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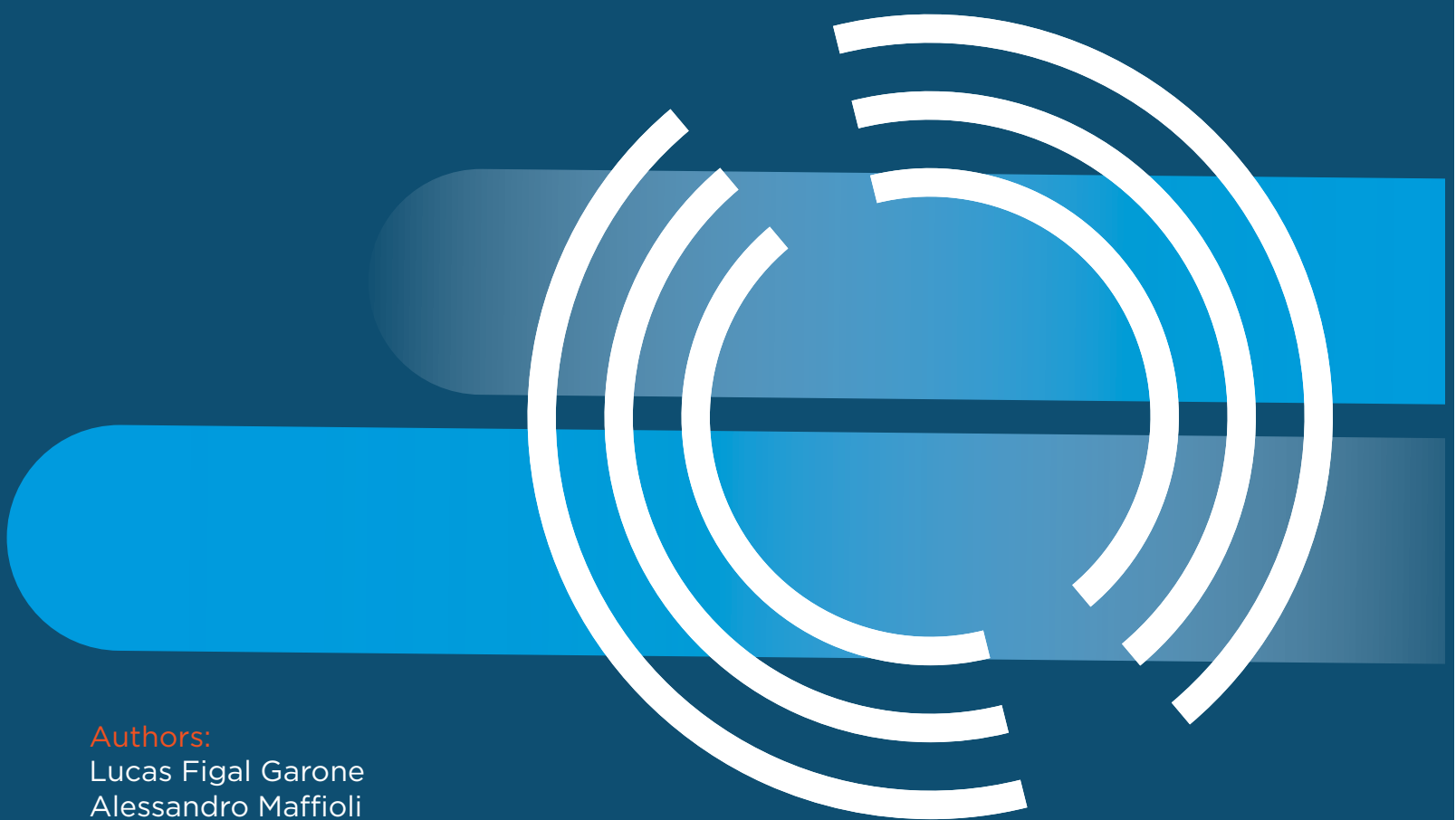
# Supporting SMEs to Export

## The Importance of the Dynamics and Sequence of the Effects



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# Supporting SMEs to Export: The Importance of the Dynamics and Sequence of the Effects

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**Abstract**

This paper presents evidence of the dynamics and sequence of the causal effects of a small and medium-sized enterprise (SME) export support program in a developing country. Using firm-level administrative data of the universe of formal firms in Argentina from 1998 to 2013 and lagged dependent variable models, we assess the impact of Credicoop Bank's *Diverpymex* Program on SME export, growth, and productivity measures. The analysis of the dynamics of these effects allows exploring some of the mechanisms through which the program might affect firm performance. Our results show that the program has positive impacts on participant firms' export behavior, growth, and productivity. In particular, we find that the effect on the likelihood of exporting is higher in the short term, which confirms the importance of entry costs to foreign markets. The impact on the value of total exports of firms that already exported appears in the medium term and is likely related to the solution of more specific market and product information barriers to growth in export markets. Finally, we find that the program increases firm productivity in the long term, indicating that efficiency gains due to learning-by-exporting occurred.

**JEL Classification:** C23; D22; F14; L25; O24.
**Keywords:** Export support, SMEs, impact evaluation, panel data, Argentina.

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# 1 Introduction

Most national and local governments around the world have implemented trade support initiatives. Mainly offered by export promotion agencies, these programs can be defined as a set of activities aimed at helping firms to overcome internationalization obstacles (Van Biesebroeck *et al.*, 2015). Typically, the growing international trade literature has focused on assessing the impact of these export promotion programs (EPPs) on various margins of export performance, i.e., whether the program works[1]. However, the traditional scope of an impact evaluation of an EPP could be expanded to address issues that go beyond the simple "what works" question, providing a much larger array of inputs to the policy-making process. This paper aims to fill this gap in the literature by exploring three key questions in the assessment of EPPs: (i) What are the program's effects on firms' exports, growth, and productivity measures?; (ii) Do these effects vary over time?; and (iii) What is the actual sequence of effects?

Some important effects of EPPs may manifest themselves over a relatively long period[2]. That is not the only reason, however, for which timing should be carefully considered. A detailed analysis of the dynamics and sequencing of effects can shed light on some key features of the evaluated instruments. For instance, it could provide evidence of the mechanisms through which EPPs affect firm performance. In the short term, the main channel may be the entry and survival margins, highlighting the role of fixed costs of entry in exporting activities. In the medium term, the expansion of exports (intensive margin) may be more related to the solution of market and product information barriers that firms need to overcome to increase penetration or access more sophisticated new foreign markets. In the long term, efficiency gains may materialize from the knowledge acquired by increasing presence in foreign markets.

This paper analyses the effectiveness of EPPs by focusing on the case of the *Diverpymex* program implemented by the Credicoop Bank Foundation in Argentina from 2002 to 2013. The program provides technical assistance to help small- and medium-sized enterprises (SMEs) to export. By assigning a consultant that supports and accompanies the participant firm through the different stages of the export process, this program aims to help firms enter new foreign markets or increase their exports.

To answer the aforementioned questions, we use a comprehensive dataset covering the universe of formal Argentinian firms. The dataset contains firm-level information from 1998 to 2013 on firm age, location, industry, type of corporation, whether the firm is multinational, number of employees, average wage, export behaviour, whether the firm hires high-skilled workers, and two decomposition terms from the average wage. To estimate the causal effects of the *Diverpymex* program, our identification

[1] Analyzing the intensive margin of trade – i.e. the impact on the level of exports, and product and destination diversification – has been the most common way to assess EPPs. Studying the effect at the extensive margin – i.e. whether support helps firms becoming exporters – has been more challenging since it requires information on the universe of potential exporters (Van Biesebroeck *et al.*, 2015).

[2] For instance, (Crespi *et al.*, 2015) show evidence that it can take between three and five years to fully observe the effect of production development policies on the productivity of firms.

strategy adopts a lagged dependent variable model to take full advantage of the length of the longitudinal dataset and deal with potential endogeneity and selectivity issues. In particular, this method allows us to compare firms with similar evolution in the outcome of interest before they receive the program support.

Our most important findings are the following. First, our results confirm the hypothesis that, in the short term, the participation in the *Diverpymex* program is linked to export growth through the extensive rather than the intensive margin. This finding is expected since the program seems to be mainly correcting for market failures associated with information externalities related to entry costs to export markets. Specifically, we find that, relative to the control group, the likelihood of exporting increased by an average of five percentage points (pp) per year, most of which is concentrated in the first two years after treatment (13 pp) and decreasing but maintained after that. When decomposing the likelihood of exporting between the probability of entering and the probability of surviving in export markets, we find that participant firms are more likely to enter world markets only in the short term (8 pp). However, the program increases the probability of survival in export markets in the whole period after treatment but the effect decreases over time (starting at 5 pp). Regarding the volume of exports, the effect was positive and statistically significant only between the third and fifth year after treatment (medium term) reaching the value of 19 percent. This finding is related to the solution of more specific market and product information barriers to growth in export markets.

Second, by increasing foreign sales, the *Diverpymex* program enhances firms' growth and efficiency. Results reflect an increase in participant firms' growth proxied by employment and in the probability of survival. These effects seem to be concentrated in the short term (6 and 2 percent, respectively) and decreasing but maintained over time. Finally, we find that the program increases the average wage only in the long term by 1.8 percent, which is to be expected if productivity effects take time to materialize. This increase in wages is mainly due to an increase in the wage of workers who continue in the firms rather than those new skilled workers hired as a result of the program.

This paper contributes to the existing literature in three main ways. First, to the best of our knowledge, this is the first paper that examines the dynamics and sequence of the causal effects of an EPP on firms' export, growth, and productivity measures. Second, our analysis allows us to shed light on the mechanisms through which this type of program may affect firm performance. Finally, we produce new evidence on the assessment of EPPs that provide technical assistance to help SMEs in developing countries to export. Indeed, this study expands the current literature, which has been mainly focused on developed countries, analysis of the intensive margins of trade, and other types of instruments provided by export promotion agencies, such as the coordination and co-financing of firms' participation in international trade missions and trade fairs.

The rest of this study is organized as follows. Section 2 discusses the rationale behind and evidence on EPPs and describes the background of the *Diverpymex* program. Section 3 describes the dataset used for the estimations. Section 4 presents the empiri-

cal strategy. Section 5 reports the results, and Section 6 presents the robustness checks to validate the findings. Finally, Section 7 concludes.

# 2 Background

## 2.1 The Rationale behind Export Promotion Programs

Strong and consolidated evidence has shown that the growth of Latin America and Caribbean (LAC) economies lagged behind other more advanced economies because of a productivity gap (Cole *et al.*, 2005; Pages, 2010). Improving productivity is therefore key for LAC economies and the expansion of international trade can help through several channels.

