

The Effect of Export Promotion on Firm-Level Performance

Author(s): Jakob Munch and Georg Schaur

Source: *American Economic Journal: Economic Policy*, February 2018, Vol. 10, No. 1 (February 2018), pp. 357-387

Published by: American Economic Association

Stable URL: <https://www.jstor.org/stable/10.2307/26529018>

REFERENCES

Linked references are available on JSTOR for this article:

https://www.jstor.org/stable/10.2307/26529018?seq=1&cid=pdf-reference#references_tab_contents

You may need to log in to JSTOR to access the linked references.

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



JSTOR

American Economic Association is collaborating with JSTOR to digitize, preserve and extend access to *American Economic Journal: Economic Policy*

The Effect of Export Promotion on Firm-Level Performance[†]

By JAKOB MUNCH AND GEORG SCHAUR*

Most countries promote exports. This paper answers two questions: Does export promotion improve firm performance, and do any benefits outweigh costs? We solve self-selection problems by accounting for an extensive set of firm characteristics. In addition, we distinguish firms that self-selected into promotion services from firms the Danish Trade Council approached based on observed information. We find that export promotion increases sales, value added, employment, and value added per worker. For small firms, summing expenditures on export promotion, subsidies, and tax distortions, the gain in value added is roughly three times higher than the direct costs of export promotion. (JEL D22, F13, F14, L25, L53)

Most countries allocate public funds to export-promotion services. The goal of these services is to help firms in general and in many cases small- and medium-sized firms in particular to become successful exporters. The key policy question related to promotion activities is whether export promotion creates value and generates employment opportunities to justify the appropriation of tax revenues. Existing studies show that export promotion works to improve various margins of export performance. The question if export promotion affects firms' performance overall in terms of sales, value added, and employment and whether the benefits of export promotion outweigh the costs is not discussed in the current literature.

To fill this gap in the literature, we merge firm-level data of Danish firms with export-promotion services delivered by Denmark's Trade Council and examine if export-promotion activities affect export performance, raise value added, productivity, and create jobs. As is common in this literature, we apply a difference-in-difference matching estimator that relies on observable firm characteristics to identify the effect of export-promotion activities on firm performance.

The main identification challenge is self-selection of firms into export-promotion services. The common presumption is that firms decide to purchase export-promotion services, and this decision is correlated with unobserved export

*Munch: Department of Economics, University of Copenhagen, Øster Farimagsgade 5, Building 26, DK-1353 Copenhagen K, Denmark (email: jakob.roland.munch@econ.ku.dk); Schaur: 519 Stokely Management Center, University of Tennessee, Knoxville, TN 37996 (email: gschaur@utk.edu). Financial support from the Economic Policy Research Network (EPRN) and the Danish Industry Foundation is gratefully acknowledged. We thank Andrew Bernard, Natalie Chen, Emmanuel Dhyne, Keith Head, Beata Javorcik, James Rauch, Christian Volpe Martincus, and seminar and workshop participants at Lund University, Aarhus University, University of Munich, EITI 2015, ETSG 2015, University of Oxford, IEFS China 2016, and AMES Kyoto 2016 for helpful comments. We would also like to thank the Trade Council for providing and assisting with the export-promotion data.

[†]Go to <https://doi.org/10.1257/pol.20150410> to visit the article page for additional materials and author disclosure statement(s) or to comment in the online discussion forum.

ability. Compared to the existing literature, we have several advantages to solve this identification problem.

First, we observe the universe of Danish firms including detailed firm characteristics and firm-level export and performance measures over several years. This is the most comprehensive dataset to date that has been used to examine the effects of trade promotion. This matters for identification because the data allow us to use a much more comprehensive list of firm characteristics to control for selection of firms into export-promotion services. For example, we observe variables such as the firm-level composition of labor in terms of education, age, gender, and import status that are not commonly included in this literature because they tend to be unobserved. We also construct a world import demand shock variable to capture that firms facing increasing demand abroad are more likely to buy export-promotion services.

Second, we have data from the Danish Trade Council on all export-promotion activities with firms that have a Danish address. This includes information on the costs of the promotion service and whether the service was initiated by the firm or the Trade Council. The data show that only about half of the firms self-select into export promotion. The other firms are approached by the Trade Council. This is an advantage from an identification point of view. Conditional on observable firm characteristics, we argue there is no systematic bias in the Trade Council's approaching of firms. This information is also important from a trade-promotion point of view. The idea that approaching firms stimulates export activity as part of trade promotion is a policy action that has not received attention in the literature.¹

Third, firms may acquire information about foreign markets in other ways than through Trade Council provided services. There are private providers of information about export destinations, and firms may collect information on their own by hiring workers with specific knowledge about export markets. Our data allow us to compare firms buying export-promotion services from the Trade Council with firms that seek to acquire information about export markets in other ways.

In addition to using matching estimators for the effect of export promotion on export performance, we also take advantage of the destination-specific export-promotion information we obtained from the Trade Council. Observing variation in promotion services across firms, years, and destinations allows us to implement a regression based identification strategy with a rigorous set of fixed effects. Compared to the existing literature, these results are more robust with respect to unobserved variables. Evidence based on this identification strategy supports the idea that export promotion works as expected and may positively affect firm-level performance measures other than exports.

A natural first step is to examine whether export promotion increases export performance. However, it is not obvious how a positive effect on, say, export status improves the overall performance of firms.² For that reason, it is an advantage to estimate the impact of export promotion on firm-performance measures such as

¹ Randomized control trials provide evidence for the effects of trade facilitation on exporting and firms but do not evaluate organized trade-promotion activities by official institutions (Atkin, Khandelwal, and Osman 2017; Hui 2016).

² For example, whether domestic sales are substitutes or complements determines the effect of export activity on the total sales of the firm. Ahn and McQuoid (2013), Nguyen and Schaur (2012), and Soderbery (2014) provide

employment and value added, directly. If there is a direct relationship between the export activity and total real economic activity at the firm level, then the next question is if the benefits of export-promotion activities are greater than the direct costs.

We find that export promotion facilitates entry into export markets and the continuation of export activity across all types of firms. The effect is largest for small firms with 1–20 employees, where export promotion raises the probability of exporting by almost 8 percentage points relative to control firms. We also find that overall sales, value added, and employment are only boosted at small firms. Allowing for a two year lag, sales and value added increase by 8–9 percentage points while employment rises by 4 percentage points as a consequence of export promotion. Our results are robust with respect to alternative estimators and classifications of the treatment and control groups.

The finding that export promotion improves performance for small firms is intuitive. These firms face entry barriers on foreign markets that require an upfront investment to learn about market conditions, identify distribution channels, and search for foreign partners. This investment is difficult to recover for the smallest firms. By pooling this information and providing it to firms at subsidized rates, the Trade Council reduces the fixed cost of entry into the export market and the cost of obtaining additional information to improve initial export performance. Our detailed information on export-promotion services allows us to directly examine the importance of foreign contacts (Rauch 1996, Chaney 2014) and intelligence and analysis as main export-promotion instruments.

Focusing on the smallest firms and using value added per worker in the treatment year as base, we find that these small firms create additional value that is about three times higher than the cost of export promotion even taking into account tax distortions (but excluding other general equilibrium effects). We provide evidence that conditioning on a more parsimonious set of variables, as is common in the literature, biases the estimates and results in a misleading cost-benefit evaluation.

To our knowledge, we are the first to examine the effect of export promotion on firm-level performance other than specific dimensions of export activity. In one branch of the literature, it is common to apply aggregate country-level or state-level trade data (Head and Ries 2010; Lederman, Olarreaga, and Payton 2010; Rose 2007; Wilkinson and Brouthers 2000) or examine the location of US state's overseas offices (Cassey 2014; Cassey 2012).

Early studies using firm-level data include Bernard and Jensen (2004) and Görg, Henry, and Strobl (2008). Bernard and Jensen (2004) find no effect of state-level export-promotion expenditures on export entry among US firms. Görg, Henry, and Strobl (2008) are also pessimistic about the possibility that pure export promotion affects export activity. Instead, they argue that indirect export promotion in the form of grant support (e.g., employment grants, R&D grants, and training grants) can affect productivity and therefore allow firms to compete successfully in foreign markets. They find that grant support to Irish firms does not encourage non-exporters to start exporting, but existing exporters increase export volumes if grants are large

evidence that they are substitutes, potentially affecting markups and overall revenues (e.g., Spearot 2013). Berman, Berthou, and Héricourt (2015) provide evidence for exports and domestic sales being complements.

enough. Accounting for a large set of firm characteristics, we examine if direct export promotion affects firm-level exports. We find that direct export promotion is especially effective for small firms. This implies that export promotion and grant support programs are policy complements to encourage export activity.

Some more recent studies apply firm-level data to examine the effect of export promotion on firms in developed countries (Van Biesebroeck, Yu, and Chen 2011; Hiller 2012) and developing countries (Volpe Martincus and Carballo 2008, 2010a,b,c). Common to these studies is that they all examine various margins of export activity such as the number of destination countries, the number of exported products, or the export volume within a destination product for firms that already export. Compared to these studies, we observe firm-level trade as well as other performance measures such as value added and employment for all firms including non-exporters. This allows us to identify the effect of export promotion on the overall performance of firms, which is important if the goal of the policy is to affect value added, jobs, and growth in firms. For example, the Trade Council's strategy toward 2015 includes value, growth, and knowledge.³

Section I discusses theories of implications of export promotion and explains the matching estimator we apply to identify the effect of trade promotion on firm performance. Section II describes the data. Section III presents and discusses the estimation results, and Section IV concludes.

I. Methodology

Exporters acquire and process a vast amount of information to supply foreign markets. Variation in product and safety standards, tariffs, enforcement of intellectual property rights, macroeconomic conditions as well as distribution and supply chain related difficulties that vary across countries make it difficult to start and maintain export activity. This section outlines the existing theory related to this information management problem and our empirical strategy to identify if information that firms purchase from the Trade Council of Denmark improves firm performance.

A. Existing Theory

To sell on foreign markets, most exporters match with foreign partners. Recent literature highlights information barriers as an important friction to forming successful international partnerships and several mechanisms that solve this information problem.

The basic problem is that to engage in international trade, firms must find an appropriate business partner on the foreign market. The quality of the match between the two business partners may depend on the ability to rule out partners in a first cut approach (Rauch and Trindade 2003), membership in a business network (Rauch and Casella 2003), and ethnic networks (Casella and Rauch 2002, Rauch and Trindade 2002). When there is a lack of knowledge about foreign markets,

³<http://um.dk/en/tradecouncil/about/strategy/>. Also using firm-level data, Van Biesebroeck, Konings, and Volpe Martincus (2016) examine if export promotion helps firms recover from the global recession.

initial matches provide information that affect firms' incentives to search for more partners (Eaton et al. 2014). The underlying problem of finding a match on the foreign market, for example, in the form of a distributor, directly relates to export promotion. The majority of the Trade Council's activities are in terms of partner search and matchmaking.

Aeberhardt, Buono, and Fadinger (2014) extend Araujo and Ornellas (2007) to model an exporter's need to rely on a foreign partner to supply the foreign market. The challenge is that exporters are initially uncertain about the foreign partner's reliability. According to their intuition, it is especially the small exporters who may gain from a reliable partner recommended by export promotion and legal advice. The idea is that impatient importers hold up the exporter and try to renegotiate contracts if the exporter's productivity is low, such that the value of the future relationship for the importer is low and legal institutions are weak. This implies that especially small firms can benefit from promotion programs. Chaney (2014) examines how networks form and how exporters use their existing network of partners to find partners in new markets. Again, this suggests some heterogeneity in the effects of export promotion. Firms that are large and have been active for a longer time can draw information from a bigger network and their own experience. If this information is a substitute for Trade Council services, then we expect that export promotion for these firms is not as effective.

