Rev World Econ (2010) 146:437–467
DOI 10.1007/s10290-010-0062-x

ORIGINAL PAPER

Entering new country and product markets: does export promotion help?

Christian Volpe Martincus · Jerónimo Carballo

Published online: 12 June 2010

Abstract Entering new export markets is primarily a discrete choice. Even though several empirical papers have used modeling strategies consistent with this fact, no study has examined the effects of public policies aimed at affecting this decision within this setting. In this paper we assess the impact of trade promotion activities on export outcomes using trade support and highly disaggregated export data for the entire population of exporters of Uruguay, a small developing country, over the period 2000–2007 to estimate a binary outcome model that allows for unobserved heterogeneity. We find that trade supporting activities have helped firms reach new destination countries and introduce new differentiated products.

Keywords Export promotion · Firm exports · Latin America · Uruguay

JEL Clasification F13 · F14 · L15 · H32 · H40 · L25 · O17 · O24 · C23

1 Introduction

A simple portfolio argument suggests that, if covariance of firm sales across countries is not perfect, then spreading these sales over a larger number of countries will be associated with more stable total sales, which can be expected to result in lower likelihood of failure, in general, and of exiting international markets, in

C. Volpe Martincus (✉) · J. Carballo
Inter-American Development Bank,
Stop W0610, 1300 New York Avenue, NW, Washington, DC 20577, USA
e-mail: christianv@iadb.org

particular (see, e.g., Hirsch and Lev 1971; and Bernard and Jensen 2002).[1] However, given the severe information problems deterring export activities, adding new destination countries or new export products may be challenging, especially for firms with limited export experience based in developing countries. Trade promotion activities ameliorate these information problems and might therefore affect the probability that firms start exporting to a new country or selling a new good abroad. Is this really the case? Even though some previous studies report evidence on the effect of these activities on the growth of firms' export margins (see, e.g., Volpe Martincus and Carballo 2008), no formal evaluations have been performed of their direct impact on the probability of incorporating a new destination or introducing a new export product.[2] Taking explicitly into account the discrete-choice nature of the decision to enter new countries or product markets, such an evaluation could provide valuable new insights on how trade promotion actions specifically affect the extensive margin of firms' exports and thereby their overall export performance, including their ability to survive in foreign markets.[3] This requires specifying and estimating an econometric model with discrete outcomes, which allows for heterogeneous responses to treatment over observationally identical persons. This paper aims precisely at filling this gap in the literature, estimating a discrete-choice, latent index model using trade support and highly disaggregated export data for the entire population of exporters of a small developing country, Uruguay, over the period 2000–2007.[4]

Incomplete information creates frictions in the process of matching between buyers and sellers across national borders and can therefore become an important obstacle to developing export activities (see, e.g., Rangan and Lawrence 1999; Rauch and Casella 2003; and Huang 2007). Information gaps are particularly pronounced in the case of differentiated products. These products differ along multiple dimensions in such a way that their prices do not convey all relevant information to guide resource allocation (see, e.g., Rauch 1996).[5] As a consequence, international trade of differentiated goods is especially favored by factors reducing

[1] Supporting empirical evidence for this argument has been reported in recent papers. Thus, Eaton et al. (2007) estimate transition matrices for Colombian exporters and find that firms exporting to more than three countries are more likely to keep selling abroad the next year. In the case of Uruguay, Cox estimations based on a model including (the natural logarithm of) total exports, unobserved firm heterogeneity, and year fixed effects suggest that firms that export to two countries are approximately 50% less likely to exit international markets than firms that only export to one country, whereas firms that trade with three countries have roughly a 70% lower probability of doing so. Similar results are obtained when controlling for the number of products exported. These estimates are available from the authors upon request.

[2] For an overview of the literature on the impact of export promotion policies at different levels of aggregation (i.e., country, regions, and firms) see Volpe Martincus and Carballo (2008).

[3] Thus, in this paper, we will focus on two specific measures of export performance: entry into new country markets and entry into new product markets (see Sect. 2). As noticed below, whether firms actually enter or not these markets is likely to affect other, more general, performance measures commonly used in the empirical literature, such as total exports and their growth rate.

[4] For detailed descriptions of Uruguay' trade patterns see, e.g., Vaillant and Bittencourt (2001), Giordano and Quevedo (2006), and Snoeck et al. (2008).

[5] More specifically, differentiated products have no reference price (see Sect. 3).

the aforementioned gaps such as common language, colonial ties, and co-ethnic business networks (see Rauch 1999; and Rauch and Trindade 2002).

Heterogeneity in the degree of information incompleteness is also likely to prevail across different export activities. More precisely, information problems tend to be more severe when firms attempt to export to a new country or sell a new product abroad than when they simply expand their export activities in countries they already export to or increase their sales of already exported products. When exporting to a new destination, firms must learn, among other things, about the alternative ways and respective costs of shipping their merchandise, the tariffs/non-tariff measures, and technical regulations applied on their goods, both for the home country and for competing countries; domestic consumer preferences relevant for the saleability of the good to be traded; the distribution channels, in general, and potential business partners, in particular; and the main marketing strategy of incumbent firms. Gathering this information requires performing market-specific studies, whose costs are at least partially fixed in nature. As highlighted in recent international trade models with firm heterogeneity, these costs can prevent firms with productivity levels below certain thresholds from entering such export markets (see, e.g., Melitz 2003; and Melitz and Ottaviano 2008).

Several trade promotion actions aim at reducing the frictions generated by incomplete information and thereby the fixed costs associated with exporting. Thus in general, export promotion agencies provide firms with training on the export process as well as with information on foreign markets; organize, coordinate and sometimes co-finance their participation in trade fairs, shows, and missions; and help companies establish specific business contacts (see Jordana et al. 2010). These activities could be rationalized as public interventions correcting market failures if the search for business partners is assumed to be subject to free-riding through information spillovers (see, e.g., Rauch 1996).

Hence, by helping overcome information barriers, trade promotion programs may facilitate the expansion of exports along the extensive margin in terms of both countries and products, and, in the latter case, especially those of differentiated goods. More specifically, these programs may aid firms adding an entirely new market, i.e., a market they never had trade relationships with before. Notice that this is not the same as an overall increase in the number of markets in which firms operate as studied in Volpe Martincus and Carballo (2008), since such an increase might result from simultaneously adding several markets and dropping others, potentially some already having been served in the past. In fact, in Uruguay only about 30% of the exporting companies registering expansions in the number of destination countries and products exported have actually penetrated a new market between 2001 and 2007.[6] The aforementioned specific extensive margin dimension is particularly interesting in itself for at least three reasons. First, as mentioned above, this is precisely where information problems hit more forcefully and accordingly where export promotion can make the largest difference. Second, when doing it, firms tend to add new markets gradually rather than in large clumps (see,

[6] Companies may even incorporate a new market while experiencing a reduction in the total number of markets in which they are present.

e.g., Eaton et al. 2007; Lawless 2009; Schmeiser 2009).[7] In particular, most firms incorporate only one market at a time. For instance, in the case of Uruguay, among exporting companies with new destinations (products) in a given year, more than 60% (approximately 50%) add just one country (product).[8] Third, sales to new destinations and those of new goods may be influential in determining firms' export performance and even aggregate export outcomes. Thus, in Uruguay, new products account for almost 10% of total exports of firms with continuous presence in international markets over the period 2000–2007 and 3.8% of the country's total exports. After 5 years, the shares of these products increase to 27.6 and 6.7%, respectively.[9] Hence, a deeper understanding of the channel through which trade promotion programs affect exports can be reached by assessing their influence on firms' penetration of new markets. This is what this paper aims to do. It therefore addresses one main question: Do export supporting activities performed by trade promotion organizations in developing countries actually help firms add new destination countries or new export products?[10]

Answering this question involves performing a counterfactual exercise, i.e., in order to determine the effect of export promotion programs, one needs to estimate how firms would have behaved had they not participated in those programs. Since this potential behavior is not observed, it must be estimated from the data using information on non-participating firms to build an appropriate control group. More precisely, establishing causal impacts instead of simple correlations requires controlling for all firm characteristics that may potentially affect both usage of export promotion programs and export outcomes. Standard methods such as matching are based on the identifying assumption that selection into trade promotion activities is only based on observed (by the econometrician) attributes. Since there might be several unobserved factors that may play an important role in determining assistance status and also export performance, this may turn out to be a very restrictive assumption. Furthermore, the decision whether to add a new destination country or a new export product is primarily a discrete choice and the interest accordingly lies on the probability that such events actually occur (see, e.g., Roberts and Tybout 1997). Thus, in our case the outcome variables of interest are dichotomous. This raises additional specific econometric issues for program evaluation (see, e.g., Athey and Imbens 2006). To address these issues we use the estimator proposed by Aakvik et al. (2005), which allows for unobserved factors

[7] This pattern is consistent with the model developed by Eaton et al. (2008) augmented to allow for serial correlated productivity shocks. According to this model, variations across firms in market entry are primarily explained by differences in efficiency.

[8] Further, even though there are firms that enter more than one market simultaneously, correlation in the decisions to penetrate separate markets can be expected to be weak after conditioning by firms' size, their previous export market coverage, and general macroeconomic conditions (see Eaton et al. 2007; and Lawless 2009).

[9] In Chile, new products accounted on average for 15% of total exports over the period 1992–2001, while in Russia more than 13% of exports are due to continuing exporters entering new destinations between 2003 and 2004 (see Álvarez et al. 2007; and Schmeiser 2009, respectively).

[10] An assessment of these activities from the point of view of social welfare requires contrasting the costs they incur with the benefits they generate. This is beyond the scope of this paper, which focuses only on the benefits of these actions in terms of export performance.

that may affect selection into programs and export outcomes and thus heterogeneous responses to programs (i.e., firms respond differently to the same program). We thereby contribute to the existing literature assessing, to our knowledge for the first time, the impact of export promotion programs on probably the most relevant dimension of firms' export extensive margin, i.e., the decision to enter new country or product markets, while taking into account its discrete choice nature.[11] In doing this, we exploit a new database primarily consisting of an annual list of companies assisted by Uruguay's main export promotion agency, URUGUAY XXI, and firm-level export data disaggregated by product and destination country covering the whole population of this country's exporters over the period 2000–2007.[12] Noteworthy, we thus focus on the impact of trade support on already exporting firms. Unfortunately, due to data constrains, we cannot evaluate whether URUGUAY XXI helps non-exporters become exporters.[13] While admittedly this is a limitation of our study, for the reasons listed above, we believe that much is to be gained by investigating the effects of export promotion activities on exporters' entry into new markets. Further of interest from both academic and trade policy points of view, we look at the experience of a small developing country, where obstacles hindering expansion of exports along these margins are likely to be stronger. In particular, products of firms from these countries might be perceived as less technologically advanced and of poorer quality than those from developed countries (see, e.g., Chiang and Masson 1988; Han and Terpstra 1988; Hudson and Jones 2003).[14]

We find that export supporting activities by URUGUAY XXI have been effective in helping Uruguayan firms reach new destination countries, especially non-OECD, Latin American and Caribbean markets, and in introducing new differentiated products. In contrast, no significant impacts are observed when no distinction in terms of the degree of differentiation of the goods is performed. This result can be explained by the fact that, in this case, we are implicitly pooling over goods whose trade involves information problems of varying intensity, so we are accordingly likely mixing effects of trade support actions of varying intensity, i.e., strong for

[11] There are few antecedents in the use of binary outcome models to evaluate export promotion activities. Thus, Spence (2003) examines the effect of U.K. overseas trade missions estimating a standard logit model with data on 190 companies. She shows that firms whose sales are spread over a larger number of countries and accordingly have been exposed to the entry process in various markets are more likely to establish contacts and obtain leads during trade missions. Álvarez (2004) estimates a standard probit model to assess the impact of the trade promotion instruments used by PROCHILE on the probability of becoming a permanent exporter using a sample of 295 Chilean manufacturing small and medium sized enterprises. He finds that trade shows and trade mission do not affect this probability, but exporter committees do.