First, a large part of the differences in productivity among countries is due to misallocation of resources (Hsieh & Klenow, 2009) and international trade has been shown to effectively reallocate resources from less productive firms and sectors to the ones that are more productive (Bernard & Jensen, 1999; Aw *et al.*, 2000; Bernard *et al.*, 2003; Melitz, 2003; Bernard & Jensen, 2004; Melitz & Redding, 2015). Second, productivity gains also come from learning-by-exporting (Clerides *et al.*, 1998; De Loecker, 2007, 2013; Atkin *et al.*, 2014) and trade-induced innovation. While the former is related to knowledge transfer, the latter is related to incentives and the size of the market. In fact, firms that aim to export need to become more productive and larger markets allow them to afford the upfront cost of productivity-enhancing products and processes.[3] Third, trade affects the incentives for investment in activities that foster technological diffusion and cause international knowledge spillovers as the knowledge acquired in one country can be used to improve production technologies in other countries (Sampson, 2014; Perla *et al.*, 2015).

It is understandable then why governments put in place export promotion policies and programs. However, the existence of some kind of market or coordination failures that limit export activity is necessary to justify public intervention in this area.

Firms face multiple obstacles when they try to enter to export markets (Leonidou, 2004). They must contact customers abroad, identify business opportunities in foreign markets, and learn about distribution channels for their products and bureaucratic procedures that generate information that could be used by other firms without additional cost. When it is difficult to exclude other firms from this information, they can imitate pioneers' behaviour and make profits without incurring the same costs (Blyde *et al.*, 2014). This scenario generates a free-riding problem in the search of foreign buyers because it reveals valuable information that may be used by other firms. Therefore, since private returns for pioneers are lower than social returns, pure market-incentives will lead to suboptimal investment in the exploration of foreign markets. The existence of information externalities may negatively affect the internationalization process of

[3] For more discussion on this topic, see Grossman & Helpman (1991), Helpman (2004), Verhoogen (2008), Lileeva & Trefler (2010), Aw *et al.* (2011), Bustos (2011), and Melitz & Trefler (2012).

firms and provides a key argument to justify public intervention in the area of export promotion.

In addition, SMEs usually face constraints in different key business areas, mainly due to market and coordination failures, that may limit their internationalization, particularly in developing regions. These areas are related to SMEs' access to finance, intensity of innovation, human capital, and organizational form.

SMEs face a limited access to credit due to information asymmetry problems. That is, financial institutions usually do not have enough information to evaluate and monitor their projects, which may create moral hazard problems. Lack of adequate financial products also hamper access to finance for SMEs due to scale problems related to non-convexities, indivisibilities, and absence of long-term finance.[4] Finally, SMEs usually do not have (enough) collateral, which is a limiting factor since, in their case, access to credit is more based on collateral than on expected returns (Ibarrarán *et al.*, 2009).

In terms of innovation, the nature of knowledge as a public good, information asymmetries, and coordination failures disincentive investments in R&D, and therefore, hamper SMEs' (local and international) competitiveness (Casaburi *et al.*, 2016). In addition, SMEs usually lack of capabilities – i.e., presence of qualified and experienced staff – to identify and select export markets, design and implement successful marketing strategies abroad, obtain valid and reliable information on these markets, and develop contracts abroad. They have poor knowledge of exportable products and little understanding of the factors underlying international competitiveness (e.g., packaging, quality norms and standards). They also face other barriers specific to export activities, such as language, paperwork, invoicing, and sales management. Finally, SMEs typically present poor corporate governance, management and business structures, considering that in most of the cases the SME is a firm with traditional personalized organizational hierarchies tied to a single owner or family. All these factors severely limit SMEs' export development and competitiveness (Crespi *et al.*, 2014).

For these reasons, almost all developed and most developing countries have strengthened their commitment to support SMEs' export development. National governments have created their own export promotion agencies (EPAs) to provide a variety of services to help firms to overcome internationalization obstacles and enhance export activities. EPA support usually includes services such as training on export procedures, market and technical information provision, coordination and support to participate in international fairs and shows, and sponsor consortia, among others[5].

There is a growing body of literature that assesses the impact of EPP on export performance at the firm level. Most of the studies combine information on trade transactions with administrative records of beneficiaries of EPAs, using matching difference-in-difference or propensity score methods to construct a counterfactual on what the trajectory of beneficiary firms would be in the absence of treatment. Almost all studies show that the export growth rate is higher for firms that receive assistance from these

[4] A common financial product for a large firm may be nonviable for SMEs.

[5] See Jordana *et al.* (2010) for a detailed description of the Latin America's EPAs and the services they provide.

kinds of programs than those that do not, indicating that on average the assistance produces an increase in the volume of exports (Görg *et al.*, 2008; Volpe M. & Carballo, 2010c; Hayakawa *et al.*, 2014; Van Biesebroeck *et al.*, 2015). Although an understanding of the average effects of EPP is relevant, it is also important to learn about the mechanisms underlying its effects. Information problems may vary according to firm and product characteristics and the kind of trade to be promoted. Volpe M. & Carballo (2008, 2012) show export growth of beneficiary firms implies an increase in both number of destination countries and number of products. Also, Volpe M. & Carballo (2010a,b) find an increase in the number of countries to which differentiated products are exported, but find no effect related to homogenous goods. Moreover, Volpe M. & Carballo (2010a) and Volpe M. *et al.* (2012) show that small firms are the main beneficiaries of such policies.

This evidence confirms what the theory predicts. Because small firms have more information problems, correcting them produces more benefits. In terms of number of destinations and products, it is expected that those firms that already successfully export to a particular market do not need help to improve their performance in that market; rather, they need help to access a new market[6]. Finally, firms that export differentiated goods, which require more information about their characteristics, should benefit the most from these kinds of programs.

Despite increasing evidence of the effects of EPPs on firms' export performance, there is not much evidence of the effects of such programs on other firm measures. Because the main aim of these programs is to boost economic growth, it is important to know how they affect firm productivity. Atkin *et al.* (2014) conduct a randomized control trial that generates an exogenous variation in the access to foreign markets in Egypt and find that both productivity and product quality increase in those firms that receive the assistance. Munch & Schaur (2015) analyze an EPP provided by the government of Denmark and find that treated firms significantly increased value-added, employment, and value-added per employee (as a proxy for productivity). Finally, while most studies focus their attention on the short term, evidence of the long term and the dynamics of the effects is very scarce. Cadot *et al.* (2015) found that, after three years of completing the program, beneficiary firms are no different from those of the control group, despite the fact that initially they perceive higher export levels and greater diversification.

## 2.2 The *Diverpymex* Program and Expected Impact

In the early 2000s the Argentine government recognized the importance of developing SME support programs to promote export activity and diversify markets. SMEs faced major constraints to develop their export potential. In this context, in 2002 the Credicoop Bank Foundation, with the support of the Multilateral Investment Fund

[6] Van Biesebroeck *et al.* (2015) studied a Canadian export program and found an exception to this hypothesis in the form of a greater effect on the intensive margin of trade.

(Inter-American Development Bank Group), introduced the *Diverpymex* program[7]. This program aims to enhance the international competitive positioning of SMEs by providing technical assistance. The program seeks to help non-exporters SMEs to successfully enter into foreign markets and exporting SMEs to increase their exports (both through consolidation and/or market diversification). The *Diverpymex* program is a resource for firms to access information, gain knowledge, and accumulate experience to manage the complexities of exporting. As a result, SMEs will have the ability to enter into export markets in a strategic, systematic, and long-term fashion.

The *Diverpymex* program follows a replicable export-markets diversification methodology for SMEs, adapted to the local context[8]. Initially, it promotes and disseminates the program to encourage SMEs to participate, through exhibitions, leaflet and magazine, and Internet, radio, and television advertisements. Firms that express interest in participating in the program provide basic information to enter into the selection process. The program consists of three stages that take into account the phases of the export development process: (i) assessment of export readiness, focused on the export potential or current international position of the firm; (ii) elaboration of an export-markets diversification plan (EMDP); and (iii) execution of the plan (see Figure 1 in Annex B.1). Participant SMEs are assigned a consultant who guides and support them through the program.

The first stage assesses the firm's export readiness i.e. its ability and competencies to operate in foreign markets. A program coordinator and a consultant visit each participant SME to gather information about its organization, operations, and product offerings. They also hold meetings with managers to assess their entrepreneurial traits in terms of export-related activities and gauge their commitment to incorporate a college intern (in the absence of skilled staff) and to make the required investments to develop their export profile. Once this information has been collected, an internal meeting is held at the Credicoop Bank Foundation during which a committee evaluates the firm's export potential. If the firm receives a positive evaluation, it begins receiving program support.

In the second stage, the firm develops an EMDP with technical assistance provided by the consultant. The firm researches and chooses potential foreign markets, contacts potential clients, and decides which products are likely to perform best in those markets. It also establishes objectives and budget, plans how exports will be managed, and analyses financial, facilities, and staffing requirements, among other aspects of the export process. The hiring of an intern is usually suggested at this stage given the need for a market researcher.

The third stage consists of implementation of the plan. The firm undertakes actions in target foreign markets. Coaching, training and technical assistance activities are

[7] The Credicoop Bank Foundation is a non-profit institution established in early 1999, with the aim, among other things, of helping to enhance the competitiveness of SMEs through training and technical assistance.

[8] This methodology was developed by the Consorcio de Promoción Comercial de Catalunya (COPCA) under an agreement between the MIF-IDB and Credicoop Bank Foundation.

carried out on specific topics that arise during the market penetration process, such as delivery and insurance, quality and environmental standards, design and packaging, marketing channels, tax legislation, and others.

Based on the characteristics of the *Diverpymex* program just described, its underlying theory of change, and the existing evidence on the impacts of EPP discussed in the previous subsection, the following are the main hypotheses about the program effects:

**Hypothesis 1:** The program mitigates the information externality problem and improves firms' capabilities. This hypothesis would be confirmed by a positive and significant impact on the probability of exporting, entering, and surviving in export markets (extensive margin). We expect these effects to occur mainly in the short term, that is, during the first few years after treatment. The program also helps firms that already exported to increase their exports or export to new markets. This would be confirmed by a positive and significant impact on the value of exports for exporting firms (intensive margin). This effect probably occurs in the medium term since it is associated with the resolution of more specific market and product information barriers.