Based on standard trade theory (Melitz 2003) and the literature summarized above, we expect that export promotion is especially helpful for small firms. Recovering the fixed costs from information acquisition related to export markets is more difficult to overcome for small firms. Therefore, bundling basic information on exporting and foreign partners in an export-promotion office and spreading the acquisition costs over many firms purchasing the information most likely affects small firms that otherwise could not recover this fixed cost of exporting.

Instead of solving these information problems with direct organized export-promotion activities, firms can acquire information about foreign partners without the Trade Council.⁴ These alternative ways of accumulating information are likely more relevant to larger firms that may already have experience and networks on foreign markets and require specific information related to their products and activities, which may be beyond the expertise of the Trade Council.⁵

B. Difference-in-Difference Matching Estimator

The main identification challenges are that it is not clear what type of firm will choose which strategy of information management and that the impact of outside information across firms is likely heterogeneous. For example, if outside information

⁴In addition to the literature discussed above, Nugyen (2012) shows how firms predict demand based on market correlations, and Albornoz et al. (2012) show how firms sequentially export due to experimentation and cross-market correlations. Allen (2014) provides theory and evidence that even in homogenous products firms search across markets to arbitrage price differences.

⁵Additional actions firms can take include integrating logistics services directly with purchasing decisions and relying on experience with export activity (Artopoulos, Friel, and Hallak 2013; Mion and Oromolla 2014; Labanca, Molina, and Muendler 2014).

is a substitute to inside information, then small firms that do not have marketing and research departments will likely purchase outside information. For large firms that already perform their own market research, there is little value in the outside information. Therefore, they are likely not purchasing outside information, and if they do, then we would expect that the benefits are small. This suggests that certain types of firms are more likely to select into purchasing information from the Trade Council and that the impact of the services provided by the Trade Council may be heterogeneous across different types of firms.

We apply a difference-in-difference matching estimator to solve these identification challenges (Heckman, Ichimura, and Todd 1997). For a given measure of firm performance, we compare the change in performance within a firm that buys export-promotion services (the treatment group) to the change within a similar firm that does not buy export-promotion services (the control group). Let Δw_j^T denote the change in performance of firm j that was treated with export promotion and let Δw_j^{NT} be the firm in the sample of non-treated firms that most closely matches the characteristics of the treated firm. The average treatment effect of the treated is then defined as

$$(1) \quad \delta_{ATET} = \frac{1}{N} \sum_{j=1}^N (\Delta w_j^T - \Delta w_j^{NT}),$$

where N is the total number of treated firms. This estimator is identified, if there is no unobserved information that leads firm j to purchase export promotion and at the same time changes its performance relative to the comparison firm. This implies that for each firm that purchases export-promotion services, we need to find a comparison firm that is subject to the same shocks and characteristics as the treated firm but did not participate in export-promotion activities.

Within firm differencing eliminates unobserved factors such as productivity as long as the impact of the treatment does not depend on the unobserved time invariant information. This is similar to a linear regression framework where the treatment indicator should be interacted with firm productivity. In that case, time differencing eliminates productivity, but not the interaction of productivity with the treatment indicator. The matching estimator allows for heterogeneity in the treatment effect across different types of firms. For example, it may be that $\Delta w_j^T - \Delta w_j^{NT} \neq \Delta w_k^T - \Delta w_k^{NT}$. The key is that we choose comparison firms for j and k based on observable firm characteristics such that on average the differences are driven by the treatment and not by endogenous selection into the treatment based on unobserved differences between the treated and the comparison firms.

To make sure that our estimates are not driven by unobserved information and self-selection, we match treated firms with control firms based on a high dimension of observed covariates. We use the propensity score method (Rosenbaum and Rubin 1983), which summarizes the matching characteristics X into a single index variable, the propensity score $P(X)$. The propensity score is the conditional probability that a firm receives export-promotion services from the Trade Council. We estimate this propensity with a probit model based on an extensive set of firm, industry, and demand characteristics.

The propensity score tells us the relative importance of firm characteristics in predicting if a firm receives export-promotion services. With the predicted propensity score for the treated and control firms at hand, we then find for each treated firm the control firm that most closely matches the propensity score of the treated firm. This is the standard nearest neighbor matching, where each treated firm is matched with the nearest neighbor control firm based on the propensity score.

If the propensity score appropriately accounts for selection into receiving export-promotion services such that no unobserved firm-level characteristics that predict treatment and the impact of the treatment remain, then $\Delta w_j^T - \Delta w_j^{NT}$ measures the change in performance of treated firm j relative to the change in performance of j 's nearest neighbor and the average (1) estimates the average treatment effect of the treated (ATET) firms.

The ATET is especially convenient for ex post policy evaluation. In theory, treatment effects vary across different types of firms. In that case, an OLS estimator pools over the entire sample averaging the impact of treatment across these different types of firms. By appropriately choosing the comparison group, nearest neighbor matching compares the treated firms' change in performance to what their performance most likely would have been if they did not receive export-promotion services.

C. Identification

To examine firm-level performance measures, the identifying assumption is that all relevant variables that affect both the selection process into trade promotion and outcomes of interest are known. This is the so-called conditional independence assumption. Compared to the existing literature, we have two advantages in meeting this condition.

First, we observe a long list of firm characteristics that are not usually available and that plausibly affect both selection and outcome. For example, Albornoza et al. (2012) and Nguyen (2012) show that firms use past information to predict their demand on a new market. We account for this by including proxy variables for a firm's own efforts to collect information about export markets and foreign demand shocks in our model. We explain the construction of all control variables in Section III.

Second, treatment effects are biased if firms' selection into receiving promotion services is associated with other systematic but unobserved activities that affect export and firm performance. To examine this concern, we distinguish between two types of treatment. The first type of firms self-select into export promotion. The second type of firms are approached by the Trade Council.

The Trade Council approaches firms and offers these firms export-promotion services. The Trade Council does not have an overall strategy for how to pick the firms to approach, and as a result, there is no coordination across embassies and consulates. Instead, caseworkers located in embassies and consulates in foreign countries independently approach Danish firms and offer export-promotion services. The caseworkers typically make these decisions based on information about industry-specific growth in the local destination market. So within each embassy or consulate, there may be a particular focus on certain sectors or industries, but this type of information

is observable. This suggests that conditional on the information we observe in our data, the approach of the Trade Council to identify firms for services is random.⁶

Some caveats apply. First, the caseworkers' focus on particular industries may create a problem if, e.g., most firms in certain industries are approached and many firms turn down the offer. In this case, it is difficult to find an appropriate control group with similar characteristics that did not self-select out of promotion services. This does not seem to be the case in our data. Across four-digit industries, the median share of the treatment intensity is only about 2 percent. In addition, based on information from the Trade Council, most firms that are approached take advantage of Trade Council services (about 70 percent). Therefore, we have a large proportion of potential control firms that we can match with treated firms irrespective of whether firms self-selected or were approached by the Trade Council.

Second, about 30 percent of the approached firms decline the Trade Council's offer for trade-promotion services. We could not obtain information on why some firms decline the offer, but the literature provides guidance. Firms with low levels of productivity and pessimistic export prospects based on foreign demand do not expect to be successful on foreign markets (Melitz 2003, Albornoza et al. 2012, Nguyen 2012). Since the Trade Council cannot directly affect productivity or foreign demand, these firms are also likely not interested in export-promotion services. So conditional on these mechanisms, our estimator matches treated firms that did not seek promotion services with similar control firms that would likely accept the Trade Council's offer for services because they have similar productivity and export prospects. As a consequence, estimates based on the Trade Council approached firms are less likely to suffer from self-selection bias.⁷

In addition to examining the effect of export promotion on firm-level performance, our data provide an opportunity to extend existing evidence on the effects of export promotion on export performance. We observe destination-specific treatment and examine if promotion affects trade performance in the market for which the promotion service was designed. The additional sources of variation allow us to account for all firm-by-time specific and firm-destination specific information with fixed effects in linear regressions mitigating concerns related to unobserved information. Results based on this identification strategy corroborate the idea that export promotion positively affects trade performance and therefore may have an effect on the firms' overall performance.

Finally, identification of the treatment effect requires that there is no spillover from treated firms to non-treated firms. For example, non-exporting firms may learn from neighboring exporting firms about demand on foreign markets (Fernandes and

⁶Information from the estimation supports this conclusion. If the Trade Council approaches firms based on the information we observe while other firms self-select based on some unobserved information, then we would expect that the first-stage probit model that identifies the treatment indicator as a function of firm and industry characteristics fits better for the group of firms approached by the Trade Council. A comparison of R^2 measures for the two groups of treated firms confirms this intuition. The first-stage pseudo R^2 for the group of Trade Council approached firms is 0.24, while for self-selected firms it is lower at 0.20.

⁷In both groups of treated firms, self-selected and Trade Council approached, we account for the issue that treatment is potentially correlated with demand and productivity. The additional advantage with the Trade Council approached firms is that we know why they consider export-promotion services—it is due to the approach by the Trade Council. This improves identification if the self-selected firms approach the Trade Council based on other potentially unobserved actions to affect export performance.

Tang 2014). We account for demand conditions in foreign markets in the matching model. If there is any remaining spillover, then it is worth pointing out that this will likely take some time to kick in and it would downward bias any positive effects of export promotion. Another source for spillovers are general equilibrium or reallocation effects through, e.g., the labor market or through displacement of Danish competitors in the foreign market. We note that the export-promotion program is small relative to the size of the economy, and we expect that such general equilibrium effects are negligible.

II. Data

To estimate the impact of export-promotion services on firm performance, we need information on export promotion, firm-level performance measures, and firm-level characteristics that predict a firms' propensity to select into export-promotion services and outcomes of interest. In this section, we first describe the institutional framework for export promotion in Denmark, and then we explain how we collect and merge information from four distinct data sources. Finally, we provide some descriptive statistics of our data.

A. Export Promotion in Denmark

In Denmark, all governmental trade-promotion activities are organized under one roof in the Trade Council under the Ministry of Foreign Affairs. In 2012, the Trade Council had approximately 75 employees in Denmark and 230 employees abroad located at more than 100 embassies, consulates general, and trade commissions. The annual budget of the Trade Council is around DKK 400 million corresponding approximately to USD 65 million. The trade-promotion services offered are subsidized, but the Trade Council still charges the firms for the services corresponding to the number of consultancy hours delivered (the subsidization rate is roughly 50 percent). As such, the Trade Council is clearly the most important player offering trade-promotion services to Danish firms.

The Trade Council focuses on offering Danish firms individual advice on all issues important for their international activities, and according to their web page, "the goal is to offer the Danish business community the opportunity to enter a close partnership which will enhance the professional analysis of foreign markets and thereby increase the competitiveness of the companies."⁸ The Trade Council accomplishes this goal by offering a range of different trade-promotion activities, which will be explained in more detail below.

