KATHOLIEKE UNIVERSITEIT
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Faculty of Economics and Applied Economics

Department of Economics

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by

Johannes VAN BIESEBROECK
Emily YU
Shenjie CHEN

Econometrics

Center for Economic Studies
Discussions Paper Series (DPS) 11.21
http://www.econ.kuleuven.be/ces/discussionpapers/default.htm

September 2011

DISCUSSION PAPER

The Impact of Trade Promotion Services on Canadian Exporter Performance*

Johannes Van Biesebroeck, Emily Yu, and Shenjie Chen‡

September 16, 2011

Abstract

We evaluate the impact of the export promotion program delivered by the Canadian Trade Commissioner Service on various dimensions of export performance. Over the 1999-2006 time period we study, Canadian firms successfully diversified their exports to destinations beyond the United States and smaller firms increased their share of total exports. Both of these achievements are explicit aims of the program, but in order to make causal inferences we rely on various identifying assumptions from the treatment effects literature. The results indicate very robustly that the program had an effect at the intensive margin, boosting the average level of exports to given product-destination markets. Effects at the extensive margins of trade, increasing the number of export destinations or number of products exported, are smaller and more sensitive to the identification assumption. This finding differs from previous studies for several Latin American countries where extensive margin effects were most robust. One reason is that the Canadian program was most effective for larger firms and for firms already active on several export markets.

Key words: Export Promotion, treatment effect, heterogeneous firms
JEL codes: F13, F14, L15

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* The views expressed here are those of the authors and are not to be attributed to Foreign Affairs and International Trade Canada or to the Government of Canada. The authors thank Statistics Canada for permission to access the firm-level data that underpin this study and Christian Volpe Martincus for comments.

‡ Johannes Van Biesebroeck, K.U.Leuven and CEPR, E-mail: Jo.VanBiesebroeck@econ.kuleuven.be; Emily Yu and Shenjie Chen, Office of the Chief Economist, Foreign Affairs and International Trade Canada; e-mail: Emily.Yu@international.gc.ca and Shenjie.Chen@international.gc.ca, respectively.

1. Introduction

Governments spend a lot of money on programs intended to help firms achieve export success. From a theoretical viewpoint, such export promotion can be justified if it helps to overcome entry barriers or fixed costs to enter specific export markets, which might be the result of informational problems or credit constraints (Copeland, 2008). Even if intervention is justified, it is important to know whether an actual program is accomplishing its goal.

Over the 1999-2006 time period that we study, we see Canadian firms successfully diversify their exports to destinations beyond the United States and we see small and mid-size firms account for a growing share of exports. Both of these achievements are explicit aims of the export promotion program delivered by the Canadian Trade Commissioner Service (TCS). Our aim is to go beyond a description of trends and assess the causal impact of the program on the export performance of Canadian firms. We adopt various identifying assumptions from the treatment effects literature to achieve this.

One channel through which TCS programs can affect exports is by helping firms to start exporting. Unfortunately, the data available to us does not allow disentangling the effect of TCS services on the extensive and intensive margins of trade for two reasons. First, we only observe firms that are exporting at some point in the sample period. In the absence of information of firms that never export, we cannot reliably assess whether the program is successful in boosting the probability of exporting. Second, we do not observe whether firms seek assistance for products they do not yet export, for export destinations they do not currently serve, or to stimulate export levels into markets they already serve.

What we do observe is the full export history between 1999 and 2006 of all firms that export at some point in this period broken down by product line and export destination.[1] In addition, we observe for all these firms whether they have ever received TCS assistance, in what year, and from which office.[2] From this, we will assess whether TCS assistance is able to boost firms' export intensity, and whether it helps existing exporters to serve more destination and widen the range of products that are exported. This we interpret as helping clients to adapt products to local market conditions and to build market presence, which results in export growth along the *intensive* margin.

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[1] The sample is not limited to manufacturing firms. It includes all firms that are TCS clients and that could be matched to the Exporter Register maintained by Statistics Canada.

[2] TCS programs are offered through 140 offices around the world and 12 regional offices across Canada.

The evidence thus far in the literature whether existing export programs are effective is mixed. Bernard and Jensen (2004) find that U.S. state budgets for export promotion have no effect on manufacturing firms' probability of entering the export market. In contrast, Lederman, Olarreaga, and Payton (2010) do find cross-country evidence that larger agency budgets lead to higher export volumes. The effects are stronger for countries facing more export restrictions and for differentiated products. Rose (2007) finds a positive effect for the number of embassies and consulates on exports in a gravity model. These last two studies use instruments for the possible endogeneity of the treatment variable driven by reverse causation or by omitted variable bias due to unobserved heterogeneity.[3]

The few studies that observe both assistance and export performance at the firm level do find positive effects. Volpe Martincus and Carballo (2008) use a matched difference-in-differences approach to show that assistance from the Peruvian export promotion agency lead to more rapid export growth. The effect was concentrated on the extensive margin with firms adding country destinations and products to their export portfolios. This pattern was confirmed for Chile (Alvarez and Crespi, 2000) and Uruguay (Volpe Martincus and Carballo, 2010) using different estimation strategies.

Helmers and Trofimenko (2009) survey several older industry-level studies for developing countries and conclude that direct export subsidies were an expensive and ineffective way to boost exports. Their own firm-level evidence for Colombia suggests that subsidies lead to higher exports using standard techniques from the dynamic panel literature to deal with endogeneity. The impact of subsidies declines strongly with size and with the degree of 'connectedness' of the firm, which they proxy with the gap between actual and predicted subsidies.

Finally, some researchers have looked at the impact of other types of government support programs on export performance. Irish firms that received investment or training grants did increase exports more rapidly than firms not receiving grants (Görg, Henry and Strobl, 2008). Only large grants, i.e. the top third or above €80,000, had any effect and it only boosted export intensity, not the export probability itself. Production subsidies are associated with large export effects in China (Girma, Gong, Görg and Yu, 2009), but not in Germany (Girma, Görg and Wagner, 2009). To deal with the endogeneity of treatment, the studies for Ireland and Germany use a

[3] Lederman et al. (2010) use the number of years since the last election or since the establishment of the agency as instruments for the budget of the export promotion agency. Rose (2007) uses several indicators for the destination country's geo-political importance (e.g. oil reserves) and its attractiveness to the diplomatic corps (e.g. rating in tourist surveys) as instruments for the presence of embassies and consulates.

matching estimator to construct a comparison group, while the study for China instruments production subsidies with employee social welfare benefits and local government equity participation.

We advance this literature in a number of ways. First, we are the first to examine for a developed economy the trade promotion effects on exports using the statistical tools from the treatment effects literature to control explicitly for reverse causality going from export success to assistance. The evidence from the learning-by-exporting literature already suggested that the experience of firms in developing countries is not necessarily mirrored in more mature economies (Harrison and Rodríguez-Clare, 2010).