[12] In particular, assisted companies are those that have used the export support services provided by URUGUAY XXI (Uruguay's Institute for Promotion of Investments and Exports of Goods and Services). More generally, we will use interchangeably assistance, (export) support, treatment, and participation (in export promotion programs) throughout the paper.

[13] We do not have the required data to examine selection of firms into export markets and how assistance by URUGUAY XXI shapes this selection process (e.g., sales for both exporters and non-exporters and a list of non-exporting firms assisted by URUGUAY XXI).

[14] This would be specifically the case if consumer attach informational value to quantity and accordingly interpret low market shares as a signal of low quality (see Caminal and Vives 1996).

differentiated products as referred above and weak or null for homogeneous products.

The remainder of the paper is organized as follows: Sect. 2 explains the empirical methodology. Section 3 presents the data set and descriptive evidence on firms' export performance. Section 4 reports and discusses the econometric results, and Sect. 5 concludes.

2 Empirical methodology

Let Y_i be an export performance indicator of firm i. Each firm either participates or not in trade promotion programs. Thus, there are two potential outcomes, Y_{0i} and Y_{1i}, where Y_{0i} corresponds to the non-participation state and Y_{1i} corresponds to the participation state. The difference between Y_{1i} and Y_{0i} is the gain or loss in terms of export performance that firm i would experience if it participates in export promotion activities relative to what it would register if it has not participated in these activities, i.e., this difference is the causal effect of assistance by the trade promotion agency, in our case, URUGUAY XXI. Since it is impossible to observe Y_{1i} and Y_{0i} for the same firm, such an individual treatment effect can never be observed. This is the so-called fundamental problem of causal inference (see Holland 1986). The statistical solution to this problem consists of using the population of firms to learn about the properties of the potential outcomes. Usually, an average treatment effect is computed, typically, *the average treatment effect on the treated.* In our case, this would correspond to the average effect for firms that participate in trade promotion activities.

In order to estimate this effect consistently, an unbiased estimate of the expected counterfactual is required. Alternative methods have been proposed in the literature to construct the correct sample counterpart for the missing information on the outcomes realized if firms had not been assisted when no randomized control groups were available (see, e.g., Heckman et al. 1998, 1999; Klette et al. 2000; Jaffe 2002; Blundell and Costa Dias 2002; Lee 2005; Smith and Todd 2005a). Matching is one of these methods and consists of pairing each assisted firm with the more similar members of the non-assisted group on the basis of their observable characteristics and then estimating the impact of assistance by comparing the exports of matched assisted and non-assisted firms. This method is based on the main identifying assumption that selection into assistance occurs only on observables (see, e.g., Heckman and Robb 1985; and Heckman et al. 1998).[15] In general, due to data limitations, there may be several characteristics that are not observed by the econometrician and, as a consequence, systematic differences between treated and non-treated outcomes may persist even after conditioning on observables. Thus,

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

assuming that unobservables play no role in selection can therefore be very restrictive. One way to allow for selection on an unobservable determinant consists of combining matching with difference-in-differences as long as this determinant lies on separable individual and/or time-specific components of the error term (see, e.g., Blundell and Costa Dias 2002; and Smith and Todd 2005a).[16] The resulting matching difference-in-differences estimator compares the change in before and after exports of assisted firms with a weighted average of the change of matched non-assisted ones, so that imbalances in the distribution of covariates between both groups are accounted for and time-invariant effects are eliminated. Operatively, differences are matched on the probability of treatment exposure conditional on observed covariates or propensity score and weights depend on the cross-sectional matching estimator used in the first stage. A related approach uses instead a direct weighting scheme on the propensity score (see Abadie 2005). These procedures rely, for identification, on the assumption that there are no time-varying unobserved effects influencing selection and exports (see Heckman et al. 1997; and Blundell and Costa Dias 2002).

This solution works well with continuous export performance measures along the extensive margin such as the (growth of the) number of export destinations and the number of products exported (see, e.g., Volpe Martincus and Carballo 2008). In this paper, however, we are interested in assessing whether export promotion activities help firms reach new destination countries or introduce new export products. Our outcome variables are therefore eminently dichotomous. Formally, Y_i is a binary indicator that takes the value of 1 if firm i adds a new country and 0 otherwise.[17] With binary outcomes, standard models can lead to predictions outside the allowable range, and giving up the additivity assumption to avoid potential misspecification without imposing additional assumptions may result in non-identification of the counterfactual distribution of outcomes (see Athey and Imbens 2006).

In order to estimate the aforementioned effects within a binary framework, we use the procedure proposed by Aakvik et al. (2005), which builds upon Heckman (1981) and the latent variable model developed by Heckman and Vytlacil (1999).[18] More precisely, we specify and estimate an endogenous switching binary response model where selection into export promotion programs and export outcomes are jointly determined and unobservables are generated by factor structures.[19] Firms are thus allowed to participate in these programs on the basis of their idiosyncratic response to assistance and these responses are allowed to differ with observed characteristics and also across observationally identical firms (i.e., with different

[16] See also Heckman et al. (1997) and Heckman et al. (1998).

[17] We should mention herein that, even though the presentation hereafter focuses on the probability of incorporating a new destination, mutatis mutandis it also applies to other measures of export performance along the extensive margin (e.g., the probability of adding a new export product).

[18] This approach has been also used in Andrén and Andrén (2002); Auld (2005); Graversen and Jensen (2006) and Coelli et al. (2007). Unlike matching, this method requires a first-stage decision rule given by a threshold crossing model (see Heckman and Vytlacil, 2005).

[19] An econometric model of the form: $Y_i^* = X_i\delta + \lambda_i D_i + \varepsilon_i$ with $\lambda_i = X_i\rho + \vartheta_i$ can be written as $Y_{1i}^* = X_i\beta_1 + U_{i1}$ for $D_i = 1$and $Y_{0i}^* = X_i\beta_0 + U_{0i}$ for $D_i = 0$ (see Auld 2005).

unobserved attributes) (see Aakvik et al. 2005; Auld 2005). Formally, the observed outcome can be defined as follows:

$$Y_i = D_i Y_{1i} + (1 - D_i) Y_{0i} \tag{1}$$

where D_i is an indicator codifying information on treatment by URUGUAY XXI which takes the value 1 if firm i has been assisted by the agency and 0 otherwise.[20] As we will see in Sect. 4, since the selection process into trade assistance is in fact a joint decision of the firm and the agency a multiple index model should be specified (see Poirier 1980).[21] Given the appropriate exclusion restrictions, this analysis can be extended to allow for such a model (see Aakvik et al. 2005).[22]

Specifically, the potential outcome for the participation state is $Y_{1i} = \mu_1(X_i, U_{1i})$, whereas that for the non-participation state is $Y_{0i} = \mu_0(X_i, U_{0i})$, where X_i is a vector of observed random variables and U_{0i} and U_{1i} are unobserved random variables. Furthermore, Y_{0i} and Y_{1i} are assumed to be defined for any firm and independent across firms, so that there are no interactions among them (see Heckman and Vytlacil 1999).[23] Moreover, we assume in particular that a linear latent index generates the dichotomous outcome, i.e., $\mu_j(X, U_j) = 1[X\beta_j \geq -U_j]$ where $j = 1$ for the treated state and $j = 0$ for the non-treated state, and $\mathbf{1}\{.\}$ is an indicator function.[24] Thus, we specify the following export outcome equation of the assistance state:

$$\begin{aligned} Y_{1i}^* &= X_i\beta_1 + U_{1i} \\ Y_{1i} &= \begin{cases} 1 & \text{if } Y_{1i}^* \geq 0 \\ 0 & \text{otherwise} \end{cases} \end{aligned} \tag{2}$$

and the following export outcome equation for the non-assistance state:

$$\begin{aligned} Y_{0i}^* &= X_i\beta_1 + U_{0i} \\ Y_{0i} &= \begin{cases} 1 & \text{if } Y_{0i}^* \geq 0 \\ 0 & \text{otherwise} \end{cases} \end{aligned} \tag{3}$$

[20] This is the classical model of potential outcomes (see Neyman 1923; Fisher 1935; Roy 1951; Cox 1958; Quandt 1972 and Rubin 1978).

[21] This also applies to participation in social programs (see, e.g. Sianesi 2004, and Aakvik et al. 2005).

[22] This extension is left for future work.

[23] In this exercise, we ignore general equilibrium effects so that outcomes for each firm do not depend on the overall level of participation in the activities performed by the agency (see Heckman et al. 1997, 1998). In particular, we do not consider information spillovers. It is well known that firms may learn about export opportunities from other firms through employee circulation, customs documents, customer lists, and other referrals (see Rauch 1996). Evidence on spillovers has been presented in several papers, e.g., Aitken et al. (1997); Greenaway et al. (2004); Álvarez et al. (2007), and, to some extent, Barrios et al. (2003). If these spillovers were to be associated with participation in export promotion activities, i.e., unassisted firms obtain business information from assisted firms, then the treatment effects, as estimated here, would be underestimated. Given the number of companies actively participating in these activities (see Table 1) this risks can be expected to be low.