B. Export-Promotion Data

We collect information on export-promotion services from the Trade Council's Customer Relationship Management (CRM) database. This database reports all

⁸<http://um.dk/en/tradecouncil/about/org>.

companies that received promotion services, the country for which the service was purchased, the intensity of the service measured by consulting hours, and types of services. All domestically based firms are identified by their so-called CVR number, and we observe all promotion activities from 2002 to 2012. These data are then merged with register data for the population of Danish private sector firms from Statistics Denmark via the CVR number, which is also available in all firm-level register datasets. In the raw trade-promotion data, we have in total more than 86,000 observations accounting for a total revenue (the amount received by the Trade Council) of DKK 905 million; see columns 1 and 2 in Table 1.⁹ In a given year, firms frequently contribute with more than one observation when they buy trade-promotion services more than once and often they buy different types of services within the same year.

To merge the data with the register data, we clean the trade-promotion data in several ways. First, we exclude all firms based abroad since these firms do not appear in the register data. This reduces the number of observations by about 20 percent and the total revenue by about 15 percent; see columns 3 and 4 in Table 1. Second, we collapse all observations by firm and year (and we drop a small number of duplicate entries), which reduces the number of observations substantially to 25,298 but maintains a total revenue of DKK 771 million. Next, we cross check CVR numbers with listed firm identifiers in the register data and drop all entries that do not have a match.¹⁰ This step reduces the number of observations further to 20,992 and the total revenue to DKK 606 million; see columns 5 and 6 in Table 1.

A given firm may purchase export-promotion services in consecutive years. The last two columns of Table 1 report the new relationships reported in the CRM database in each given year. These account for more than half of the merged firm-year observations and 40 percent of the total revenue. For example, in 2006, exactly 1,000 firms were first-time buyers of trade-promotion services in the sense that they did not buy trade-promotion services the previous year.

The difference-in-difference matching estimator exploits variation across time to identify the ATET, and so we cannot estimate the impact of trade promotion in a given year for firms that continuously buy trade-promotion services. Therefore, the treatment group of firms in our baseline scenario will consist of firms from the last two columns of Table 1 that acquired trade promotion in a given year (year t) and did not buy trade promotion the year before (year $t - 1$). Similarly, the control group of firms will consist of firms that neither bought trade-promotion services in year t nor in year $t - 1$. We will perform robustness checks where we condition on not buying trade promotion in additional years (years $t - 2$ and $t - 3$) and where we allow for trade promotion in year $t - 1$.

The TC groups their trade-promotion services into broad categories according to the goal of the product. Most of the activity relates to four broad categories. Partner search and matchmaking helps Danish firms find new trade partners such as distributors in foreign markets through meeting facilitation, recruitment, and other forms of market entry assistance. This group comprises the majority of promotion services.

⁹ In what follows, all nominal variables are measured in 2010 DKK prices using the GDP deflator.

¹⁰ Some firms in the CRM database cannot be identified in Statistics Denmark likely due to entry error in CRM.

TABLE 1—CRM DATABASE MERGED WITH REGISTER DATA

Year	All observations in CRM		Observations for Danish based firms		Firms in CRM merged with register data		Firms in CRM current year but not previous year	
	Count (1)	Million DKK (2)	Count (3)	Million DKK (4)	Count (5)	Million DKK (6)	Count (7)	Million DKK (8)
2002	7,240	41.8	6,166	36.3	2,157	28.5	1,850	20.9
2003	7,061	49.7	6,145	43.9	2,362	35.2	1,301	13.1
2004	10,334	65.5	8,649	57.2	2,791	44.0	1,603	16.2
2005	8,677	74.7	7,143	66.2	2,323	52.9	1,160	19.1
2006	7,925	80.8	6,346	70.8	2,014	57.5	1,000	21.2
2007	7,616	87.3	6,038	78.2	1,817	59.7	909	22.1
2008	8,596	102.0	6,585	88.4	1,767	68.0	923	22.0
2009	8,327	99.4	6,394	82.8	1,621	66.2	853	20.8
2010	7,308	98.8	5,540	82.0	1,407	64.2	734	21.3
2011	7,235	110.9	5,387	91.1	1,412	72.4	817	29.7
2012	6,399	94.2	4,474	74.9	1,321	57.7	701	24.0
Total	86,718	905.1	68,867	771.7	20,992	606.4	11,851	230.5

Notes: The unit of observation in columns 1 to 4 is an individual transaction a firm has with the Trade Council in a given year. In columns 5 to 8, we collapse within the years, and the unit of observation is firm year.

The TC provides additional services. These include intelligence and analysis on political and economic conditions, advertising, fairs, exhibitions, public relations activities, and communication with customs authorities and diplomacy. In general, these activities allow the TC to pool broad information related to foreign markets that can be distributed across Danish firms interested in exporting or expanding their foreign activities.

Our goal is to examine the impact of export-promotion services on the total performance of the firm. Some of the literature (e.g., Volpe Martincus and Carballo 2010c) examine the effects of different kinds of promotion services and bundled promotion products across various destination markets. In line with most of the literature, we focus on the impact of the aggregate firm-level purchase of export promotion in a given year. Our main advantage compared to the existing literature is that we can examine effects of export promotion on total firm-level exports as well as firm-level performance measures that are usually not observed such as employment, value added, and value added per worker.

C. Performance Measures

We have access to firm register datasets in Statistics Denmark covering all private manufacturing and service firms with addresses in Denmark from 1999 to 2012. These data are drawn from the Firm Statistics and Account Statistics registers, where firms also are identified by their CVR number. For each firm, the data reports industry codes (according to the NACE classification), number of employees, wage bill, capital stock, total sales, value added, total exports, total imports, and total purchases of intermediate products. A key objective of trade promotion is to help companies be successful in export markets. The information from Statistics

Denmark provides us with several performance measures related to exports and firm performance in general.

To be specific, let t be the year where the firm was treated with promotion services. We focus on the change in export status (i.e., whether the firm exports or not) and the log change in export volume, total sales, value added, employment, and value added per worker in the treatment year (year t) and the two following years $t + 1$, $t + 2$ relative to the initial year (year $t - 1$).

D. Firm Characteristics and Control Variables

As explained in Section II, to properly identify the effects of export promotion, we need, in principle, to observe all characteristics that affect selection into export promotion and the firm-performance outcomes. We improve on the existing literature by exploiting the comprehensive nature of our data to carefully measure relevant firm characteristics.

First, a core variable that should affect both selection and outcome is firm productivity. A flexible way to control for productivity is to include firm output and inputs from the pretreatment year, $t - 1$. To characterize output, we include total sales, export status (export or not), and export intensity (exports as a share of total sales) in addition to one-digit NACE industry dummies.¹¹ To characterize inputs, we use measures for capital stock, raw materials and intermediate inputs, import status, import intensity, total employment, and total wage bill. To further characterize the composition of the firm-level labor force, we draw in detailed information about all employees of each firm from the Integrated Database for Labor Market Research (IDA) for 1999 to 2012. These data allow us to measure employee characteristics such as age, gender, education (we classify workers into three education groups: workers with further education, vocational education, and less than that), occupation, and union membership composition of each firm.

We use the occupation code (four-digit ISCO) to define the share sales workers in the firm.¹² The purpose of this variable is to measure whether the firm has employees that to some extent can substitute for the purchase export-promotion services.

It is also relevant to control for changes in input use and output before the treatment year because a growing firm is more likely to explore new markets and to buy export-promotion services. We include the (log) change in total sales, value added, employment, and wage bill between year $t - 2$ and $t - 1$. In addition, we also use the change in the export and import intensity between year $t - 2$ and $t - 1$.

¹¹ We also experimented with a more flexible specification where we interact industry indicators with measures of outputs and inputs to allow their effects to vary across industries. Results are similar and available upon request.

¹² The included occupations are Sales and marketing managers (1233), Advertising and public relations managers (1234), Supply and distribution managers (1235), Philologists, translators and interpreters (2444), Technical and commercial sales representatives (3415), Trade brokers (3421), Clearing and forwarding agents (3422), and Customs and border inspectors (3441).

E. Firm-Specific Demand Shocks

A potentially important driver behind selection into export promotion and firm performance are firm-specific demand shocks. Sudden demand increases in world markets for the firm's products will make it more likely for the firm to acquire export-promotion services and to perform better.

We construct a firm-specific demand shock variable using three additional data sources. From the Foreign Trade Statistics, we have information about each firm's sales abroad broken down by eight-digit CN product codes and destination countries. Information about domestic sales is obtained from the PRODCOM register, where each firm's sales is recorded by ten-digit CN product codes. These two data sources allow us to characterize each firm's pretreatment sales by detailed product codes.¹³ We aggregate these firm-specific pretreatment sales to the six-digit HS level and combine them with product-specific changes in demand on international markets from the UN COMTRADE database for 1999 to 2012 at the six-digit HS level.

We use this information to compute firm-specific demand shocks in the following way. Let M_{kt} denote total imports by all countries except Denmark of product k in year t . Let s_{kjt-1} be the share of sales of product k of firm j in period $t - 1$, and let Ω_{jt-1} be firm j 's product set. We measure the change in global demand for the firm's products as

$$(2) \quad EV_{jt} = \sum_{k \in \Omega_{jt-1}} s_{kjt-1} \frac{M_{kt} - M_{kt-1}}{M_{kt-1}}.$$

Instead of just entering EV_{jt} in the selection equation directly, we construct a dummy variable that takes the value one if firm-specific demand increased by at least 10 percent between year $t - 1$ and t and zero otherwise. In addition, we also include a similar dummy variable for increases in demand between year $t - 2$ and year $t - 1$. The idea is that firms with a high share of sales in products that are increasingly purchased by the world market see an increase in the global demand for their products.

III. Results

In this section, we use the data described in the previous section to match treated firms with control firms, examine the impact of export promotion on the outlined measures of firm performance, and to examine the robustness of our results.

¹³ Small non-exporters are an exception as PRODCOM does not record information for very small firms. We circumvent this data issue in two ways. First, we replace the firm's product shares in year $t - 1$ (see equation (1)) with those from year $t - 2$ or $t - 3$ if missing. Second, we include a control dummy variable for missing demand shock in pretreatment years in the selection equation.

A. *Export-Promotion Propensity*

The first step of the matching estimator is to match firms that received export promotion in year t with control firms that have similar characteristics but did not receive export promotion. The initial group of control firms is constructed such that they did not buy export-promotion services in year $t - 1$ and t .¹⁴ We then trim this group of firms, and to make it more likely, we compare them with firms that are in a similar pretreatment development as the treated firms. To that end, we select control firms that increase their expenditure on sales activities between year $t - 1$ and t , where sales expenditures are defined as the sum of annual wages for sales workers (using the matched worker data) and external consultancy work, which includes expenses for export-promotion services offered by private consultancy firms (this variable comes from the Account Statistics). The idea is that control firms can buy substitutes for export promotion from the TC either by hiring more sales workers on their own or by buying export promotion from private companies. This trimming procedure cuts the control group roughly in half, but it still includes more than 275,000 observations.

The next step is to match treated and control firms based on the propensity score generated by a probit model. Table 2 shows the estimates of the probit model that relates firm characteristics to the probability of receiving export promotion, compares summary statistics of the treated and control firms along the observed characteristics, and provides standard test statistics examining systematic differences between treatment and control firms. The results imply that there are no systematic differences across the two groups of firms along the variables included in the probit model.

The purpose of the probit is not to estimate a theory driven model that tests hypotheses regarding selection into export promotion. Instead, we want to match firms on all observable characteristics that may predict if a firm received export promotion. Then, if we compare the performance of a treated firm with a matched non-treated firm, the fact that the treated firm received export promotion is most likely random.