Second, we find small but positive effects of TCS assistance on total exports, on the order of a two to four per cent overall boost. Somewhat surprisingly, the total effect is driven primarily by higher export intensity at the purely intensive margin. Results for every estimation method we use indicate that the average level of exports within destination-product markets is higher or increases with TCS assistance. Only some of the methods find a positive effect on the number of export destinations served and the number of products exported. In contrast, the abovementioned studies for Peru, Chile, and Uruguay consistently found stronger effects at the extensive product and destinations margins.

Third, we illustrate a number of interesting patterns in the variation of the effectiveness of TCS assistance across several dimensions. Firms profit more from the first instance of assistance than from subsequent help. At the same time it takes several years for the full effects of assistance to materialize. The export-boosting effect is only slightly larger if we focus on the specific country where the firm asked for assistance. Existing trade relationships between other Canadian firms and a particular export destination do not diminish the effectiveness of TCS assistance for this location. Finally, we find that the average effect for treated firms is somewhat lower than the unconditional average effect. Weaker effects for firms that export a lot of products, which are overrepresented among TCS clients, seems to be the primary reason.

The remainder of the paper is organized as follows. In the next section we introduce the different data sources we use. Section 3 provides a descriptive analysis of the exporting record of Canadian firms. We also provide information on the TCS assistance program and compare TCS clients with other exporters. The measuring framework and identifying assumptions that permit causal interpretation are introduced in Section 4 and estimation results are reported in Section 5. We draw some conclusions and indicate caveats in Section 6.

2. Data

In order to include some descriptive statistics in our discussion of exports, the characteristics of exporters, and trade promotion activities in Canada in the next section, we start by introducing the different data sets used. There are three in total.

The Business Register is maintained by Statistics Canada and contains information on the characteristics of all firms that operate in Canada. We use it to construct control variables. Industry is available at the 3-digit NAICS classification and firms can come from any sector, with manufacturing and trading firms most common. The start-up year is used to construct firm-age. Total employment is used to define four firm-size categories: micro (1-10 employees), small (11-50), medium (51-200) and large (more than 200 employees). Sales divided by employment serves as a proxy for labor productivity.

The Exporter Register, which is also maintained by Statistics Canada, provides annual information on the value of exports for all exporters. Trade flows are reported separately for each destination-product pair, with product definitions following the 8-digit HS classification. We use this information to construct the four dependent variables used in the analysis: total exports, total number of products exported, total number of export destinations served, and the average value of exports across all destination-product markets a firm serves.

The TCS client management database is maintained by Foreign Affairs and International Trade Canada. It provides details on trade promotion services delivered by Canadian trade commissioners at offices in Canada and abroad. For each year we observe the type of service each client firms received at each TCS office. This information is broken down by country, office, sector, the size and age of firms, their financial resources, and types of TCS services accessed.

We link these datasets as follows. First, each exporter registered in the Exporter Register database is identified by an enterprise number that is common to both the Exporter and the Business Register. Linking the firm-level characteristics to exporters is straightforward. Second, for the sample of all firms that exported at some point in the 1999-2006 period, Statistics Canada looked for a corresponding record in the TCS client management database using name and address matching. If an exporter could be identified as a TCS client, its annual record of trade promotion services received is included in the dataset. The final sample we work with includes all firms that exported at some point in the sample period and it indicates whether firms could be matched or not. In the next section we provide summary statistics on the fraction of exporters that are TCS clients and to what extent firm characteristics, including export patterns, differ between clients and non-clients.

3. Overview of Canadian exports and Trade Commissioner Services

To provide some context for the policy environment and the nature of the intervention, we start with an overview of Canadian firms' export record over the sample period. The different columns in Table 1 summarize the average evolution for three of the four dependent variables used in the analysis: the value of exports, the number of foreign markets served, and the number of distinct products exported.

[Table 1 approximately here]

The number of exporters expanded from 43,568 in 1999 to 49,314 in 2004 and declined afterwards to 44,127 in 2006. The total value of exports bounced around, averaging $360 billion CAD per year. Exports per firm averaged $7.6 million over the full period. After three successive annual declines between 2000 and 2003, it increased in the last three years of the sample to $8.6 million, a quarter higher than the low-point of 2003. The total number of export destinations served and products exported only increased slightly because coverage was already almost complete in 1999. The firm-averages definitely trend up, throughout the entire period for number of destinations and from 2002 onwards for the number of products.

Table 2 illustrates a few important stylized facts on the nature of Canadian exporters. The dominance of the U.S. market really stands out. In the initial years of the sample, almost 90% of Canadian exporters served this market and it accounted for 88.5% of all manufacturing exports in 1999.[4] This concentration made Canadian exporters extremely vulnerable to exchange rate fluctuations and to the U.S. business cycle.

[Table 2 approximately here]

In subsequent years, Canadian exporters clearly diversified the destination of their sales with a notable increase in the fraction of firms serving other markets. In many cases this growth is in addition to U.S. exports, but the fraction of exporters not serving the United States at all increased as well. By 2006, Europe remained the second most popular destination region, attracting sales from 50% more Canadian firms. The fraction of exporters serving the Asia-Pacific and Latin American regions increased even more rapidly, on average by 70%, and stood at respectively 17.6% and 10.6% in 2006.

Current trade statistics indicate that this trend of diversifying the export destination of manufactured product has continued. By 2010 the importance of the

[4] Aggregate trade statistics in this section come from the Trade Data Online search engine available at the Industry Canada web site: http://www.ic.gc.ca/eic/site/tdo-dcd.nsf/eng/home

United States (in value) declined to 77.2%, with China now the second most important destination receiving 3.9% of exports, followed by the United Kingdom, Japan, and Mexico. The fast growing Asia-Pacific region has almost caught up with Europe, receiving 8.8% versus 9.1% of manufacturing exports by value.

A second important characteristic of the group of exporters is the importance of large firms, those employing at least 200 workers. While on average only one in twenty exporters is large, they account for approximately two thirds of all exports. Over the sample period, however, smaller firms are gaining importance. The fraction of exports account for by smaller firms increased substantially, from 26.7% in 1999 to 35.2% in 2006. This trend makes the growth in export destinations and the stability in the number of products exported documented in Table 1 more remarkable.

At the end of the sample period, the typical exporter served two or three foreign markets with five products. Table 3 provides a more detailed breakdown of the evolution in the market and product distribution over time. A first thing to note is that the destination and product distributions are rather different. In the first four years of the sample period more than 82% of exporters served a single market, predominantly the United States. In contrast, almost two thirds of all exporters sold more than one product abroad.

[Table 3 approximately here]

Over the period, Canadian exporters have diversified and expanded the number of export destinations served. By 2006, 27% of all exporters served more than one market compared to only 17% in 2000; an increase of more than half. The number of firms serving more than six foreign market more than doubled from 4.0% in 1999 to 8.3% in 2006. This is an important evolution because for Canadian firms serving the U.S. market is substantially easier than serving any other foreign market. Even more so than for many other countries, the distinction between successful and other firms is their ability to access export markets beyond neighboring countries.[5]

The number of products that the average firm exports is higher than the number of destinations served, but in contrast it has been relatively stable over time. Fewer than 40% of firms export a single product and approximately one tenth export more than ten products. The slight increase in the average number of products exported per firm between 2002 and 2006 has been concentrated at the top end of the distribution.

