reference-priced goods, which are not traded in these organized exchanges but have reference prices quoted in specialized publications; and differentiated goods, which are neither traded in organized exchanges nor have reference prices, i.e., prices do not convey all the relevant information for international trade on these goods. In particular, we follow the liberal version of the aforementioned classification because it is more stringent in typifying goods as differentiated, which we believe is more appropriate for a developing country such as Costa Rica.[15] We then construct groups of firms which export the same export bundles: only differentiated products, only reference-priced products, only homogeneous products, and their alternative combinations.

Almost 50.0% of the firms exclusively export differentiated goods. On average, these firms export 4.0 products to 2.5 countries. Around 20% of the companies export both differentiated and reference-priced goods. These companies export an average of 14.8 products to 5.5 countries. Firms exporting only reference-priced and homogeneous products account for 12.0% and 8.2% of the total number of exporters, respectively. On average, the former export 2.3 products to 2.1 countries, whereas the latter export just 1.3 products to 2.9 countries. As expected, exporters of homogeneous goods register the smallest average in terms of number of products.[16] Finally, and also consistent with our priors, firms exporting goods over all the differentiation spectrum export more in value

[15] Due to some ambiguities, Rauch (1999) proposes two alternative classifications, conservative and liberal. The former maximizes the number of commodities that are classified as either organized exchange or reference-priced and the latter maximizes this number. Combining this latter goods typology with a sectoral classification, we can see that, in the case of Costa Rica, differentiated goods are primarily manufactured products (approximately 80.0%), while homogeneous goods are mainly agricultural products (around 70.0%). Reference-priced goods are, as expected, an intermediate case: 50.0% are manufactured products, 30.0% are agricultural products, and 20.0% are mineral and metal products.

[16] It might be argued that, due technological reasons, firms exporting homogeneous goods are less likely to expand their sets of goods over time. If this was the case and accordingly variations in the number of products would be on average the same for assisted and non-assisted firms, no impact are to be expected from the very beginning. However, in our case, the average annual (logarithmic)

terms, more products, and to more countries. Thus, they export an average of 28.1 products to 7.1 countries. Note that whereas firms that only export differentiated products (export both differentiated and reference-priced products) explain more that 30.0% (almost 60.0%) of the total number of exporters assisted by PROCOMER, firms that only export homogeneous products account for just 6.3% of this total.

The existing empirical evidence suggests that larger firms are more likely to export (see, e.g., Roberts and Tybout, 1997; Bernard and Jensen, 2004), tend to export more (see, e.g., Görg et al., 2008), and have a higher export intensity (see, e.g., Barrios et al., 2003). Table 3 also presents basic statistics on the relationship between size and exports for Costa Rica. Specifically, for each group of firms exporting a particular type of good or a given combination of goods, this table breaks down the export and treatment indicators into four size categories defined in terms of employment: up to 5 employees (micro), between 6 and 30 employees (small), between 31 and 100 employees (medium), and more than 100 employees (large).[17] We observe that, on average, larger firms export more and export to a larger number of countries. Although they tend to export more products, the relationship does not seem to be monotonic for all categories. In the particular case of firms exporting the three kinds of goods, micro firms sell abroad on average more products than small firms. This might reflect the fact that a larger fraction of the formers are traders. Finally, note that micro and small firms account for approximately two thirds of total Costa Rican exporting companies. Exports from these firms jointly explain around 9.0% of the country's total exports. Further, these firms represent the largest category in the group of firms assisted by PROCOMER, i.e., 48.8% over the sample period.

4 Econometric Results

As explained in Section 2, we estimate the average treatment effect on the treated firms applying matching difference-in-differences. In order to do this, we first estimate the propensity scores. This requires defining what determines the propensity to

growth rate of the number of homogeneous goods is different from zero for most groups of firms exporting these goods in most years. Furthermore, there are significant unconditional differences in these average growth rates between supported and non-supported firms.

[17] This is the classification used by the CCSS (2007).

participate in the activities organized by PROCOMER. In principle, this agency mainly target small, relatively inexperienced firms. Thus, one of PROCOMER's missions is to "support micro, small, and medium-sized firms, both those which are already exporting and those with export potential, through programs aiming to provide them with information, training and trade promotion in order make it easier for them to access international markets" (see Jordana et al., 2008). In fact, we have already seen in Section 3 that smaller firms with relatively limited experience in international markets as measured by total exports, the number of products exported, and the number of countries they export to, account for a large share of firms served by PROCOMER. On the other hand, beyond the agency's primary targets, it may be also possible that firms self-select into assistance. More precisely, relatively larger and more experienced firms may be more likely to be aware of and use export promotion services (see, e.g., Reid, 1984; Kedia and Chhokar, 1986; and Ahmed et al., 2002). We therefore include employment and the aforementioned measures of previous export experience as determinants of the propensity score (see Ashenfelter, 1978; Becker and Egger, 2007).[18] In particular, we consider lagged values of employment to control for the fact that this covariate may be affected by assistance (see Caliendo and Kopeinig 2008). Moreover, firms selling abroad goods with different degree of differentiation are likely to have different needs in terms of support. More specifically, as stated above, firms exporting differentiated products face more severe information problems and so are more likely to resort to (and also to be selected for) services provided by the agency. Hence, we include binary variables for each of the good classes identified in Rauch's (1999) classification. These variables take the value of one if the firm in question exports the respective good and 0 otherwise. Furthermore, over the sample period, PROCOMER has mainly had just one office in San José. Even though five regional offices were inaugurated in the rest of the territory towards the end of our sample period (i.e., Liberia, Ciudad Quesada, Limón, Puntarenas, and Pérez Zeledón), endowment of staff and infrastructure determining access to the offices are markedly different from those in the capital (see Jordana et al., 2008). Firm location may then also play an important role in explaining the probability to be assisted

[18] Note that, if adding a new destination country (product) requires incurring specific sunk costs of entry, then trading with a larger number of countries (a larger number of products) will reflect higher productivity (see Bernard et al, 2006). Thus, by including those

by PROCOMER. Hence, we include in the propensity score specification a binary variable taking the value of one if the firm is located in San José and 0 otherwise. In addition, previous use of services provided by PROCOMER may affect current participation. For instance, firms satisfied with these services are more likely to come back to the agency for additional assistance. Accordingly, we also control for previous treatment status by incorporating a binary variable indicating whether the firm received assistance in the previous period (see Görg et al., 2008). Finally, we include year-fixed effects to account for macroeconomic factors affecting participation rates.

We then match each assisted firm with the more similar non-assisted firms as determined by their respective propensity scores, first, on the pooled sample, i.e., pooling over firms exporting different kind of goods and over years. In doing this, we consider three alternative matching estimators: the nearest neighbor estimator (each assisted firm is compared to the most similar non-assisted firm), the radius estimator (each assisted firm is compared to all firms within a certain radius around its propensity score), and the kernel estimator (each assisted firm is compared to all non-assisted firms within an area around the propensity score inversely weighted with the difference between their propensity scores and that of the relevant assisted firm).[19]

In this case, a proper identification of the parameter of interest relies on the assumption that these procedures are able to balance the distribution of the relevant variables in both the control and the treatment groups. We therefore examine the quality of the matching using a battery of tests commonly implemented in the evaluation literature (see, e.g., Smith and Todd, 2005b; Arnold and Javorcik, 2005; Lee, 2006; and Girma and Görg, 2007; Caliendo and Kopeinig, 2008).

First, we perform the stratification (balancing) test, which consists of splitting observations into equally spaced intervals based on the estimated propensity scores and running simple t-tests of the difference between the treated and control groups in terms of

export indicators, to some extent we are also implicitly accounting for productivity differences across (groups of) firms and henceforth at least partially controlling for the possibility that the agency picks "winners".