[24] The linear index assumptions are imposed to reduce the dimensionality of the estimation problem. These assumptions are not critical to the empirical approach (see Aakvik et al. 2005).

where Y_{1i}^* is a latent index of adding a new country when receiving support and Y_{0i}^* is the corresponding latent index when not receiving support. We assume here that $U_{0i} \neq U_{1i}$, so that idiosyncratic gains from assistance are allowed for each firm. In other words, the model allows for treatment effects to vary by unobserved individual characteristics (see Aakvik et al. 2003). This is a random coefficient model if firms act on U_{0i} and U_{1i} (see Heckman 1997).[25]

We further assume that a latent variable model generates the indicator variable D_i. Concretely, the decision rule for participation in export promotion activities is governed by the following process:

$$\begin{aligned} D_i^* &= Z_i\beta_D + U_{Di} \\ D_i &= \begin{cases} 1 & \text{if } D_i^* \geq 0 \\ 0 & \text{otherwise} \end{cases} \end{aligned} \tag{4}$$

where D_i^* is a latent index that determines whether a firm is assisted or not and can be viewed as the net utility associated with participation in export promotion programs (see Aakvik et al. 2005; and Coelli et al. 2007). Z_i is a vector of observed random background variables that determine selection into these programs. Note that X_i and Z_i are not necessarily the same vectors. In particular, those variables included in Z_i but not included in X_i, i.e., variables that determine selection into assistance but do not directly affect export outcomes, provide an identifying exclusion restriction (see Aakvik et al. 2003). As we will see below, we assume normality and one-factor structure, i.e., correlation is generated through an individual specific random factor that does not vary over outcomes. Under these assumptions, no such exclusion restrictions are required to identify the mean treatment effects (see Aakvik et al. 2005). In particular, parametric identification is obtained from the distributional assumptions without exclusion restrictions because of the non-linearities (see Auld 2005). In the empirical implementation below, we do use an instrumental variable, namely, the share of firms assisted averaged over the sectors firms are actively exporting. This variable will be discussed in more detail in Sect. 4. Thus, we will not only rely on functional forms for identification. Finally, β_D is a set of parameters and U_{Di} are unobservables.

We assume that unobserved heterogeneity follows a factor structure and enters into the selection as well as the outcome equations (see Heckman 1981; Aakvik et al. 2003; and Aakvik et al. 2005). Formally, error terms in Eqs. (2)–(4) are assumed to follow:

$$U_{Di} = \alpha_D\theta_i + \varepsilon_{Di} \tag{5}$$

$$U_{1i} = \alpha_1\theta_i + \varepsilon_{1i} \tag{6}$$

$$U_{0i} = \alpha_0\theta_i + \varepsilon_{0i} \tag{7}$$

[25] If $U_{0i} = U_{1i}$, then the effects of the unobservables are the same in both states. In this case, firms with the same observed X will have the same treatment effect. This is the so-called common coefficient model (see Aakvik et al. 2003).

where θ_i is an unobserved firm-specific time-invariant factor and ε_D, ε_1, ε_0 are independent with respect to each other and of the exogenous variables in the model (see Aakvik et al. 2003). The parameter α_D is the factor loading for the selection outcome, α_1 is the factor loading for the outcome equation with treatment, and α_0 is the factor loading for the outcome equation without treatment.[26] These α's capture potential correlations among the error terms in Eqs. (2)–(4). To identify the model, we assume that $\alpha_D = 1$ and $(\varepsilon_D, \varepsilon_1, \varepsilon_0, \theta) \sim N(0, I)$, i.e., follow the standard normal distribution (see Aakvik et al. 2005).[27]

In this framework, the effect of the assistance by the agency on assisted firms is given by:

$$\begin{aligned}\Delta^{TT}(x,z,D=1) &= E(\Delta|X=x,Z=z,D=1)\\ &= Pr(Y_1=1|X=x,Z=z,D=1)\\ &\quad - Pr(Y_0=1|X=x,Z=z,D=1)\\ &= \frac{1}{F_{U_D}(z\beta_D)}\left[F_{D,1}(z\beta_D,x\beta_1) - F_{D,0}(z\beta_D,x\beta_0)\right]\\ &= \frac{1}{E\left(\Phi\left(z\beta_D/\sqrt{2}\right)\right)}\int \left[\Phi(x\beta_1+\alpha_1\theta) - \Phi(x\beta_0+\alpha_0\theta)\right]\\ &\quad \times \Phi(z\beta_D+\theta)\phi(\theta)d\theta\end{aligned} \tag{8}$$

Since θ is not observed, we integrate it out assuming that $\theta \coprod (X, Z)$, which is the standard random effects assumption. This random effects setup can therefore be

[26] Notice that this estimation strategy is designed to correct for the correlation between the unobservables in the outcome and selection equations. Hence, if measurement errors in the export outcome and/or the assistance variables only introduce additional sources of correlation between the unobservables in the respective equations, it can be shown that under certain circumstances, estimates obtained with these kinds of econometric approaches are consistent in the presence of such errors (see, e.g., Kenkel and Terza 2001).

[27] In this case, the correlations among the unobservables in the model are given by:

$$Corr\,(U_D,U_1) = \sigma_{D1} = \frac{Cov\,(U_D,U_1)}{\sqrt{Var\,(U_D)}\sqrt{Var\,(U_1)}} = \frac{\alpha_1}{\sqrt{2}\sqrt{1+\alpha_1^2}}$$

$$Corr\,(U_D,U_0) = \sigma_{D0} = \frac{Cov(U_D,U_0)}{\sqrt{Var\,(U_D)}\sqrt{Var\,(U_0)}} = \frac{\alpha_0}{\sqrt{2}\sqrt{1+\alpha_0^2}}$$

$$Corr\,(U_0,U_1) = \sigma_{01} = \frac{Cov\,(U_0,U_1)}{\sqrt{Var\,(U_0)}\sqrt{Var\,(U_1)}} = \frac{\alpha_0\alpha_1}{\sqrt{1+\alpha_0^2}\sqrt{1+\alpha_1^2}}$$

and

$$Cov\,(U_D,\theta) = 1, Cov\,(U_1,\theta) = \alpha_1, and\ Cov\,(U_0,\theta) = \alpha_0.$$

Identification of α_0 (from $Cov\,(U_D, U_0)$) and α_1 (from $Cov(U_D, U_1)$) immediately imply identification of $\alpha_0\alpha_1 = Cov(U_0, U_1)$. This latter covariance needs neither be estimated nor normalized because it does not enter the likelihood and thus has no effect on the parameter estimates. This follows because only the bivariate distribution (D, Y_0) and (D, Y_1) is required to form the likelihood and to calculate conditional means $(Y_1 - Y_0)$ (see Aakvik et al. 2005). The joint distribution of (Y_1, Y_0) is needed to compute the distributional treatment parameters (see Auld 2005).

viewed as a solution to a missing conditioning variables problem in matching (see Aakvik et al. 2005).[28]

The likelihood function for this one-factor model integrating out θ has then the following form $L = \prod_{i=1}^{N} \int Pr\,(D_i, Y_i|X_i, Z_i, \theta)\varphi(\theta)\mathrm{d}\varphi$ where $Pr(D_i, Y_i|X_i, Z_i, \theta_i) = Pr(D_i|Z_i, \theta_i)Pr(Y_i|D_i, X_i, \theta_i)$. We estimate the parameters by maximum likelihood. Finally, in order to assess the significance of the treatment effect, we compute bootstrapped standard errors based on 500 replications.

3 Data and descriptive statistics

In our empirical analysis we look at the experience of a small developing country, Uruguay. Specifically, we use annual firm-level export data in US dollars disaggregated by product (at the 10-digit HS level) and destination country over the period 2000–2007 from the Uruguayan customs. The sum of the firms' exports almost adds up to the total merchandise exports as reported by the Central Bank of Uruguay, with the annual difference never exceeding 1.1%. Hence, our data cover virtually the whole population of Uruguayan exporters. Furthermore, along with these data, we have a list of the firms that have been assisted by URUGUAY XXI in each year, kindly provided by this entity. This list primarily includes firms that have interacted closely with the agency on a face-to-face basis. The typical cases are companies that participated in international fairs and missions, potentially including those attending to complementary training activities.[29] Thus, for instance, firms just visiting the agency's website to access public reports on foreign trade or simply requesting specific information (e.g., tariff on a given good) via phone calls or e-mails are not identified as assisted firms.[30] Given that support primarily involves a subset of actions that, at least in the short run, are more likely to lead to foreign sales (as opposed to other promotion initiatives such as, for example, the provision of generic information), estimated effects reported below should be more properly interpreted as an upper bound on the true impact of export promotion.

Table 1 presents basic aggregate export and treatment indicators. Uruguayan exports have grown almost 100% between 2000 and 2007. A large fraction of this aggregate export growth has been due to significant expansions along the intensive margin, i.e., larger average exports per country and larger average exports per product. The total number of destination countries and that of products have also increased over these years (32.8 and 13.0%, respectively), while the number of firms selling their products abroad has risen significantly, by 46.6% from 2000 to 2007. The fraction of exporters that have received support from URUGUAY XXI

[28] This random effects factor model and the matching model of Rosenbaum and Rubin (1983) are affine. If the econometrician knew θ, then the matching conditions of the latter would be satisfied and propensity score matching could be used to estimate the treatment effect on the treated (see Aakvik et al. 2005).

[29] These services are provided in a relatively customized way (see Jordana et al. 2010).

[30] Unfortunately, data on these assistances are not consistently available over the sample period.

Table 1 Aggregate export and treatment indicators

Year	Total exports	Number of countries	Number of products	Number of exporting firms	Number of exporters assisted by URUGUAY XXI
2000	2,281	134	2,541	1,424	45
2001	2,040	130	2,470	1,397	32
2002	1,855	146	2,464	1,498	19
2003	2,225	150	2,729	1,724	25
2004	2,968	158	2,687	1,878	13
2005	3,420	162	2,872	1,940	46
2006	3,986	171	2,873	1,955	22
2007	4,518	178	2,871	2,088	56

Source Own elaboration on data provided by URUGUAY XXI

Total exports are expressed in millions of US dollars. Assisted exporters are only those that have interacted closely with the agency in the year in question on a face-to-face basis

according to the criterion defined above has fluctuated around 2% over the sample period.[31]

Table 2 presents a characterization of the average Uruguayan exporter over the sample period. This representative firm has total exports around 1.7 million dollars and sells 4.4 products to 3.0 countries. The aforementioned figures are lower than those corresponding to the United States in 2000, 8.9 and 3.5, respectively (see Bernard et al. 2005). Notice that average exports and number of destination countries have increased over recent years, whereas the opposite holds for average number of products.

Table 3 reports the shares of firms that add new destination countries and new export goods over our sample period. The shares suggest that, over the sample period, 50% of Uruguayan firms start exporting to a new country. Information barriers to entry are likely to differ across countries. In particular, these barriers are

[31] To put this low coverage into perspective, the annual budget of the agency needs to be considered. This budget is relatively small. It amounted to USD 600,000. From this amount approximately USD 480,000 (80%) are devoted to trade promotion. More specifically, as indicated above, these funds are primarily allocated to activities such as participation in international fairs and complementary training and specific information services, which are more likely to result in increased firms' exports in the short run, thereby making possible for export promotion to generate significant positive effects despite the limited resources available with this purpose (see Sect. 4). As a reference, PROCOMER, Costa Rica's main export promotion organization, has an annual budget of about USD 12 million and assists more than 250 companies each year, whereas PROCHILE, the Chilean counterpart is annually endowed with USD 33 million and serve more than 2,000 firms within a year (see Jordana et al. 2010). In addition, notice that, while the sub-sample of treated firms is relatively small, the total sample is large. This implies that the pool of control observations is large, which makes our particular data set suitable to estimate the treatment effect on the treated as done here (see Frölich 2004). Further, there are no difficulties in finding firms comparable to the treated ones within the non-treated group. The classical problem of sensitivity of results associated with small sample sizes are not likely to be pronounced here (see Smith and Todd 2005b). Nevertheless, given that the estimated effect will be identified based on the potentially different export outcomes of these relatively reduced number of assisted companies and that the aforementioned problems cannot be fully ruled out, caution should be exercised when drawing conclusions from the point estimates presented in the next section.