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[5] The close integration of the U.S. and Canadian economies makes international trade between them relatively easy. Facilitating factors are the geographical proximity, dense transportation and logistics linkages, duty free market access, integration of the financial systems, presence of multinational firms in each other markets, etc.

A comparison of new and continuing exporters in Table 4 illustrates that there is a natural evolution for exporters. Firms tend to enter the export market small: more than two thirds of new exporters start selling a single product in a single destination market, both in 2000 and in 2006. When export market entry is broader it is almost always on the product side. New exporters that start serving multiple destinations right away, 3.9% of new exports in 2000 and 7.5% in 2006, almost always exports multiple products as well.

[Table 4 approximately here]

Comparing new with continuing exporters, which are reported in the right panels of Table 4, illustrates that with export market experience firms tend to add products as well as destinations. Single product–multiple destination exporters remain rare. In contrast, the category of multiple product–multiple market exporters is five to six times larger for continuing firms than for new entrants. Interestingly, comparing the initial year for which we can distinguish new and continuing exports (2000) with the last year of the sample (2006), both fractions on the diagonal increase. More firms specialize in exporting a single product to a single destination, while at the same time the fraction of continuing exporters that send multiple products to multiple destinations also increases to more than one quarter of all continuing exporters. In 2006, many more firms are classified as continuing, which also has an effect on the aggregate distribution.[6]

We have documented two notable trends for Canadian exporters—diversification away from the United States and greater importance of exports by small firms—which have been accompanied by a stable distribution in the number of products exported and a moderate increase in exports per firm. Statistics in the last column of Table 2 indicate that between 3.1% and 5.7% of exporters received TCS assistance in any given year. Underlying the substantial annual variation there is a very small positive time trend.

TCS programs are offered through 140 offices around the world and 12 regional offices across Canada. The services provided can be subdivided into six groups: information on market prospects, key contacts search, local company information, visits information, face-to-face briefings and trouble shooting. The first three information-related services are those most-requested by TCS clients. In the next section we introduce an econometric framework to investigate whether the variation over time and across firms in the export performance can be explained by access to export promotion services.

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[6] To some extent this is due to the longer history we observe and firms repeatedly moving in and out of the export market.

Statistics in Table 5 summarize some characteristics of TCS clients and compares them to other exporters. The probability that an exporter is a TCS client is strongly increasing in size. In 1999, 12.1% of large firms with more than 200 employees received services, more than four times the sample average. The propensity even increased to 18.6% in 2006. This association in itself makes it important to control for selection in evaluating the association between export performance and TCS services. We already documented that large firms are the most prolific exporters, but also that their dominance has diminished over time.

[Table 5 approximately here]

The statistics further indicate that TCS clients are more likely to export beyond the United States, serve multiple destination markets and export multiple products. The higher propensity of TCS assistance for firms that serve multiple markets and especially for firms that export multiple products even increased over time. Statistics in the bottom panel of Table 5 indicate that TCS clients are more likely to be manufacturing firms and less likely to be wholesalers or retailers. Their average labor productivity is virtually indistinguishable from other exporters even though they are much larger on average and have more export experience.[7]

All these characteristics highlight that clients are very different from the average exporter. As these differences are unlikely to be exogenously given, but at least partially the result of self-selection of TCS clients, we have to control for them when measuring the impact of TCS assistance.

4. Econometric Framework

We have shown that Canadian exporters over the sample period increased their total exports and became more diversified in terms of destination markets. While only a small proportion of exporters (around 5%) seek TCS assistance, those that do are larger and have more diversified exports. To assess causality, we have to control for the nonrandom selection of TCS clients.

We follow earlier studies and adopt the empirical framework of the treatment effects literature, where firms that receive TCS support are called 'treated'.[8] Two

[7] A large literature finds that productivity tends to increase with firm size and that export status or export experience is also related to firm-productivity, but not necessarily in a causal sense—see Baldwin and Gu (2003) for Canadian evidence.

[8] The estimation of treatment effects has generated an extensive and rapidly evolving literature. We refer the reader to Imbens and Wooldridge (2009) for a broad and up to date overview of this field.

potential outcome variables are defined for each firm (in each time period) to indicate performance in two mutually exclusive situations: y^1 if the firm received treatment, i.e. benefitted from export promotion services, and y^0 if the firm received no treatment. Of course, only one of these two outcomes can be observed for any actual firm. The objective is to calculate the average treatment effect over the entire population, $E[y^1 - y^0]$, or the average treatment effect on the treated, $E[y^1 - y^0 | \omega=1]$, where the conditioning indicates that the expectation is taken only over firms that actually received treatment.

The potential output without treatment y^0 is the proper performance benchmark for a treated firm, but the expectation of this counterfactual performance outcome needs to be estimated. We face a missing data problem and need to estimate $E[y^0|\omega=1]$.[9] If firms have some control over treatment, as is likely, this quantity will differ from $E[y^0|\omega=0]$, the expected outcome for firms that self-selected out of treatment. The average observed outcome for non-treated firms is likely to be a bad proxy for the counterfactual situation.

If we observe firms in several years and in particular we observe treated firms also in pre-treatment years, we can use a difference-in-differences estimator. For comparison with the matching estimators that we discuss next, we state the identifying assumption this relies on explicitly.

Assumption 1: In expectation, the potential outcome without treatment evolves in the same way for treated and untreated firms. In particular, if we observe firms in two years t_0 and t_1, and using Δ for the time difference, we assume[10]

[A1] $E[\Delta y^0 | \omega=1] = E[\Delta y^0 | \omega=0]$.

This is equivalent to assuming that the average difference in potential performance without treatment between firms that are treated and those that are not is constant over time: i.e. $E[y^0(t_1) | \omega=1] - E[y^0(t_1) | \omega=0] = E[y^0(t_0) | \omega=1] - E[y^0(t_0) | \omega=0]$.

With this assumption, we can estimate the expected effect of treatment on the treated as

$$\begin{aligned} ATT &= E[y^1(t_1) - y^0(t_1)|\omega=1] \\ &= \{E[y^1(t_1) - y^0(t_0)|\omega=1]\} - \{E[y^0(t_1) - y^0(t_0)|\omega=0]\}. \end{aligned} \quad (1)$$

[9] We also need to estimate the alternative counterfactual $E[y^1|\omega=0]$ if we are interested in the ATE.

[10] We always condition on values of $\omega(t_1)$ being equal to 0 or 1, as we are evaluating the performance of firms being treated in period t_1.

All quantities on the right-hand side can be estimated from a sample that contains some treated firms both before and after they receive treatment and some firms that do not receive treatment in either period. An alternative way to write equation (1) is to subtract the pre-existing performance differentials from the observed ex-post differential to control for the non-random selection into treatment:

$$\text{ATT} = \{\text{E}[y^1(t_1)\,|\omega{=}1] - \text{E}[y^0(t_1)\,|\omega{=}0]\} - \{\text{E}[y^0(t_0)|\omega{=}1] - \text{E}[y^0(t_0)|\omega{=}0]\}. \quad (1')$$

This underscores that the method works if selection into treatment is based on the time-invariant unobservable. If other variables affect firm's treatment decision, we will have to additionally control for them.