Nevertheless, some interesting patterns emerge in the probit estimates. Large firms are less likely to purchase export promotion. This may reflect that large firms also invest in their own market research. Therefore, if a firm's own market research is a substitute to government facilitated export promotion, this is the result we would expect.

Firms with a high share of experienced employees measured by their age are less likely to purchase promotion services, which might be because their own experience substitutes for purchased information. However, firms with a more educated work force, more sales workers, and more female workers are more likely to purchase export-promotion services.

Exporting and importing firms are more likely to receive export promotion. This suggests that even firms that have experience on international markets purchase

¹⁴Thus, the same firm may enter the control group every time it has two consecutive years without buying export-promotion services.

TABLE 2—PROBIT MODEL AND MEAN CHARACTERISTICS FOR TREATMENT AND SELECTED CONTROL FIRMS

	Probit coefficient (1)	SE (2)	Treatment firms (3)	Control firms (4)	Percent bias (5)	<i>t</i> -stat (6)	<i>p</i> > <i>t</i> (7)
log (full time employees)	−0.1077	0.0226	2.966	2.937	2.1	1.17	0.243
Share further education	0.6536	0.0305	0.290	0.296	−2.3	−1.39	0.166
Share vocational education	0.0113	0.0316	0.387	0.386	0.5	0.36	0.719
Share union members	−0.0262	0.0251	0.614	0.611	0.9	0.63	0.527
Share 40+ years	−0.1090	0.0236	0.460	0.463	−1.0	−0.76	0.449
Share women	0.1277	0.0235	0.344	0.338	1.9	1.41	0.159
Share sales workers	0.4272	0.0467	0.056	0.060	−3.9	−1.56	0.119
log (sales)	−0.0372	0.0119	17.275	17.262	0.8	0.47	0.638
log (inputs)	0.0609	0.0100	16.724	16.707	1.0	0.55	0.579
log (capital)	0.0055	0.0043	15.100	15.038	3.1	1.79	0.074
log (wage bill)	0.2768	0.0229	15.810	15.800	0.6	0.36	0.716
Export status	0.3866	0.0274	0.678	0.682	−1.0	−0.57	0.568
Import status	0.3739	0.0181	0.712	0.723	−2.6	−1.47	0.141
Export intensity	0.0391	0.0085	0.238	0.252	−1.1	−0.26	0.792
Import intensity	−0.0523	0.0121	0.184	0.221	−1.1	−0.78	0.433
Δ log (full time employees)	0.1145	0.0254	0.068	0.073	−1.4	−0.86	0.391
Δ log (sales)	0.0696	0.0137	0.117	0.122	−1.0	−0.60	0.549
Δ log (value added)	0.0271	0.0122	0.113	0.119	−1.0	−0.62	0.534
Δ log (wage bill)	−0.0179	0.0226	0.103	0.111	−2.1	−1.35	0.176
Δ export intensity	−0.0144	0.0075	0.000	−0.014	1.3	0.42	0.673
Δ import intensity	0.0156	0.0065	−0.018	0.002	−0.6	−0.82	0.412
Missing year <i>t</i> − 2	0.1700	0.0294	0.040	0.044	−1.8	−1.21	0.226
Δ demand year <i>t</i> − 1 to <i>t</i>	0.0432	0.0181	0.383	0.398	−3.8	−1.92	0.055
Missing demand year <i>t</i> − 1	−0.1013	0.0409	0.285	0.276	2.0	1.13	0.257
Δ demand year <i>t</i> − 2 to <i>t</i> − 1	−0.0284	0.0192	0.303	0.313	−2.7	−1.36	0.172
Missing demand year <i>t</i> − 2	−0.1115	0.0331	0.328	0.324	0.9	0.48	0.629
Export promotion year <i>t</i> − 2	0.8371	0.0247	0.146	0.144	1.0	0.44	0.663
Observations		284,605	7,658	7,658			

Notes: Coefficients in bold are significant at the 5 percent level. The matching estimator is nearest neighbor matching without replacement. The bias for a given variable is defined as the difference between the means of treatment and control firms scaled by the average variance. The model includes one-digit industry dummies and year dummies (not shown). Inputs include raw material and intermediate inputs. In addition to the data restrictions mentioned in the text, the table also conditions on the firms being observed in year *t* + 1 and *t* + 2.

additional information to extend or improve their international activities. Similarly, growing firms and firms that see an increase in the world demand for its product are more likely to purchase information about international markets. This suggests that growing firms look for expansion opportunities in international markets.

Firms are only included if they did not receive export promotion in year *t* − 1. However, if a firm received export promotion in *t* − 2, then it is more likely to also purchase export-promotion activities in year *t*. This suggests that firms having good experience with export services offered by the Trade Council are likely to come back for additional services.

Having estimated the propensity scores, we can now select the nearest neighbor control firm for every treated firm and verify that our procedure successfully balances all the characteristics across the two groups of firms; see columns 3–7 of Table 2.

In summary, the detailed firm-level data we obtain from Statistics Denmark combined with the export-promotion services provide a much more detailed and extensive list of firm characteristics than in the previous literature. The ability to

merge detailed firm characteristics with firms' export-promotion activities provides an important identification advantage compared to existing research on the impact of export promotion on firm performance. We will examine the differences between more parsimonious specifications present in the literature and our approach in the robustness section. Our main estimation results presented in the following sections apply our full set of firm characteristics.

B. Export Status

We now compute the average treatment effects for the treated firms as defined by equation (1). We first examine the impact of export promotion on a firm's export status. The hypothesis about the impact of export promotion on a firm's export status is ambiguous. On the positive side, if export promotion lowers information costs and results in a better international experience, then we would expect that export promotion increases the likelihood of exporting. In addition, export promotion may allow firms that are already active on export markets to remain successful and continue their export activities while their counterparts that did not receive export promotion exit. On the negative side, it may also be the case that firms learn their limitations, and the information they receive discourages them from exporting.¹⁵

Panel 1 of Table 3 shows the results. Across the columns, we distinguish three treatment effects based on timing. Recall that the treatment was received in year t . Then, across all firms, column 1 shows that export promotion increases the probability of being an exporter in the treatment year t by 3.9 percentage points relative to the control firms. Columns 3 and 5 show that one and two years after receiving export promotion the probability of exporting increases by about 5.9 percentage points. Going down in the rows, we report estimates for samples split by firm size.¹⁶ Especially small firms benefit from export promotion. Across all three estimates, the impact for small firms is about double the impact for larger firms.

The message of these estimates is clear. Across all firms and several subsamples, export promotion positively impacts the export status of firms. The effects are economically meaningful, in most cases significant and largest in magnitude for small firms between 1 to 20 employees.¹⁷

The estimated effect is the difference in the change in average export status of the treated and the change in average export status of non-treated firms. To better understand what is driving the treatment effect, we find that for treated firms with

¹⁵ For example, see Breinlich, Donaldson, and Wright's work "Information and Attitudes towards Exporting—Evidence from a Randomized Controlled Trial," which states in the abstract that "the results of our intervention reveal a surprising, asymmetric response on the part of exporters and non-exporters. Instead of revising their negative perceptions upward, treated non-exporters become more likely to report lower perceived benefits and higher perceived barriers compared to non-treated non-exporters." Source: http://www.uclouvain.be/cps/ucl/doc/core/documents/Trade_sem_breinlich.pdf.

¹⁶ We estimate separate probit models for all subsamples. The probit model results and the associated match quality are available upon request.

¹⁷ In addition to splitting the samples by firm size, we also estimated a second-stage regression with firm-size specific treatment effects on the matched sample pooling across firm size. Across the three time periods and three size categories, we reject the null that the treatment effect of the smallest firms is the same as for the medium-sized and largest firms. All p -values are less than 0.01 with one exception. For the first time period, comparing smallest to medium-sized firms, the p -value is about 0.1.

TABLE 3—CHANGE IN FIRM PERFORMANCE FROM YEAR $t - 1$

	ATET, t (1)	t -stat (2)	ATET, $t + 1$ (3)	t -stat (4)	ATET, $t + 2$ (5)	t -stat (6)	Firms (7)
<i>Change in export status</i>							
All firms	0.0388	9.30	0.0585	12.42	0.0593	11.46	7,766
1–20 employees	0.0470	7.42	0.0735	10.32	0.0783	10.00	4,110
20–50 employees	0.0234	2.81	0.0342	3.71	0.0449	4.33	1,673
More than 50 employees	0.0141	2.19	0.0303	4.04	0.0328	4.05	1,983
<i>Growth in exports</i>							
All firms	0.0128	0.57	0.0375	1.35	0.0580	1.77	4,754
1–20 employees	0.0565	1.41	0.0599	1.23	0.0472	0.85	1,980
20–50 employees	0.0341	0.87	0.1200	2.37	0.1575	2.53	1,165
More than 50 employees	0.0193	0.57	–0.0149	–0.35	0.0546	1.08	1,609
<i>Growth in sales</i>							
All firms	0.0028	0.35	0.0307	2.82	0.0524	3.57	7,658
1–20 employees	0.0152	1.23	0.0490	2.94	0.0846	3.80	4,044
20–50 employees	0.0024	0.18	0.0316	1.69	0.0497	1.76	1,649
More than 50 employees	–0.0181	–1.35	–0.0092	–0.49	–0.0003	–0.01	1,965
<i>Growth in value added</i>							
All firms	0.0060	0.70	0.0289	2.60	0.0318	2.25	7,359
1–20 employees	0.0259	1.94	0.0665	3.84	0.0927	4.32	3,813
20–50 employees	–0.0214	–1.40	0.0098	0.45	0.0040	0.13	1,617
More than 50 employees	0.0009	0.08	–0.0199	–1.19	–0.0179	–0.73	1,928
<i>Growth in employment</i>							
All firms	–0.0022	–0.43	0.0077	1.07	–0.0001	–0.01	7,474
1–20 employees	0.0280	3.38	0.0404	3.67	0.0361	2.58	3,895
20–50 employees	–0.0095	–1.14	0.0018	0.15	–0.0120	–0.65	1,632
More than 50 employees	–0.0263	–3.30	–0.0198	–1.62	–0.0311	–1.65	1,939
<i>Growth in value added per worker</i>							
All firms	–0.0021	–0.29	0.0031	0.36	0.0220	2.41	7,109
1–20 employees	–0.0145	–1.23	0.0014	0.10	0.0303	2.15	3,632
20–50 employees	–0.0288	–2.19	–0.0302	–1.94	–0.0296	–1.79	1,583
More than 50 employees	0.0123	1.19	–0.0136	–1.07	0.0057	0.42	1,893

Notes: All treatment effects are calculated using nearest neighbor matching without replacement. The dependent variable is measured as the difference in outcome between $t - 1$ (the year before treatment) and t or $t + 1$ or $t + 2$ (as indicated). A common support restriction has been imposed.

1 to 20 employees the average change in export status 1 to 3 years after treatment is 0.0221, 0.0389, and 0.0275. For the control firms, these averages are –0.0248, –0.0345, and –0.0509. These numbers imply that for the first two time periods the total effect of export promotion is split by entry of treated firms and exit of control firms. We conclude that export promotion affects export status in both ways, entry of firms into new export markets and continued success on existing markets.¹⁸

Given that more than two thirds of the treated firms already exported initially, export promotion in a developed country like Denmark is then as much a question about sustaining successful exporting as it is to improve export propensities.