[19] The parameters (e.g., caliper, bandwidth) used in these estimations are specified in the text below the tables showing the results (Table 5 and Table 6). Estimates based on alternative specifications of these parameters are similar to those reported here and can be obtained from the authors upon request. We perform matching using the software provided by Leuven and Sianesi (2003).

the variables listed above (see, e.g., Arnold and Javorcik, 2005).[20] In our case, all differences turn out to be small and statistically insignificant.[21]

Second, we compute the standardized bias for each covariate before and after matching using the formulas:

$$SB_{Before} = 100.\frac{\left(\overline{X}^{1} - \overline{X}^{0}\right)}{\sqrt{0.5.\left[V^{1}(X) + V^{0}(X)\right]}} \text{ and } SB_{After} = 100.\frac{\left(\overline{X}^{1,M} - \overline{X}^{0,M}\right)}{\sqrt{0.5.\left[V^{1,M}(X) + V^{0,M}(X)\right]}}$$

where $\overline{X}^{1}\left(\overline{V}^{1}\right)$ is the mean (variance) in the group of assisted firms before matching, $\overline{X}^{0}\left(\overline{V}^{0}\right)$ the analogues for the control group, and $\overline{X}^{1,M}\left(\overline{V}^{1,M}\right)$ and $\overline{X}^{0,M}\left(\overline{V}^{0,M}\right)$ are the corresponding values for the matched sample, and estimate the resulting change in the before and after biases (see, e.g., Sianesi, 2004; Girma and Görg, 2007; Caliendo and Kopeinig, 2008). Matching should be associated with decreased standardized biases (see Rosenbaum and Rubin, 1983; Sianesi, 2004; and Caliendo and Kopeinig, 2008). This is in fact what we observe in the first panel of Table 4. The diminution of the bias is substantial for most of the variables. The average reduction ranges from 75.4% to 90.4%, depending on the estimator used. Further, even though there is no formal criterion to identify a standardized bias as "large", following Rosenbaum and Rubin (1985) the usual practice is to consider biases above 20% as large (see, e.g., Smith and Todd, 2005b; Lee, 2006; and Girma and Görg, 2007). As shown in the first panel of Table 4, the standardized differences after matching do not exceed 6.2% for all variables.

Third, we additionally conduct a two-sample *t-test* to check whether there are significant differences in the covariate means for assisted and control groups (see, e.g., Girma and Görg, 2007). The test statistics reported in the first panel of Table 4 indicate that, after matching, differences are not statistically different from zero and accordingly covariates are balanced across groups. Fourth, we implement the Hotelling *t-squared test* (see, e.g., Lee, 2006; and Girma and Görg, 2007). This implies assessing whether the above individual differences are jointly insignificant, i.e., testing the joint null hypothesis that the mean of all variables included in the matching are equal for supported and control groups. Following Girma and Görg (2007), we divide the sample by propensity score quintile and perform the test for each interval. The relevant test statistics along the corresponding *p-values* are presented in the second panel of Table 4. The evidence is also

[20] We implement the procedure developed by Becker and Ichino (2002) over 9 bands of the propensity score.

favorable in this case. No significant differences are detected so balancing conditions are fulfilled within each propensity score quintile.

Fifth, we estimate the propensity score before and after matching and compare the respective pseudo-R^2. This measure indicates how well observed covariates explain the participation probability. If matching was successful, there should be no systematic differences in the distribution of the explanatory variables between treatment and control groups and the pseudo-R^2 should be lower after matching (see Sianesi, 2004). The third panel of Table 4 confirms that this is true for our matching. The pseudo-R^2 declines dramatically when the probit estimation is performed on the matched sample, which clearly suggests that selected firms (treated and non-treated) are indeed very similar. One can also perform a X^2 likelihood-ratio test of the null hypothesis of joint insignificance of all regressors. This hypothesis should not be rejected after matching (see Caliendo and Kopeinig, 2008). This test is also satisfied by our data.

Summing up, there is robust evidence suggesting that our matching procedure has been successful in finding appropriate non-assisted firms to compare with each assisted firm. This procedure results in all distances in propensity scores within matched pairs being less than 1.4%, with a standard deviation of 0.2. Further, we should recall herein that, since we estimate the impacts of interest on first differences, we are also controlling for (unobserved) firm-specific time-invariant variables such as main sector of activity, and, given the relatively short length of our sample period, also, to a large extent, for factors such as managerial attitudes, qualification profile of personnel, and innovation capabilities, which may play a role in determining both service usage and export performance.

Table 5 reports matching difference-in-differences estimates of the assistance by PROCOMER on assisted firms pooling over firms with heterogeneous export bundles, i.e., firms selling abroad products with different degrees of differentiation.[22] Note that, since we are including lagged values of treatment and additional covariates, estimations are performed on the period 2002-2006. The results suggest that export promotion activities performed by PROCOMER are, on average, associated with an increased rate

[21] Detailed tables can be obtained from the authors upon request.

of growth of exports and number of countries they export to. In other words, these activities seem to have been effective in helping firms to expand their exports, primarily along the country-extensive margin. On the contrary, with the exception of a weak effect on the average exports per product, trade promotion actions do not seem to have any significant impact on the intensive margin of firms' exports. These results are consistent with our priors. Export promotion activities aiming at attenuating information problems are likely to have a stronger effect when these problems are acuter, namely, when entering a new market rather than when expanding operation in a country which is already a destination market for the company. Moreover, they are broadly similar to those found in Peru (see Volpe Martincus and Carballo, 2008).

Further, as discussed before, the impact of export promotion may differ depending on the degree of differentiation of the goods exported by the firms. We accordingly split firms into groups with the same export bundles, as defined in terms of the type of goods they consist of. Like in Section 3, we distinguish among firm exporting only differentiated products, firms exporting reference-priced products, firms exporting only homogeneous products, and their different combinations. This also allows us to increase homogeneity between treated and control groups thus leading to cleaner estimates. In fact, we perform the same tests we run on the pooled sample to assess the quality of matching within each sub-sample and find that most of these sub-samples pass those tests (see Table 6).[23,24]

The estimates of the treatment effect for each group of firms pooling over years are presented in Table 7. These results indicate that firms exporting only differentiated goods that participate in promotion activities organized by PROCOMER have larger rates of growth of exports and number of countries they export to than their counterparts. More specifically, according to the kernel estimator, the rate of growth of exports is on average 15.3% ((e0.142-1)x100=15.3) higher for firms assisted by PROCOMER, while that of the number of countries is 8.5% ((e0.082-1)x100=9.6) higher. Thus, for instance, the sample

[22] Bootstrapped standard errors corresponding to nearest neighbor estimates might be inaccurate. Abadie and Imbens (2006) show that because the non-smoothness nature of this matching and the lack of evidence that the resulting estimator is asymptotically linear the bootstrapped variance may diverge from the actual variance.

[23] We have also computed the bias reduction. Figures suggest that our matching procedures are able to substantially reduce the biases in most cases. A detailed table with these results is available from the authors upon request. The Hotelling test, on the contrary, has not been calculated because the number of observations within each propensity score quintile is relatively small for some sub-samples.

average (logarithm) annual growth rate of the number of countries is 4.6%, so this would imply that treated firms would have a rate 0.4 percentage points higher than non-treated firms. Hence, export promotion actions seem to favor an expansion of exports of those firms selling differentiated goods abroad, primarily facilitating an increase in the number of trading partners.[25]

Furthermore, assistance by PROCOMER does not seem to translate into higher export growth, neither on the intensive nor on the extensive margin, for firms that only export reference-priced or homogeneous products. Finally, notice there are some additional significant effects, but these results are not robust either to using different matching estimators or to using different procedures to compute the standard errors.

The evidence suggests that export promotion activities by PROCOMER do have a positive impact and that this impact is essentially concentrated on the extensive margin of firms trading differentiated products, i.e., these activities have helped Costa Rican firms to expand their exports mainly by reaching new destination countries. This is exactly what we would expect *a priori*. Trade promotion services are likely to have stronger effects on those export activities where information incompleteness is more pronounced and this is precisely the case when firms selling differentiated products attempt to expand the sets of countries they export to.