Unfortunately, assumption [A1] by itself does not allow us to recover the average treatment effect over the full population. Nothing in the data is informative about the potential performance under treatment for firms selecting out; additional assumptions are needed to estimate this.

An alternative solution to the problem of missing data on counterfactual outcomes is to invoke what is known as the 'ignorability of treatment' assumption:

Assumption 2: Potential outcomes are mean independent of treatment status after we condition on a set of covariates:

[A2] $\text{E}[\, y^i \,|\, \boldsymbol{x},\, \omega] = \text{E}[\, y^i \,|\, \boldsymbol{x}]$ for $i = 0, 1$

The expected effect of treatment can then be estimated from the following observable quantities:

$$\text{ATT} = \text{E}[y^1 - y^0 \,|\, \boldsymbol{x},\, \omega{=}1] = \text{E}_{\boldsymbol{x}}\{\text{E}[y^1 \,|\, \boldsymbol{x},\, \omega{=}1] - \text{E}[y^0 \,|\, \boldsymbol{x},\, \omega{=}0]\} \quad (2)$$

This approach even works with only a cross-section of firms. To estimate the unconditional average treatment effect (ATE) one simply takes the population average over the differences conditional on $\boldsymbol{x}$. To estimate the average effect of treatment on the treated (ATT) the average is only over the group of firms receiving treatment. If the distribution of covariates $\boldsymbol{x}$ differs for treated and untreated firms, it will matter exactly how we implement the sample analog of equation (2). The expectation $\text{E}_{\boldsymbol{x}}\{.\}$ must average the $\boldsymbol{x}$ covariates over the appropriate group of firms.

To calculate either average, it is necessary to estimate the expectations of both y^1 and y^0 conditional on the same covariate values. This is only possible if the covariate values overlap for the two groups of treated and untreated firms.[11] Given that only 5%

[11] The importance of 'overlap' restrictions is discussed in Imbens and Wooldridge (2009) with references to statistical tests to assess validity.

of the firms in our sample receive treatment, this does not pose a problem to estimate the ATT. In contrast, there are bound to be untreated firms with covariate values for which we do not observe comparable treated firms. Especially when implementing equation (2) with estimators that employ the propensity score we need to be cautious interpreting the results as they are likely to incorporate important functional form assumptions for the ATE.

Both assumptions can be combined. It is intuitive that the assumption of constant performance differences [A1] is less restrictive when we only invoke it conditionally on a set of observable covariates. Similarly, one might be more willing to assume the ignorability of treatment assumption knowing that first differencing will remove a firm-fixed effect in the performance comparisons. One method that has proved popular in applications is to match treated and untreated firms using the propensity score in a first stage and then comparing first differences in performance for both groups (see for example Martincus and Carballo, 2008 and Görg, *et al.* 2008).

It is important to stress that any causal interpretation depends inextricably on a particular identifying assumption or a particular way to implement the assumption. For example, there are several ways to achieve the conditioning in assumption [A2]. When we describe the findings in the next section, we will pay particular attention to results that are robust across different estimators.

5. Results

5.1 Difference-in-differences estimates of the treatment effect

We now present treatment effect estimates for TCS assistance using the various approaches we discussed to control for self-selection into treatment. Results for the difference-in-differences (DID) methodology using firm-fixed effects—invoking assumption A1—are in panel (a) of Table 6. The four columns contain results for the different dependent variables.

In the first line, all client firms are coded as treated in any year they receive TCS assistance and no covariates are included. All export variables are significantly higher for treated firms—indicating better performance during treatment years compared to years before or after. The point estimate of 0.086 implies that the total value of exports is 9.0% higher for treated firms.[12]

[Table 6 approximately here]

[12] The log-point estimates from the tables can be transformed into percentage changes as follows: 9.0% = exp(0.086)-1.

The overall effect on exports is the result of positive responses on all three margins. At the extensive (market) margins, 4.1% more 8-digit HS products are exported to 3.8% more export destinations. These effects are augmented by a significant intensive margin response: average exports per product and destination are 3.1% higher. While the extensive margin effects that Volpe Martincus and Carballo (2008) obtained for Peru were approximately two times as large, the comparable intensive margin estimates were very small and insignificant. Note that the 3.1% higher exports for the average product-destination market is particularly remarkable because this average incorporates exports to the new product and destination markets.

Results in the second line of Table 6 condition additionally on a set of time-varying firm characteristics. These include age, size, productivity, export market experience, and in the first and last column also the number of products exported and markets served. While all effects remain positive, all point estimates are smaller. In years that firms take advantage of TCS assistance, other characteristics that are associated with export success are also elevated. It makes it likely that the average effect of treatment differs from the effect on the treated, something we return to later.

The total effect is reduced the most, to 2.1%, only a quarter of the original export response. It remains significant, but only at the 10% level. The results now indicate that the response is largest for the extensive margin of export destinations. The point estimate for the intensive margin effect is barely smaller than the total effect, but it becomes statistically insignificant.

Given the importance of controlling for time-varying firm characteristics, one might also suspect that unobservables that are persistent but not constant over time have a continued impact on export market performance. In this case, the DID estimates with covariates will be biased, but the dynamic panel approach of Blundell and Bond (1998) would be valid. Serial correlation in the unobservables is addressed by quasi-differencing the equation and estimating with instrumental variables (lagged values of the endogenous variables).

The point estimates without covariates are lower for the Blundell-Bond estimator, except for the intensive margin response which is unchanged. As expected, adding covariates now has a much smaller impact on the estimates. The total effect and the intensive margin response are now 3.1% and 2.8%, not statistically different from the earlier DID estimates. The two extensive margin responses are now estimated to be lower and neither remains significantly different from zero.

The results so far point to a much smaller total effect for Canada than for Peru, using the same estimators (Volpe Martincus and Carballo, 2008), although point estimates tend to be more stable across specifications. Another important difference is the pronounced effect of export promotion on the level of exports within product-

destinations that were already served for Canadian firms. In Peru, the extensive margin effects dominated and most estimates of the intensive margin were very small and insignificant.[13]

The next results, in panel (c) of Table 6, restrict the group of treated firms to those that that did not receive TCS assistance in any of the previous years in the sample. For firms that receive support in multiple periods, the effect is identified solely from the change in performance in the first observed instance that firms enjoy export promotion support. Compared with the results in panel (a) all point estimates are now slightly higher and significant at a 5% or lower level. None of the differences with the earlier coefficients are statistically significant, but it does suggest that most positive effects of TCS support are realized in the very first year a firm becomes a client.[14]

5.2 Treatment effect estimates using matching estimators

The differences in the DID estimates with and without covariates in Table 6 highlight the importance of controlling for time-varying firm characteristics. One reason would be to make performance comparisons more appropriate. Another reason would be to control better for the self-selection of firms into treatment. To do so in a flexible way, we now rely on assumption [A2] and employ several matching estimators.