¹⁸For the whole sample of firms, the comparable numbers are 0.0142, 0.0246, and 0.0153 for treated firms and –0.0246, –0.0339, and –0.0439 for control firms. This suggests that export continuation for larger firms is even more important in determining the total effects of export promotion. This is consistent with the fact that larger firms are more productive and therefore are more likely to already export.

These results are in line with the notion that it can be difficult to find appropriate foreign business partners. Some firms initially match with a suboptimal partner on foreign markets. If competitive pressure on global markets increases, some firms can improve their match by obtaining help from the Trade Council and remain in the market while other firms drop out. The total effect of export promotion in this case on export status is the sum of the effect on new entry and successful continuation.

C. Export Value

The impact of export promotion on export values are reported in panel B of Table 3. The significant effects take a couple of years to kick in, and they are concentrated to a few subcategories. Medium-sized firms see an increase of about 12 and 16 percentage points over a two and three year period.¹⁹ Overall, we conclude that the effect of export promotion on the intensive margin, the expansion of export sales, is limited. To some extent, this is explained by a smaller sample of firms that export throughout.²⁰

D. Total Sales

Our next question is if export promotion affects firm-level performance along margins that are not directly related to export activity. It is worth pointing out that these effects may be driven by both changes in firm-level export status and sales on the export market.

Panel C of Table 3 examines the effect of export promotion on firms' total sales. Promotion activities lead to an increase in total sales with a one and two year lag for small firms. This finding may seem surprising given that we found no effect on the intensive margin of export sales. However, we know from the results above that for small firms export promotion mostly affects export status and to a large extent this effect is driven by entry into export markets. If firms enter in period t , then it may take some time before export opportunities have fully materialized and results in greater total sales. For the medium- and large-sized firms, export promotion does not lead to significantly greater sales.

E. Value Added, Employment, and Value Added per Worker

We now examine if export-promotion activity has real effects on the organization of the firm in terms of value added, employment, and value added per worker. Panels D, E, and F of Table 3 report the estimates.

Panel D shows that especially small firms increase their value added in response to export promotion. Recall from Sections IIIB and IIIC that export promotion affects small firms by facilitating entry and continuation in export markets, while

¹⁹ Similar results are presented in Volpe Martincus, Carballo, and García (2010).

²⁰ Compared to export entry, we lose some observations. This is because we require that all firms included in the estimation are in the sample for three consecutive years and are exporters throughout. Otherwise, the change in $\log(\text{exports})$ is not defined. Also, some performance measures are not reported for some of the firms.

there is no significant effect on the intensive margin of exports. As with total sales, a key channel for how export promotion affects value added, therefore, works through the effect of this extensive margin of exports. The difficulty with value added is that we still do not know if this creates jobs and whether productivity rises. Panels E and F answer these questions.

Consistent with the previous results, only small firms experience positive employment effects. Panel F shows the effects on worker productivity. These results combine the value added and employment effects to see if trade-promotion driven export behavior increases productivity. In the short run, the answer is no. In fact, the results show that in the short run many firms see a decrease in labor productivity. However, allowing firms to adjust to their new export activities, especially small firms see an improvement in labor productivity. Therefore, long run positive productivity effects are isolated to the smallest firms.²¹

In summary, the most consistent finding of Table 3 is that export promotion affects the smallest firms in the Danish economy. Using our information on self-selected versus council-selected firms, we verify next that this results is not driven by self-selection.

F. Trade Council versus Self-Selection among the Smallest Firms

Table 4 provides estimates for the treatment effects on all performance variables only for firms with 1 to 20 employees. For each performance measure, we report the effect of promotion across all firms and for samples split by whether the firm's self-selected or whether they were selected by the Trade Council. In addition, we report estimates for the effect of export promotion when we directly match firms that were approached by the Trade Council with firms that self-selected to receive trade-promotion services. These estimates answer two questions. First, against the benchmark of council-apprached firms, is there any evidence for selection bias among the group of self-selected firms? Second, how important is the Trade Council selection of firms to the success of export promotion?

Across the performance variables and especially for export status, value added and employment, the picture is the same as in the previous tables. If anything, council-selected firms show treatment effects that are greater than the self-selected firms. This result suggests that self-selection may introduce a negative bias; firms that know that they have low export ability self-select for trade-promotion services to try and overcome their weaknesses.

To examine this issue further and to check if the difference between self-selected and council-apprached firms is significant, we match council-apprached firms with self-selected firms. The data do not identify a statistically significant difference between the two groups other than in employment in the first period. Self-selected and council-apprached firms show similar outcomes in terms of exporting and

²¹ To confirm that export promotion affects firm performance through increasing export activity, we separated the treated firms into performers and nonperformers. Performers are those treated firms that see export growth and export status greater than or equal to their matched counterparts. Then, we estimate the effect of export promotion on value added per worker for the performers. The results show that the conclusion on value added per worker from Table 3 are driven by the performers. Detailed results are available upon request.

TABLE 4—SELECTION AMONG FIRMS WITH 1–20 EMPLOYEES

	ATET, t (1)	t -stat (2)	ATET, $t + 1$ (3)	t -stat (4)	ATET, $t + 2$ (5)	t -stat (6)	Firms (7)
<i>Change in export status</i>							
All firms	0.0470	7.42	0.0735	10.32	0.0783	10.00	4,110
The Trade Council's initiative	0.0487	5.00	0.0793	7.27	0.0776	6.59	1,829
Firm's initiative	0.0425	5.79	0.0592	6.27	0.0592	5.12	2,281
TC selected versus self-selected	−0.0055	−0.57	0.0093	0.87	0.0126	1.06	1,825
<i>Growth in exports</i>							
All firms	0.0565	1.41	0.0599	1.23	0.0472	0.85	1,980
The Trade Council's initiative	−0.0123	−0.21	0.0662	0.93	0.1054	1.28	922
Firm's initiative	0.1067	2.00	0.0544	0.84	0.0006	0.01	1,058
TC selected versus self-selected	−0.0032	−0.05	0.0569	0.80	0.1167	1.41	920
<i>Growth in sales</i>							
All firms	0.0152	1.23	0.0490	2.94	0.0846	3.80	4,044
The Trade Council's initiative	0.0190	0.96	0.0648	2.46	0.0994	3.08	1,795
Firm's initiative	0.0378	2.48	0.0629	2.96	0.0848	2.93	2,249
TC selected versus self-selected	0.0087	0.45	0.0129	0.51	0.0532	1.54	1,790
<i>Growth in value added</i>							
All firms	0.0259	1.94	0.0665	3.84	0.0927	4.32	3,813
The Trade Council's initiative	0.0502	2.45	0.0987	3.77	0.1116	3.54	1,683
Firm's initiative	−0.0126	−0.67	0.0179	0.77	0.0374	1.29	2,130
TC selected versus self-selected	0.0127	0.63	0.0190	0.76	0.0185	0.58	1,681
<i>Growth in employment</i>							
All firms	0.0280	3.38	0.0404	3.67	0.0361	2.58	3,895
The Trade Council's initiative	0.0444	3.56	0.0754	4.55	0.0683	3.29	1,738
Firm's initiative	0.0115	1.14	0.0180	1.29	0.0132	0.73	2,157
TC selected versus self-selected	0.0265	2.13	0.0271	1.61	0.0241	1.15	1,735
<i>Growth in value added per worker</i>							
All firms	−0.0145	−1.23	0.0014	0.10	0.0303	2.15	3,632
The Trade Council's initiative	−0.0147	−0.81	0.0036	0.18	0.0288	1.36	1,611
Firm's initiative	−0.0224	−1.41	−0.0108	−0.58	0.0139	0.74	2,021
TC selected versus self-selected	−0.0001	0.00	0.0140	0.66	0.0019	0.09	1,606

Notes: All treatment effects are calculated using nearest neighbor matching without replacement. The dependent variable is measured as the difference in outcome between $t - 1$ (the year before treatment) and t or $t + 1$ or $t + 2$ (as indicated). A common support restriction has been imposed. For the growth in exports, only firms that are observed in the data all years from $t - 1$ to $t + 2$ as exporters are included.

overall performance. These results confirm that among the smallest firms the positive results of export promotion are not driven by self-selection.

G. Back-of-the-Envelope Cost-Benefit Analysis

The estimates for value added, employment, and value added per worker allow us to perform a back-of-the-envelope cost-benefit calculation. Table 5 summarizes the cost and benefits of the export-promotion program. We are not suggesting a welfare analysis because many general equilibrium effects are unobservable, and we do not know how any gains or costs are distributed and valued across the population. Instead, we simply compare the direct costs related to providing the export-promotion service with the estimated benefits in terms of value added. This procedure can be applied to any subgroup of firms. We focus on firms with 1–20 employees

TABLE 5—QUANTIFICATION OF EFFECTS FOR FIRMS WITH 1–20 EMPLOYEES

Outcome	Year t (1)	Year t (2)	Year $t + 1$ (3)	Year $t + 2$ (4)
Average value added (million DKK)	5.4			
Total value added (million DKK)	20,765			
Estimated effect		0.0259	0.0665	0.0927
Quantification (million DKK)		537	1,380	1,925
Average number of employees	8.2			
Total number of employees	32,125			
Estimated effect		0.0280	0.0404	0.0361
Quantification		899	1,299	1,160
Average value added per worker (million DKK)	0.695			
Total number of employees	32,125			
Estimated effect				0.0303
Quantification (million DKK)				677

because this is where the effects of export promotion are significant, and these firms are the focus of trade promotion dedicated to small- and medium-sized enterprises in many countries.²²

The average value added in the sample of small firms that purchased export promotion in year t over all year t observations is about DKK 5.4 million. The effect of export promotion on value added in year $t + 2$ is 0.0927. This implies that for the average Danish firm that purchased export promotion in year t , value added increased by about DKK 0.5 million 2 years down the road. Similarly, the total value added of all small firms that purchase export promotion is DKK 20.8 million. The estimates imply that export-promotion activity raised total value added by DKK 1.93 billion 2 years down the road. In other words, with a two year lag, export promotion increases the total amount of value that is created by the treated firms by about DKK 1.93 billion.

This increase in value added is to some extent created by additional workers employed by the export-promotion firms. Similar calculations using the estimated employment effects and the total number of workers initially employed by the export promotion firms show that the number of employees increases by about 900–1,300 in years t , $t + 1$, and $t + 2$. These additional workers are likely coming from other productive jobs, so in a welfare calculation, the relevant outcome is the estimated increase in value added per worker. Two years down the road, value added per worker is found to increase by about 0.03, which translates into an increase in the average value added per worker of about DKK 21,000 (0.03×0.695 million DKK). So for all the initially employed workers in the export-promotion firms, the additional value created amounts to DKK 677 million.

Our data from the Trade Council show revenue of DKK 79 million for export-promotion services by the firms with 1–20 employees. The subsidy rate for these services is roughly 50 percent, which implies that tax money of another

²² All conclusions in this section remain valid qualitatively if, instead of the baseline results from Table 3, we use any of the parameter estimates obtained from the robustness analysis in Subsection I of Section III.