One possible concern with these estimates is that their precision may be low when the covariates have significantly different effects on the participation probabilities and the potential outcomes. In particular, firms with identical propensity scores may be very dissimilar with respect to the relative importance of the determinants of these outcomes. Since the main purpose of the matching is to balance particularly the covariates that are highly influential on the outcomes, conditioning only on the propensity score may not be the most efficient method. An alternative strategy proposed in the literature consists of matching on the propensity score and a subset of covariates (see Lechner, 2002a; Lechner, 2002b; Gerfin and Lechner, 2002; and Frölich, 2004). In this sense, it is clear

[24] According to the *t-test*, some variables display significant differences between matched and control groups after matching for the sub-samples corresponding to firms simultaneously exporting differentiated and reference-priced products when using kernel and radius matching and to firms exporting both differentiated and homogeneous products when using kernel matching.

[25] A similar pattern is also observed for firms exporting both differentiated and reference-priced goods. In particular, even though the impact on total exports is not robust, there seems to be a significant positive effect of trade promotion on the rate of growth of the number of destination countries Results for this sub-sample based on the kernel and radius estimators should however be considered with caution because, as mentioned above, some variables seem to be still unbalanced after matching according to the t-test.

that a given location may have different implications in terms of selection into promotion activities and export performance.[26] For instance, a firm located in the port city of Limón may have better access to and thereby better conditions to compete successfully in international markets than a pair situated in the landlocked capital city of San José, whereas the opposite may hold regarding access to services provided by PROCOMER and thus probability of being assisted. We therefore check whether our results are robust to augmenting the propensity score with our binary indicator of location.[27] In this case, firms are matched according to their closeness in the propensity score and this attribute as defined by the Mahalanobis distance.[28] The estimates obtained with this alternative matching procedure are shown in Table 8. They confirm our main results.

There is an additional important econometric issue that needs to be addressed. As mentioned before, the matching has the advantage of leaving the individual causal effect completely unrestricted thus allowing for impact heterogeneity across firms in the population (see Gerfin and Lechner, 2002). In particular, this procedure can be applied on strata of the data defined by different values of variables that cannot be changed by the effect of the treatment (see Lechner, 2002). This latter requirement might potentially be not fulfilled in our case as export promotion activities may be not only associated with improved performance of exporters of specific goods, but also with changes in the set of goods being exported across differentiation degrees over time and henceforth with reclassification across groups of firms. In order to investigate whether there is a systematic relationship between these changes and assistance which might affect our estimates, we apply again the econometric strategy outlined in Section 2 on the same propensity score estimated before. We also perform probit estimations. The dependent variable is a binary indicator taking the value of one if the firm changes its export basket, i.e., it changes the group it should be placed in from the previous to the current year, and 0 otherwise, while the key explanatory variable is the binary assistance indicator. We use several specifications including alternative models such as pooled probit and dynamic panel probit (see Wooldridge, 2005) and varying sets of covariates. The message is clear across these specifications (see Table 9). There is no significant link between

[26] Location has been shown to have a significant impact on export performance (see, e.g., Roberts and Tybout, 1997).
[27] Recall that this indicator takes the value of one if the firm is located in San José and 0 otherwise.

participation in trade promotion programs organized by PROCOMER and changes across groups of firms exporting goods with different level of specialization. This evidence thus provides support to our stratification strategy.

In the previous exercise we pool changes across different export baskets together. It is however interesting in itself to know whether assistance by PROCOMER is particularly associated with a high incidence of exporting differentiated goods. To investigate this, we can use the same approach as before. In this case, the outcome variable is a binary indicator taking the value of one if the firm starts selling differentiated goods abroad and 0 otherwise.[29] According to this indicator, in our sample 356 firms register additions of differentiated goods to export bundles that did not previously contained them. We present estimation results in Table 10. These results consistently indicate that trade promotion activities performed by PROCOMER do not seem to have played an important role in the aforementioned additions, i.e., they do not seem to have encouraged firms active in international markets to start exporting differentiated goods.

Even though supply factors can admittedly exert a significant influence, the range and nature of the services offered by PROCOMER are likely to share responsibility in explaining this finding.[30] More specifically, this agency has six programs within a broad area of services aiming to develop an export culture and strengthening the competitiveness of national exports and only one of them is specially focused on supporting firms in competing through differentiation (PIVA: Programa de Impulso al Valor Agregado – Value Added Impulse Program). While these six programs jointly represent less than 4.0% of the PROCOMER's budget, standard export promotion activities such as sponsorship of participation in trade missions and fairs, which are more likely to be functional in helping exporters to incorporate new trading partners, account for more than 15.0% of this budget. In particular, PIVA is small scale program. Only 23 entrepreneurs participated in the last year (see Jordana et al., 2008). As Görg et al. (2008)

[28] See Rubin (1980) for an explanation of this measure. Zhou (2004) shows that Mahalanobis matching is relatively robust under different sample sizes and correlation patterns between covariates and program participation and outcomes.

[29] We alternatively use a binary indicator taking to value of one if the firm either incorporates differentiated goods to an export basket that did not contain them or drops these goods from a bundle that did include them and 0 otherwise. This yields results similar to those reported here. They are available from the authors upon request.

[30] For instance, diversification into new differentiated products may be hindered by limited know-how accumulated, constraints in available qualified personnel, and difficulties in access to credit to finance the risky activity of entering a new product market.

have shown, when assistance is not large enough, it may not result in expanded export activity of firms in international markets.

Summing up, support services provided by PROCOMER are effective in promoting export growth primarily through the country-extensive margin in the case of firms that are already established exporters of differentiated goods but do not seem to stimulate other exporters to diversify into these goods.

5 Concluding Remarks

It is well known from the literature that lack of diversification can be potentially costly in terms of economic growth (see, e.g., Brainard and Cooper, 1968; Lederman and Maloney, 2003; and Herzer and Nowak-Lehmann, 2006). Since homogeneous commodities prevail in most developing countries' exports, for these countries diversification primarily means diversifying into differentiated products. This represents a big challenge. These products are particularly affected by information problems and accordingly require more sophisticated marketing strategies. Can be effective export promotion policies part of the answer to this challenge?

This paper has attempted to shed light into this question by providing firm-level evidence from Costa Rica. More specifically, we have assessed the relative effectiveness of trade promotion activities performed by Costa Rica's national agency on export performance of firms selling abroad goods with different degrees of differentiation. In doing this, we have applied a matching difference-in-difference procedure on a rich dataset containing export data disaggregated by product and destination country and employment for (almost) the whole population of Costa Rican exporters. We find that, in the case of firms selling only differentiated goods, export promotion actions have been associated with increased exports along the extensive margin, in particular, through a stronger expansion of the number of countries they export to. However, these actions do not seem to encourage exporters to start selling differentiated products abroad. Finally, they do not have any distinguishable impacts on export behavior of firms trading reference-priced and homogeneous goods.

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Table 1

Aggregate Export and Treatment Indicators					
Year	**Total Exports**	**Number of Countries**	**Number of Products**	**Number of Exporting Firms**	**Number of Exporters Served by PROCOMER**
2001	4,880	134	3,772	2,132	76
2002	5,120	135	3,796	2,101	74
2003	5,920	139	3,918	2,241	296
2004	6,080	139	3,969	2,340	244
2005	6,770	146	3,974	2,507	258
2006	7,980	146	4,231	2,956	213

Source: Own elaboration on data provided by PROCOMER.
Total exports are expressed in millions of US dollars.