The simplest approach to condition on the observables in a flexible way is to run a linear regression of the performance variables on the treatment dummy, the set of covariates, and the mean-differenced covariates interacted with the treatment dummy:

$$y_{it} = \alpha T_{it} + x'_{it}\gamma + T_{it} \cdot (x_{it} - \bar{x})'\beta + \varepsilon_{it}.$$

This approach does not match firms explicitly, but allows for correlation between the covariates and subsequent performance as well as with treatment selection, see Imbens and Wooldridge (2009, p. 28-32) for an extensive discussion. The coefficient α on the treatment dummy provides an estimate of the ATE. The ATT differs from this by the extent that covariates for the treated firms differ from the sample average, i.e. by $\sum T_{it}\,(x_{it} - \bar{x})'\beta$. We use the same covariates as before, but now also include industry dummies and quadratic terms of the continuous variables.

[Table 7 approximately here]

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[13] Using different estimators, Alvarez and Crespi (2000) and Volpe Martincus and Carballo (2010) also find strong effects at the extensive export margins for firms in Chile and Uruguay.

[14] When firms are classified as treated if they received support in year *t* but not in year *t-1*, all effects turn insignificant and many point estimates are even negative. Firms that rely on TCS support intermittently do not seem to boost their exports after the first contact year.

Only the coefficient estimates on the treatment dummy and the ATT are reported in panel (a) of Table 7. The results suggest notably higher effects for each of the four dependent variables than estimated using the alternative difference-in-differences approach. The average effects on the treated are slightly higher on the extensive margins, but smaller in total. Firms that self-select into treatment have characteristics that are associated with greater effectiveness of TCS assistance in increasing the number of markets served and the number of products exported. The most pertinent ones seem to be firm size, export market experience, and already serving several destinations.

An alternative way to condition on the observables is to proceed in two steps. First, we predict the probability of treatment by regressing treatment status on the set of covariates (including quadratic terms). The predicted probability, the p-score, provides a parsimonious way to condition on all the relevant information that affects the treatment probability if some of the variables in the $\boldsymbol{x}$ vector are continuous.

Weighting treated observations by the inverse of their p-score and untreated observations by the inverse of one minus the p-score has attractive robustness properties, see Imbens and Wooldridge (2009, p. 38-40). It combines the advantage of matching estimators to flexibly control for selection on observables and the advantage of regression analysis to interpolate in areas with little data or extrapolate beyond the sample range. Applied to our sample, the point estimates become implausibly large, ranging from 0.195 to 0.920 for the four performance variables, but with very high standard errors.

An alternative way to use the p-score is to match firms and identify an explicit control firm or group of firms for each treated firm. As suggested by Abadie and Imbens (2006), we still control for the covariates in a second stage regression of export performance on the treatment dummy for the matched pairs of firms. The comparison of performance differences in the second stage is limited to the sample of treated firms and their control observations. We avoid extrapolating out of the range of our sample that has many fewer treated than untreated firms and only estimate the effect on the treated. To verify robustness, we use three different approaches to match firms.

The different methods point consistently to a positive and significant effect of TCS assistance on the total value of exports. The estimates in the first column of panel (b) are similar to the OLS results in panel (a) and again much higher than the difference-in-differences estimates in Table 6. The total effects are driven by much higher intensive margin effects than before. The percentage increase of exports in the average product-destination market are estimated to be 19.6%, 16.9%, and 16.2%, using nearest neighbor, kernel, and radius matching, respectively.

Effects at the extensive margin, on the other hand, are vastly smaller than in panel (a) and more in line with the DID results in Table 6. They are also more sensitive to the matching technique used. Huber, Lechner, and Wunsch (2010) perform Monte Carlo experiments to compare a whole range of matching estimators and find that results across different methods are sensitive to individual observations that receive a very high weight. Their preferred method is the radius matching combined with regression, which in our case produces results in the middle range of the different methods.

To trust the last two sets of results, one needs to be confident that there are no unobservable factors influencing the selection into treatment. We now control flexibly for time-varying covariates, but not for an unobserved firm-fixed effect. The results in panel (c) of Table 7 apply the difference-in-differences estimator to the sample of matched firms. Hence, we only need to make the "selection on observables" assumption [A2] on the first differenced performance measures that remove any firm-fixed unobservable [A1]. The point estimates are closer to the difference-in-differences results than to those for the matching estimators. The effect on the total value of exports are particularly similar to the Blundell-Bond results, ranging from a boost to exports of 2.7% using nearest neighbor matching to 4.6% using kernel matching. Radius matching results are again intermediate.

This final set of results indicates that export promotion services raise total exports for treated firms, relative to their own pre-treatment baseline export level and controlling for selection into treatment based on time-varying observables. All effects are also estimated very precisely. The effect on total exports comes exclusively from the intensive margin. Treated firms export more to each product-destination market, but they are not expanding the number of products they export or the number of markets they serve. The Blundell-Bond estimates for the extensive margin effects were already insignificant and the estimates using matching without first-differencing also produced effects at the extensive margin that were on average eight and four times smaller than the intensive margin response. Now the point estimates are even negative, suggesting that treated firms are concentrating on fewer but more successful products and markets.

This finding differs notably from the results for Peru in Volpe Martincus and Carballo (2008) who found the strongest response at the product and destination extensive margins. In Canada, the positive estimates at the extensive margins obtained using matching methods cannot be viewed as causal effects of the export promotion program. It should either be interpreted as the result of self-selection of firms or the

result of client firms also making changes on other dimensions that make exporting additional products to more destinations more likely.[15]

5.3 Sensitivity to timing, location, and peer effects

The earlier estimates already indicated that the effect for treated firms is likely to differ from the average effect in the full population. We now investigate other dimensions along which the effects might vary using the regression framework. The advantage of this methodology is that multiple dimensions of treatment can be investigated at the same time and we can easily verify what the impact is of specific control variables on the performance variable as well as on the estimated treatment effect. Clearly, the point estimates will be higher than for the difference-in-differences estimates, but our main interest is now how the estimate changes across specifications.

Benchmark results for all four dependent variables were reported in panel (a) of Table 7 and we repeat the full estimates in the first column of Table 8. The concurrent effect of TCS assistance on total exports was estimated at 17.9% (corresponding to a point estimate of 0.165). In the next column we additionally include the treatment dummy for the previous year to investigate whether lagged effects are important. While both the contemporaneous and lagged treatment show up with positive signs, the lagged variable has the strongest effect. The sum of the two effects is almost the same as the total effect in the first column, but two thirds of the combined effect is associated with lagged treatment. It suggests that it takes some time for the full effect of assistance to be realized.

[Table 8 approximately here]

In the third column, the treatment effects at different time periods are replaced with a single dummy that captures whether a firm was ever a TCS client. This effect cannot be identified in a difference-in-differences framework as it is now impossible to control for the firm-specific export benchmark. The point estimate is now almost 40% larger than the effect limited to treatment in only the current year or the last two years. It underscores that assistance might have a lingering effect for several more years. The concurrent effect identified using DID or matched-DID approaches is more reliable, but likely to be a lower bound of the total benefit associated with TCS assistance.