DKK 79 million is dedicated to export promotion. The Danish Ministry of Finance estimates that the marginal cost of public funds is about 20 percent of each dollar in distortions. At the high end, Kleven and Kreiner (2006) estimate for Denmark a marginal cost of public funds of 75 percent. Therefore, DKK 79 million in subsidies are worth an additional 16 to 59 million DKK in tax distortions. Summing this up implies that the total cost of export promotion to firms with 1 to 20 employees is DKK 174 to 217 million. Ignoring all sunk costs of establishing the Trade Council, etc., this means that the gains in value added are worth about three times the cost of trade promotion for small firms. In summary, for small firms, the benefits in terms of value added clearly outweigh the direct costs and associated tax distortions.

The direct costs for export-promotion services to larger firms are DKK 64 million according to our data. For these firms, there will be a deficit, since there are no effects on value added or value added per worker. This suggests that the Trade Council should direct its services and resources to small firms.

H. Channels and Mechanisms

In the previous section, we followed most of the export-promotion literature and lumped all export-promotion services into one treatment indicator to examine the effect of export promotion on firm-level performance measures. In this section, we use the detailed information we obtained from the Trade Council and trade flows to examine if export promotion works through the expected micro channels. First, we split out two types of services that are most closely related to existing theory, “Partner search and matchmaking” and “Intelligence and analysis” and reestimate the performance effects. Second, we merge destination-specific export flows with destination-specific export-promotion services. This additional variation allows us to more deeply examine the effect of export promotion on export performance.

Partner Search, Intelligence, and Analysis.—The Trade Council maintains a network of foreign firms to facilitate meetings and interaction between Danish firms, foreign buyers, and distributors. This type of service accounts for more than 50 percent of the revenues the Trade Council generates from promotion services. The idea is closely related to search and matching models (e.g., Rauch 1996, Rauch and Trindade 2002, Rauch and Watson 2003, and Chaney 2014) where firms have to interact with foreign partners and find contacts to be active on international markets. Instead of business or ethnic networks, in the case of export promotion, the Trade Council maintains a network of foreign contacts.

Nguyen (2012) and Albornoz et al. (2012) examine how firms sequentially enter markets making predictions about the new markets from their experience on other markets. The Trade Council holds information about foreign markets, monitors market conditions, and provides reports about potential destination countries. This intelligence and analysis is meant to provide firms with information to make better export market decisions. This type of service accounts for about one third of the revenues the Trade Council realizes.

TABLE 6—TREATMENT EFFECTS ON OUTCOMES FOR SMALL FIRMS WITH 1–20 EMPLOYEES BY PROMOTION TYPE

	ATET, <i>t</i> (1)	<i>t</i> -stat (2)	ATET, <i>t</i> + 1 (3)	<i>t</i> -stat (4)	ATET, <i>t</i> + 2 (5)	<i>t</i> -stat (6)	Firms (7)
<i>Change in export status</i>							
Partner search and matchmaking	0.0554	5.34	0.0956	8.06	0.0937	7.32	1,643
Intelligence and analysis	0.0437	3.94	0.0649	5.40	0.0671	5.17	1,326
<i>Growth in exports</i>							
Partner search and matchmaking	0.1675	2.79	0.1692	2.25	0.1469	1.76	835
Intelligence and analysis	0.1260	1.72	0.1267	1.47	0.2004	2.00	590
<i>Growth in sales</i>							
Partner search and matchmaking	−0.0052	−0.27	0.0268	1.01	0.0744	2.25	1,616
Intelligence and analysis	0.0391	1.76	0.0476	1.59	0.0414	1.12	1,309
<i>Growth in value added</i>							
Partner search and matchmaking	0.0290	1.31	0.0857	3.16	0.0869	2.60	1,521
Intelligence and analysis	0.0152	0.70	0.0173	0.58	0.0796	2.13	1,250
<i>Growth in employment</i>							
Partner search and matchmaking	0.0068	0.52	0.0295	1.71	0.0347	1.61	1,555
Intelligence and analysis	0.0187	1.27	0.0243	1.21	0.0040	0.16	1,264
<i>Growth in value added per worker</i>							
Partner search and matchmaking	−0.0081	−0.41	−0.0010	−0.05	0.0305	1.35	1,450
Intelligence and analysis	−0.0228	−1.13	−0.0384	−1.73	0.0073	0.31	1,192

Table 6 provides the results for these two types of services. We split the sample by the main service each firm received from the Trade Council.²³ The results show that both types of services affect firm performance, but especially, partner search affects firms along all export performance measures, sales, and value added. The effect on employment is also positive, but the data do not identify precise effects. This is likely the reason why the effect on value added per worker is positive, but we are not able to reject the null of no effect. In summary, the results suggest that matchmaking and providing Danish firms with contacts on foreign markets is an important channel by which trade promotion affects firm performance.

The Trade Council also provides a range of other services that have positive effects on firm-level performance. However, in those cases, it is less clear by what channels the Trade Council's activities contribute to firm-level performance.

Aggregation and Destination-Specific Export Promotion.—Next, we examine if the export effects we estimate with the matching estimator reflect changes in export performance related to the market for which the promotion was purchased. We focus on firms that report employees, exported at least once over the sample period, and/or bought export promotion.²⁴ Danish firms' report exports to over 200 destinations,

²³ Note that here we focus on only the main services partner match and intelligence and analysis. In the baseline estimation of Table 3, we include all promotion services. Therefore, the estimates in Table 6 do not directly "average" to the effects in Table 3.

²⁴ Some firms in the dataset report zero employment. These firms are owner operated and often are reported as firms for tax purposes. We also ran the regressions including these firms. The estimates are almost identical and the conclusions remain the same.

and in this sample, 8.1 percent of the firms bought export promotion, but never exported. About 22.9 percent of the firms export exactly to one market over this time period. The remaining share of firms exports to multiple markets. For identification purposes, this implies that we have cross firm-destination variation and cross-destination variation within firms to identify the effects of export promotion as long as there is variation across destinations in export-promotion services.

Danish firms purchase promotion services for 76 destinations over our sample period. It is worth pointing out that a significant share of purchased promotion services are dedicated to top export destinations for Danish firms. However, Danish firms also purchase a substantial amount of export promotion for countries that are not among the top 10 export destinations. To examine destination-level extensive and intensive margin effects of export promotion, we focus on destinations where the export council offers promotion services, i.e., we exclude all destinations for which we never observe any firm purchase promotion services. This preserves about 97 percent of the total export value.

To examine the extensive margin effect, we start with all (exporters and non-exporters) firm-year observations of active firms. Then, following Bastos and Silva (2012), we let the indicator $IEXT_{ijt} = 1$ if firm i exports to destination j in year t and zero for all destinations where the firm could have exported.²⁵ This results in a very large dataset with the main advantage that we can account for unobserved firm and market characteristics with fixed effects. We estimate variations of linear probability models accounting for different levels of fixed effects.²⁶ Let $Promotion_{ijt} = 1$ if the exporter purchased promotion services for destination j in year t and zero otherwise. Our preferred model specifies the extensive margin indicator linear in the promotion indicator and exporter-by-year and destination-by-exporter fixed effects

$$(3) \quad IEXT_{ijt} = \beta Promotion_{ijt} + \gamma_{it} + \delta_{ij} + u_{ijt}.$$

The parameter of interest β measures the percentage points by which export promotion affects the probability of exporting. The specification accounts for firm-level productivity differences that change over time and country characteristics such as the destinations' preferences for a firm's exports.

The results reported in column 1 in Table 7 allow for three takeaways.²⁷ First, export promotion has a positive and significant effect on the probability of serving a destination for which export promotion was purchased. Second, accounting for firm-level destination-specific information is important for the identification of the magnitude of the effect of export promotion. As we introduce firm-destination specific effects, the magnitude of the effect drops by an order of magnitude. Third, the most rigorous specification accounts for firm-by-year varying characteristics such as productivity, firm-destination specific information such as unobserved

²⁵ Bastos and Silva work with cross-sectional data. We fill in the data for all firms (exporters and non-exporters) for all destinations and time periods.

²⁶ The high dimensional fixed effects models are implemented using `reghdfe` (Correia 2016).

²⁷ Sample sizes vary across the specification because we drop singleton observations that are perfectly explained by the fixed effects. In addition, once we include, for example, firm effects, only firms that have variation in the promotion indicator identify the promotion indicator.

TABLE 7—FIXED-EFFECT REGRESSIONS

Fixed effects		Extensive margin (1)	Intensive margin (2)
None	Promotion indicator	0.31	1.45
	<i>t</i> -stat	114.89	56.68
	Observations	21,616,376	1,031,467
Firm	Promotion indicator	0.19	0.80
	<i>t</i> -stat	81.96	35.54
	Observations	21,616,376	1,026,389
Destination	Promotion indicator	0.27	1.30
	<i>t</i> -stat	97.56	52.2
	Observations	21,616,376	1,031,467
Firm and destination	Promotion indicator	0.14	0.49
	<i>t</i> -stat	62.17	23.85
	Observations	21,616,376	1,026,389
Firm-by-year	Promotion indicator	0.18	0.90
	<i>t</i> -stat	81.37	36.87
	Observations	21,616,376	976,225
Firm-by-year and destination	Promotion indicator	0.13	0.54
	<i>t</i> -stat	61.04	24.83
	Observations	21,616,376	976,225
Firm-by-year, firm-by-destination	Promotion indicator	0.02	0.08
	<i>t</i> -stat	14.21	5.04
	Observations	21,429,340	894,101
Firm-by-year, firm-by-destination, destination-by-year	Promotion indicator	0.02	0.07
	<i>t</i> -stat	13.5	4.48
	Observations	21,429,340	894,101
Firm-by-year, firm-by-destination	Promotion indicator, empl. < 20	0.02	0.02
	<i>t</i> -stat	9.98	0.72
	Promotion indicator, 0 < empl. < 50	0.03	0.05
	<i>t</i> -stat	6.47	1.24
	Promotion indicator, empl. > 50	0.02	0.11
	<i>t</i> -stat	7.80	5.42
	Observations	21,429,340	894,101

Notes: *t*-stats are based on robust standard errors. Unit of observation: firm-by-destination-by-year. Dependent variables: (extensive margin) one if firm exports to a given destination in a given year, zero otherwise, (intensive margins) log of export value.

market-potential, and destination-year specific information such as exchange rate changes with fixed effects (Berman, Martin, and Mayer 2012). This specification identifies an effect that is comparable to the extensive margin effects we estimate with the matching estimator reported in Table 3 and is almost identical to the specification with firm-by-year and destination-by-firm fixed effects. However, remember from Table 2 that the export propensity in the matched sample is about 68 percent. In the regression sample, the export propensity is only about 5 percent. To obtain an elasticity, divide the treatment effects by these export propensities. Then, evaluated at the export propensity, the effect of export promotion in the firm-by-destination data is much greater compared to the matching sample, 40 compared to about 6 percent.

In the last model, at the bottom of the table, we split the promotion indicator by employment in the first period where we observe the firm. The results show that the extensive margin effect is fairly homogeneous in firm size. The matching estimator identifies the greatest extensive margin effects for the smallest firms. There are two possible reasons for this difference. First, the fixed effects regressions identify the treatment effects compared to a much broader and more heterogeneous comparison group. Second, aggregation to firm-level data in the matching estimator attenuates the treatment effect for large firms that export to many markets in addition to the market for which they purchase promotion services.