Table 2

Average Exporter							
Variables	**Pooled**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Employees	98.83	99.91	104.79	100.18	99.03	97.96	93.51
Location	0.62	0.61	0.61	0.61	0.61	0.62	0.65
Exports	2,575.23	2,290.14	2,441.77	2,636.51	2,599.42	2,705.38	2,699.73
Number of Countries	3.34	3.45	3.40	3.38	3.34	3.36	3.17
Number of Products	7.07	7.19	7.22	7.13	7.15	7.08	6.78
Average Exports by Product	372.02	339.38	360.57	396.11	416.08	376.85	346.46
Average Exports by Country	437.64	469.64	468.34	460.30	433.96	413.87	398.65
Average Exports by Country and Product	110.99	107.30	106.76	128.37	121.08	105.94	99.80

Source: Own elaboration on data provided by PROCOMER and CCSS.
Exports and average exports are expressed in thousands of US dollars.

Table 3

Average Exporter by Type of Firm and Size Category					
Variables	**Pooled**	**Micro**	**Small**	**Medium**	**Large**
Firms Exporting Differentiated Products					
Total Number of Firms	3,450	1,529	935	450	258
Average Exports	697.16	80.04	265.15	549.21	5,265.30
Average Number of Countries	2.47	1.74	2.52	3.30	4.79
Average Number of Products	3.97	3.16	3.98	4.80	7.25
Total Number of Firms Assisted by PROCOMER	236	48	77	70	46
Firms Exporting Reference-Priced Products					
Total Number of Firms	840	445	184	79	67
Average Exports	677.06	223.63	265.55	987.69	3,909.61
Average Number of Countries	2.14	1.53	2.30	3.06	4.27
Average Number of Products	2.25	2.03	2.43	2.87	2.58
Total Number of Firms Assisted by PROCOMER	98	35	31	18	17
Firms Exporting Homogeneous Products					
Total Number of Firms	572	254	85	80	119
Average Exports	1,762.39	267.76	647.66	933.60	4,566.51
Average Number of Countries	2.86	1.45	2.30	3.46	4.60
Average Number of Products	1.34	1.40	1.38	1.41	1.24
Total Number of Firms Assisted by PROCOMER	47	6	14	14	12
Firms Exporting Differentiated and Reference-Priced Products					
Total Number of Firms	1,276	390	386	263	267
Average Exports	6,828.95	1,432.34	817.53	2,527.51	21,900.00
Average Number of Countries	5.54	3.08	3.95	5.81	9.41
Average Number of Products	14.82	9.86	11.23	15.46	22.64
Total Number of Firms Assisted by PROCOMER	194	29	34	62	74
Firms Exporting Differentiated and Homogeneous Products					
Total Number of Firms	199	69	40	32	45
Average Exports	2,878.10	241.43	1,462.79	833.77	9,505.72
Average Number of Countries	3.84	2.64	3.30	4.06	6.28
Average Number of Products	5.99	4.93	5.84	6.08	7.94
Total Number of Firms Assisted by PROCOMER	18	2	2	3	11
Firms Exporting Reference-Priced and Homogeneous Products					
Total Number of Firms	265	149	52	23	33
Average Exports	2,285.70	1,414.95	1,094.22	1,583.76	9,601.61
Average Number of Countries	2.81	2.10	2.95	3.51	5.86
Average Number of Products	6.82	6.81	7.67	6.47	6.21
Total Number of Firms Assisted by PROCOMER	62	26	17	8	11
Firms Exporting Differentiated, Reference-Priced, and Homogeneous Products					
Total Number of Firms	403	114	81	86	141
Average Exports	9,372.03	706.68	1,057.42	4,205.32	19,500.00
Average Number of Countries	7.13	3.00	4.28	6.09	10.91
Average Number of Products	28.09	23.10	16.88	27.68	35.22
Total Number of Firms Assisted by PROCOMER	88	14	13	17	49

Source: Own elaboration on data provided by PROCOMER and CCSS.

Average exports are expressed in thousands of US dollars. Total number of firms corresponds to the number of different firms within each category over the sample period, 2001-2006. The same holds for total number of firms that have been assisted by PROCOMER.

Table 4

Panel 1: Standardized Bias and T-test

Covariates	Nearest Neighbor					
	Mean		%Bias	%Bias Reduction	t-test	
	Treated	Control			t-test	p-value
Treatment	0.439	0.428	2.700	97.200	0.460	0.643
Total Exports	13.157	13.257	-6.200	80.700	-1.180	0.264
Number of Countries	1.458	1.478	-2.300	95.200	-0.510	0.611
Number of Products	1.761	1.772	-1.000	96.800	-0.210	0.831
Labor	3.802	3.797	0.300	99.400	0.060	0.953
Location	0.607	0.578	5.900	-5.900	1.260	0.206
Differentiated Goods	0.748	0.756	-1.900	66.500	-0.430	0.670
Reference-Priced Goods	0.599	0.621	-4.600	89.000	-0.990	0.322
Homogeneous Goods	0.281	0.267	6.100	59.500	1.170	0.265
Covariates	**Kernel**					
Treatment	0.439	0.419	5.100	94.800	0.870	0.386
Total Exports	13.157	13.208	-2.100	93.900	-0.460	0.644
Number of Countries	1.458	1.439	2.300	95.400	0.490	0.626
Number of Products	1.761	1.746	1.200	96.100	0.260	0.793
Labor	3.802	3.757	2.300	94.800	0.510	0.612
Location	0.607	0.594	2.600	53.400	0.560	0.577
Differentiated Goods	0.748	0.744	0.800	86.100	0.180	0.861
Reference-Priced Goods	0.599	0.595	0.600	98.500	0.140	0.890
Homogeneous Goods	0.281	0.278	0.600	96.000	0.130	0.896
Covariates	**Radius**					
Treatment	0.439	0.420	4.800	95.100	0.820	0.410
Total Exports	13.157	13.226	-2.800	91.600	-0.630	0.527
Number of Countries	1.458	1.447	1.300	97.300	0.280	0.779
Number of Products	1.761	1.754	0.600	98.100	0.130	0.900
Labor	3.802	3.779	1.200	97.300	0.270	0.791
Location	0.607	0.593	2.900	47.100	0.630	0.526
Differentiated Goods	0.748	0.746	0.400	93.600	0.080	0.935
Reference-Priced Goods	0.599	0.599	-0.100	99.700	-0.030	0.978
Homogeneous Goods	0.281	0.277	0.900	94.200	0.190	0.850

Panel 2: Hotelling T-Squared Test

Quintile	Nearest Neighbor		Kernel		Radius	
	F	p-value	F	p-value	F	p-value
First	0.757	0.669	1.046	0.368	1.046	0.368
Second	0.610	0.830	0.725	0.592	0.725	0.592
Third	1.210	0.270	0.594	0.860	0.594	0.860
Forth	0.765	0.697	1.520	0.108	1.520	0.108
Fifth	1.140	0.319	1.074	0.354	1.074	0.354

Panel 3: Pseudo-R^2 and X^2-Test of Joint Insignificance of Regressors

Estimator	Pseudo R^2		X^2-Test of Joint Insignificance of Regressors			
			Before		After	
	Before	After	X^2	p-value	X^2	p-value
Nearest Neighbor	0.212	0.006	1262.430	0.000	16.570	0.280
Radius	0.212	0.001	1262.430	0.000	3.060	0.999
Kernel	0.212	0.001	1262.430	0.000	3.060	0.999

Source: Own calculations on data from PROCOMER and CCSS.

The table reports, for each covariate included in the probit model determining selection into treatment, the percentage bias after matching, the reduction in the standardized bias, and the t-test statistics for the difference in means between treated and control groups after matching, as well as the Hotelling t-squared test statistics for the joint significance of these mean differences over quintiles, estimates of the pseudo-R^2 from the probit model, and the likelihood ratio test statistics of joint insignificance of the covariates. Variables included in the propensity score specification are: lagged (natural logarithm of) export earnings, lagged (natural logarithm of) number of products exported, lagged (natural logarithm of) number of countries served, lagged treatment status, lagged (natural logarithm of) employment, a binary variable for location (San José=1 and 0 otherwise), a binary variable for type of good exported (differentiated products=1 and 0 otherwise, reference-priced products=1 and 0 otherwise, and homogeneous products=1 and 0 otherwise), and year-fixed effects (not reported).