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[15] Recall, that our data set unfortunately excludes firms that never export. As a result, we are unable to identify the pure firm-level extensive margin effect on the probability of entering the export market.

In the same framework we can also investigate the sensitivity of the estimates to dimensions other than timing of the export support services. We investigate two questions in particular.

Is targeted support that firms request from TCS offices in a particular country especially effective at boosting exports to that same export destination? Recall that for the United States Rose (2007) found evidence that the presence of more embassies and consulates in a country raised exports there, even controlling for endogeneity of embassies. To investigate this question we made both the performance measure and the key explanatory variable location specific. The coefficient in the fourth column of Table 8 reflects the effect of TCS assistance at the firm-year-country level on total exports to that same country. While the point estimate is indeed higher, 0.176 versus 0.165 (19.2% versus 17.9%), the change is remarkably small and not statistically significant.

The second question we investigate is whether exports by other firms to the same destination country diminishes the effectiveness of TCS assistance. An important role of export promotion activities is dissemination of information (Copeland, 2008). It is possible that the demonstration effect of other Canadian exporters or the ability to learn directly or indirectly from other firms mitigates information problems and lowers the effectiveness of export promotion activities. For example, Swenson (2008) has demonstrated that exports of foreign multinationals located in China tend to boost the exports to the same destinations of domestic firms located nearby. As it is likely that this channel takes time, exports by other firms first need to be realized and observed, we include the lagged value of exports by "peers" in the regression and compare with estimates of the treatment effects in the second column of Table 8.

The coefficient of lagged exports of peer firms is positive and estimated extremely precisely (standard error is only 0.003). This is likely to be a combination of several effects. Learning from other firms is one channel, but other firms' success can also indicate a potential export market for Canadian products. The positive estimate suggests that the combination of these two effects dominate any negative business stealing effect as higher exports from competing firms would ceteris paribus depress exports.

More importantly and contrary to expectation, the inclusion of peer exports raises the point estimates on both the concurrent and lagged TCS dummies. The change is small and not statistically significant, but enough to render the concurrent effect also to be significant now. The increase comparing the location-specific estimates in columns (5) and (2) is even larger than comparing the estimates in column (4) and (1).

The evidence suggests that exports by Canadian peers are more of a complement to than a substitute for TCS assistance.

5.4 ATE versus ATT

As mentioned, the most striking difference with earlier results is that for Canada the intensive margin effect dominates, while responses at the extensive product and destination margins dominated for several Latin American countries. The difference is particularly apparent for the matching estimators and the matched DID. It is therefore useful to look which firm characteristics are most closely associated with performance benefits of the export promotion program.

At the bottom of Table 8 we indicate the average effect of treatment on the treated (ATT). The average effect of treatment for the full sample (ATE), i.e. for the universe of exporters, is captured by the uninteracted treatment dummies reported in the top rows of the table. In most cases, the ATT is below the ATE. It suggests that firms that participate on average have characteristics associated with lower program effects. The differences tend to be small, but on average the estimated ATT is almost one fifth lower than the ATE. The lower point estimates for the difference-in-differences estimators that only identify ATT effects also have to be seen in this light.

It is illuminating to look at the coefficients on the interaction terms between the treatment dummy and the demeaned firm characteristics in Table 8. The significant coefficients invariably have the same signs in all five regressions reported, which facilitates the discussion.

The strongest and most robust finding is that the treatment effects are associated negatively, but at a decreasing rate, with the number of products a firm exports. Firms that exporting more products see a smaller increase in the total value of exports when they participate in the export promotion program. This is consistent with the small effects we estimated at the extensive product margin. Firms with more export market experience also see smaller benefits. These two factors explain much of the shortfall in the ATT compared to the ATE. Export assistance is of most use for inexperienced firms, while participation is increasing in firms' export market experience and the number of products exported.

TCS clients are also much more likely to serve multiple export destinations. However, while the coefficients on the interaction terms with the number of markets are always positive, the point estimates are much smaller. Older and larger firms also benefit more from TCS export promotion services, but effects are smaller and often insignificant. Productivity is positively associated with strong participation effects, but only in the fourth column.

6. Conclusions

We have shown that export promotion activities by the Canadian Trade Commission Services (TCS) are successful in boosting exports of Canadian firms. The overall effect is positive and significant using any of the identification assumptions that permit causal interpretation, but relatively small in size. Controlling for time-varying covariates as well as unobservable firm-fixed effects using several different methodologies always leads to an estimate of 2 to 4% higher exports as a result of TCS assistance.

The different estimation methods differ somewhat in the relative importance they assign to the different channels that lead to this overall effect. The most demanding identification methods suggest that the only significant effect are higher average exports for specific destination-product markets, with only insignificant effects on the number of destinations served and products exported. This breakdown is the exact opposite from results of previous studies for several Latin American countries.

The effects vary in intuitive ways but only to a limited extent along a number of dimensions. They tend to be higher for first-time clients and take a few years to materialize fully. Effects are slightly higher for location-specific assistance and do not disappear when controlling for peer effects. Assistance is somewhat more effective for larger and older firms and for exporters that export to many destination markets. In contrast, assistance is less effective for experienced exporters and for firms that export many products. These last two characteristics are prominent among TCS clients, which leads to lower estimated treatment effects for treated firms than would be expected for random clients.

Two caveats are in order. A major objective of any export promotion program is to draw new firms into the export market. Unfortunately, our dataset does not allow us to investigate this issue. Given the relatively small and declining fraction of Canadian exports that is accounted for by new firms and the weaker results on the extensive destination and product markets for existing exporters, we conjecture this omission is quantitatively not so important.

A second issue to keep in mind is that we only measure the benefits of export assistance. In order to evaluate the net benefits of the program the costs need to be taken into account. A back of the envelope calculation suggests that a 3% boost to the average annual export level amounts to C$3.6 billion (Canadian) of additional value added, assuming a value added to sales ratio of one to three. Whether this represents a net benefit to the Canadian economy and how large it is depends on the value added that the resources would have created in their counterfactual application and how costly the program is. A calculation beyond the scope of this study.

References

Abadie, Alberto and Guido W. Imbens. 2006. "Large Sample Properties of Matching Estimators for Average Treatment Effects," *Econometrica*, 74(1): 235-267.

Alvarez, Roberto E. and Gustavo T. Crespi. 2000. "Exporter Performance and Promotion Instruments: Chilean Empirical Evidence," *Estudios de Economía* 27(2): 225-224.

Baldwin, John R. and Wulong Gu. 2003. "Export-market Participation and Productivity Performance in Canadian Manufacturing," *Canadian Journal of Economics*, 36(3): 634-657.

Bernard, Andrew B. and J. Bradford Jensen. 2004. "Why Some Firms Export," *Review of Economics and Statistics* 86(2), May: 561-569.