**Hypothesis 2:** By increasing the presence in foreign markets, the *Diverpymex* program enhances firm competitiveness and efficiency. This would be first confirmed by a positive and significant impact on the firm's growth and survival. We expect this effect to occur mainly in the short and medium term, accompanying the improvements in its export behaviour. This hypothesis would be also confirmed by a positive and significant impact on the firm's productivity. However, since productivity effects may take time to materialize, we expect this effect to appear in the long term.

# 3 Data and Relevant Outcomes

We combine data from three sources. First, we use social security data with the population of formal firms in Argentina. This data source is a two-dimensional panel dataset by firm and year between 1998 and 2013. Second, we match this database with a panel dataset on exports by firm and year between 1998 and 2013. Third, we combine the former two data sources with the administrative records of the *Diverpymex* program.

The firm-exports dataset was constructed by the Observatory of Employment and Entrepreneurial Dynamics (OEDE) at Ministry of Labor, Employment, and Social Security in Argentina[9]. It includes data from administrative records of two public entities: the National Administration of Social Security (ANSES), and the General Customs Bureau (DGA) of the Federal Administration of Taxes (AFIP). These sources were produced by different organizations, at different times, and with different objectives. The data were consolidated taking this heterogeneity into account. The dataset includes all firms with formal employees in Argentina after 1998. It covers the primary, manu-

[9] Given the confidentiality of the data, the estimations were conducted following the Ministry of Labor, Employment, and Social Security's microdata policy, which implies working under the supervision of its staff and with blinded access to sensible information.

facturing, and services sectors, and contains firm-level information about age, location, industry, type of corporation, whether a firm is multinational, number of employees, average wages, value of exports, whether the firm hires skilled workers, and two terms from a decomposition of the average wage. The administrative records of the *Diverpymex* program provide information about the firms that received support between 2002 and 2013 (see the data appendix A for details).

Our final 1998-2013 dataset allows us to construct several measures of the outcomes of interest. In terms of international trade, the data allow us to compute the probability of exporting (extensive margin) and export volume for exporting firms (intensive margin). Furthermore, we decompose the probability of exporting between the probability of entering into export markets (= 1 if exports $> 0$ in $t$ and exports $= 0$ in $t-1$) and surviving in export markets (= 1 if exports $> 0$ in $t$ and exports $> 0$ in $t-1$).

In addition, we compute the firm's growth in term of number of employees and firm survival. One limitation of our dataset is that it does not contain information about sales and capital; therefore, it is not possible to construct a direct measure of firm productivity. To overcome this limitation we compute impacts on wages as a proxy for improved labor productivity and exploit a decomposition of the average wage.

In particular, the change in the average wage paid by each firm can be decomposed between the change in the wage paid to the workers that continue in the firm from one period to the other and the change due to hiring and/or firing workers. These terms allow us to identify two important sources of wage variation at the firm level. While the first is more related to changes in productivity, the second is related to changes in the skill composition of the firm. Both terms are relevant in our study. First, given that we are studying the effects of an EPP that provides technical assistance, we expect productivity gains caused by the application of specific knowledge, adoption of practices, and quality and general improvements related to export activity. Second, since the export development process may imply the hiring of skilled workers, it is possible to expect changes in the skill composition of the firm.

Formally, let the average wage firm $i$ pays to workers in period $t$ be $W_{it} = \sum_{j=1}^{N_{it}} \frac{1}{N_{it}} w_{jt}$, where $w_{jt}$ is the wage of worker $j$ in period $t$, and $N_{it}$ the number of workers in firm $i$ in period $t$. The change in the average wage of each firm $i$ can be decomposed using a similar decomposition of the one used to study the change in aggregate productivity (see, for example, (Baily *et al.*, 1992; Foster *et al.*, 2001, 2008). The average wage of firms' decomposition is given by:

$$\begin{aligned}\Delta W_{it} = &\sum_{j\in C} s_{jt-1}\Delta w_{jt} + \sum_{j\in C} \Delta s_{jt}(w_{jt-1}W_{it-1}) + \sum_{j\in C} \Delta s_{jt}\Delta w_{jt} \\ &+ \sum_{j\in N} s_{jt}(w_{jt} - W_{it-1}) - \sum_{j\in X} s_{jt-1}(w_{jt-1} - W_{it-1}) \end{aligned} \tag{1}$$

where $s_{jt}$ is the weight of worker $i$ in the average wage and is equal for all the workers in the firm, i.e., $s_{jt} = \frac{1}{N_{it}}$. The sets $C$, $N$, and $X$ represent the set of continuing,

entering, and exiting workers, respectively. This decomposition has five terms that embody the contributions of various components to the average wage of the firm. The first three terms measure the change in the average wage paid by firm $i$ coming from the workers that continue in the firm. The last two terms measure the change in average wage due to new workers and workers that left the firm. If new workers have wages above average, then the average wage of firm $i$ increases. This could be the case if the firm hires skilled workers. Similarly, if the worker that leaves the firm had a lower wage than the average, the average wage increases. This could be the case if the firm fires less skilled workers. In our estimations, the sum of the first three terms will be used to test the productivity hypothesis while the sum of the last two terms test the skill composition hypothesis.

# 4 Empirical Strategy

## 4.1 Sample and Descriptive Statistics

Our dataset contains information for 1,571,969 firms between 1998 and 2013[10]. Given that the program targeted SMEs, we drop firms with fewer than five employees and more than 500 employees. We also drop firms that belong to a sector-province without beneficiary firms. Finally, we retain firms with at least seven consecutive years in the dataset. We do this because, as it will explained later, we need several lags to control for firms' past performance and avoid autocorrelation. After these restrictions, the sample shrinks considerably to $35,622$ firms and $449,173$ firm-year observations (see Table 1)[11]. Although these sample restrictions requires dropping a high percentage of firm-year observations, the reduction helps to construct a much more homogeneous sample.

Table 1: Number of Firms and Observations Before-after Sample Restriction

| Period 1998-2013 | Population | Sample after constraints | | |
|---|---|---|---|---|
| | | Diverpymex firms | Rest of firms | Total |
| Number of firms | 1,571,969 | 118 | 35,504 | 35,622 |
| Observations | 10,100,174 | 1,676 | 447,497 | 449,173 |

Notes: The criteria for dropping firms were: (i) firms with fewer than five employees or more than 500 employees; (ii) firms with less than seven consecutive years in the dataset; and (iii) firms that belong to a sector or province without beneficiary firms.

In terms of firms that receive support from *Diverpymex*, Table 2 shows the number

[10] 10,100,174 firm-year observations.

[11] Most of the reduction in sample size comes from dropping micro firms.

of firms by cohort of entry to the program. Table 3 shows the basic descriptive statistics (number of observations, mean, and standard deviation) for *Diverpymex* firms and the firms we use to compare them (rest of firms) for the whole period under study.

Table 2: Number of Beneficiary Firms by Cohort

| Year | Diverpymex firms |
|---|---|
| 2002 | 34 |
| 2003 | 9 |
| 2004 | 4 |
| 2005 | 8 |
| 2006 | 5 |
| 2007 | 10 |
| 2008 | 6 |
| 2009 | 11 |
| 2010 | 7 |
| 2011 | 4 |
| 2012 | 5 |
| 2013 | 15 |
| **Total** | **118** |

This analysis reveals that *Diverpymex* firms are on average larger, older, paid higher wages, and had higher probability of exporting than the rest of firms in Argentina. However, given that the *Diverpymex* support was not randomly assigned, the pool of non-participant firms is not necessarily comparable to the group of *Diverpymex* firms; hence, potential issues of administrative selection (export readiness) and self-selection may arise. That is, beneficiary firms may self-select into the program because of characteristics that are related to the outcomes of interest. In this case, a simple comparison with the rest of non-participant firms would lead to biased results. The next section explains the identification strategy we adopt to control for these potential bias.

## 4.2 Identification Strategy and Estimation Method

The main challenge in identifying these effects is the selection bias coming from the fact that firms decide to participate in the program and they are selected based on their export readiness. These biases can be reduced in a simple regression framework if they are related to observable factors by simply including those factors as control variables in the regressions. In our case, however, some important differences between the groups of firms may also be related to unobservable (or unobserved) factors. To deal with this issue, one may assume that unobserved heterogeneity is constant over time and eliminate these potential sources of bias using a fixed-effects approach. However, many of these unobserved cofounders may be time-varying, such as, for example, export

readiness and entrepreneurial behavior. Indeed, the existence of multiple cohorts of treatments reinforces this idea and points out that firms apply to the program once they are ready to export or growth in foreign markets. That is, participation in the program depends on past outcomes. In this context, the assumption that the most important omitted variables are time-invariant does not seem plausible.

Our strategy is to take advantage of the panel structure of our data to control for past values of the outcome variable by using a lagged dependent variable (LDV) model. In this case, the identifying assumption is independence of treatment status and potential outcomes conditional on lagged outcome variables and other observable confounders[12]. This assumption implies that after controlling for the lagged dependent variables and other covariates, there are no omitted variables or other sources of endogeneity. This seems to be a strong assumption. However, as explained below, we control for several lags of the outcome variable and a rich set of interaction terms between year dummies and characteristics that allow us to control for different trends at the firm level and unobservable factors that change over time and have different effects on firms with certain characteristics, like industry or location.

[12] See Chapter 5 in Angrist & Pischke (2008).