Table 5

Average Effect of Assistance by PROCOMER on Assisted Firms
Matching Difference-in-Differences Estimates

Export Performance Indicator	Standard Error	NN	Radius	Kernel
Total Exports		0.114	0.100	0.101
	Analytical	(0.045)***	(0.034)***	(0.034)***
	Bootstrapped	(0.047)**	(0.037)***	(0.036)***
Number of Countries		0.062	0.052	0.052
	Analytical	(0.024)***	(0.018)***	(0.018)***
	Bootstrapped	(0.026)***	(0.020)***	(0.019)***
Number of Products		0.027	0.040	0.041
	Analytical	(0.033)	(0.024)*	(0.024)*
	Bootstrapped	(0.037)	(0.028)*	(0.029)*
Average Exports per Country and Product		0.025	0.008	0.008
	Analytical	(0.053)	(0.038)	(0.038)
	Bootstrapped	(0.057)	(0.039)	(0.040)
Average Exports per Product		0.087	0.060	0.060
	Analytical	(0.047)*	(0.034)*	(0.035)*
	Bootstrapped	(0.048)*	(0.036)*	(0.036)*
Average Exports per Country		0.052	0.049	0.049
	Analytical	(0.044)	(0.033)	(0.033)
	Bootstrapped	(0.042)	(0.036)	(0.037)

Source: Own elaboration on data provided by PROCOMER and CCSS.
The table reports matching difference-in-differences estimates of the average assistance effect on assisted firms over the period 2002-2006. Nearest neighbor (NN) with caliper *r*=0.04. Radius matching obtained with *r*=0.04. Kernel matching is based on the Epanechnikov kernel with a bandwidth of 0.04. Standard errors reported in parentheses. Bootstrapped standard errors based on 500 replications. * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. The significance indicator is reported with the standard errors corresponding to each method used to compute these errors

Table 6

Panel 1: Standardized Bias and T-test

Covariates	D				R				H			
	Mean		%Bias	t-test p-value	Mean		%Bias	t-test p-value	Mean		%Bias	t-test p-value
	Treated	Control			Treated	Control			Treated	Control		
	Nearest Neighbor											
Treatment	0.443	0.439	1.143	0.925	0.431	0.431	0.000	1.000	0.529	0.539	-2.383	0.889
Total Exports	12.086	12.251	-6.904	0.443	12.523	12.790	-13.261	0.440	14.875	15.280	-19.120	0.131
Number of Countries	1.118	1.210	-11.001	0.263	1.057	1.071	-2.085	0.903	2.075	2.184	-13.932	0.247
Number of Products	1.220	1.225	-0.499	0.957	0.852	0.940	-12.399	0.475	3.136	3.195	-6.607	0.632
Labor	3.473	3.261	12.154	0.200	2.834	2.652	9.434	0.604	4.970	5.023	-2.379	0.849
Location	0.636	0.618	3.715	0.699	0.615	0.538	15.626	0.379	0.559	0.647	-17.755	0.200
Covariates	Kernel											
Treatment	0.443	0.431	3.160	0.795	0.431	0.440	-2.254	0.919	0.529	0.515	3.436	0.841
Total Exports	12.086	12.100	-0.581	0.949	12.523	12.362	8.033	0.663	14.875	15.112	-11.203	0.397
Number of Countries	1.118	1.120	-0.204	0.983	1.057	0.998	8.514	0.642	2.075	2.014	7.765	0.540
Number of Products	1.220	1.220	0.033	0.997	0.852	0.723	18.346	0.308	3.136	3.215	-8.969	0.510
Labor	3.473	3.252	12.714	0.174	2.834	3.050	-11.199	0.524	4.970	4.931	1.762	0.890
Location	0.636	0.591	9.492	0.327	0.615	0.588	5.648	0.748	0.559	0.621	-12.466	0.371
Covariates	Radius											
Treatment	0.443	0.433	2.685	0.825	0.431	0.440	-2.201	0.920	0.529	0.518	2.886	0.866
Total Exports	12.086	12.111	-1.038	0.909	12.523	12.429	4.700	0.794	14.875	15.106	-10.906	0.405
Number of Countries	1.118	1.126	-0.933	0.923	1.057	1.020	5.388	0.767	2.075	2.026	6.285	0.618
Number of Products	1.220	1.220	0.091	0.992	0.852	0.714	19.562	0.278	3.136	3.222	-9.764	0.473
Labor	3.473	3.275	11.366	0.226	2.834	3.092	-13.331	0.448	4.970	4.961	0.414	0.974
Location	0.636	0.591	9.572	0.323	0.615	0.583	6.587	0.709	0.559	0.628	-13.831	0.320

Panel 2: Pseudo-R^2 and X^2-Test of Joint Insignificance of Regressors

Estimator	Pseudo R^2		X^2-Test of Joint Insignificance		Pseudo R^2		X^2-Test of Joint Insignificance		Pseudo R^2		X^2-Test of Joint Insignificance	
			Before	After			Before	After			Before	After
	Before	After	p-value	p-value	Before	After	p-value	p-value	Before	After	p-value	p-value
Nearest Neighbor	0.219	0.015	0.000	0.560	0.241	0.027	0.000	0.937	0.266	0.057	0.000	0.788
Radius	0.219	0.010	0.000	0.835	0.241	0.031	0.000	0.896	0.266	0.057	0.000	0.775
Kernel	0.219	0.009	0.000	0.884	0.241	0.033	0.000	0.881	0.266	0.055	0.000	0.785

Source: Own calculations on data from PROCOMER and CCSS.

The table reports, for each covariate included in the probit model determining selection into treatment, the percentage bias after matching and the p-value of the t-test for the difference in means between treated and control groups after matching, as well as the estimates of the pseudo-R^2 from the probit model, and the p-values of the likelihood ratio test of joint insignificance of the covariates. Variables included in the propensity score specification are: lagged (natural logarithm of) export earnings, lagged (natural logarithm of) number of products exported, lagged (natural logarithm of) number of countries served, lagged treatment status, lagged (natural logarithm of) employment, a binary variable for location (San José=1 and 0 otherwise), and year-fixed effects (not reported). The sets of goods have been defined using the basic categories identified in the classification proposed by Rauch (1999) (liberal version) and their combinations. D: firms exporting differentiated products; R: firms exporting referenced-price products; H: firms exporting homogeneous products.

Table 6 (cont.)