Table 2 Average exporter

Variable	Pooled	2000	2001	2002	2003	2004	2005	2006	2007
Total exports	1,675.27	1,601.64	1,460.10	1,238.34	1,290.70	1,580.48	1,762.84	2,038.88	2,163.85
Number of countries	2.96	2.93	2.94	2.90	2.85	2.92	2.97	3.07	3.03
Number of products	4.35	4.76	4.56	4.26	4.38	4.13	4.38	4.38	4.13
Average exports per country and product	105.57	111.55	111.35	94.54	73.44	93.46	104.31	139.71	112.13
Average exports per country	272.03	307.43	271.49	207.59	202.94	241.99	259.80	341.17	325.16
Average exports per product	286.33	254.01	255.67	238.53	210.62	266.96	308.27	346.32	366.53

Source Own elaboration on data provided by URUGUAY XXI

Exports and average exports are expressed in thousands of US dollars

Table 3 Proportion of exporters entering new export markets

Export margin	No (%)	Yes (%)
New country	51	49
New OECD country	57	43
New product	41	59
New differentiated product	55	45

Source Own elaboration on data provided by URUGUAY XXI

The table reports the percentage share of Uruguayan exporters that enter new country, new OECD country, new product, and new differentiated product export markets over the sample period

expectedly higher in more sophisticated markets such as those of the OECD countries. Uruguayan data accordingly indicate that only 43% of the companies incorporate a new OECD country among the destinations over the period we focus on.

On the other hand, almost 60% of the exporting firms introduce a new export product. As with countries, trade of different goods faces obstacles of varying degrees of intensity, which are correlated with their degree of differentiation. We thus explore separately the probability of adding a new differentiated product. In doing this we use the definition of differentiated products proposed by Rauch (1999), according to which these are goods with no reference price, i.e., goods that are neither traded in organized exchanges (like homogeneous goods) nor have reference prices quoted in specialized publications (like reference-priced goods). (e.g., shoes, electrical machinery, etc.). Specifically, we follow the liberal classification because it is more stringent in typifying goods as differentiated,

which we believe is more appropriate for a developing country such as Uruguay.[32] Figures reported in Table 3 suggest that the shares of companies adding differentiated products are significantly smaller than the overall one, 45 and 59%, respectively.

The probability of adding new destinations and new products may also depend on the previous export experience of firms along the respective extensive margins. This is explicitly investigated in Table 4. There we report two transition matrices, one for countries and one for products. The values behind the main diagonal indicate that the likelihood of entering a new country or product export market in a given period varies substantially with the number of countries firms exported to and the number of goods exported in the previous period, respectively. In particular, in line with previous evidence, when changing market coverage, firms whose export transactions are initially more concentrated tend to add (or subtract) only one market, whereas those whose trade operations are initially more diversified are more likely to enter (or leave) multiple markets at the same time, but only exceptionally in more than four (see Eaton et al. 2007, 2008; Lawless 2009). This is consistent with the latter being more regularly affected by changes to trade costs and demand across a range of markets, including the less popular ones, i.e., those where a few domestic firms are present (see Lawless 2009). In the next section, we econometrically evaluate whether trade promotion activities performed by URUGUAY XXI have also contributed to shape this dimension of Uruguayan firms' export extensive margin.

4 Econometric results

In this section we evaluate the effectiveness of export promotion programs on the probabilities of entering new country and product export markets using the methodology outlined in Sect. 2. More precisely, we examine the impact of export promotion assistance by URUGUAY XXI on the probability of adding a new destination country; the probability of adding a new OECD country; the probability of adding a new export product; and the probability of adding a new differentiated export product. We first discuss the determinants of selection into trade promotion programs. Then we explain how these variables affect the export outcomes. Finally, we report and comment on the estimation results.

4.1 What determines selection into export promotion programs?

Several factors may affect selection into activities organized by URUGUAY XXI. As discussed above, this selection is in fact a joint decision of the firm and the

[32] Due to some ambiguities, Rauch (1999) proposes two alternative classifications, conservative and liberal. The former minimizes the number of commodities that are classified as either organized exchange or reference-priced and the latter maximizes this number. Combining this latter good typology with a sectoral classification that identifies as manufacturing (those HS codes that correspond to) categories 5–8 of the Standard Industrial Trade Classification (SITC) (see Hummels and Klenow 2005), we can see that, in the case of Uruguay, differentiated goods are primarily manufactured products (approximately 83.4%).

Table 4 Transitions across country-diversification patterns

Number of countries $t\backslash t-1$	1	2	3	4	5	6	7	8	9	10	>10
1	0.735	0.377	0.169	0.100	0.043	0.026	0.020	0.000	0.015	0.010	0.007
2	0.177	0.350	0.255	0.125	0.069	0.040	0.010	0.008	0.000	0.010	0.007
3	0.055	0.164	0.255	0.188	0.154	0.070	0.056	0.039	0.008	0.010	0.002
4	0.019	0.054	0.178	0.227	0.186	0.110	0.091	0.062	0.053	0.041	0.003
5	0.008	0.032	0.079	0.162	0.194	0.213	0.127	0.116	0.053	0.021	0.016
6	0.002	0.015	0.022	0.090	0.128	0.206	0.157	0.062	0.061	0.062	0.013
7	0.001	0.001	0.019	0.037	0.098	0.140	0.157	0.178	0.115	0.052	0.018
8	0.001	0.001	0.009	0.021	0.045	0.085	0.071	0.155	0.099	0.144	0.010
9	0.001	0.002	0.008	0.020	0.029	0.040	0.147	0.101	0.191	0.072	0.023
10	0.000	0.001	0.001	0.012	0.011	0.022	0.066	0.078	0.069	0.093	0.041
>10	0.001	0.001	0.003	0.012	0.029	0.026	0.061	0.140	0.267	0.381	0.860

Transitions across product-diversification patterns

Number of products $t\backslash t-1$	1	2	3	4	5	6	7	8	9	10	>10
1	0.675	0.301	0.178	0.116	0.083	0.069	0.030	0.045	0.020	0.044	0.023
2	0.187	0.365	0.253	0.145	0.116	0.044	0.052	0.039	0.013	0.029	0.014
3	0.067	0.150	0.248	0.182	0.152	0.097	0.078	0.061	0.046	0.029	0.014
4	0.027	0.086	0.125	0.222	0.140	0.126	0.091	0.067	0.066	0.036	0.024
5	0.013	0.042	0.078	0.118	0.183	0.186	0.091	0.050	0.079	0.044	0.015
6	0.007	0.022	0.040	0.068	0.090	0.142	0.156	0.134	0.105	0.058	0.027
7	0.006	0.016	0.023	0.032	0.075	0.104	0.126	0.106	0.112	0.073	0.019
8	0.005	0.005	0.018	0.025	0.041	0.060	0.078	0.095	0.125	0.058	0.041
9	0.002	0.002	0.009	0.018	0.018	0.028	0.091	0.034	0.112	0.139	0.037
10	0.001	0.005	0.003	0.020	0.028	0.041	0.039	0.084	0.059	0.073	0.045
>10	0.010	0.005	0.022	0.047	0.059	0.085	0.139	0.240	0.204	0.343	0.742

Source Own elaboration on data provided by URUGUAY XXI

The upper panel of the table reports the number of exporters which transited from exporting to a destinations in year $t-1$ to b destinations in year t, divided by the number of firms exporting to a destinations in year $t-1$. The bottom panel presents analogous figures for products

agency. Thus, the latter declaredly prioritizes small, relatively inexperienced firms (see Jordana et al. 2010). There may be also self-selection into export support. On the one hand, the aforementioned companies are those expected to require and ask for this support (see, e.g., Volpe Martincus and Carballo 2010). On the other hand, relatively larger and more experienced firms may be more likely to be aware of and to use export promotion services (see, e.g., Reid 1984; Kedia and Chhokar 1986; and Ahmed et al. 2002). We therefore include three measures of previous export experience, namely, total exports, number of countries to which the firm exports to,

and number of products exported, all lagged on year, as determinants of the probability of participating in trade promotion programs (see Ashenfelter 1978; Becker and Egger 2007). Noteworthy, as we will discuss below these export indicators are implicitly capturing productivity differences across (groups of) firms. Henceforth, we are at least partially controlling for the possibility that the agency picks "winners".

Furthermore, Uruguayan exporters can be clearly classified into firms exporting to the region, firms exporting outside the region, and firms exporting to both destinations (see Snoeck et al. 2008). Demand for assistance may vary depending on the firms' main destination countries. Distance can be considered a proxy for familiarity and thus information (see, e.g., Grossman 1998; Anderson 2000; Portes et al. 2001; Loungani et al. 2002; Guiso et al. 2006; and Huang 2007). Firms usually have more information about nearby markets than about markets that are far away because interactions for business or tourism tend to be more frequent and media coverage is likely to be better (see Portes et al. 2001). Hence, firms mainly exporting to neighboring countries may be less likely to need and accordingly request export promotion assistance. On the assistance supply side, the agency may assign different levels of priority to markets at varying distances and henceforth degrees of information incompleteness. Specifically, more distant markets, where lack of information is expectedly a more deterring obstacle, can be targeted. Alternatively, given the budget constraints faced, the trade promotion organization may focus on close countries as the costs of boosting exports in their markets are in principle lower. According to URUGUAY XXI's officials, the former prevails. To control for these geographically related factors, we include as determinant of selection the (lagged) share of MERCOSUR in firms' total exports.[33] Notice that, as MERCOSUR is the main trade arrangement Uruguay takes part of, using these shares we simultaneously account for preferential market access.

Moreover, firms selling abroad goods with different degrees of differentiation are likely to have different needs in terms of support. More specifically, firms exporting differentiated products face more severe information problems and so are more likely to resort to and also to be selected for services provided by the agency. Hence, we include the lagged share of differentiated products in the firms' total exports.

In addition, previous use of URUGUAY XXI's programs may affect current participation. For instance, firms satisfied with these programs are more likely to come back to the agency for additional assistance. Accordingly, we also control for previous treatment status by incorporating a binary variable indicating whether the firm received assistance in the previous period (see Görg et al. 2008). We also include year-fixed effects to control for macroeconomic factors affecting participation rates.