Table 3: Descriptive Statistics (1998-2013)

| | *Obs.* | *Mean* | *SD* | *Obs.* | *Mean* | *SD* |
|---|---|---|---|---|---|---|
| | **Diverpymex firms** | | | **Rest of firms** | | |
| Number of employees | 1,676 | 45 | 55 | 447,497 | 27 | 55 |
| = 1 if exporting | 1,676 | 0.67 | 0.47 | 447,497 | 0.17 | 0.38 |
| Level of exports if > 0 (U$S 1K fob) | 1,128 | 549 | 1,336 | 78,128 | 2,287 | 32,749 |
| Average wage | 1,676 | 2,631 | 2,575 | 447,497 | 2,452 | 2,936 |
| "Productivity" term | 1,632 | 490 | 661 | 428,418 | 445 | 953 |
| "Skill composition" term | 1,632 | 43 | 188 | 428,418 | 41 | 591 |
| Age | 1,676 | 21 | 16 | 447,497 | 18 | 15 |
| = 1 if multinational | 1,676 | 0.00 | 0.00 | 447,497 | 0.02 | 0.14 |
| = 1 if hire skilled workers | 1,676 | 0.44 | 0.50 | 447,497 | 0.33 | 0.47 |
| *Size* | | | | | | |
| Micro | 1,676 | 0.00 | 0.00 | 447,497 | 0.00 | 0.00 |
| Small | 1,676 | 0.44 | 0.48 | 447,497 | 0.71 | 0.49 |
| Medium | 1,676 | 0.56 | 0.50 | 447,497 | 0.22 | 0.42 |
| Large | 1,676 | 0.00 | 0.00 | 447,497 | 0.07 | 0.25 |
| *Type of corporation* | | | | | | |
| Individual firms | 1,676 | 0.03 | 0.17 | 447,497 | 0.17 | 0.38 |
| SA | 1,676 | 0.66 | 0.47 | 447,497 | 0.47 | 0.50 |
| SRL | 1,676 | 0.31 | 0.46 | 447,497 | 0.28 | 0.45 |
| Other commercial firms | 1,676 | 0.00 | 0.00 | 447,497 | 0.07 | 0.26 |
| Other association forms | 1,676 | 0.00 | 0.00 | 447,497 | 0.01 | 0.08 |
| *Sector* | | | | | | |
| Agriculture and livestock | 1,676 | 0.02 | 0.12 | 447,497 | 0.13 | 0.34 |
| Food | 1,676 | 0.09 | 0.29 | 447,497 | 0.11 | 0.31 |
| Textile products | 1,676 | 0.03 | 0.17 | 447,497 | 0.02 | 0.14 |
| Apparel products | 1,676 | 0.03 | 0.17 | 447,497 | 0.03 | 0.17 |
| Leather products | 1,676 | 0.02 | 0.13 | 447,497 | 0.01 | 0.08 |
| Paper products | 1,676 | 0.02 | 0.14 | 447,497 | 0.01 | 0.09 |
| Editing | 1,676 | 0.03 | 0.17 | 447,497 | 0.03 | 0.18 |
| Petroleum products | 1,676 | 0.01 | 0.10 | 447,497 | 0.00 | 0.03 |
| Chemical products | 1,676 | 0.12 | 0.33 | 447,497 | 0.04 | 0.20 |
| Rubber and plastic products | 1,676 | 0.05 | 0.22 | 447,497 | 0.03 | 0.18 |
| Other non-metallic minerals | 1,676 | 0.02 | 0.13 | 447,497 | 0.01 | 0.10 |
| Regular metals | 1,676 | 0.03 | 0.17 | 447,497 | 0.01 | 0.11 |
| Other metal products | 1,676 | 0.14 | 0.35 | 447,497 | 0.09 | 0.28 |
| Machinery and equipment | 1,676 | 0.19 | 0.39 | 447,497 | 0.04 | 0.19 |
| Electronic equipment | 1,676 | 0.05 | 0.21 | 447,497 | 0.02 | 0.12 |
| Medical instruments | 1,676 | 0.04 | 0.19 | 447,497 | 0.01 | 0.09 |
| Automotive | 1,676 | 0.03 | 0.17 | 447,497 | 0.02 | 0.15 |
| Furniture | 1,676 | 0.03 | 0.16 | 447,497 | 0.02 | 0.16 |
| Wholesale | 1,676 | 0.02 | 0.13 | 447,497 | 0.18 | 0.39 |
| Informatics activities | 1,676 | 0.03 | 0.18 | 447,497 | 0.03 | 0.16 |
| Legal and accounting services | 1,676 | 0.01 | 0.11 | 447,497 | 0.15 | 0.36 |
| *Province* | | | | | | |
| Autonomous City of Buenos Aires | 1,676 | 0.31 | 0.46 | 447,497 | 0.43 | 0.49 |
| Buenos Aires | 1,676 | 0.50 | 0.50 | 447,497 | 0.49 | 0.50 |
| Cordoba | 1,676 | 0.07 | 0.26 | 447,497 | 0.04 | 0.20 |
| La Rioja | 1,676 | 0.01 | 0.10 | 447,497 | 0.00 | 0.01 |
| San Luis | 1,676 | 0.01 | 0.10 | 447,497 | 0.00 | 0.04 |
| Santa Fe | 1,676 | 0.09 | 0.28 | 447,497 | 0.04 | 0.20 |
| Tucuman | 1,676 | 0.01 | 0.09 | 447,497 | 0.00 | 0.05 |

Based on this assumption, we use the following equation for our estimations:

$$Y_{i,s,p,t} = \alpha_t + \alpha_{s,t} + \alpha_{p,t} + \alpha_{o,t} + \sum_{k=1}^{n} \beta_k Y_{i,t-k} + \gamma T_{i,t} + \delta X_{i,t} + \epsilon_{i,s,p,t} \tag{2}$$

where $Y_{i,s,p,t}$ represents the set of outcomes to be considered for firm $i$, belonging to industry $s$, in province $p$, and year $t$. $\alpha_t$ depicts yearly shocks that affect all firms. Regarding the interaction terms, $\alpha_{s,t}$ are industry-year effects, that is, time-specific shocks that affect the outcomes of all firms in industry $s$, $\alpha_{p,t}$ are province-year effects such as the construction of a freeway, an airport, or implementation of new local policies, and $\alpha_{o,t}$ is a vector of two interaction terms that includes type of society-year and multinational-year effects.

$T_{i,t}$ is a binary variable that takes the value of one the year the firm $i$ receives the program, and so thereafter. Therefore, $\gamma$ represents the parameter of interest and captures the annual average effect of participating in *Diverpymex* on the outcome under consideration. Finally, $X_{it}$ is a vector of time-varying control variables, and $\epsilon_{i,s,p,t}$ is the usual error term assumed to be uncorrelated with $T_{i,t}$.

The set of year dummies ($\alpha_t$) plays an important role in our analysis. After a long recession that started in 1998, Argentina suffered a severe crisis in 2001. As a consequence of the crisis, there was a sharp devaluation of the Argentine peso, and the government defaulted on its sovereign debt. Although in 2002 GDP contracted by 10.8 percent, 2003 began a period of growth for Argentina that lasted until 2008. Prices also changed during the recovery and accelerated after 2007. In terms of our study, controlling for these factors is important because the recovery also implied an increase in employment and nominal wages. As long as these factors affected our groups of firms in the same way, the year dummy variables should properly control their influence on employment and wages.

We also relax the assumption of equal effects of the aggregate shocks by controlling for industry-year ($\alpha_{s,t}$) and province-year ($\alpha_{p,t}$) dummies. In this way we allow for time-varying shocks that affect firms in different industries or regions in different ways. This is important, for example, for the exchange rate changes that can benefit firms in tradeable sectors and affect firms in non-tradeable sectors using imported inputs. The industry-specific shocks also allow us to deflate wages using an industry-specific price level index. In addition, province-specific shocks allow us to deflate using province-specific price level indices. The use of province-specific shocks is also important, for example, if the difference in unemployment between provinces led to a different evolution in wages.

The choice of the lag length for the outcome variable is also important. If the error term in equation (2) is autocorrelated, then the estimated coefficient would be inconsistent due to an endogeneity problem. Adding lags of the dependent variable helps reduce the autocorrelation. We then add the minimum number of lags that remove the residual autocorrelation for all outcome variables in order to have a white noise error

term[13].

Although the average effect over the whole post-treatment period is a useful indicator of program effect, additional relevant information on the dynamics and sequence of the effects can be obtained by studying the effects of the program over time. Therefore, we modify equation (2), changing the treatment dummy for several dummies indicating the number of years since the SME entered the program:

$$Y_{i,s,p,t} = \alpha_t + \alpha_{s,t} + \alpha_{p,t} + \alpha_{o,t} + \sum_{k=1}^{n} \beta_l Y_{i,t-k} + \sum_{j=1}^{m} \gamma_j T_{i,t}^{j} + \delta X_{i,t} + \epsilon_{i,s,p,t} \tag{3}$$

Thus, $T_{i,t}^{j}$ will be equal to one on the $jth$ year of program support. For instance, $T_{i,t}^{1}$ will be equal to one on the first year of program support; $T_{i,t}^{2}$ will be equal to one in the second year of program support; and so on. Therefore, these new treatment dummies measure the dynamics of the impacts of interest. More specifically, given that our equation controls for past values of the outcome variable, the coefficients of these variables capture the annual average marginal effect for each post-treatment period included in the analysis.

# 5 Results

We group the estimates according to the outcomes of interest as follows: (i) export behaviour, (ii) firm growth and survival, and (iii) productivity and skill composition measures.

## 5.1 The Effects on Export Behaviour

When firms ask for support from *Diverpymex* program, they want to start exporting (if they only sell in local markets) or increase their exports or export to new foreign markets (if they are already exporters). Therefore, the export performance measures constitute key outcome variables the program is expected to affect. Table 4 presents the effects on the likelihood of exporting and the total value of exports.

[13] As pointed out by Wooldridge (2002) serial correlation is a problem to be dealt with only if the null hypothesis is rejected at the 5% level. However, "In deciding whether serial correlation needs to be addressed, we should remember the difference between practical and statistical significance. With a large sample size, it is possible to find serial correlation even though $\hat{\rho}$ is practically small; when $\hat{\rho}$ is close to zero, the usual OLS inference procedures will not be far off" (Wooldridge, 2002, p. 397).

Table 4: Effects on Export Behavior

| Dependent variable: | Likelihood of exporting | | Exports (in logs) if exporting firm | | Entry into export markets | | Survival in export markets | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Average effect | 0.054*** | | 0.106*** | | 0.009 | | 0.037*** | |
| | [0.010] | | [0.037] | | [0.008] | | [0.008] | |
| Dynamics of effect | | | | | | | | |
| 1st-2nd years | | 0.137*** | | 0.065 | | 0.077** | | 0.052** |
| | | [0.030] | | [0.170] | | [0.034] | | [0.023] |
| 3rd-5th years | | 0.041*** | | 0.187*** | | -0.012 | | 0.046*** |
| | | [0.016] | | [0.051] | | [0.013] | | [0.015] |
| 6th-10th years | | 0.038*** | | 0.067 | | 0.003 | | 0.028** |
| | | [0.014] | | [0.050] | | [0.010] | | [0.011] |
| Number of observations | 230,365 | 230,365 | 26,042 | 26,042 | 194,709 | 194,709 | 194,709 | 194,709 |
| Number of firms | 35,622 | 35,622 | 4,387 | 4,387 | 32,251 | 32,251 | 32,251 | 32,251 |
| R-squared | 0.733 | 0.733 | 0.845 | 0.845 | 0.038 | 0.038 | 0.806 | 0.806 |
| Ho: no serial correlation | | | | | | | | |
| $\rho$(rho) | -0.002 | -0.002 | -0.002 | -0.002 | 0.000 | 0.000 | -0.003 | -0.003 |
| p-value | 0.753 | 0.750 | 0.897 | 0.900 | 0.846 | 0.846 | 0.534 | 0.534 |

Notes: (a) Estimates of lagged dependent variable model. (b) All regressions include six lags of the outcome variable, year, industry-year, province-year, multinational-year, type of society-year dummies, age and age squared. (c) Robust standard errors in parentheses. (d) ***, **, * statistically significant at 1%, 5%, and 10%.