Copeland, Brian R. 2008. "Is There a Case for Trade and Investment Promotion Policy?" in Dan Ciuriak (ed.), T*rade Policy Research 2007*. Ottawa: Foreign Affairs and International Trade Canada: 1-64.

Girma, Sourafel, Holger Görg and Joachim Wagner. 2009. "Subsidies and Exports in Germany: First Evidence from Enterprise Panel Data," *Applied Economics Quarterly*, 55(3): 179-195

Girma, Sourafel, Yundan Gong, Holger Görg, and Zhihong Yu. 2009. "Can Production Subsidies Explain China's Export Performance? Evidence from Firm-level Data," *Scandinavian Journal of Economics*, 111(4): 863-891.

Görg, Holger, Michael Henry and Eric A. Strobl. 2008. "Grant Support and Exporting Activity," *The Review of Economics and Statistics*, 90(1): 168-174.

Harrison, Ann and Andrés Rodríguez-Clare. 2010. "Trade, Foreign Investment, and Industrial Policy for Developing Countries," in Dani Rodrik and Mark Rosenzweig (eds.) *Handbook of Development Economics, Volume 5*. North-Holland: 4039-4214.

Helmers, Christian, and Natalia Trofimenko. 2010. "Export Subsidies in a Heterogeneous Firms Framework: Evidence from Colombia," Working Paper, September.

Huber, Martin, Michael Lechner, and Conny Wunsch. 2010. "How to Control for many Covariates? Reliable Estimators Based on the Propensity Score," University of St. Gallen, Working Paper No. 30.

Imbens, Guido W. and Jeffrey M. Wooldridge. 2009. “Recent Developments in the Econometrics of Program Evaluation,” *Journal of Economic Literature,* 47(1), March: 5-86.

Lawless, Martina, 2009. “Firm Export Dynamics and the Geography of Trade,” *Journal of International Economics,* 77(2): 245-254.

Lederman, Daniel, Marcelo Olarreaga and Lucy Payton. 2010. “Export Promotion Agencies: Do They Work?” *Journal of Development Economics,* 91(2), March: 257-265.

Moser, Christoph, Thorsten Nestmann, and Michael Wedow. 2008. “Political Risk and Export Promotion: Evidence from Germany,” *The World Economy,* 31(6): 781-803.

Rose, Andrew K. 2007. “The Foreign Service and Foreign Trade: Embassies as Export Promotion,” *The World Economy,* 30(1), January: 22-38.

Swenson, Deborah L. 2008. “Multinationals and the Creation of Chinese Trade Linkages,” *Canadian Journal of Economics,* 41(2): 596-618.

Volpe Martincus, Christian, Jerónimo Carballo and Pablo Garcia. 2010. “Firm Size and the Impact of Export Promotion Programs,” in Dan Ciuriak (ed.) *Trade Policy Research 2010*. Ottawa: Department of Foreign Affairs and International Trade.

Volpe Martincus, Christian and Jerónimo. Carballo. 2008. “Is Export Promotion Effective in Developing Countries? Firm-Level Evidence on the Intensive and the Extensive Margins of Exports,” *Journal of International Economics,* 76(1), September: 89-106.

Volpe Martincus, Christian and Jerónimo. Carballo. 2010. “Entering New Country and Product Markets: Does Export Promotion Help?” *Review of World Economics,* 146(3): 437-467.

Wooldridge, Jeffrey M. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

Table 1: Summary statistics on the export record of Canadian exporters

Year	No. of Exporters	Value of Exports		No. of Destinations		Number of Products	
		Total (bil. C$)	by firm (mil. C$)	Total	by firm	Total	by firm
1999	43,568	321	7.4	225	1.7	5,422	4.8
2000	46,465	373	8.0	221	1.7	5,435	4.7
2001	48,140	360	7.5	226	1.8	5,429	4.6
2002	49,146	351	7.2	227	1.8	5,457	4.2
2003	48,504	337	6.9	230	2.0	5,528	4.4
2004	49,314	366	7.4	231	2.2	5,551	4.6
2005	48,126	388	8.0	234	2.4	5,557	4.8
2006	44,127	381	8.6	230	2.5	5,539	5.0
Average	**47,174**	**360**	**7.6**	**228**	**2.0**	**5,490**	**4.6**

Source: Statistics in this and all following tables are calculated from the information in the Business and Export Registers, maintained by Statistics Canada, and the TCS client management database of DFAIT.

Table 2: Characteristics of Canadian exports and exporters

Year	Share of exporters serving this destination[1]				Share of large firms[2]		TCS clients
	United States	Europe	Asia Pacific	Latin America	of exporters	of exports	
1999	89.2	14.6	10.3	6.1	5.4	73.3	3.1
2000	89.5	13.9	10.2	5.8	5.3	71.0	5.7
2001	89.1	14.5	10.7	6.0	5.1	69.3	4.8
2002	87.7	15.5	12.0	6.3	4.9	68.7	4.4
2003	85.0	18.7	14.0	7.8	5.0	67.1	4.7
2004	82.2	20.6	15.9	9.1	5.0	66.5	5.4
2005	82.1	21.3	16.9	10.2	5.3	63.7	4.7
2006	82.2	21.6	17.6	10.6	5.5	64.8	5.6
Average	**85.9**	**17.6**	**13.5**	**7.7**	**5.2**	**68.0**	**4.8**

Notes: [1] Percentages add to more than 100 as firms can export to multiple destinations; [2] More than 200 employees.

Table 3: Fraction of exporters by number of markets and number of products

Year	Number of Markets			Number of Products			
	1	2-5	6+	1	2-3	4-10	11+
1999	82.0	14.0	4.0	37.3	28.6	24.1	10.1
2000	82.8	13.6	3.8	38.6	28.4	23.0	10.0
2001	82.2	13.6	4.1	39.9	28.3	22.4	9.4
2002	81.1	14.3	4.6	41.1	28.7	22.2	7.9
2003	77.5	16.5	6.0	41.2	28.0	22.2	8.5
2004	75.3	17.9	6.8	41.2	27.8	22.0	8.9
2005	74.0	18.3	7.7	40.0	27.9	22.5	9.6
2006	73.2	18.6	8.3	38.5	28.4	23.0	10.2
Average	**78.5**	**15.9**	**5.7**	**39.7**	**28.3**	**22.7**	**9.3**

Table 4: Destination and product range for new and continuing exporters

2000:	New exporters (39.5% of exporters)		Continuing exporters (60.5% of exporters)	
	Single product	Multiple products	Single Product	Multiple Products
Single destination	67.2%	28.9%	26.1%	51.4%
Multiple destinations	0.5%	3.4%	1.0%	21.4%

2006:	New exporters (12.0% of exporters)		Continuing exporters (88.0% of exporters)	
	Single product	Multiple products	Single Product	Multiple Products
Single destination	69.2%	23.3%	31.9%	39.0%
Multiple destinations	1.8%	5.7%	2.7%	26.4%