Next, we examine the effect of export promotion on the destination-specific intensive margins. We repeat the same specifications as for the extensive margin, but replace the dependent variable with the log of the destination-by-year-by-firm specific exports.²⁸ Let EXV_{ijt} be exporter i 's sales in destination j in year t . Our preferred specification regresses the log export values on the promotion indicator, and firm-by-year and destination-by-firm fixed effects

$$(4) \quad \ln(EXV_{ijt}) = \theta Promotion_{ijt} + \gamma_{it} + \delta_{ij} + u_{ijt}.$$

For interpretation, the quantity of interest, $\theta \times 100$, approximately equals the effect of export promotion on export values in percent. Column 2 in Table 7 reports the parameter estimates, $\hat{\theta}$. Similar as with the extensive margin results, including firm-destination effects is important to identify the magnitude of the effect. In summary, we conclude that destination-specific export promotion raises destination-specific export flows. The magnitude of the treatment effect we identify with regressions is similar to the estimates of the matching estimator reported in Table 3.

Again, the model reported at the bottom of Table 7 splits the promotion indicator by firm size in the first period we observe the firm. As with the matching estimator, we do not identify a significant intensive margin effect for the smallest firms, suggesting that export promotion works for small firms mostly by helping them enter export destinations. However, as firm size increases, the effect of export promotion increases and is significant for the largest firms. This points to a potential aggregation issue with firm-level data. Aggregating over the export destinations and applying the promotion indicator to all exports introduces potential measurement problems such that market-specific effects are hidden in total exports.

Comparing intensive and extensive margin t -stats in Table 7 reveals that, consistent with the matching estimator, it is more difficult to identify significant intensive margin effects. Although with the destination-specific data, this is likely due to the enormous difference in the sample sizes.

²⁸ Taking logs drops all zero export flows and reduces the dataset significantly. We also estimated a specification in first differences and with the percentage change using the midpoint formula to recover some of the zero observations as the dependent variable. The results are comparable and available upon request.

TABLE 8—TREATMENT GROUP DEFINITIONS, FIRMS WITH 1–20 EMPLOYEES

	ATET, t (1)	t -stat (2)	ATET, $t + 1$ (3)	t -stat (4)	ATET, $t + 2$ (5)	t -stat (6)	Firms (7)
<i>Change in export status</i>							
Main specification	0.0470	7.42	0.0735	10.32	0.0783	10.00	4,110
No export promotion in $t - 1$ and $t - 2$	0.0486	7.15	0.0724	9.55	0.0718	8.64	3,662
No export promotion in $t - 1$, $t - 2$, and $t - 3$	0.0575	8.27	0.0850	10.80	0.0810	9.57	3,458
Export promotion in $t - 1$ included	0.0441	8.49	0.0627	10.58	0.0632	9.80	6,031
<i>Growth in exports</i>							
Main specification	0.0565	1.41	0.0599	1.23	0.0472	0.85	1,980
No export promotion in $t - 1$ and $t - 2$	0.0012	0.03	−0.0181	−0.35	0.0049	0.08	1,707
No export promotion in $t - 1$, $t - 2$, and $t - 3$	−0.0011	−0.02	0.0229	0.43	−0.0005	−0.01	1,586
Export promotion in $t - 1$ included	0.0313	1.02	0.0373	0.97	0.0318	0.72	3,067
<i>Growth in sales</i>							
Main specification	0.0152	1.23	0.0490	2.94	0.0846	3.80	4,044
No export promotion in $t - 1$ and $t - 2$	0.0121	0.89	0.0257	1.46	0.0716	3.06	3,604
No export promotion in $t - 1$, $t - 2$, and $t - 3$	0.0417	3.00	0.0670	3.65	0.1050	4.42	3,403
Export promotion in $t - 1$ included	0.0074	0.70	0.0405	2.91	0.0734	4.00	5,927
<i>Growth in value added</i>							
Main specification	0.0259	1.94	0.0665	3.84	0.0927	4.32	3,813
No export promotion in $t - 1$ and $t - 2$	0.0241	1.70	0.0746	4.14	0.0791	3.56	3,405
No export promotion in $t - 1$, $t - 2$, and $t - 3$	0.0357	2.43	0.0692	3.69	0.0978	4.20	3,214
Export promotion in $t - 1$ included	0.0147	1.31	0.0595	4.21	0.0842	4.70	5,530
<i>Growth in employment</i>							
Main specification	0.0280	3.38	0.0404	3.67	0.0361	2.58	3,895
No export promotion in $t - 1$ and $t - 2$	0.0249	2.91	0.0400	3.51	0.0365	2.52	3,465
No export promotion in $t - 1$, $t - 2$, and $t - 3$	0.0230	2.55	0.0431	3.54	0.0373	2.42	3,278
Export promotion in $t - 1$ included	0.0121	1.84	0.0254	2.88	0.0239	2.11	5,724
<i>Growth in value added per worker</i>							
Main specification	−0.0145	−1.23	0.0014	0.10	0.0303	2.15	3,632
No export promotion in $t - 1$ and $t - 2$	−0.0105	−0.85	0.0058	0.40	0.0396	2.65	3,236
No export promotion in $t - 1$, $t - 2$, and $t - 3$	−0.0087	−0.66	−0.0056	−0.38	0.0504	3.17	3,057
Export promotion in $t - 1$ included	−0.0309	−3.17	0.0022	0.20	0.0068	0.58	5,287

Notes: Results for the main specification that conditions on no export promotion in year $t - 1$ are repeated from Table 3. All treatment effects are calculated using nearest neighbor matching without replacement. The dependent variable is measured as the difference in outcome between $t - 1$ (the year before treatment) and t or $t + 1$ or $t + 2$ (as indicated). A common support restriction has been imposed.

I. Robustness

In this section, we perform some robustness checks for the definition of the treatment and control groups. As outlined in Section II, the treatment group in our baseline scenario consists of firms that acquired trade promotion in a given year (year t) and did not buy trade promotion the year before (year $t - 1$). Similarly, the control group consists of firms that neither bought trade-promotion services in year t nor in year $t - 1$. Table 8 first replicates the effects on the performance measures we examine in Table 3 using this definition of the treatment and control groups. Then, in the next row, for each outcome, we strengthen the requirement such that neither group of firms acquired export promotion in years $t - 2$ and $t - 1$. In the third row, we further require that the firms did not buy export promotion in years $t - 3$, $t - 2$, and $t - 1$. These additional restrictions clearly imply that fewer firms enter the treatment and control groups. The conclusions remain the same. In the final robustness check, we

TABLE 9—ROBUSTNESS CALCULATIONS, FIRMS WITH 1–20 EMPLOYEES

	ATET, t (1)	t -stat (2)	ATET, $t + 1$ (3)	t -stat (4)	ATET, $t + 2$ (5)	t -stat (6)	Firms (7)
<i>Change in export status</i>							
Main specification	0.0470	7.42	0.0735	10.32	0.0783	10.00	4,110
Parsimonious selection model	0.0627	9.85	0.0954	13.54	0.0989	12.76	4,225
NN matching, two neighbors	0.0478	8.31	0.0732	11.38	0.0758	10.71	4,110
Kernel matching	0.0475	10.29	0.0733	14.14	0.0754	13.21	4,110
Regression adjustment	0.0474	10.99	0.0732	15.55	0.0756	14.53	4,110
<i>Growth in exports</i>							
Main specification	0.0565	1.41	0.0599	1.23	0.0472	0.85	1,980
Parsimonious selection model	0.0899	2.91	0.0997	2.69	0.1002	2.33	1,996
NN matching, two neighbors	0.0296	0.79	0.0599	1.32	0.0329	0.63	1,980
Kernel matching	0.0443	1.42	0.0473	1.27	0.0411	0.95	1,980
Regression adjustment	0.0473	1.58	0.0620	1.73	0.0534	1.28	1,980
<i>Growth in sales</i>							
Main specification	0.0152	1.23	0.0490	2.94	0.0846	3.80	4,044
Parsimonious selection model	0.0735	6.06	0.1130	7.11	0.1460	6.99	4,155
NN matching, two neighbors	0.0289	2.59	0.0663	4.41	0.1083	5.39	4,044
Kernel matching	0.0225	2.38	0.0540	4.34	0.0875	5.27	4,044
Regression adjustment	0.0203	2.33	0.0500	4.36	0.0822	5.24	4,044
<i>Growth in value added</i>							
Main specification	0.0259	1.94	0.0665	3.84	0.0927	4.32	3,813
Parsimonious selection model	0.0432	3.11	0.0864	5.04	0.1233	5.79	3,909
NN matching, two neighbors	0.0242	1.98	0.0594	3.82	0.0935	4.82	3,813
Kernel matching	0.0262	2.60	0.0621	4.87	0.0875	5.48	3,813
Regression adjustment	0.0243	2.53	0.0584	4.79	0.0805	5.20	3,813
<i>Growth in employment</i>							
Main specification	0.0280	3.38	0.0404	3.67	0.0361	2.58	3,895
Parsimonious selection model	0.0619	7.79	0.0966	9.08	0.0935	7.01	3,979
NN matching, two neighbors	0.0253	3.40	0.0346	3.49	0.0303	2.41	3,895
Kernel matching	0.0222	3.55	0.0412	4.94	0.0338	3.21	3,895
Regression adjustment	0.0215	3.90	0.0408	5.38	0.0325	3.26	3,895
<i>Growth in value added per worker</i>							
Main specification	−0.0145	−1.23	0.0014	0.10	0.0303	2.15	3,632
Parsimonious selection model	−0.0276	−2.31	−0.0137	−1.01	0.0178	1.25	3,700
NN matching, two neighbors	−0.0183	−1.68	−0.0026	−0.21	0.0299	2.32	3,632
Kernel matching	−0.0148	−1.59	−0.0064	−0.60	0.0219	2.01	3,632
Regression adjustment	−0.0147	−1.68	−0.0078	−0.78	0.0178	1.73	3,632

Notes: Results for the main specification are repeated from Table 3. The parsimonious selection model includes the following control variables: $\log(\text{sales})$, $\log(\text{full time employees})$, export status, import status, export intensity, import intensity, lagged treatment indicator, and year effects. Local-linear matching without replacement is used as the Kernel estimator. The regression adjustment is an inverse probability weighted regression implementation. The probability model is normal; the second stage is linear. Both models include all continuous and indicator variables.

allow both treatment and control firms to acquire export promotion in the pretreatment year (year $t - 1$), such that firms that continuously buy export promotion are included. In this case, the effects tend to be somewhat smaller, which is to be expected since they will be a mix of export promotion in the current and previous years.

Table 9 shows robustness of the treatment effects with respect to alternative estimators and more parsimonious matching models considered in the literature. Again, in the main specification, we repeat our estimates for comparison.

In the parsimonious specification, we match treatment and control firms only based on sales, employees, export status, import status, export and import intensity,

lagged treatment, and a year indicator. This approach leads to an overestimation of the treatment effect on our measures of export performance, value added, and employment, in some cases by more than double compared to our full specification. Value added per worker, however, is underestimated suggesting negative effects of export promotion. These results imply that in the context of a developed economy such as Denmark matching on a broad set of firm characteristics is important to remove bias.

The next two robustness exercises of Table 9 show that our results are robust with respect to Kernel matching estimators and the nearest neighbor matching with two neighbors. A remaining concern is misspecification. To examine this identification issue, we implement a doubly robust inverse normal probability weighted regression estimator with a linear adjustment model in the second stage.²⁹ The results are reported in the rows labeled Regression Adjustment. They are similar in sign, magnitude, and significance to our baseline estimates from Table 3.³⁰

In addition, we experimented with splitting the data by industries. We did not detect a clear pattern in those results, and we therefore choose to make them available upon request.