The estimates on exports show evidence of large positive impacts both in terms of probability of exporting (extensive margins) and export volume (intensive margins). More specifically, we find that relative to the control group, beneficiary firms increased, on average, their likelihood of exporting by about 5.5 percentage points (pp) and their value of total exports by 10.6 percent.

However, the impacts are not constant over time (Figures 1-2). The effect on the probability of exporting is mostly concentrated in the first two years after program support, reaching the value of 14 pp and decreasing but maintained thereafter. Regarding the volume of exports, the effects turned out to be statistically significant only between the third and fifth year after treatment, reaching the value of 19 percent.

When decomposing the likelihood of exporting, results show that the program increases the probability of entering into export markets only in the first two years, while the impact on survival in export markets is higher in the first two years and decreases thereafter (Figures3-4). Thus, these first set of findings confirm our hypothesis 1: the effect on the extensive margin of exports is perceived mainly in the short term, while the impact on the intensive margin of exports is manifested in the medium term.

Figure 1: Dynamics of the Effect on the Probability of Exporting

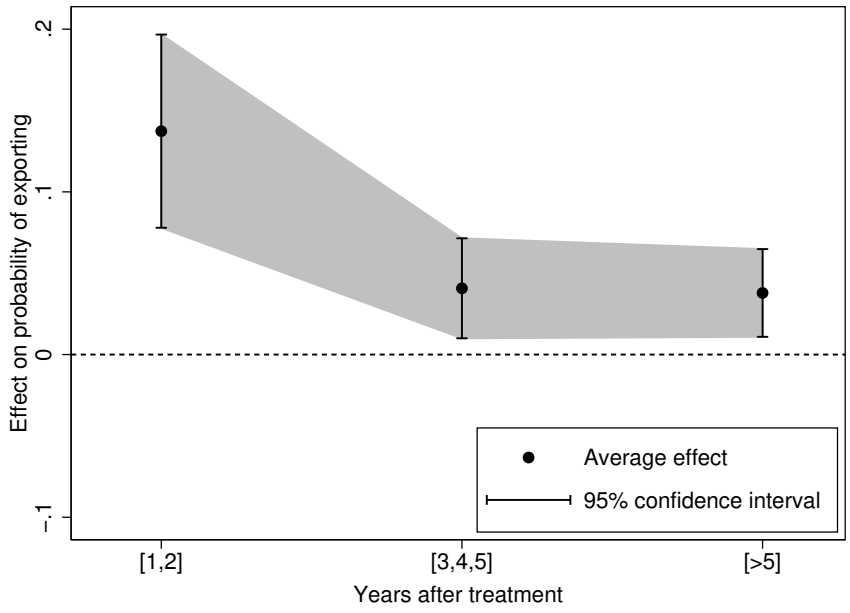


Figure 2: Dynamics of the Effect on Volume of Exports

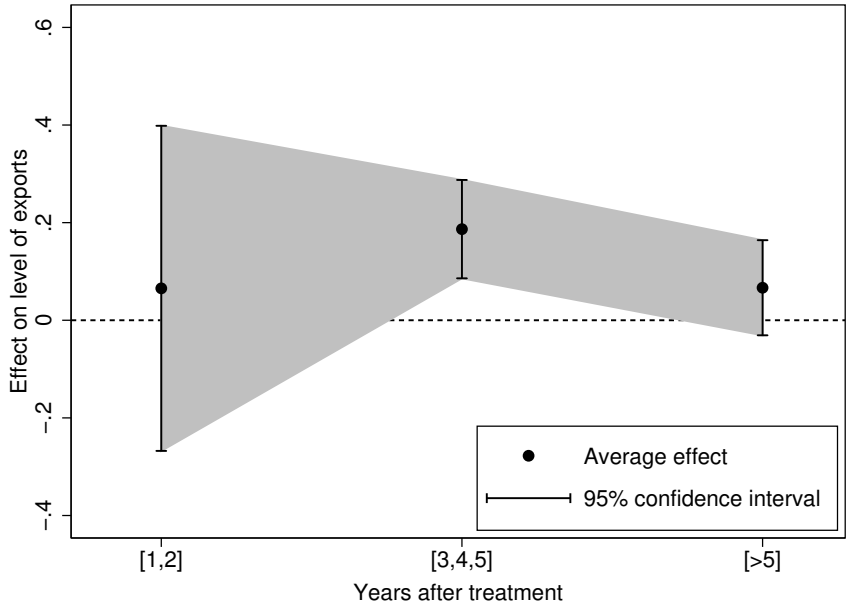



Figure 3: Dynamics of the Effect on the Probability of Entering Export Markets

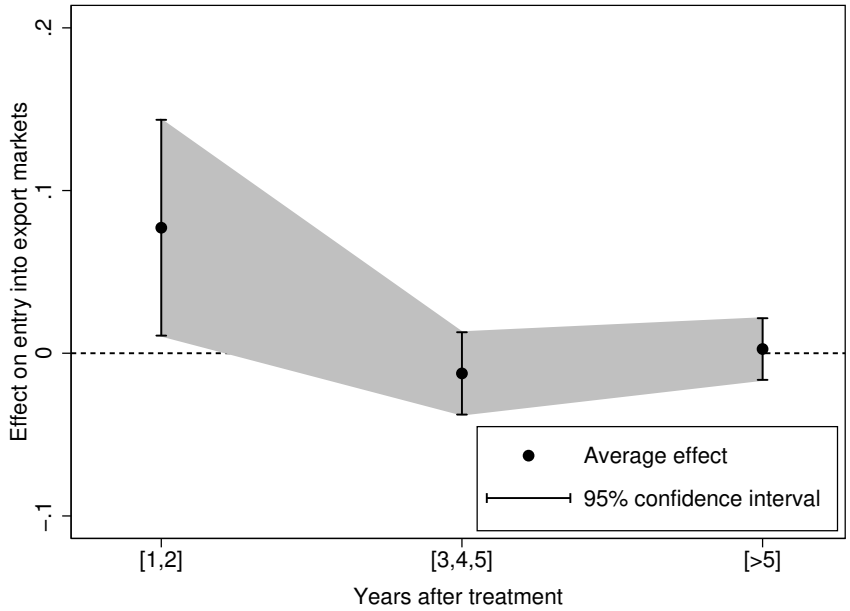
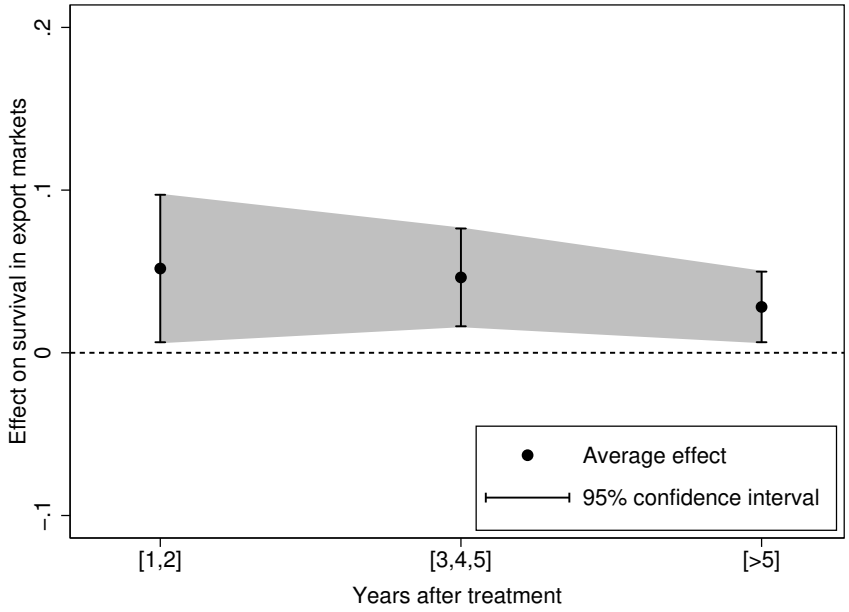


Figure 4: Dynamics of the Effect on the Probability of SME Survival in Export Markets




## 5.2 The Effects on Firms' Growth and Survival

It is also relevant to explore the effects of the program on other measures of firm performance. Intuitively, firms that develop their export potential because of the program gain knowledge and capabilities and may also increase their market share. Therefore, participant firms are expected to grow more and have a higher survival rate relatively to non-beneficiary firms. The results of these estimates are presented in Table 5.2.

Participation in the program positively affects both measures. Beneficiary firms have, on average, 3.6 percent more employees than the control group, which indicates that the program affected firm' growth. Moreover, the program increases firm survival rate by 1.4 pp. These results indicates that the program's impacts manifest themselves in improvements in the international position of the firms as well as in the participant firms' overall performance.

The program has greater effects in the short term in both employment (5.6 percent) and survival rate (2.2 percent), accompanying the effects found on firms' export behaviour. These effects are maintained but decreasing in the medium and long run (Figures 5-6).

Table 5: Effect on Growth and Survival Measures

| Dependent variable: | # of employees (in logs) | | = 1 if survives | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Average effect | 0.036*** | | 0.014*** | |
| | [0.008] | | [0.003] | |
| Dynamics of effect | | | | |
| 1st-2nd years | | 0.056** | | 0.022*** |
| | | [0.022] | | [0.002] |
| 3rd-5th years | | 0.028** | | 0.015*** |
| | | [0.013] | | [0.006] |
| 6th-10th years | | 0.036*** | | 0.010** |
| | | [0.012] | | [0.005] |
| Observations | 230,365 | 230,365 | 230,365 | 230,365 |
| Number of firms | 35,622 | 35,622 | 35,622 | 35,622 |
| R-squared | 0.909 | 0.909 | 0.017 | 0.017 |
| Ho: no serial correlation | | | | |
| $\rho$(rho) | 0.006 | 0.006 | - | - |
| p-value | 0.363 | 0.363 | - | - |

Notes: (a) Estimates of lagged dependent variable model. (b) All regressions include six lags of the outcome variable, year, industry-year, province-year, multinational-year, type of society-year dummies, age and age squared. (c) Robust standard in parentheses. (d) ***, **, * statistically significant at 1%, 5%, and 10%.