Table 5: Characteristics of TCS clients

(a) Fraction of exporters that are TCS clients

	1999	2006
Total:	3.1%	5.6%
By firm size:		
micro firms (1-10 empl.)	1.5%	3.2%
small firms (11-50 empl.)	3.1%	5.6%
medium firms (51-200 empl.)	5.0%	7.9%
large firms (>200 empl.)	12.1%	18.6%
By export destination:		
United States	3.1%	5.7%
Europe	9.1%	12.9%
Asia-Pacific	9.6%	14.2%
Latin America	11.9%	16.1%
By export portfolio		
single market exporters	1.8%	2.8%
multiple market exporters	9.1%	12.9%
single product exporters	1.4%	2.5%
multiple product exporters	4.1%	11.9%

(b) Comparison of TCS clients to other exporters (1999-2006)

	TCS clients	Other exporters
Sectoral breakdown (NAICS code)		
Agriculture and mining (100-200)	7.0%	9.8%
Manufacturing (300)	55.7%	40.2%
Wholesale-retail and other services (400-500)	37.5%	50.0%
Firm characteristics:		
number of markets	6.1	1.8
number of products	12.5	4.2
labor productivity (in logs)	12.0	11.8
employment	308.3	61.2
years of export experience	3.2	2.3

Table 6: Average effect of export promotion assistance on current year performance estimated using difference-in-differences

	Value of exports	Number of products	Number of destination countries	Av. exports per product and country
(a) All firms receiving TCS support (simple DID estimates)				
Without covariates	0.086	0.040	0.037	0.031
	(.015)***	(.007)***	(.005)***	(.013)***
With covariates	0.021	0.018	0.037	0.019
	(.013)*	(.007)***	(.005)***	(.013)
(b) Dynamic panel estimates				
Without covariates	0.045	0.013	0.006	0.031
	(.020)**	(.010)	(.008)	(.018)**
With covariates	0.031	0.007	0.005	0.028
	(.017)*	(.009)	(.007)	(.017)*
(c) Effect for firms receiving support for the first time (in the sample)				
Without covariates	0.093	0.045	0.046	0.031
	(.016)***	(.008)***	(.007)***	(.013)**
With covariates	0.031	0.023	0.043	0.027
	(.016)***	(.007)***	(.006)***	(.013)**

Notes: The covariates included, in addition to firm-fixed effects, are firm-age, size (number of employees), years of export market experience, log-productivity, and in the first and last column also the number of products exported and countries served. ***, **, * indicate significance at the 1%, 5%, 10% level.

Table 7: Treatment effect estimates by conditioning on observables

Dependent Variable:	Value of exports	Number of products	Number of destination countries	Av. exports per product and country
(a) One step estimates on the full sample: include interactions with all covariates				
ATE	0.165	0.144	0.305	0.124
	(0.027)***	(0.013)***	(0.008)***	(0.026)***
ATT	0.148	0.189	0.442	
(b) Performance differences for matched pairs of firms (ATT)				
Nearest Neighbor	0.188	-0.013	0.005	0.179
	(.021)***	(.010)	(.010)	(.021)***
Kernel	0.176	0.029	0.047	0.156
	(.011)***	(.005)***	(.005)***	(.011)***
Radius	0.174	0.041	0.056	0.150
	(.011)***	(.005)***	(.005)***	(.011)***
(c) Differences estimated in two steps using matching difference-in-differences				
Nearest Neighbor	0.027	-0.027	-0.061	0.027
	(.013)**	(.007)***	(.006)***	(.013)**
Kernel	0.045	-0.045	-0.017	0.042
	(.007)***	(.003)***	(.003)***	(.007)***
Radius	0.042	-0.019	-0.058	0.039
	(.007)***	(.004)***	(.003)***	(.007)***

Notes: Panel (a): OLS regression on treatment dummy, covariates, and interactions between treatment and mean-differenced covariates. The set of covariates used are firm-age, size (number of employees), export market experience, log-productivity, industry dummies, and in the first and last column also the number of products exported and countries served. All controls except productivity are included both linearly and quadratic. Panel (b): The same set of covariates is used to predict the treatment probability in the first stage and performance differences for matched pairs of firms, using different matching techniques, are reported. Standard errors are bootstrapped. Panel (c): includes firm-fixed effects in the second stage regression. ***, **, * indicate significant at the 1%, 5%, 10% level.

Table 8: Treatment effects controlling for the timing of support, location, and peer effects

	Dependent Variable in each regression is the "value of exports"				
	Concurrent (benchmark)	Lagged	Lingering	Concurrent in export destination	Lagged with peer effects
	(1)	(2)	(3)	(4)	(5)
TCS(t)	0.165***	0.052			0.079**
TCS($t-1$)		0.117***			0.136***
Any TCS in $0,\ldots,t$			0.228***		
TCS at export destination(t)				0.176***	
Exports of peers($t-1$)					0.099***
TCS(t) * Age of enterprise	0.107	0.324**	0.214***	0.044	0.320**
TCS(t) * (Age of enterprise)^2	0.012	−0.049	–0.017	0.029	−0.048
TCS(t) * Number of employees	0.081**	0.058	0.104***	0.085**	0.051
TCS(t) * (Number of employees)^2	–0.006	−0.009	0.000	–0.001	−0.009
TCS(t) * Lagged Productivity	–0.003	−0.005	–0.003	0.070***	−0.007
TCS(t) * Export experience	–0.207***	−0.043	–0.122***	–0.118*	−0.054
TCS(t) * (Export experience)^2	0.002	−0.001	0.001	–0.002	−0.001
TCS(t) * Number of products	–0.320***	−0.230***	–0.285***	–0.551***	−0.247***
TCS(t) * (Number of products)^2	0.067***	0.051***	0.046***	0.087***	0.052***
TCS(t) * Number of markets	0.083*	0.106*	0.013	0.276***	0.072
TCS(t) * (Number of markets)^2	–0.033**	−0.030	–0.030**	–0.073**	−0.019
TCS(t –1) * Peer exports(t –1)					0.000
TCS(t –1) * Age of enterprise		−0.007			−0.012
TCS(t –1) * (Age of enterprise)^2		0.029			0.030
TCS(t –1) * Number of employees		0.056			0.049
TCS(t –1) * (Number of employees)^2		0.001			0.002
TCS(t –1) * Lagged Productivity		−0.023			−0.024
TCS(t –1) * Export experience		−0.177			−0.175
TCS(t –1) * (Export experience)^2		0.045			0.046
TCS(t –1) * Number of products		−0.199***			−0.220***
TCS(t –1) * (Number of products)^2		0.036**			0.040***
TCS(t –1) * Number of markets		0.039			0.015
TCS(t –1) * (Number of markets)^2		−0.023			−0.015
(ATT)	*(0.148)*	*(0.119)*	*(0.202)*	*(0.115)*	*(0.123)*

Notes: In each column, the treatment variable(s) is interacted with the covariates; uninteracted covariates are included as well, but not reported. In column (3) and (4) the interactions with the actual treatment variables, respectively "any TCS" and "concurrent TCS at the export destination", are reported. *, **, and *** indicate significance at the 10%, 5%, and 1% level.