[33] MERCOSUR is a trade agreement established in 1991 whose member countries are Argentina, Brazil, Paraguay, and Uruguay. Notice that these countries, but Brazil, also share Spanish as a common language, which is an additional source of familiarity (see Rauch 1999). While Spanish is also official language in several other Latin American countries, knowledge of these markets as proxied by the relative intensity of bilateral trade exchanges is variable and on average significantly more limited. We have therefore decided to prioritize the distance criterion.

Finally, URUGUAY XXI appears to prioritize specific sectors in particular years (see Jordana et al. 2010). This sector targeting affects the probability of individual firms being selected into export promotion. We account for this possibility including the ratio of the number of exporters participating in export promotion activities to the total number of exporters in each (2-digit HS) sector averaged over the sectors in which the firm is active in international markets. The raw ratio exhibits substantial variation across sectors. Its minimum and maximum values are 0.00 and 0.47, respectively. We expect that the aforementioned time-varying variable influences the probability that an individual firm receives trade support, but not its export outcome after assistance, i.e., it affects the probability that the company firm enters new country and product export markets only through export promotion assistance. Admittedly, the variable in question may instead be seen as capturing the agency targets sectors with high export growth potential, which would make it invalid as instrument. However, as mentioned before, the firm-level lagged export outcomes should control for the possibility that URUGUAY XXI picks up best performers. To informally assess whether this is nonetheless an issue in our case, we have also estimated a model specification including the average annual growth rate of exports at the sectoral level (as defined above) over the five previous years as an additional determinant of selection into trade support programs. Comfortably, unlike the previous one, this variable turns out to be insignificant.[34] We therefore use this sector targeting indicator as our identifying exclusion restriction in the selection model. Noteworthy, this strategy is similar in spirit to the use of regional treatment intensity as an instrument for identification when evaluating active labor market policies proposed by Lechner and Frölich (2006).[35]

4.2 Observed covariates and export outcomes

We have seen in Sect. 3 that the probability of adding new countries and new products varies with the number of countries firms exported to and the number of products they exported in the previous period, respectively (see Table 4). This informally suggests that previous export experience, as measured by total exports, number of destination countries, and number of products, can be an important determinant of the ability to enter new country and product export markets.[36] Several studies present evidence supporting this relationship. Thus, Spence (2003) argues that firms that have been exposed to the entry process in various countries have acquired skills that allow them to obtain relevant and direct information about a market in an efficient way and are likely to have a proactive attitude towards exports that helps them overcome export barriers and build business relationships. In particular, firms' export diversification patterns can be viewed as indicative of

[34] The correlation between the two variables is −0.01. These results are not shown here, but are available from the authors upon request.

[35] Sianesi (2004) uses local participation rates to account for unobserved local factors that are relevant for both program-joining decisions and individuals' potential labor market performance.

[36] Volpe Martincus and Carballo (2010) examine the heterogeneous effects of export promotion programs across groups of firms with different levels of international experience. Exploring these heterogeneous effects in our setting is beyond the scope of this paper and is left for future research.

their productivity levels. Existing empirical literature suggests that most exporting firms sell to only one foreign country (see, e.g., Eaton et al. 2004; Bernard et al. 2006; Volpe Martincus and Carballo 2008). Furthermore, the number of firms serving multiple markets declines with the number of destinations (see, e.g., Eaton et al. 2004). This is precisely the case of Uruguay. Moreover, firms trading with only few countries are likely to do it with the most popular ones. Conversely, firms exporting to many countries are more likely to reach less popular destinations. These patterns can be interpreted as reflecting that firms with relatively low marginal costs can profitably trade with a larger number of foreign countries (see Eaton et al. 2007; and Eaton et al. 2008).[37] Similarly, if adding new export products requires incurring specific sunk costs, then exporting more products would be consistent with higher levels of efficiency (see Bernard et al. 2006).[38]

Destination and types of good traded may also contribute to shape export outcomes. Exigencies when exporting to well-known neighbor countries are likely to be smaller for Uruguayan firms than those faced when exporting to distant, more sophisticated developed country markets. In this latter case, firms must undergo product upgrades as well as marketing upgrades to succeed in exporting goods to these markets. Properly shaping the marketing strategy is an information-intensive activity. For instance, firms need to learn and understand the preferences of foreign consumers; the nature of competition in foreign markets; the structure of distribution networks, and the requirements, incentives and constraints of the distributors (see, e.g., Artopoulos et al. 2007). On the other hand, entry costs can also be conceivably high in developing country markets. Thus, Rauch and Watson (2003) argue that the cost of search for alternative suppliers is much higher in developing countries than in developed ones due to inferior communication and transport infrastructure. For the same reasons, costs are also likely to be high when searching for potential business partners, in general, and customers, in particular.

Differentiated goods are heterogeneous both in terms of their characteristics and their quality. This interferes with the signaling function of prices thus making it difficult to trade them in organized exchanges. In short, information problems are more critical when trading differentiated products than when trading more homogeneous goods. As stated above, this is especially important for firms from a developing country such as Uruguay, whose products, due to national reputation effects, might be perceived by buyers as less technologically advanced and of poorer quality than those from developed countries.

Hence, geographical export orientation and degree of differentiation of goods exported are also likely to account for relevant factors determining the ability of the firms to penetrate new country and products markets, in general, and OECD country and differentiated product markets, in particular. These factors are captured in our export outcome equations by the (lagged) share of MERCOSUR and that of

[37] Eaton et al. (2007, 2008) show that French firms that sell to more markets and serve less popular markets systematically sell more in France.

[38] Bernard et al. (2006) find evidence suggesting that firms' productivity is correlated positively across products, i.e., single-product firms with relatively high productivity in their product are more likely to add a new product to their mix of goods than relatively low-productivity firms producing the same initial product.

differentiated products in firms' total exports. These variables isolate the influence of preferential market access and (at least partially) sectoral specificities, respectively.[39]

Past assistance status can influence current export outcomes, too. This would be the case if participation in export promotion activities has lagged impacts. Thus, for instance, business contacts established during a trade mission in a given year may lead to sales the next year. This is controlled for by the binary variable indicating whether the firm has used trade promotion services the previous year. Finally, we also include in this case year fixed-effects to account for macroeconomic conditions that may condition individual firms' export outcomes.[40] In closing this sub-section, we should recall herein that our estimation strategy accounts for firm-specific unobserved heterogeneity (see Eqs. (5)–(7) in Sect. 2).[41]

4.3 Estimation results

Tables 5, 6, 7 and 8 present the parameters of the selection equation, the export outcome equation for non-assisted firms, and the export outcome equation for assisted firms, based on the model with unobserved heterogeneity. Specifically, for each equation the parameter values, the mean marginal effects, and respective standard errors are reported.[42] These standard errors are clustered by firms, thus

[39] As referred to in Footnote 19, differentiated products are primarily manufactures. Hence, the share of differentiated products implicitly allows discriminating between manufacturing and agricultural and mining exporters. Further, this share differs markedly across the 2-digit sectors. Detailed tables are available from the authors upon request.

[40] The empirical literature suggests that other firm-level time-varying factors (e.g., employment, age, innovation activities) may also contribute to explain firms' export performance (see, e.g., Roberts and Tybout 1997; Bernard and Jensen 2004). Unfortunately, we do not have data on these additional factors in our data set.

[41] As noticed above, the number of assisted companies is small relative to the population of exporters. Thus, one might argue that the untreated sample potentially include many firms that are not looking for adding new markets. More formally, there might be an unobserved firm-specific factor shaping the dynamics of the export extensive margin. This unobserved heterogeneity should be controlled for by our estimation procedure. Moreover, as seen before, the probability of incorporating new markets appear to be highly correlated with previous market coverage and this is explicitly accounted for in the econometric model being estimated. Further, as an additional informal check exercise in this direction, we have first constructed matched samples including only the 5 or 10 most similar non-supported firms for each supported one as identified based on their propensity scores. Second, we have estimated a non-parametric test of differences in proportions of companies in both groups that enter new markets as well as the Mantel–Hanszel test (see Aakvik 2001). Consistent with the evidence presented below, these tests clearly indicate that the proportions are significantly larger for the assisted group in all export outcome dimensions considered in this study. These results are not reported here but are available from the authors upon request.

[42] The mean marginal effects of a continuous regressor z_k in the selection equation is defined as $E_Z[\partial P(D=1|Z)/\partial z_k]$, where E_z denotes the expectation operation taken with respect to the distribution of Z, i.e., the mean marginal effect is the analytical derivative averaged over the unconditional distribution of Z. Further, the marginal effect of a binary explanatory variable is computed as $E_Z\{[P(D=1)\ |Z_{-j}, z_j=1] - [P(D=1)|Z_{-j}, z_j=0]\}$, where Z_{-j} stands for the elements of Z excluding the binary variable z_j, i.e., the marginal effect is the impact of a change from zero to one in the variable in question. Notice, finally, that the expressions for the marginal effects corresponding to the outcome equations Y_0 and Y_1 (with respect to X instead of Z) are defined analogously (see Aakvik et al. 2005; and Auld 2005).

correcting for potential serial correlation.[43] Finally, the implied assistance effect on assisted firms is shown.

The first two columns of Tables 5, 6, 7 and 8 present the estimated coefficients and the mean marginal effects of observed covariates on the probability to participate in trade promotion programs.[44] Estimation results reported therein clearly suggest that selection into these programs is far away from being random. In other words, participants differ significantly from non-participants with respect to observed characteristics. In general, firms that have traded with more countries, and accordingly have faced entry processes in more markets and had to deal with different marketing environments, thus having already accumulated important previous export experience, are more likely to be users of the export promotion services provided by URUGUAY XXI. This confirms previous findings in the literature mentioned above that more experienced firms tend to have a higher probability of being clients of trade promotion agencies (see, e.g., Reid 1984; Kedia and Chhokar 1986; and Ahmed et al. 2002). Moreover, firms that have been assisted in the past are more likely to be assisted in the current period. This might reflect a process of gradual building of work relations through repeated interactions leading to increased reciprocal trust over time. In particular, if companies evaluate positively the net benefits of their participation in these public programs, they will be more likely to use them again. Importantly, the estimated coefficient on the mean share of supported firms is positively and statistically significantly different from zero.[45] Hence, this sectoral targeting variable is a significant predictor of selection of individual companies into export promotion activities and thereby satisfies the first requirement of being a valid instrument, namely, to be correlated with the treatment decision. Estimates from single equation probits of adding new countries, new OECD countries, new products, and new differentiated products suggest that this share has no significant effect on these export outcomes after stratifying by participation status.[46] This informally indicates that the aforementioned variable also fulfills the second condition to be an appropriate instrument, i.e., not affecting the outcomes after conditioning on treatment (see Auld 2005). Finally, other variables such as (lagged) total exports as proxy for size; (lagged) product export diversification; and (lagged) geographical and product specialization patterns as measured by the shares of OECD countries and differentiated goods in firms' total

[43] We also estimate the correlations between unobservables in the selection and outcome equations: (−0.252; 0.445), (−0.088; 0.204), (0.263; 0.162) (0.141; 0.715) where the first component of the pairs is the estimated correlation between the unobservable of the selection equation and that of the export outcome equation for assisted firms and the second component is the estimated correlation between the unobservable of the selection equation and that of the export outcome equation for non-assisted firms.