Panel 1: Standardized Bias and T-Test

Covariates	D-R				D-H				R-H				D-R-H			
	Mean		%Bias	t-test	Mean		%Bias	t-test	Mean		%Bias	t-test	Mean		%Bias	t-test
	Treated	Control		p-value	Treated	Control		p-value	Treated	Control		p-value	Treated	Control		p-value
	Nearest Neighbor															
Treatment	0.449	0.449	0.000	1.000	0.148	0.111	13.403	0.692	0.400	0.457	-14.012	0.635	0.429	0.429	0.000	1.000
Total Exports	14.058	13.768	13.852	0.125	12.590	13.169	-7.199	0.257	13.462	13.656	-16.675	0.252	14.925	14.426	17.278	0.118
Number of Countries	1.933	1.925	0.873	0.927	0.936	1.004	-8.424	0.215	0.989	0.946	7.206	0.794	1.834	1.795	5.742	0.872
Number of Products	2.391	2.556	-17.994	0.402	0.276	0.257	5.693	0.323	1.865	1.858	1.078	0.963	1.732	1.622	17.161	0.402
Labor	4.542	4.223	18.679	0.305	3.839	3.674	9.548	0.373	2.412	2.449	-1.946	0.941	5.153	4.759	9.547	0.126
Location	0.719	0.663	12.520	0.230	0.444	0.493	-9.603	0.285	0.257	0.314	-12.176	0.603	0.571	0.852	-7.004	0.055
Covariates	Kernel															
Treatment	0.449	0.443	1.496	0.908	0.148	0.111	10.321	0.692	0.400	0.401	-0.311	0.992	0.429	0.429	0.000	1.000
Total Exports	14.058	13.680	18.045	0.067	12.590	12.861	-7.475	0.014	13.462	13.620	-10.732	0.671	14.925	14.628	16.845	0.226
Number of Countries	1.933	1.870	7.608	0.431	0.936	1.042	-9.092	0.062	0.989	0.914	12.694	0.613	1.834	1.791	10.045	0.337
Number of Products	2.391	2.538	-16.028	0.113	0.276	0.226	12.648	0.215	1.865	1.831	5.230	0.831	1.732	1.626	11.294	0.576
Labor	4.542	4.127	19.330	0.013	3.839	4.014	-16.541	0.292	2.412	2.194	11.533	0.655	5.153	4.971	12.923	0.166
Location	0.719	0.672	10.481	0.313	0.444	0.528	-16.693	0.548	0.257	0.305	-12.214	0.298	0.571	0.637	-13.660	0.569
Covariates	Radius															
Treatment	0.449	0.443	1.477	0.909	0.148	0.111	13.403	0.695	0.400	0.407	-1.764	0.952	0.429	0.429	0.000	1.000
Total Exports	14.058	13.698	17.204	0.081	12.590	13.055	-9.737	0.205	13.462	13.624	-11.002	0.665	14.925	14.702	13.049	0.239
Number of Countries	1.933	1.884	5.967	0.537	0.936	0.899	5.423	0.261	0.989	0.928	10.264	0.683	1.834	1.717	6.283	0.360
Number of Products	2.391	2.542	-16.470	0.103	0.276	0.237	13.666	0.199	1.865	1.824	6.293	0.795	1.732	1.707	7.246	0.532
Labor	4.542	4.352	12.886	0.020	3.839	4.183	-12.885	0.259	2.412	2.250	8.567	0.740	5.153	5.072	9.461	0.185
Location	0.719	0.668	11.452	0.272	0.444	0.544	-19.795	0.480	0.257	0.308	-17.895	0.248	0.571	0.634	-12.971	0.560

Panel 2: Pseudo-R^2 and X^2-Test of Joint Insignificance of Regressors

Estimator	Pseudo R^2		X^2-Test of Joint Insignificance		Pseudo R^2		X^2-Test of Joint Insignificance		Pseudo R^2		X^2-Test of Joint Insignificance		Pseudo R^2		X^2-Test of Joint Insignificance	
			Before	After			Before	After			Before	After			Before	After
	Before	After	p-value	p-value	Before	After	p-value	p-value	Before	After	p-value	p-value	Before	After	p-value	p-value
Nearest Neighbor	0.245	0.046	0.000	0.641	0.156	0.307	0.000	0.285	0.260	0.087	0.000	0.670	0.281	0.052	0.000	0.194
Radius	0.245	0.045	0.000	0.733	0.156	0.167	0.000	0.328	0.260	0.093	0.000	0.620	0.281	0.047	0.000	0.275
Kernel	0.245	0.045	0.000	0.734	0.156	0.172	0.000	0.301	0.260	0.095	0.000	0.598	0.281	0.045	0.000	0.311

Source: Own calculations on data from PROCOMER and CCSS.

The table reports, for each covariate included in the probit model determining selection into treatment, the percentage bias after matching and the p-value of the t-test for the difference in means between treated and control groups after matching, as well as the estimates of the pseudo-R2 from the probit model, and the p-values of the likelihood ratio test of joint insignificance of the covariates. Variables included in the propensity score specification are: lagged (natural logarithm of) export earnings, lagged (natural logarithm of) number of products exported, lagged (natural logarithm of) number of countries served, lagged treatment status, lagged (natural logarithm of) employment, a binary variable for location (San José=1 and 0 otherwise), and year-fixed effects (not reported). The sets of goods have been defined using the basic categories identified in the classification proposed by Rauch (1999) (liberal version) and their combinations. D-R: firms exporting differentiated and reference-priced products; D-H: firms exporting differentiated and homogeneous products; R-H: firms exporting reference-priced and homogeneous products; D-R-H: firms exporting differentiated, reference-priced, and homogeneous products.

Table 7

Average Effect of Assistance by PROCOMER on Assisted Firms
Matching Difference-in-Differences Estimates

Export Performance Indicator	Standard Error	D			R			H		
		NN	Radius	Kernel	NN	Radius	Kernel	NN	Radius	Kernel
Total Exports		0.162	0.145	0.142	0.167	-0.129	-0.121	0.132	0.254	0.258
	Analytical	(0.094)*	(0.076)*	(0.077)*	(0.221)	(0.162)	(0.165)	(0.229)	(0.173)	(0.173)
	Bootstrapped	(0.090)*	(0.068)**	(0.069)**	(0.220)	(0.179)	(0.162)	(0.260)	(0.169)	(0.169)
Number of Countries		0.112	0.081	0.082	0.035	0.013	-0.001	-0.069	-0.069	-0.075
	Analytical	(0.052)**	(0.042)*	(0.042)*	(0.087)	(0.076)	(0.076)	(0.118)	(0.097)	(0.097)
	Bootstrapped	(0.051)**	(0.042)*	(0.044)*	(0.100)	(0.073)	(0.073)	(0.132)	(0.096)	(0.096)
Number of Products		0.115	0.075	0.071	0.234	-0.073	-0.079	-0.092	0.031	0.029
	Analytical	(0.072)	(0.052)	(0.052)	(0.108)**	(0.088)	(0.089)	(0.083)	(0.061)	(0.061)
	Bootstrapped	(0.077)	(0.053)	(0.053)	(0.149)	(0.098)	(0.110)	(0.094)	(0.069)	(0.063)
Average Exports per Country and Product		-0.065	-0.010	-0.011	-0.102	-0.069	-0.041	0.292	0.292	0.303
	Analytical	(0.119)	(0.090)	(0.091)	(0.206)	(0.162)	(0.164)	(0.264)	(0.203)	(0.204)
	Bootstrapped	(0.120)	(0.089)	(0.094)	(0.231)	(0.197)	(0.188)	(0.284)	(0.189)	(0.187)
Average Exports per Product		0.047	0.070	0.071	-0.067	-0.056	-0.042	0.224	0.223	0.228
	Analytical	(0.105)	(0.079)	(0.080)	(0.207)	(0.158)	(0.160)	(0.232)	(0.177)	(0.177)
	Bootstrapped	(0.109)	(0.071)	(0.076)	(0.217)	(0.176)	(0.177)	(0.272)	(0.178)	(0.172)
Average Exports per Country		0.051	0.064	0.060	0.132	-0.142	-0.120	0.200	0.323	0.333
	Analytical	(0.093)	(0.076)	(0.077)	(0.202)	(0.154)	(0.156)	(0.251)	(0.183)*	(0.183)*
	Bootstrapped	(0.094)	(0.070)	(0.071)	(0.200)	(0.169)	(0.153)	(0.268)	(0.185)*	(0.177)*

Source: Own elaboration on data provided by PROCOMER and CCSS.

The table reports matching difference-in-differences estimates of the average assistance effect on assisted firms for exporters of different sets of goods over the period 2002-2006. Nearest neighbor (NN) with caliper r=0.04. Radius matching obtained with r=0.04. Kernel matching is based on the Epanechnikov kernel with a bandwidth of 0.04. The sets of goods have been defined using the basic categories identified in the classification proposed by Rauch (1999) (liberal version) and their combinations. D: firms exporting differentiated products; R: firms exporting referenced-price products; H: firms exporting homogeneous products. Standard errors reported in parentheses. Bootstrapped standard errors based on 500 replications. * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. The significance indicator is reported with the standard errors corresponding to each method used to compute these errors.