## 5.3 The Effects on Productivity and Skill Composition Measures

We finally explore whether the *Diverpymex* program has an impact on firm productivity. To test this hypothesis, we estimate program effects on average wages, likelihood of hiring a skilled worker (defined as a worker in the top quartile of the salary distribution of the firm of origin), productivity, and skill composition measures. The main idea of this exercise is to analyse whether changes in average wages are due to changes in the productivity or changes in the skill composition of the firm.

We first observe that the effect on average wages is not statistically significant (Table 5.3). However, when we analyse its dynamics, we find that the program increases wages in the long term by 1.8 percent (Figure 7). The program also increases the probability

of hiring a skilled worker. In particular, participant firms are on average 3.6 pp more likely to hire a skilled worker. This effect appears to be more relevant in the short term (6.7 pp), perhaps because of the incorporation of skilled staff to develop and implement the export plan, than in the medium and long term (Figure 8).

Figure 5: Dynamics of the Effect on Employment

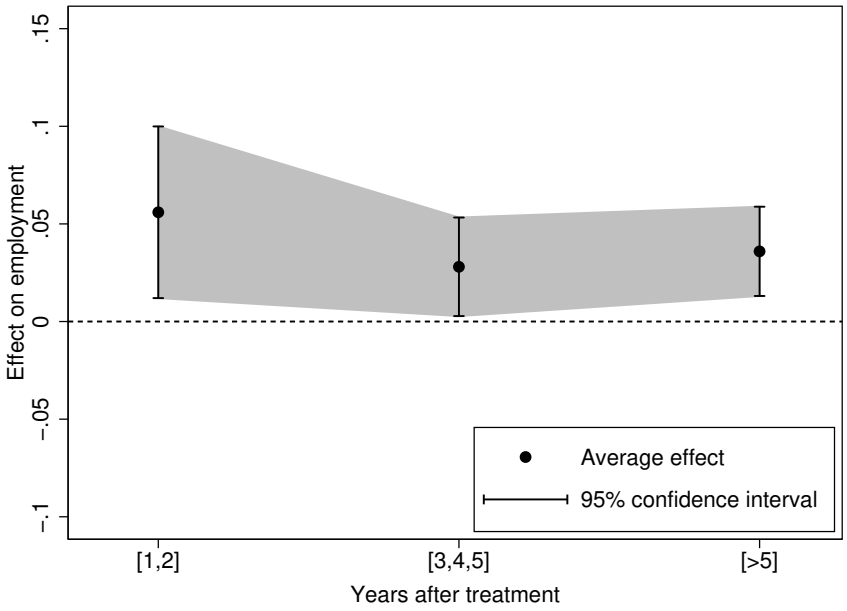



Figure 6: Dynamics of the Effect on Probability of SME Survival

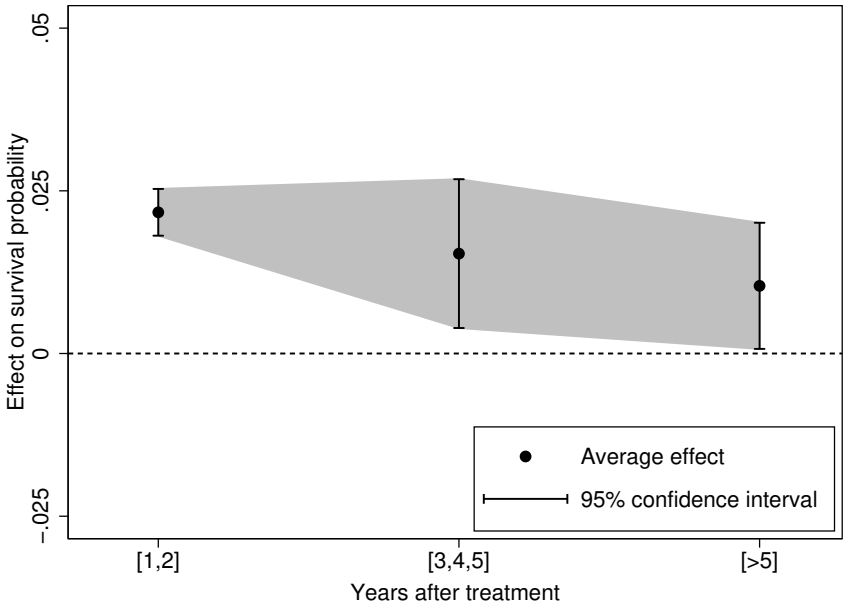


Table 6: Effect on Productivity and Skill Composition Measures

| Dependent variable: | Average wage | | = 1 if hire skill workers | | Productivity hypothesis | | Skill composition hypothesis | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Average effect | 0.004 | | 0.036** | | 54.130*** | | 5.400 | |
| | [0.005] | | [0.015] | | [19.729] | | [8.590] | |
| Dynamics of effect | | | | | | | | |
| 1st-2nd years | | -0.000 | | 0.067* | | -1.556 | | 20.674 |
| | | [0.010] | | [0.038] | | [32.608] | | [21.467] |
| 3rd-5th years | | -0.014 | | 0.020 | | -9.623 | | 16.673 |
| | | [0.012] | | [0.026] | | [26.104] | | [13.813] |
| 6th-10th years | | 0.018*** | | 0.037* | | 114.971*** | | -7.008 |
| | | [0.006] | | [0.020] | | [33.595] | | [12.211] |
| Number of observations | 230,365 | 230,365 | 230,365 | 230,365 | 230,365 | 230,365 | 230,365 | 230,365 |
| Number of firms | 35,622 | 35,622 | 35,622 | 35,622 | 35,622 | 35,622 | 35,622 | 35,622 |
| R-squared | 0.951 | 0.951 | 0.315 | 0.315 | 0.247 | 0.247 | 0.085 | 0.085 |
| Ho: no serial correlation | | | | | | | | |
| $\rho$(rho) | 0.001 | 0.001 | -0.003 | -0.002 | 0.004 | 0.004 | -0.017 | -0.017 |
| p-value | 0.888 | 0.888 | 0.304 | 0.305 | 0.963 | 0.963 | 0.908 | 0.908 |

Notes: (a) Estimates of lagged dependent variable model. (b) All regressions include six lags of the outcome variable, year, industry-year, province-year, multinational-year, type of society-year dummies, age and age squared. (c) Robust standard errors in parentheses. (d) ***, **, * statistically significant at 1%, 5%, and 10%.

From columns 5-8 in Table 5.3 we observe that the increase in wages is mostly due to an increase in the wage of current workers rather than that of the newly hired skilled workers (Figures 9-10). This finding reveals that the increase in wages is due to an improvement in productivity that is also manifested in the long term (4.7 percent), rather than a change in the skill composition of the firm. This result further confirms the hypothesis that participant firms acquire new knowledge, experience, and competencies related to the export process due to the program and that efficiency gains actually occurred.

Overall, our findings show that the *Diverpymex* program is effective in enhancing export activity of participant firms. Our results support the hypothesis that the enhancing activities put in place by the program through an export-market diversification methodology, namely comprehensive technical assistance, were actually effective. As expected, we find positive effects on export, performance, and productivity measures.

We also find that the program effects required different maturation periods to materialize. Our results support hypothesis 1 as, in the short term, participation in the *Dyverpymex* program is linked to export growth through the extensive rather than the intensive margin. This finding indicates that, in the short term, the program mainly mitigates the effects of market failures associated with information externalities related to foreign market entry costs. Our results show a significant impact on export levels in the medium term, which may be due to the resolution of information barriers related to the expansion in the current export market or access to more sophisticated new ones. Finally, in line with our hypothesis 2, firms improved their productivity and paid higher wages in the long term, which is evidence of a learning-by-exporting process.