[44] Note that specific estimated coefficients exhibit slight differences. This is because selection and outcome equations are jointly estimated, and so, even though all selection equations aim at explaining participation in export promotion programs of the same group of firms with the same set of covariates, this selection interacts with different outcomes.

[45] In an alternative specification of the selection equation, we have used the share of assisted firms in the main (2-digit) export sector instead of the average over all sectors in which the firm is present in international markets. Estimation results are almost identical to those reported here and are available from the authors upon request.

[46] These estimates are not shown here but are available from the authors upon request.

Table 5 Effect of assistance by URUGUAY XXI on the probability of entering a new country market

Variables	Selection		Y_0		Y_1	
	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect
Lagged total exports	0.027362	0.000924	−0.005005	−0.001994	−0.084199*	−0.019236
	(0.024374)	(0.000716)	(0.009016)	(0.003363)	(0.049597)	(0.03835)
Lagged number of countries	0.282366***	0.00953***	0.460960***	0.183478***	0.476546***	0.109125***
	(0.063297)	(0.00204)	(0.032496)	(0.011836)	(0.168446)	(0.01310)
Lagged number of products	−0.056429	−0.001902	−0.020313	−0.008073	−0.044709	−0.010238
	(0.048949)	(0.001551)	(0.020428)	(0.007874)	(0.115795)	(0.029345)
Lagged assistance	0.792450***	0.061042***	0.222813*	0.088747*	−0.043582	−0.010268
	(0.142164)	(0.017041)	(0.121712)	(0.047354)	(0.289835)	(0.071323)
Lagged share of MERCOSUR	0.023195	0.000783	−0.317555***	−0.126387***	0.504632**	0.115423**
	(0.090095)	(0.003143)	(0.038498)	(0.014205)	(0.239116)	(0.05843)
Lagged share of differentiated products	−0.106676	−0.003601	0.007720	0.00307	−0.419356*	−0.095636
	(0.087966)	(0.002793)	(0.038387)	(0.0140)	(0.222297)	(0.03246)
Sector targeting	5.482187***	0.185145***				
	(0.367385)	(0.017724)				
Assistance effect on assisted firms						0.401**
						(0.166)

Source Own elaboration on data provided by URUGUAY XXI

The table presents the parameters of the selection equation, the export outcome equation for non-assisted firms, and the export outcome equation for assisted firms, based on the latent variable, discrete choice model with unobserved heterogeneity outlined in Sect. 2. Covariates are: lagged (natural logarithm of) frims' total exports, lagged (natural logarithm of) number of countries to which frims export, lagged (natural logarithm of) number of products exported, lagged assistance status, lagged share of MERCOSUR in the firms' total exports, lagged share of differentiated products in the firms' total exports, sectoral targeting as measured by the share of assisted firms averaged over the sectors in which the firms are active exporters, and year fixed-effects (not reported). Standard errors clustered by firms are shown below these estimated parameters. The last row of the table reports the implied assistance effect on the probability of entering a new country market. In this case, standard errors are bootstrapped based on 500 replications

* Significant at the 10% level

** Significant at the 5% level

*** Significant at the 1% level

Table 6 Effect of assistance by URUGUAY XXI on the probability of entering a new OECD country market

Variables	Selection		Y_0		Y_1	
	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect
Lagged total exports	0.027571	0.000930	−0.004890	−0.001424	−0.071333	−0.026431
	(0.024407)	(0.000716)	(0.010315)	(0.002792)	(0.047578)	(0.022541)
Lagged number of countries	0.283213***	0.00956***	0.395719***	0.115387***	0.237042*	0.087624
	(0.063525)	(0.002043)	(0.032099)	(0.009081)	(0.138698)	(0.056836)
Lagged number of products	−0.057248	−0.001934	−0.075484***	−0.021812***	−0.068084	−0.025129
	(0.048911)	(0.001553)	(0.022514)	(0.006363)	(0.113028)	(0.045913)
Lagged assistance	0.790427***	0.060727***	0.267048**	0.084735**	−0.030953	−0.011424
	(0.142198)	(0.016934)	(0.115295)	(0.039342)	(0.262778)	(0.107361)
Lagged share of MERCOSUR	0.021981	0.000742	−0.362086***	−0.105241***	0.272845	0.101374
	(0.090130)	(0.003143)	(0.044247)	(0.011937)	(0.282275)	(0.104367)
Lagged share of differentiated products	−0.106109	−0.003582	−0.097768**	−0.028336**	−0.872720***	−0.323364***
	(0.088006)	(0.002793)	(0.042574)	(0.011341)	(0.250306)	(0.102343)
Sector targeting	5.476974***	0.185391***				
	(0.366450)	(0.017736)				
Assistance effect on assisted firms	0.137					
	(0.108)					

Source Own elaboration on data provided by URUGUAY XXI

The table presents the parameters of the selection equation, the export outcome equation for non-assisted firms, and the export outcome equation for assisted firms, based on the latent variable, discrete choice model with unobserved heterogeneity outlined in Sect. 2. Covariates are: lagged (natural logarithm of) total exports, lagged (natural logarithm of) number of countries firm exports to, lagged (natural logarithm of) number of products exported, lagged assistance status, lagged share of MERCOSUR in the firms' total exports, lagged share of differentiated products in the firms' total exports, sectoral targeting as measured by the share of assisted firms averaged over the sectors in which the firm is an active exporter, and year fixed-effects (not reported). Standard errors clustered by firms are shown below these estimated parameters. The last row of the table reports the implied assistance effect on the probability of entering a new OECD country market. In this case, standard errors are bootstrapped based on 500 replications

* Significant at the 10% level

** Significant at the 5% level

*** Significant at the 1% level

Table 7 Effect of assistance by URUGUAY XXI on the probability of entering a new product market

Variables	Selection		Y_0		Y_1	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Lagged total exports	0.027315	0.000921	−0.035794***	−0.014032***	−0.108935*	−0.040824*
	(0.024364)	(0.000716)	(0.008969)	(0.003314)	(0.062626)	(0.023927)
Lagged number of countries	0.283524***	0.009561***	−0.006496	−0.002542	0.272536*	0.102431*
	(0.063452)	(0.002042)	(0.046009)	(0.012736)	(0.157682)	(0.056532)
Lagged number of products	−0.056817	−0.001923	0.501369***	0.196543***	0.496264***	0.186361***
	(0.048861)	(0.001552)	(0.024151)	(0.008473)	(0.132470)	(0.066232)
Lagged assistance	0.792516***	0.061038***	−0.007555	−0.002964	0.065267	0.024724
	(0.142420)	(0.017034)	(0.210956)	(0.056336)	(0.267755)	(0.107652)
Lagged share of MERCOSUR	0.021503	0.000726	−0.002759	−0.001082	0.360907	0.135573
	(0.090052)	(0.003143)	(0.039786)	(0.014036)	(0.291202)	(0.107243)
Lagged share of differentiated products	−0.106406	−0.003591	0.155069***	0.060524***	−0.105816	−0.039637
	(0.087934)	(0.002793)	(0.041017)	(0.0140)	(0.247750)	(0.089138)
Sector targeting	5.476687***	0.185487***				
	(0.367243)	(0.017736)				
Assistance effect on assisted firms	0.113					
	(0.281)					

Source Own elaboration on data provided by URUGUAY XXI

The table presents the parameters of the selection equation, the export outcome equation for non-assisted firms, and the export outcome equation for assisted firms, based on the latent variable, discrete choice model with unobserved heterogeneity outlined in Sect. 2. Covariates are: lagged (natural logarithm of) total exports, lagged (natural logarithm of) number of countries firm exports to, lagged (natural logarithm of) number of products exported, lagged assistance status, lagged share of MERCOSUR in the firms' total exports, lagged share of differentiated products in the firms' total exports, sectoral targeting as measured by the share of assisted firms averaged over the sectors in which the firm is an active exporter, and year fixed-effects (not reported). Standard errors clustered by firms are shown below these estimated parameters. The last row of the table reports the implied assistance effect on the probability of entering a new product market. In this case, standard errors are bootstrapped based on 500 replications.

* Significant at the 10% level

** Significant at the 5% level

*** Significant at the 1% level

Table 8 Effect of assistance by URUGUAY XXI on the probability of entering a new differentiated product market

Variables	Selection		Y_0		Y_1	
	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect
Lagged total exports	0.027502	0.000928	−0.053147***	−0.020724***	−0.019773	−0.007052
	(0.024387)	(0.000716)	(0.009937)	(0.003443)	(0.063282)	(0.022310)
Lagged number of countries	0.283327***	0.009561***	0.016077	0.006261	−0.008948	−0.003203
	(0.063517)	(0.002043)	(0.031160)	(0.010941)	(0.174599)	(0.063214)
Lagged number of products	−0.057153	−0.001932	0.499553***	0.195361***	0.623703***	0.223432***
	(0.048881)	(0.001553)	(0.023446)	(0.008251)	(0.126091)	(0.079710)
Lagged assistance	0.791664***	0.060936***	−0.037812	−0.014634	0.246908	0.092314
	(0.142394)	(0.017023)	(0.109442)	(0.042834)	(0.319094)	(0.108201)
Lagged share of MERCOSUR	0.021147	0.000713	−0.031130	−0.012104	0.087139	0.031198
	(0.090043)	(0.003143)	(0.041551)	(0.014314)	(0.277482)	(0.101410)
Lagged share of differentiated products	−0.106503	−0.003594	0.720691***	0.281364***	0.518833**	0.185368*
	(0.087985)	(0.002791)	(0.041947)	(0.014236)	(0.248933)	(0.104423)
Sector targeting	5.475244***	0.185284***				
	(0.366812)	(0.017736)				
Assistance effect on assisted firms	0.382***					
	(0.095)					

Source Own elaboration on data provided by URUGUAY XXI

The table presents the parameters of the selection equation, the export outcome equation for non-assisted firms, and the export outcome equation for assisted firms, based on the latent variable, discrete choice model with unobserved heterogeneity outlined in Sect. 2. Covariates are: lagged (natural logarithm of) total exports, lagged (natural logarithm of) number of countries firm exports to, lagged (natural logarithm of) number of products exported, lagged assistance status, lagged share of MERCOSUR in the firms' total exports, lagged share of differentiated products in the firms' total exports, sectoral targeting as measured by the share of assisted firms averaged over the sectors in which the firm is an active exporter, and year fixed-effects (not reported). Standard errors clustered by firms are shown below these estimated parameters. The last row of the table reports the implied assistance effect on the probability of entering a new differentiated product market. In this case, standard errors are bootstrapped based on 500 replications

* Significant at the 10% level

** Significant at the 5% level

*** Significant at the 1% level

exports, do not seem to be significant factors in explaining selection into export promotion assistance.