IV. Conclusions

Most countries invest resources to help firms access foreign markets, but the literature has so far been silent about whether export promotion improves firm performance and, if so, whether the benefits outweigh the direct costs of export promotion. In this paper, we examine the effects of Denmark's export-promotion program on export- and firm-level performance. We find that for small exporters export-promotion activities increase export performance, raise value added, employment, and productivity. In terms of value added, the benefits are about three times higher than the direct costs of the promotion program.

We provide evidence that export performance is not necessarily the same as firm performance. The Trade Council's activities help firms across the entire size distribution enter the export markets, and medium-sized firms with 20 to 50 employees see the largest increase in export values due to promotion activity. All the gains in employment and value added are with the smallest firms of 1 to 20 employees.

The estimates imply that if raising value added and creating job opportunities is the goal, then promotion activity should focus on the smallest firms active in the economy. In addition, only the smallest firms experience an increase in labor productivity following export promotion. Measured by the direct effect of promotion activities on value added, the benefits of promotion activities justify the costs. We expect that the benefits in developing countries, where information barriers are likely more severe, are even greater.

²⁹For a detailed discussion, see Imbens and Wooldridge (2009); Heckman, Ichimura, and Todd (1997); Hirano, Imbens, and Ridder (2003); and <http://www.stata.com/manuals13/te.pdf>.

³⁰We also examined specification issues by including indicator variables that account for differences in quintiles of capital and labor intensities. The results are similar to the baseline estimates. Pooling over all firms, the t , $t + 1$, and $t + 2$ effects are -0.00419 ($t = -0.58$), 0.000845 ($t = 0.1$), and 0.215 ($t = 2.38$). For firms with 1 to 20 employees, the estimates and t -statistics are -0.0084 ($t = -0.7$), -0.00207 ($t = -0.15$), and 0.0364 ($t = 2.56$).

Finally, we conclude that approaching firms about export opportunities is a productive part of trade promotion even in countries that are already very open such as Denmark.

REFERENCES

- Aeberhardt, Romain, Ines Buono, and Harald Fadinger. 2014. "Learning, incomplete contracts and export dynamics: Theory and evidence from French firms." *European Economic Review* 68: 219–49.
- Ahn, JaeBin, and Alexander F. McQuoid. 2013. "Capacity Constrained Exporters: Micro Evidence and Macro Implications." Florida International University Department of Economics Research Working Paper 2.
- Albornoz, Facundo, Héctor F. Calvo Pardo, Gregory Corcos, and Emanuel Ornelas. 2012. "Sequential exporting." *Journal of International Economics* 88 (1): 17–31.
- Allen, Treb. 2014. "Information Frictions in Trade." *Econometrica* 82 (6): 2041–83.
- Araujo, Luis, and Emanuel Ornelas. 2007. "Trust-Based Trade." Centre for Economic Performance (CEP) Discussion Paper 820.
- Artopoulos, Alejandro, Daniel Friel, and Juan Carlos Hallak. 2013. "Export emergence of differentiated goods from developing countries: Export pioneers and business practices in Argentina." *Journal of Development Economics* 105: 19–35.
- Atkin, David, Amit K. Khandelwal, and Adam Osman. 2017. "Exporting and Firm Performance: Evidence from a Randomized Experiment." *Quarterly Journal of Economics* 132 (2): 551–615.
- Bastos, Paulo, and Joana Silva. 2012. "Networks, Firms and Trade." *Journal of International Economics* 87 (2): 352–64.
- Berman, Nicolas, Antoine Berthou, and Jérôme Héricourt. 2015. "Export Dynamics and Sales at Home." *Journal of International Economics* 96 (2): 298–310.
- Berman, Nicolas, Philippe Martin, and Thierry Mayer. 2012. "How do Different Exporters React to Exchange Rate Changes?" *Quarterly Journal of Economics* 127 (1): 437–92.
- Bernard, Andrew B., and J. Bradford Jensen. 2004. "Why Some Firms Export." *Review of Economics and Statistics* 86 (2): 561–69.
- Casella, Alessandra, and James E. Rauch. 2002. "Anonymous market and group ties in international trade." *Journal of International Economics* 58 (1): 19–47.
- Cassey, Andrew J. 2012. "California's Exports and the 2004 Overseas Office Closures." *Economic Inquiry* 50 (3): 641–51.
- Cassey, Andrew J. 2014. "The Location of US States' Overseas Offices." *Review of International Economics* 22 (2): 310–25.
- Chaney, Thomas. 2014. "The Network Structure of International Trade." *American Economic Review* 104 (11): 3600–3634.
- Correia, Sergio. 2016. "A Feasible Estimator for Linear Models with Multi-Way Fixed Effects." <http://scorreia.com/research/hdfe.pdf>.
- Eslava, Marcela, James Tybout, David Jenkins, C. J. Krizan, and Jonathan Eaton. 2015. "A Search and Learning Model of Export Dynamics." Society for Economic Dynamics (RePec) Meeting Paper 1535.
- Fernandes, Ana P., and Heiwai Tang. 2014. "Learning to export from neighbors." *Journal of International Economics* 94 (1): 67–84.
- Görg, Holger, Michael Henry, and Eric Strobl. 2008. "Grant Support and Exporting Activity." *Review of Economics and Statistics* 90 (1): 168–74.
- Head, Keith, and John Ries. 2010. "Do trade missions increase trade?" *Canadian Journal of Economics* 43 (3): 754–75.
- Heckman, James J., Hidehiko Ichimura, and Petra E. Todd. 1997. "Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Program." *Review of Economic Studies* 64 (4): 605–54.
- Hiller, Sanne. 2012. "Do Private Export Associations Promote Exports? Evidence from Denmark." www20.iadb.org/intal/catalogo/PE/2012/11146a05.pdf.
- Hirano, Keisuke, Guido W. Imbens, and Geert Ridder. 2003. "Efficient Estimation of Average Treatment Effects Using the Estimated Propensity Score." *Econometrica* 71 (4): 1161–89.
- Hui, Xiang. 2016. "E-commerce Platforms and International Trade: A Large-Scale Field Experiment." http://idei.fr/sites/default/files/IDEI/documents/conf/Internet_2017/hui.pdf.
- Imbens, Guido W., and Jeffrey M. Wooldridge. 2009. "Recent Developments in the Econometrics of Program Evaluation." *Journal of Economic Literature* 47 (1): 5–86.

- Kleven, Henrik Jacobsen, and Claus Thustrup Kreiner.** 2006. "The marginal cost of public funds: Hours of work versus labor force participation." *Journal of Public Economics* 90 (10–11): 1955–73.
- Labanca, Claudio, Danielken Molina, and Marc-Andreas Muendler.** 2014. "Preparing to Export." <http://econweb.ucsd.edu/muendler/papers/brazexp.pdf>.
- Lederman, Daniel, Marcelo Olarreaga, and Lucy Payton.** 2010. "Export promotion agencies: Do they work?" *Journal of Development Economics* 91 (2): 257–65.
- Melitz, Mark J.** 2003. "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity." *Econometrica* 71 (6): 1695–1725.
- Mion, Giordano, and Luca D. Oromolla.** 2014. "Manager's mobility, trade performance and wages." *Journal of International Economics* 94 (1): 85–101.
- Munch, Jakob, and Georg Schaur.** 2018. "The Effect of Export Promotion on Firm-Level Performance: Dataset." *American Economic Journal: Economic Policy*. <https://doi.org/10.1257/pol.20150410>.
- Nguyen, Daniel X.** 2012. "Demand uncertainty: Exporting delays and exporting failures." *Journal of International Economics* 86 (2): 336–44.
- Nguyen, Daniel X., and Georg Schaur.** 2012. "Import and Export Linkages Transmit Volatility across Markets." <http://www.econ.ku.dk/nguyen/papers/NguyenSchaur2012.pdf>.
- Rauch, James E.** 1996. "Trade and Search: Social Capital, Sogo Shosha, and Spillovers." National Bureau of Economic Research (NBER) Working Paper 5618.
- Rauch, James E., and Alessandra Casella.** 2003. "Overcoming Informational Barriers to International Resource Allocation: Prices and Ties." *Economic Journal* 113 (484): 21–42.
- Rauch, James E., and Vitor Trindade.** 2002. "Ethnic Chinese Networks in International Trade." *Review of Economics and Statistics* 84 (1): 116–30.
- Rauch, James E., and Vitor Trindade.** 2003. "Information, International Substitutability, and Globalization." *American Economic Review* 93 (3): 775–91.
- Rauch, James E., and Joel Watson.** 2003. "Starting small in an unfamiliar environment." *International Journal of Industrial Organization* 21 (7): 1021–42.
- Rose, Andrew K.** 2007. "The Foreign Service and Foreign Trade: Embassies as Export Promotion." *World Economy* 30 (1): 22–38.
- Rosenbaum, Paul R., and Donald B. Rubin.** 1983. "The central role of the propensity score in observational studies for causal effects." *Biometrika* 70 (1): 41–55.
- Soderbery, Anson.** 2014. "Market size, structure, and access: Trade with capacity constraints." *European Economic Review* 70: 276–98.
- Spearot, Alan C.** 2013. "Variable demand elasticities and tariff liberalization." *Journal of International Economics* 89 (1): 26–41.
- Van Biesebroeck, Johannes, Jozef Konings, and Christian Volpe Martincus.** 2016. "Did export promotion help firms weather the crisis?" *Economic Policy* 31 (88): 653–702.
- Van Biesebroeck, Johannes, Emily Yu, and Shenjie Chen.** 2011. "The Impact of Trade Promotion Services on Canadian Exporter Performance." Centre for Economic Policy Research (CEPR) Discussion Paper 8597.
- Volpe Martincus, Christian, and Jerónimo Carballo.** 2008. "Is export promotion effective in developing countries? Firm-level evidence on the intensive and the extensive margin of exports." *Journal of International Economics* 76 (1): 89–106.
- Volpe Martincus, Christian, and Jerónimo Carballo.** 2010a. "Beyond the average effects: The distributional impacts of export promotion programs in developing countries." *Journal of Development Economics* 92 (2): 201–14.
- Volpe Martincus, Christian, and Jerónimo Carballo.** 2010b. "Entering new country and product markets: Does export promotion help?" *Review of World Economics* 146 (3): 437–67.
- Volpe Martincus, Christian, and Jerónimo Carballo.** 2010c. "Export Promotion: Bundled Services Work Better." *World Economy* 33 (12): 1718–56.
- Volpe Martincus, Christian, Jerónimo Carballo, and Andrés Gallo.** 2011. "The impact of export promotion institutions on trade: Is it the intensive or the extensive margin?" *Applied Economics Letters* 18 (2): 127–32.
- Volpe Martincus, Christian, Jerónimo Carballo, and Pablo M. García.** 2010. "Public Programs to Promote Firms' Export in Developing Countries: Are There Heterogeneous Effects by Size Categories?" Inter-American Development Bank (IDB) Working Paper 205.
- Volpe Martincus, Christian, Antoni Esteveordal, Andrés Gallo, and Jessica Luna.** 2010. "Information barriers, export promotion institutions, and the extensive margin of trade." *Review of World Economics* 146 (1): 92–111.
- Wilkinson, Timothy J., and Lance E. Brouters.** 2000. "An Evaluation of State Sponsored Promotion Programs." *Journal of Business Research* 47 (3): 229–36.