Table 7 (cont.)

Average Effect of Assistance by PROCOMER on Assisted Firms
Matching Difference-in-Differences Estimates

Export Performance Indicator	Standard Error	D-R+			D-H+			R-H			D-R-H		
		NN	Radius	Kernel	NN	Radius	Kernel	NN	Radius	Kernel	NN	Radius	Kernel
Total Exports		0.105	0.097	0.092	0.654	(0.009)	0.004	0.139	0.063	0.083	0.090	0.069	0.069
	Analytical	(0.068)	(0.057)*	(0.058)	(0.570)	(0.308)	(0.312)	(0.163)	(0.129)	(0.131)	(0.072)	(0.078)	(0.080)
	Bootstrapped	(0.066)	(0.049)**	(0.046)**	(0.852)	(0.529)	(0.528)	(0.210)	(0.119)	(0.135)	(0.073)	(0.059)	(0.058)
Number of Countries		0.092	0.089	0.086	0.323	0.072	0.066	0.063	0.139	0.139	0.106	0.063	0.068
	Analytical	(0.045)**	(0.037)**	(0.037)**	(0.187)*	(0.144)	(0.146)	(0.126)	(0.107)	(0.107)	(0.054)*	(0.049)	(0.050)
	Bootstrapped	(0.046)*	(0.035)**	(0.034)**	(0.325)	(0.179)	(0.189)	(0.140)	(0.105)	(0.105)	(0.056)*	(0.040)	(0.042)
Number of Products		0.079	0.050	0.053	0.564	0.180	0.221	0.187	0.164	0.171	-0.013	0.074	0.065
	Analytical	(0.057)	(0.044)	(0.044)	(0.361)	(0.152)	(0.154)	(0.111)*	(0.100)	(0.100)*	(0.083)	(0.067)	(0.068)
	Bootstrapped	(0.059)	(0.043)	(0.044)	(0.417)	(0.269)	(0.288)	(0.106)*	(0.092)*	(0.096)*	(0.076)	(0.064)	(0.061)
Average Exports per Country and Product		-0.037	-0.042	-0.046	-0.232	-0.261	-0.283	-0.110	-0.241	-0.228	-0.003	-0.068	-0.065
	Analytical	(0.088)	(0.070)	(0.070)	(0.543)	(0.294)	(0.298)	(0.228)	(0.196)	(0.197)	(0.108)	(0.092)	(0.095)
	Bootstrapped	(0.085)	(0.065)	(0.059)	(0.589)	(0.391)	(0.389)	(0.269)	(0.188)	(0.185)	(0.110)	(0.079)	(0.077)
Average Exports per Product		0.025	0.047	0.040	0.090	-0.189	-0.217	-0.048	-0.102	-0.089	0.103	-0.005	0.004
	Analytical	(0.075)	(0.059)	(0.059)	(0.552)	(0.289)	(0.293)	(0.197)	(0.141)	(0.142)	(0.095)	(0.082)	(0.084)
	Bootstrapped	(0.077)	(0.052)	(0.052)	(0.809)	(0.461)	(0.482)	(0.246)	(0.146)	(0.146)	(0.095)	(0.070)	(0.069)
Average Exports per Country		0.042	0.008	0.007	0.332	-0.081	-0.062	0.077	-0.077	-0.057	-0.016	0.006	0.000
	Analytical	(0.074)	(0.060)	(0.061)	(0.488)	(0.286)	(0.290)	(0.172)	(0.155)	(0.157)	(0.070)	(0.075)	(0.077)
	Bootstrapped	(0.067)	(0.051)	(0.050)	(0.549)	(0.393)	(0.434)	(0.228)	(0.147)	(0.157)	(0.073)	(0.059)	(0.058)

Source: Own elaboration on data provided by PROCOMER and CCSS.
The table reports matching difference-in-differences estimates of the average assistance effect on assisted firms for exporters of different set of goods over the period 2002-2006. Nearest neighbor (NN) with caliper *r*=0.04. Radius matching obtained with *r*=0.04. Kernel matching is based on the Epanechnikov kernel with a bandwidth of 0.04. The sets of goods have been defined using basic categories identified in the classification proposed by Rauch (1999) (liberal version) and their combinations. D-R: firms exporting differentiated and reference-priced products; D-H: firms exporting differentiated and homogeneous products; R-H: firms exporting reference-priced and homogeneous products; D-R-H: firms exporting differentiated, reference-priced, and homogeneous products. Standard errors reported in parentheses. Bootstrapped standard errors based on 500 replications. * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. The significance indicator is reported with the standard errors corresponding to each method used to compute these errors. +These sub-samples do not pass all matching quality tests (see footnote 19).

Table 8

Average Effect of Assistance by PROCOMER on Assisted Firms
Matching Difference-in-Differences Estimates Based on Mahalanobis Matching

Export Performance Indicator	Standard Error	D	R	H	DR	DH	RH	DRH
Total Exports		0.180	0.017	0.162	0.042	0.110	-0.147	0.173
	Analytical	(0.094)*	(0.171)	(0.208)	(0.073)	(0.398)	(0.179)	(0.079)**
	Bootstrapped	(0.106)*	(0.223)	(0.233)	(0.072)	(1.047)	(0.168)	(0.080)**
Number of Countries		0.126	0.007	-0.016	0.027	0.178	-0.035	0.099
	Analytical	(0.053)***	(0.085)	(0.116)	(0.045)	(0.197)	(0.122)	(0.054)*
	Bootstrapped	(0.063)**	(0.107)	(0.128)	(0.048)	(0.414)	(0.144)	(0.056)*
Number of Products		0.205	0.175	-0.060	0.022	0.017	0.134	-0.033
	Analytical	(0.071)***	(0.119)	(0.081)	(0.060)	(0.300)	(0.125)	(0.087)
	Bootstrapped	(0.088)**	(0.122)	(0.099)	(0.054)	(0.457)	(0.116)	(0.088)
Average Exports per Country and Product		-0.152	-0.165	0.238	-0.007	-0.085	-0.246	0.107
	Analytical	(0.118)	(0.181)	(0.256)	(0.084)	(0.429)	(0.260)	(0.118)
	Bootstrapped	(0.134)	(0.234)	(0.267)	(0.083)	(0.631)	(0.249)	(0.122)
Average Exports per Product		-0.026	-0.158	0.222	0.020	0.093	-0.281	0.207
	Analytical	(0.102)	(0.182)	(0.218)	(0.071)	(0.436)	(0.198)	(0.105)**
	Bootstrapped	(0.114)	(0.220)	(0.243)	(0.074)	(0.809)	(0.187)	(0.103)**
Average Exports per Country		0.053	0.010	0.178	0.016	-0.068	-0.112	0.074
	Analytical	(0.094)	(0.155)	(0.238)	(0.075)	(0.298)	(0.215)	(0.078)
	Bootstrapped	(0.099)	(0.211)	(0.269)	(0.072)	(0.643)	(0.215)	(0.072)

Source: Own elaboration on data provided by PROCOMER and CCSS.

The table reports matching difference-in-differences estimates of the average assistance effect on assisted firms for exporters of different sets of goods over the period 2002-2006. The sets of goods have been defined using the basic categories identified in the classification proposed by Rauch (1999) (liberal version) and their combinations. D: firms exporting differentiated products; R: firms exporting referenced-price products; H: firms exporting homogeneous products; D-R: firms exporting differentiated and reference-priced products; D-H: firms exporting differentiated and homogeneous products; R-H: firms exporting reference-priced and homogeneous products; D-R-H: firms exporting differentiated, reference-priced, and homogeneous products. Within each group, assisted firms have been matched with the closest non-assisted firm in terms of the propensity score and binary indicator of location (taking the value of 1 if the firm is located in San José and 0 otherwise) according to the Mahalanobis distance. Caliper r=0.04. Standard errors reported in parentheses. Bootstrapped standard errors based on 500 replications. * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level. The significance indicator is reported with the standard errors corresponding to each method used to compute these errors.