Figure 7: Dynamics of the Effect on Average Wage

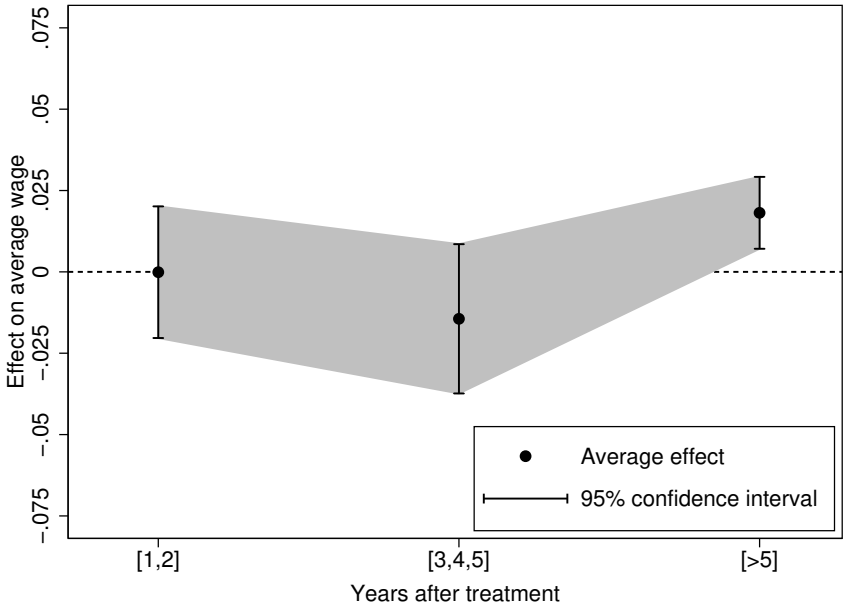


Figure 8: Dynamics of the Effect on the Hiring of Skilled Labor

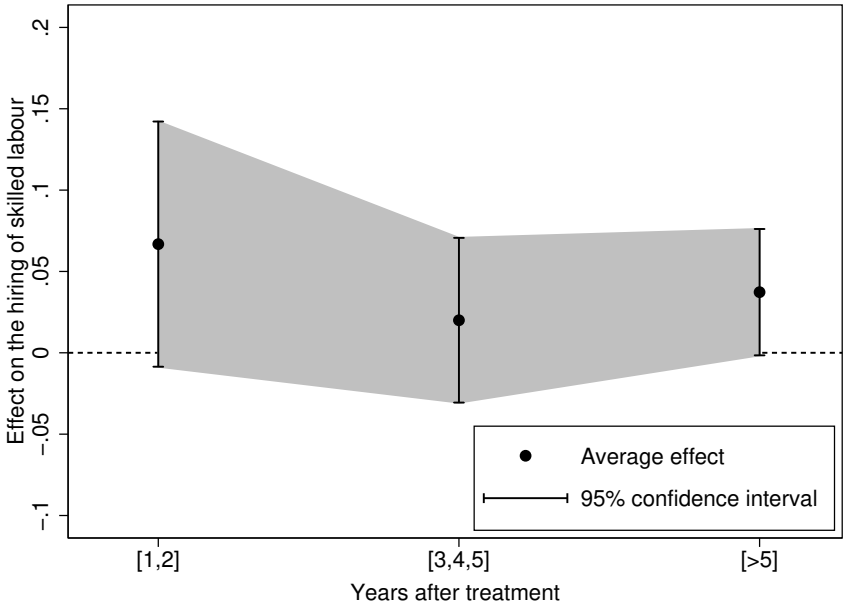



Figure 9: Dynamics of the Effect on Productivity

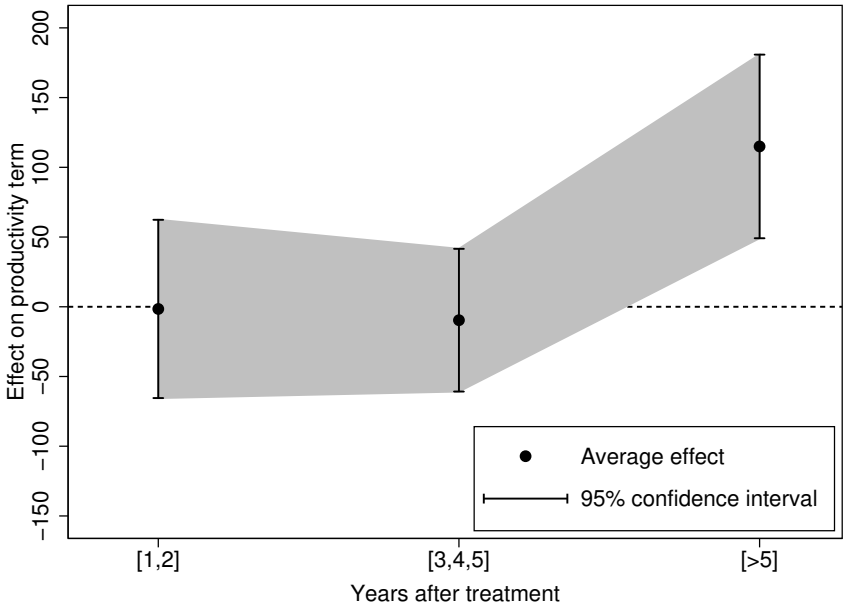
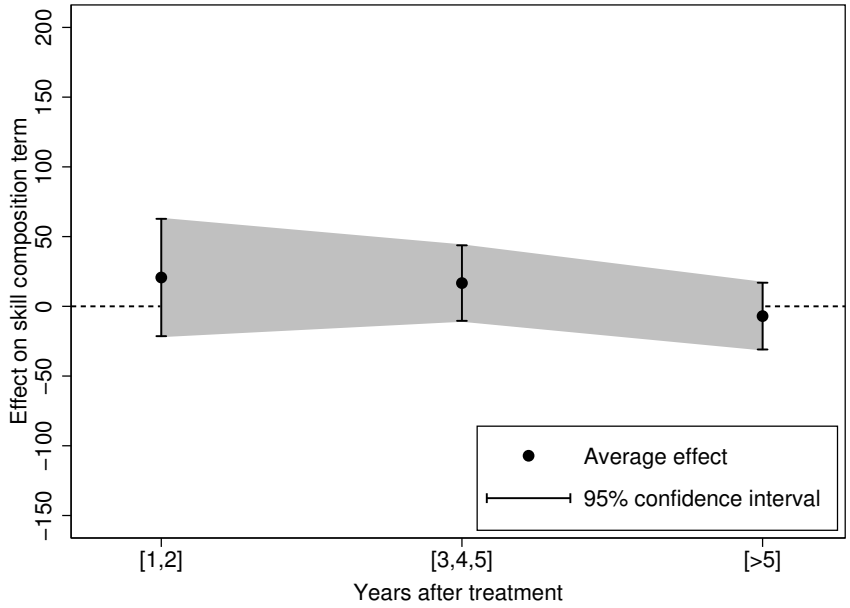


Figure 10: Dynamics of the Effect on Skill Composition




# 6 Robustness Checks

To test the robustness of our results, we run regression (2) and (3) on a common support sample created by selecting from the rest of the firms those firms that are similar to *Diverpymex* firms in terms of observed characteristics in the previous year until entry into the program, including past values of the outcome variables. This strategy involves four steps: (i) estimating the probability of participating in *Diverpymex* program (i.e., the propensity score) with a logit model for each cohort; (ii) restricting each cohort sample to a common support area based on the propensity score and a nearest neighbour matching algorithm; (iii) pooling the matched samples; and, (iv) running regression (2) and (3) on this common support.

Annex B.2 show the results for different common supports samples based on different choices of the number of nearest neighbours. The effects on our outcomes of interest are robust. In general, the coefficients show very similar values compared to the main results.

# 7 Conclusions

This paper presents evidence of the dynamics and sequence of the effects of a program that provides technical assistance to SMEs in Latin America to help them export. Using firm-level administrative data from 1998 to 2013, we provide evidence on the impact of *Diverpymex* program on SME export, performance, and productivity measures. The general effects of the program appear to be positive and with relevant policy implications.

The paper shows that participant firms clearly benefited from the program. We first find positive average effects of the program on the likelihood of exporting and value of total exports. That is, the *Diverpymex* program has been effective in removing the bottlenecks related to information and human capital barriers that prevent SMEs from accessing and diversify their offerings in foreign markets. We also find that the program has a positive effect on firm growth and survival. Finally, we show that the program increases the likelihood of hiring a skilled worker and raises the productivity of participant firms relative to the control group.

We then explore the dynamics and sequencing of these effects, providing evidence of the mechanisms by which the program may affect firm performance. We find that the effect on the likelihood of exporting is higher in the short term and is maintained but decreasing thereafter, highlighting the role of foreign market entry costs. Firm growth and survival measures follow a similar pattern. However, the impact on the value of total exports for firms that already exported appears only in the medium term and may be more related to the resolution of information barriers to increase export penetration or access more sophisticated export markets. Finally, the program affects firm productivity in the long run, indicating the presence of efficiency gains from the knowledge acquired by increasing foreign sales.

Overall, these findings point to the relevance and effectiveness of programs aimed at supporting SMEs in their efforts to enter competitive international markets. They also highlight the importance of correctly calculating the timing and gestation periods of these productive programs to allow different effects to materialize. Finally, these findings confirm the theoretical predictions on the existence of barriers to export and learning by exporting process.

# Acknowledgements

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# A Data Appendix

**Source I:** Administrative records of the National Administration of Social Security (ANSES) from the Observatory of Employment and Entrepreneurial Dynamics (OEDE) at Ministry of Labor, Employment, and Social Security in Argentina. Period: 1998-2013. Frequency: Yearly. Firm-level data.

- **Employment**: number of formal employees in October
- **Average wage**: ratio of the sum of monthly wages of formal employees to number of formal employees in October
- **Productivity term**: from average wage decomposition
- **Skill composition term**: from average wage decomposition
- **Hiring of skilled workers**: whether the firm hires a worker on the top quartile of the salary distribution of the firm of origin
- **Age**
- **Location**: province
- **Industry**: 2-digit SIC sector level
- **Type of corporation**: Individual corporation, SA, SRL, other commercial corporations, other types of associations
- **Multinational**: whether the firm is multinational

**Source II:** Administrative records of the General Customs Bureau (DGA) from the Observatory of Employment and Entrepreneurial Dynamics (OEDE) at Ministry of Labor, Employment, and Social Security in Argentina. Period: 1998-2013. Frequency: Yearly. Firm-level data.

- **Exports**: value of exports in US$

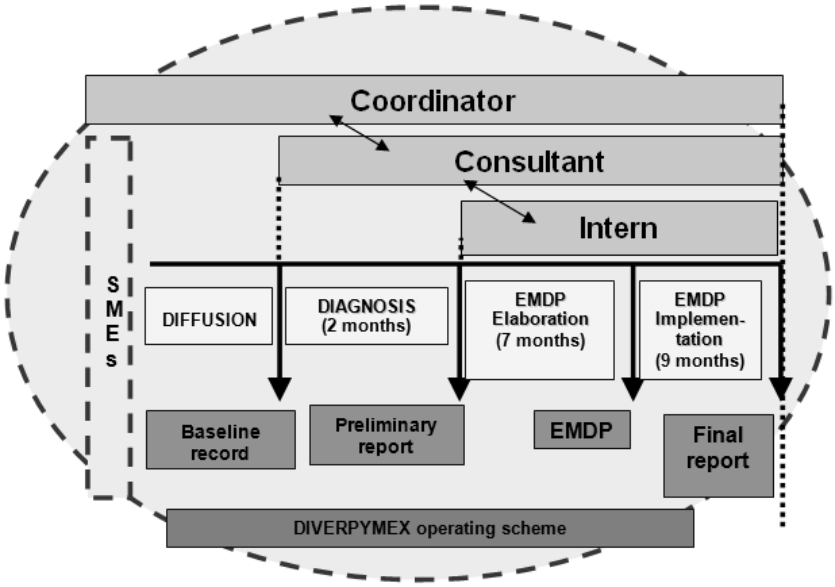
**Source III:** Administrative records of the *Diverpymex* program. Firm-level data.