Columns 3–6 of Tables 5, 6, 7 and 8 show the estimated parameters and marginal effect vectors along their respective standard errors from the export outcome regressions for non-assisted and assisted firms, respectively. The (lagged) number of destination countries is positively associated with the probability of entering a new country export market both for companies participating and non-participating in export promotion programs (see Table 5). This is consistent with our expectations. Prior experience in penetrating and operating in other countries may ease further geographical diversification. The share of neighboring countries in assisted firms' total exports has a positive effect on the probability of adding a new country. This might suggest that firms that have accumulated export experience in the region are more likely to be able to sell their goods outside the region if they are supported with trade promotion actions. The results from a similar exercise, where the outcome variable is specifically incorporating a new non-MERCOSUR country to the set of destinations instead of a country in general, indicate that this is indeed the case.[47] The opposite holds for firms that do not received assistance. In addition, the share of differentiated products in the firms' total exports is negatively related to the probability of adding a new country, in particular if that country is a developed one (see Tables 6 and 7, respectively). This can be explained in terms of Uruguay's comparative advantage patterns. Concretely, ability to enter new countries, especially OECD markets where competition is fiercer, will be stronger for firms operating in sectors where the country has a comparative advantage with respect to the rest of the world. This is clearly the case in non-differentiated agricultural and agriculture-related products. In fact, Uruguayan exports to developed countries are primarily concentrated in non-differentiated, non-manufacturing products (see, e.g., Giordano and Quevedo, 2006; Snoeck et al. 2008). Conversely, firms specialized in differentiated manufacturing goods will find it more difficult to disembark in those sophisticated markets. Furthermore, under non current participation, previous participation has a positive impact on the likelihood of reaching a new country, which could amount to lagged effects of trade support activities.[48] Moreover, firms that are not diversified in terms of products are less likely to enter new OECD countries if they do not participate in export promotion activities (see Table 6).

Using these estimates and Eq. (8), we compute the assistance effects on assisted firms and, as mentioned in Sect. 2, we assess their significance using bootstrapped standard errors based on 500 replications. The effect is positive and statistically different from zero on the probability of adding a new country. Specifically, the treatment effect on treated firms is 40.1 percentage points, i.e., this probability is 0.40 higher for firms supported by URUGUAY XXI. As stated in Sect. 3, this point estimate should be taken with caution, since it is likely to represent an upper bound of the real overall impact of trade support.

[47] These estimation results are not reported but are available from the authors upon request.

[48] In the case of assisted firms, the effect of lagged assistance may be difficult to disentangle due to persisting status.

The impact on the probability of entering a new OECD country is insignificant. Thus, export promotion assistance seems to be effective in helping firms expand their exports in the country-extensive margin by primarily favoring penetration of non-OECD country markets. In fact, the assistance effect on assisted firms is 0.412 (significant at the 5% level) when the outcome variable is the probability of incorporating a new non-OECD country.[49] Notice that within the non-OECD set we can find either countries in the region, i.e., Latin America and the Caribbean, or countries outside this region.[50] In order to determine whether there are differential effects, we have performed separate estimations for both groups of countries. Interestingly, positive significant impacts are only observed in the former case.[51] Even though search costs stemming from deficient communication and transport infrastructure are clearly high in Latin America and the Caribbean, these costs are likely to be smaller than those involved in trading with more sophisticated markets such as those of OECD countries. If this is the case, then our results would indicate that trade supporting actions seem to contribute to overcoming the non-trivial obstacles affecting entry into regional markets, but they are not effective enough to help firms cope with the more severe information problems faced when attempting to start operating in developed countries' markets.[52]

Tables 7 and 8 look at the product dimension.[53] Firms selling a larger number of products abroad are more likely to introduce new export goods, particularly new differentiated export goods, regardless their trade support status. This finding together with that on the country-margin suggests that there are gains from existing diversification in terms of further diversification along the same dimension (country or product). In the presence of country- and product-specific sunk costs, this could be the result of positive correlation of productivity across countries and products and, specifically, learning-by-doing processes across them. This is consistent with firm-level export patterns observed in several Latin American countries. In general, there are many firms that export relatively few products to many markets, many firms that export many products to relatively few markets, but only few firms, if any, that simultaneously export many products to many markets (see, e.g., Volpe Martincus and Carballo 2008).

Similarly, firms for which differentiated products account for larger shares of their external sales have a higher probability of adding new differentiated goods to their export bundles. Interestingly, companies trading with more countries are more likely to expand the set of products they sell abroad if they are assisted by

[49] Detailed results from this estimation are not reported here, but are available from the authors upon request.

[50] As mentioned above, regional markets are not explicitly targeted by URUGUAY XXI.

[51] We have used two alternative definitions of Latin America and the Caribbean, including and excluding the MERCOSUR trading partners. Estimation results obtained with these alternative definitions are very similar. These results are not reported, but are available from the authors upon request.

[52] This is probably related to the limited amount of resources available to the organization to perform such activities.

[53] As a robustness check, we have performed all estimations substituting manufacturing for differentiated products among both outcome and explanatory variables. Findings are similar to those presented here and are available from the authors upon request.

URUGUAY XXI. Hence, trade promotion may help firms use the experience they have accumulated in different country markets to diversify into new product export markets.

Using again Eq. (8), we calculate the assistance effects on assisted firms. This effect is not significant when considering adding a new product as export outcome without distinguishing according to the degree of differentiation of the products. However, the impact is positive and statistically significantly different from zero when we focus on differentiated goods. In particular, the assistance effect on assisted firms is 38.20 percentage points, i.e., the probability of introducing these goods is 0.382 higher for firms participating in trade promotion programs. This result coincides with our priors. Firms may introduce new homogeneous, reference-priced, and differentiated products. The intensity of the information problems involved varies across these products. Export promotion activities should have a stronger effect when these problems are most acute, which is precisely the case when companies attempt to start trading a new differentiated good.[54]

5 Concluding remarks

When entering new country-export or product-export markets, firms must incur sunk costs. Specifically, the decision to enter these markets is highly demanding in terms of data. Actions performed by export promotion agencies aim at helping firms obtain information, thereby reducing the investment firms have to make in this area, and ameliorating the frictions to trade across borders. In particular, since investment in collecting these needed data may be suboptimally low because of information spillovers, these actions may help counter the disincentives to search generated by potential free-riding. At least theoretically, these trade support programs should favor export diversification, one of the main goals with which these agencies have been tasked. Is this really the case? Does trade promotion assistance actually translate into new trade relationships? This paper has aimed at answering this question thus contributing to the limited literature on the impact of public programs on trade performance. In doing this, we have used information on usage of export promotion services and highly disaggregated export data for the whole population of exporters of a small developing country, Uruguay, over the period 2000–2007, to estimate a latent variable, discrete choice model, which enabled us to explicitly take into account the dichotomous nature of the decision to enter new markets while allowing for unobserved heterogeneity.

We find that trade promotion actions in Uruguay have contributed to the internationalization process of firms, along both the country and product dimensions.

[54] Álvarez et al. (2007) show that exporting firms seem to learn from other exporters. As a robustness check, we have re-estimated our models alternatively including binary explanatory variables accounting for previous export experience by other Uruguayan exporters in country, product, and country-product dimensions. Specifically, these variables take the value of one if at least another Uruguayan firm has previously exported to the same destination country, the same product, or the same product to the same destination country, respectively. Estimation results after including these additional control variables do not differ from those shown here and are available from the authors upon request.

More precisely, these actions seem to have been associated with a higher probability of incorporating new destination countries, especially within the Latin American and Caribbean region, as well as a higher probability of introducing new differentiated goods. However, they do not seem to affect the likelihood of exporting to new OECD countries or new products in general.

Acknowledgments We would like to thank URUGUAY XXI which kindly provided us with export and trade promotion assistance data for Uruguayan firms. We also wish to thank the editor, an anonymous referee, Juan Blyde, Mauricio Mesquita Moreira, and Matthew Shearer for valuable comments and suggestions. We owe gratitude to Mariana Sobral de Elia and Georgeta Dragoiu for competent editing assistance. The views and interpretation in this document are strictly those of the authors and should not be attributed to the Inter-American Development Bank, its executive directors, its member countries, or URUGUAY XXI. Other usual disclaimers also apply.

References

Aakvik, A. (2001). Bounding a matching estimator: The case of a Norwegian training program. *Oxford Review of Economics and Statistics, 63*(1), 115–143.

Aakvik, A., Holmas, T., & Kjerstad, E. (2003). A low-key social insurance reform-effects of multidisciplinary outpatient treatment for back pain patients in Norway. *Journal of Health Economics, 22*(5), 747–762.

Aakvik, A., Heckman, J., & Vytlacil, E. (2005). Estimating treatment effects for discrete outcomes when responses to treatment vary: An application to Norwegian vocational rehabilitation programs. *Journal of Econometrics, 125*(1–2), 15–51.

Abadie, A. (2005). Semiparametric difference-in-differences estimators. *Review of Economic Studies, 72*(1), 1–19.

Ahmed, Z., Mohamed, O., Johnson, J., & Meng, L. (2002). Export promotion programs of Malaysian firms: International marketing perspective. *Journal of Business Research, 55*(10), 831–843.

Aitken, B., Hanson, G., & Harrison, A. (1997). Spillovers, foreign investment, and export behavior. *Journal of International Economics, 43*(1–2), 103–132.

Álvarez, R. (2004). Sources of export success in small- and medium-sized enterprises: The impact of public programs. *International Business Review, 13*(3), 383–400.

Álvarez, R., Faruq, H., & López, R. (2007). *New products in export markets: Learning from experience and learning from others*. Mimeo: Indiana University.

Anderson, J. (2000). Why do countries trade (so little)? *Pacific Economic Review, 5*, 115–134.

Andrén, D., & Andrén, T. (2002). *Assessing the employment effects of labor market training programs in Sweden*. Mimeo: Goeteborg University.

Angrist, J., & Krueger, A. (1999). Empirical strategies in labor economics. In O. Ashenfelter & D. Card (Eds.), *Handbook of Labor Economics*. Amsterdam: Elsevier.

Artopoulos, A., Friel, D., & Hallak, J. (2007). Challenges of exporting differentiated products to developed countries: The case of SME-dominated sectors in a semi-industrialized country. Paper prepared in the framework of the project "The emergence of new successful export activities in Latin America", Inter-American Development Bank.

Ashenfelter, O. (1978). Estimating the effect of training programs on earnings. *Review of Economics and Statistics, 60*(1), 47–57.

Athey, S., & Imbens, G. (2006). Identification and inference in nonlinear difference-in-differences models. *Econometrica, 74*(2), 431–497.

Auld, C. (2005). Causal effect of early initiation on adolescent smoking patterns. *Canadian Journal of Economics, 38*(3), 709–734.

Barrios, S., Görg, H., & Strobl, E. (2003). Exporting firms' export behaviour: R&D, spillovers, and destination market. *Oxford Bulletin of Economics and Statistics, 65*(4), 475–496.