Table 9

Effect of Assistance by PROCOMER on the Probability of Changing the Set of Goods Being Exported

Variable	Matching DID			Pooled Probit					Dynamic Panel Probit			
	NN	R	K									
Treatment	0.019	0.025	0.025	-0.012	-0.008	0.016	0.004	0.023	0.0293	0.0341	0.0526	0.113
				(0.053)	(0.054)	(0.056)	(0.069)	(0.070)	(0.0695)	(0.0693)	(0.104)	(0.114)
Analytical Standard Errors	(0.027)	(0.019)	(0.019)									
Bootstrapped Standard Errors	(0.028)	(0.019)	(0.020)									
Labor						0.031***		0.0227				-0.076
						(0.010)		(0.070)				(0.115)
Location						0.072*						
						(0.044)						
Differentiated Goods						-0.089*		0.0179				-6.826
						(0.050)		(0.017)				(155.9)
Reference-Priced Goods						-0.378***		-0.005				-0.246**
						(0.038)		(0.075)				(0.113)
Homogeneous Goods						-0.093*		-0.276***				-0.533***
						(0.048)		(0.054)				(0.137)
Initial Change									0.367***	0.366***	0.422***	0.384***
									(0.078)	(0.078)	(0.093)	(0.098)
Lagged Change									0.475***	0.475***	0.572***	0.515***
									(0.074)	(0.074)	(0.087)	(0.093)
Constant				0.579***	0.633***	0.773***	-1.169***	0.601***	0.091	0.085	0.078	0.649***
				(0.021)	(0.038)	(0.071)	(0.269)	(0.049)	(0.060)	(0.073)	(0.082)	(0.177)
Year Fixed-Effects				No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Balanced Panel				No	No	No	Yes	Yes	No	No	Yes	Yes
Wooldridge (2005) Specification				No	No	No	No	No	Yes	Yes	Yes	Yes

Source: Own elaboration on data provided by PROCOMER and CCSS.

The table reports the impact of assistance by PROCOMER on the probability of changing the set of goods being exported over the period 2002-2006 as estimated by matching difference-in-differences, and pooled and dynamic panel probit models. The dependent variable is a binary indicator taking the value of one if the firm changes the set of goods being exported, i.e., it changes the group it should be placed in from the previous to the current year The sets of goods have been defined using the basic categories identified in the classification proposed by Rauch (1999) (liberal version) and their combinations. Nearest neighbor (NN) with caliper r=0.04. Radius matching obtained with r=0.04. Kernel matching is based on the Epanechnikov kernel with a bandwidth of 0.04. Variables included in the propensity score specification are: lagged (natural logarithm of) export earnings, lagged (natural logarithm of) number of products exported, lagged (natural logarithm of) number of countries served, lagged treatment status, lagged (natural logarithm of) employment, a binary variable for location (San José=1 and 0 otherwise), a binary variable for type of good exported (differentiated products=1 and 0 otherwise, reference-priced products=1 and 0 otherwise, and homogeneous products=1 and 0 otherwise), and year-fixed effects. Control variables in the probit models are lagged (natural logarithm of) employment, a binary variable for location (San José=1 and 0 otherwise), a binary variable for type of good exported (differentiated products=1 and 0 otherwise, reference-priced products=1 and 0 otherwise, and homogeneous products=1 and 0 otherwise), and year-fixed effects, whereas those in the dynamic probit models also include the initial and the lagged values of the dependent variables (see Wooldridge, 2005).

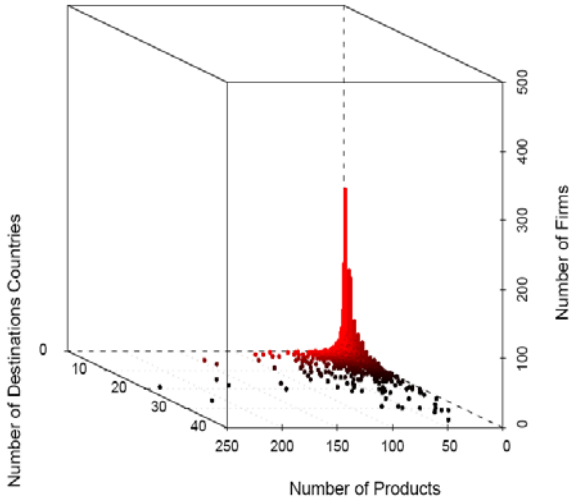
Table 10

Effect of Assistance by PROCOMER on the Probability of Starting to Export Differentiated Goods												
Variable	**Matching DID**			**Pooled Probit**					**Dynamic Panel Probit**			
	NN	**R**	**K**									
Treatment	-0.006	0.002	0.003	0.037	0.038	0.078	0.043	0.028	0.020	0.030	-0.056	-0.261
				(0.071)	(0.072)	(0.104)	(0.092)	(0.138)	(0.100)	(0.102)	(0.158)	(0.254)
Analytical Standard Errors	(0.013)	(0.010)	(0.010)									
Bootstrapped Standard Errors	(0.013)	(0.010)	(0.010)									
Labor						0.016		0.018				0.084
						(0.017)		(0.026)				(0.245)
Location						0.110						
						(0.072)						
Reference-Priced Goods						0.279***		0.653***				0.710*
						(0.075)		(0.110)				(0.396)
Homogeneous Goods						-0.500***		-0.534***				-0.279
						(0.075)		(0.105)				(0.362)
Initial Category Change									0.899***	0.886***	0.983***	0.323
									(0.157)	(0.162)	(0.188)	(0.378)
Lagged Category Change									-6.566	-6.611	-6.584	1.523
									(6.224)	(6.925)	(8.145)	(7.289)
Constant				-1.604***	-1.679***	-1.038***	-1.614***	-0.916***	-1.863***	-2.035***	-1.999***	-1.610***
				(0.027)	(0.059)	(0.107)	-0.074	(0.155)	(0.090)	(0.129)	(0.134)	(0.218)
Year Fixed-Effects				No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Balanced Panel				No	No	No	Yes	Yes	No	No	Yes	Yes
Wooldridge (2005) Specification				No	No	No	No	No	Yes	Yes	Yes	Yes

Source: Own elaboration on data provided by PROCOMER and CCSS.

The table reports the impact of assistance by PROCOMER on the probability of starting to export differentiated goods over the period 2002-2006 as estimated by matching difference-in-differences, and pooled and dynamic panel probit models. The dependent variable is a binary indicator taking the value of one if the firm starts selling differentiated goods abroad and 0 otherwise The sets of goods have been defined using the basic categories identified in the classification proposed by Rauch (1999) (liberal version) and their combinations. Nearest neighbor (NN) with caliper r=0.04. Radius matching obtained with r=0.04. Kernel matching is based on the Epanechnikov kernel with a bandwidth of 0.04. Variables included in the propensity score specification are: lagged (natural logarithm of) export earnings, lagged (natural logarithm of) number of products exported, lagged (natural logarithm of) number of countries served, lagged treatment status, lagged (natural logarithm of) employment, a binary variable for location (San José=1 and 0 otherwise), a binary variable for type of good exported (differentiated products=1 and 0 otherwise, reference-priced products=1 and 0 otherwise, and homogeneous products=1 and 0 otherwise), and year-fixed effects. Control variables in the probit models are lagged (natural logarithm of) employment, a binary variable for location (San José=1 and 0 otherwise), a binary variable for type of good exported (differentiated products=1 and 0 otherwise, reference-priced products=1 and 0 otherwise, and homogeneous products=1 and 0 otherwise), and year-fixed effects, whereas those in the dynamic probit models also include the initial and the lagged values of the dependent variables (see Wooldridge, 2005).

Figure 1
Distribution of Firms across Product-Market Export Patterns, 2006



Source: Own elaboration on data provided by PROCOMER.