Becker, S., & Egger, P. (2007). *Endogenous product versus process innovation and a firm's propensity to export*. Mimeo: Ludwig-Maximilian-Universität München.

Bernard, A., & Jensen, B. (2002). The deaths of manufacturing plants (*NBER Working Paper 9026*). Cambridge, MA.
Bernard, A., & Jensen, B. (2004). Why some firms export? *Review of Economics and Statistics, 86*(2), 561–569.
Bernard, A., Jensen, B., & Schott, P. (2005). Importers, exporters, and multinationals: A portrait of firms in the US that trade goods (*NBER Working Paper 11404*). Cambridge, MA.
Bernard, A., Redding, S., & Schott, P. (2006). Multi-product firms and product switching. (*NBER Working Paper 12293*). Cambridge, MA.
Blundell, R., & Costa Dias, M. (2002). Alternative approaches to evaluation in empirical microeconomics (*CEMMAP Working Paper CWP10/02*). Institute for Fiscal Studies, London.
Caliendo, M., & Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys, 22*(1), 31–72.
Caminal, R., & Vives, X. (1996). Why market shares matter: An information-based theory. *Rand Journal of Economics, 27*(2), 221–239.
Chiang, S., & Masson, R. (1988). Domestic industrial structure and export quality. *International Economic Review, 29*(2), 261–270.
Coelli, M., Green, D., & Warburton, W. (2007). Breaking the cycle? The effect of education on welfare receipt among children of welfare recipients. *Journal of Public Economics, 91*(7–8), 1369–1398.
Cox, D. (1958). *The planning of experiments*. New York: Wiley.
Eaton, J., Kortum, S., & Kramarz, F. (2004). Dissecting trade: Firms, industries, and export destinations. *American Economic Review, 94*(2), 150–154.
Eaton, J., Eslava, M., Kugler, M., & Tybout, J. (2007). Export dynamics in Colombia: Firm-level evidence (*NBER Working Paper 13531*). Cambridge, MA.
Eaton, J., Kortum, S., & Kramarz, F. (2008). *An anatomy of international trade: Evidence from French firms*. Mimeo: New York University.
Fisher, R. (1935). *Design of Experiments*. New York: Hafner.
Frölich, M. (2004). Finite-sample properties of propensity score matching and weighting estimators. *Review of Economics and Statistics, 86*(1), 77–90.
Giordano, P., & Quevedo, F. (2006). Apertura e inserción International en la estrategia de desarrollo de Uruguay. Documento de Divulgación, INTAL-ITD, Inter-American Development Bank.
Görg, H., Henry, M., & Strobl, E. (2008). Grant support and exporting activity. *Review of Economics and Statistics, 90*(1), 168–174.
Graversen, B., & Jensen, P. (2006). A reappraisal of the virtues of private sector employment programmes (*IZA Discussion Paper 2230*). Institute for the Study of Labor, Bonn.
Greenaway, D., Sousa, N., & Wakelin, K. (2004). Do domestic firms learn to export from multinationals? *European Journal of Political Economy, 20*(4), 1027–1043.
Grossman, G. (1998). Comments on Alan V. Deardorff, Determinants of bilateral trade: Does gravity work in a neoclassical world? In J. Frankel (Ed.), *The regionalization of the world economy*. Chicago: University of Chicago for NBER.
Guiso, L., Sapienza, P., & Zingales, L. (2006). Does culture affect economic outcome? *Journal of Economic Perspectives, 20*(2), 23–48.
Han, C., & Terpstra, V. (1988). Country-of-origin effect for uni-national and bi-national products. *Journal of International Business Studies, 19*(2), 235–255.
Heckman, J. (1981). Heterogeneity and state dependence. In S. Rosen (Ed.), *Studies on labor markets*. Chicago: The University of Chicago Press.
Heckman, J. (1997). Instrumental variables: A study of implicit behavioral assumptions used in making program evaluation. *Journal of Human Resources, 32*(3), 441–462.
Heckman, J., & Robb, R. (1985). Alternative methods for evaluating the impact of interventions. In J. Heckman & B. Singer (Eds.), *Longitudinal analysis of labor market data*. New York: Wiley.
Heckman, J., & Vytlacil, E. (1999). Local instrumental variables and latent variable models for identifying and bounding treatment effects. *Proceedings of the National Academy of Science, 96*(8), 4730–4734.
Heckman, J., & Vytlacil, E. (2005). Econometric evaluations of social programs. In J. Heckman & E. Leamer (Eds.), *Handbook of Econometrics, 5*. Amsterdam: North-Holland.
Heckman, J., Ichimura, H., & Todd, P. (1997). Matching as an econometric evaluation estimator: Evidence from evaluating a job training programme. *Review of Economic Studies, 65*(2), 261–294.
Heckman, J., Ichimura, H., Smith, J., & Todd, P. (1998). Characterizing selection bias using experimental data. *Econometrica, 66*(5), 1017–1098.

Heckman, J., LaLonde, R., and Smith, J. (1999). The economics and econometrics of active labor market programs. In O. Ashenfelter, & D. Card (Eds.), *Handbook of Labor Economics*. Amsterdam: Elsevier, 1, 3, 31, 1865-2097.

Hirsch, S., & Lev, B. (1971). Sales stabilization through export diversification. *Review of Economics and Statistics, 53*(3), 270–277.

Holland, P. (1986). Statistics and causal inference. *Journal of the American Statistical Association, 81*(396), 945–960.

Huang, R. (2007). Distance and Trade: Disentangling unfamiliarity effect and transport cost effects. *European Economic Review, 51*(1), 161–181.

Hudson, J., & Jones, P. (2003). International trade in "quality goods": Signalling problems for developing countries. *Journal of International Development, 15*(8), 999–1013.

Hummels, D., & Klenow, P. (2005). The variety and quality of a nation's exports. *American Economic Review, 95*(3), 704–723.

Jaffe, A. (2002). Building program evaluation into the design of public research support programs. *Oxford Review of Economic Policy, 18*(1), 22–34.

Jordana, J., Volpe Martincus, C., and Gallo, A. (2010). Latin American and Caribbean export promotion agencies: An institutional portrait (*IDB Working Paper*).

Kedia, B., & Chhokar, J. (1986). An empirical investigation of export promotion programs. *Columbia Journal of World Business, 21*(4), 13–20.

Kenkel, D., & Terza, J. (2001). The effect of physician advice on alcohol consumption: Count regression with an endogenous treatment effect. *Journal of Applied Econometrics, 16*(2), 165–184.

Klette, T., Moen, J., & Griliches, Z. (2000). Do subsidies to commercial R&D reduce market failures? Microeconomic evaluation studies. *Research Policy, 29*(4–5), 471–495.

Lawless, M. (2009). Firm dynamics and the geography of trade. *Journal of International Economics, 77*(2), 245–254.

Lechner, M., & Frölich, M. (2006). Exploiting regional treatment intensity for the evaluation of labour market policies (*CEPR Discussion Paper 5728*). London.

Lee, M. (2005). *Micro-econometrics for policy, program, and treatment effects*. Oxford: Oxford University Press.

Loungani, P., Mody, A., & Razin, A. (2002). The global disconnect: The role of transactional distance and scale economies in the gravity equation. *Scottish Journal of Political Economy, 49*(5), 526–543.

Melitz, M. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica, 71*(6), 1695–1725.

Melitz, M., & Ottaviano, G. I. P. (2008). Market size, trade, and productivity. *Review of Economic Studies, 75*(1), 295–316.

Neyman, J. (1923). Statistical problems in agricultural experiments. *Journal of the Royal Statistical Society, 2*, 2.

Poirier, D. (1980). Partial observability in bivariate probit models. *Journal of Econometrics, 12*(2), 209–217.

Portes, R., Rey, H., & Oh, Y. (2001). Information and capital flows: The determinants of transactions in financial assets. *European Economic Review, 45*(4–6), 783–796.

Quandt, R. (1972). Methods for estimating switching regressions. *Journal of the American Statistical Association, 67*(338), 306–310.

Rangan, S., and Lawrence, R. (1999). Search and deliberation in international exchange: Learning from international trade about lags, distance effects, and home bias (*NBER Working Paper 7012.*).

Rauch, J. (1996). Trade and search: Social capital, Sogo Shosha, and spillovers (*NBER Working Paper 5618*). Cambridge, MA.

Rauch, J. (1999). Networks versus markets in international trade. *Journal of International Economics, 48*(1), 7–35.

Rauch, J., & Casella, A. (2003). Overcoming informational barriers to international resource allocation: Prices and ties. *Economic Journal, 113*(484), 21–42.

Rauch, J., & Trindade, V. (2002). Ethnic Chinese networks in international trade. *Review of Economics and Statistics, 84*(1), 116–130.

Rauch, J., & Watson, J. (2003). Starting small in an unfamiliar environment. *International Journal of Industrial Organization, 21*(7), 1021–1042.

Reid, S. (1984). Information acquisition and export entry decisions in small firms. *Journal of Business Research, 12*(2), 141–157.

Roberts, M., & Tybout, J. (1997). The decision to export in Colombia: An empirical model of entry with sunk costs. *American Economic Review, 87*(4), 545–564.

Rosenbaum, P., & Rubin, D. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika, 70*(1), 41–55.

Roy, A. (1951). Some thoughts on the distribution of earnings. *Oxford Economic Papers, 3*(2), 135–146.

Rubin, D. (1978). Bayesian inference for causal effects: The role of randomization. *Annals of Statistics, 6*(1), 34–58.

Schmeiser, K. (2009). *Learning to export: Export growth and the destination decision of firms*. Mimeo: University of Minnesota.

Sianesi, B. (2004). An evaluation of the active labour programme in Sweden. *Review of Economics and Statistics, 86*(1), 133–155.

Smith, J., & Todd, P. (2005a). Does matching overcome Lalonde's critique of nonexperimental estimators? *Journal of Econometrics, 125*(1–2), 305–353.

Smith, J., & Todd, P. (2005b). Rejoinder. *Journal of Econometrics, 125*(1–2), 355–364.

Snoeck, M., Casacuberta, C., Doming, R., Pastori, H., and Pittaluga, L. (2008). The emergence of new successful export activities in Uruguay (*Research Network Working Paper 548*). Inter-American Development Bank, Washington, DC.

Spence, M. (2003). Evaluating export promotion programmes: UK overseas trade missions and export performance. *Small Business Economics, 20*(1), 83–103.

Vaillant, M., & Bittencourt, G. (2001). Oferta exportable en el Uruguay. Empresas: ¿Quiénes venden? Estudio preparado para Uruguay XXI.

Volpe Martincus, C., & Carballo, J. (2008). Is export promotion effective in developing countries? Firm-level evidence on the intensive and extensive margins of exports. *Journal of International Economics, 76*(1), 89–106.

Volpe Martincus, C., & Carballo, J. (2010). Beyond the average effects: The distributional impacts of export promotion programs in developing countries. *Journal of Development Economics, 92*(2), 201–214.