- ***Diverpymex***: whether the firm receives support
- **Year of support**

# B Tables and Figures

## B.1 *Diverpymex* Methodology

Figure 1: *Diverpymex* Methodology




*Source:* Credicoop Bank Foundation

## B.2 Robustness Check

Table 1: Robustness Check (common supports)

(a) Long-term effect on participant firms

| # of Nearest Neighbours | Dependent variable: | = 1 if exporting | Entry to export | Export survival | Exports (in logs) | # of employees (in logs) | = 1 if survives | Average wage (in logs) | = 1 if hire skill workers | Productivity hypothesis | Skill composition hypothesis |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| n=1,000 | Average effect | 0.051*** | 0.007 | 0.036*** | 0.104*** | 0.027*** | 0.012*** | 0.002 | 0.030** | 39.645** | 5.810 |
| | on participants | [0.010] | [0.008] | [0.008] | [0.037] | [0.008] | [0.003] | [0.005] | [0.015] | [19.791] | [8.327] |
| | Number of observations | 104,81 | 90,511 | 90,511 | 19,368 | 104,81 | 104,81 | 104,81 | 104,81 | 104,81 | 104,81 |
| | Number of firms | 14,285 | 13,531 | 13,531 | 3,189 | 14,285 | 14,285 | 14,285 | 14,285 | 14,285 | 14,285 |
| | R-squared | 0.718 | 0.031 | 0.793 | 0.834 | 0.923 | 0.013 | 0.956 | 0.330 | 0.278 | 0.027 |
| | Ho: no serial correlation | | | | | | | | | | |
| | $\rho$(rho) | -0.001 | 0.001 | -0.005 | 0.006 | 0.003 | 0.018 | -0.001 | -0.001 | -0.027 | -0.009 |
| | p-value | 0.840 | 0.442 | 0.411 | 0.668 | 0.758 | 0.390 | 0.895 | 0.795 | 0.720 | 0.925 |
| n=500 | Average effect | 0.050*** | 0.007 | 0.035*** | 0.104*** | 0.024*** | 0.010*** | 0.002 | 0.026* | 33.789* | 5.764 |
| | on participants | [0.010] | [0.008] | [0.008] | [0.037] | [0.008] | [0.003] | [0.005] | [0.015] | [19.382] | [8.397] |
| | Number of observations | 83,672 | 72,511 | 72,511 | 18,3 | 83,672 | 83,672 | 83,672 | 83,672 | 83,672 | 83,672 |
| | Number of firms | 11,149 | 10,634 | 10,634 | 2,953 | 11,149 | 11,149 | 11,149 | 11,149 | 11,149 | 11,149 |
| | R-squared | 0.720 | 0.030 | 0.794 | 0.836 | 0.925 | 0.014 | 0.956 | 0.339 | 0.324 | 0.033 |
| | Ho: no serial correlation | | | | | | | | | | |
| | $\rho$(rho) | -0.004 | 0.001 | -0.006 | 0.006 | 0.003 | 0.025 | -0.002 | -0.002 | -0.033 | 0.004 |
| | p-value | 0.547 | 0.504 | 0.362 | 0.659 | 0.813 | 0.300 | 0.847 | 0.668 | 0.680 | 0.969 |
| n=100 | Average effect | 0.049*** | 0.006 | 0.033*** | 0.105*** | 0.017** | 0.009*** | 0.001 | 0.017 | 22.023 | 4.885 |
| | on participants | [0.010] | [0.008] | [0.009] | [0.037] | [0.008] | [0.003] | [0.005] | [0.015] | [20.080] | [8.442] |
| | Number of observations | 41,242 | 36,021 | 36,021 | 13,275 | 41,242 | 41,242 | 41,242 | 41,242 | 41,242 | 41,242 |
| | Number of firms | 5,216 | 5,032 | 5,032 | 2,009 | 5,216 | 5,216 | 5,216 | 5,216 | 5,216 | 5,216 |
| | R-squared | 0.713 | 0.030 | 0.789 | 0.843 | 0.934 | 0.016 | 0.959 | 0.358 | 0.360 | 0.030 |
| | Ho: no serial correlation | | | | | | | | | | |
| | $\rho$(rho) | -0.004 | 0.002 | -0.000 | 0.010 | -0.001 | 0.027 | 0.002 | -0.004 | -0.041 | 0.033 |
| | p-value | 0.678 | 0.385 | 0.986 | 0.563 | 0.979 | 0.442 | 0.910 | 0.464 | 0.522 | 0.596 |
| n=50 | Average effect | 0.049*** | 0.006 | 0.034*** | 0.107** | 0.016** | 0.008** | 0.001 | 0.011 | 14.377 | 3.575 |
| | on participants | [0.010] | [0.008] | [0.009] | [0.038] | [0.008] | [0.003] | [0.005] | [0.015] | [21.154] | [8.600] |
| | Number of observations | 27,301 | 23,872 | 23,872 | 9,769 | 27,301 | 27,301 | 27,301 | 27,301 | 27,301 | 27,301 |
| | Number of firms | 3,426 | 3,308 | 3,308 | 1,454 | 3,426 | 3,426 | 3,426 | 3,426 | 3,426 | 3,426 |
| | R-squared | 0.705 | 0.028 | 0.786 | 0.838 | 0.931 | 0.016 | 0.959 | 0.368 | 0.341 | 0.032 |
| | Ho: no serial correlation | | | | | | | | | | |
| | $\rho$(rho) | -0.005 | 0.002 | -0.000 | 0.006 | 0.004 | 0.016 | -0.007 | -0.006 | -0.065 | 0.051 |
| | p-value | 0.644 | 0.493 | 0.974 | 0.773 | 0.882 | 0.696 | 0.676 | 0.384 | 0.398 | 0.590 |
| n=10 | Average effect | 0.049*** | 0.008 | 0.033*** | 0.105*** | 0.009 | 0.008** | 0.002 | 0.005 | 36.958* | 1.371 |
| | on participants | [0.011] | [0.008] | [0.009] | [0.041 | [0.009] | [0.003] | [0.005] | [0.015] | [19.107] | [9.026] |
| | Number of observations | 8,585 | 7,525 | 7,525 | 3,43 | 8,585 | 8,585 | 8,585 | 8,585 | 8,585 | 8,585 |
| | Number of firms | 1,060 | 1,026 | 1,026 | 509 | 1,060 | 1,060 | 1,060 | 1,060 | 1,060 | 1,060 |
| | R-squared | 0.705 | 0.046 | 0.789 | 0.844 | 0.937 | 0.048 | 0.963 | 0.391 | 0.572 | 0.082 |
| | Ho: no serial correlation | | | | | | | | | | |
| | $\rho$(rho) | -0.010 | 0.001 | 0.007 | 0.030 | 0.004 | -0.005 | 0.011 | -0.011 | -0.011 | -0.021 |
| | p-value | 0.616 | 0.909 | 0.658 | 0.316 | 0.939 | 0.920 | 0.756 | 0.390 | 0.797 | 0.669 |

Notes: (a) Estimates of lagged dependent variable model on common support. (b) All regressions include six lags of the outcome variable, year, industry-year, province-year, multinational-year, type of corporation-year dummies, age and age squared. (c) Robust standard errors in parentheses. (d) ***, **, * statistically significant at 1%, 5%, and 10%.

## (b) Dynamic Effect on Participant Firms

| # of Nearest Neighbours | Dependent variable: | a=1 if exporting | Entry to export | Export survival | Exports (in logs) | # of employees (in logs) | = 1 if survives | Average wage (in logs) | = 1 if hire skill workers | Productivity hypothesis | Skill composition hypothesis |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| | 1st-2nd years | 0.135*** | 0.077** | 0.050*** | 0.068 | 0.049** | 0.020*** | -0.001 | 0.064* | -10.162 | 16.999 |
| | | [0.030] | [0.034] | [0.023] | [0.171] | [0.023] | [0.002] | [0.010] | [0.038] | [32.267] | [20.285] |
| | 3rd-5th years | 0.037** | -0.014 | 0.044** | 0.182*** | 0.020 | 0.012** | -0.015 | 0.012 | -20.577 | 15.930 |
| | | [0.016] | [0.013] | [0.015] | [0.051] | [0.013] | [0.006] | [0.012] | [0.026] | [26.762] | [13.207] |
| | 6th-10th years | 0.036*** | 0.001 | 0.027** | 0.065 | 0.025** | 0.009* | 0.015*** | 0.032 | 96.507*** | -4.606 |
| | | [0.014] | [0.010] | [0.011] | [0.050] | [0.012] | [0.005] | [0.006] | [0.020] | [34.093] | [12.168] |
| n=1,000 | Number of observations | 104,81 | 90,511 | 90,511 | 19,368 | 104,81 | 104,81 | 104,81 | 104,81 | 104,81 | 104,81 |
| | Number of firms | 14,285 | 13,531 | 13,531 | 3,189 | 14,285 | 14,285 | 14,285 | 14,285 | 14,285 | 14,285 |
| | R-squared | 0.718 | 0.031 | 0.793 | 0.834 | 0.923 | 0.013 | 0.956 | 0.330 | 0.278 | 0.027 |
| | Ho: no serial correlation | | | | | | | | | | |
| | $\rho$(rho) | -0.001 | 0.001 | -0.005 | 0.006 | 0.003 | 0.018 | -0.001 | -0.001 | -0.027 | -0.009 |
| | p-value | 0.836 | 0.443 | 0.410 | 0.665 | 0.757 | 0.394 | 0.893 | 0.797 | 0.720 | 0.925 |
| | 1st-2nd years | 0.133*** | 0.077** | 0.049** | 0.071 | 0.046** | 0.019*** | -0.001 | 0.060 | -8.598 | 17.121 |
| | | [0.031] | [0.034] | [0.023] | [0.171] | [0.023] | [0.002] | [0.010] | [0.038] | [32.390] | [20.524] |
| | 3rd-5th years | 0.034** | -0.014 | 0.042*** | 0.182*** | 0.019 | 0.010* | -0.015 | 0.007 | -18.569 | 16.615 |
| | | [0.016] | [0.013] | [0.015] | [0.052] | [0.013] | [0.006] | [0.012] | [0.026] | [26.392] | [13.329] |
| | 6th-10th years | 0.036** | 0.000 | 0.027** | 0.065 | 0.021* | 0.008 | 0.014** | 0.029 | 82.973** | -5.214 |
| | | [0.014] | [0.010] | [0.011] | [0.050] | [0.012] | [0.005] | [0.006] | [0.020] | [33.024] | [12.201] |
| n=500 | Number of observations | 83,672 | 72,511 | 72,511 | 18,3 | 83,672 | 83,672 | 83,672 | 83,672 | 83,672 | 83,672 |
| | Number of firms | 11,149 | 10,634 | 10,634 | 2,953 | 11,149 | 11,149 | 11,149 | 11,149 | 11,149 | 11,149 |
| | R-squared | 0.720 | 0.031 | 0.794 | 0.836 | 0.925 | 0.014 | 0.956 | 0.339 | 0.324 | 0.033 |
| | Ho: no serial correlation | | | | | | | | | | |
| | $\rho$(rho) | -0.004 | 0.001 | -0.006 | 0.007 | 0.003 | 0.025 | -0.002 | -0.002 | -0.033 | 0.004 |
| | p-value | 0.544 | 0.506 | 0.361 | 0.656 | 0.812 | 0.303 | 0.846 | 0.670 | 0.680 | 0.969 |
| | 1st-2nd years | 0.130*** | 0.079** | 0.044* | 0.070 | 0.039* | 0.016*** | -0.000 | 0.051 | -15.764 | 16.675 |
| | | [0.031] | [0.034] | [0.023] | [0.174] | [0.023] | [0.002] | [0.010] | [0.038] | [35.195] | [19.916] |
| | 3rd-5th years | 0.033** | -0.014 | 0.041*** | 0.180*** | 0.012 | 0.009 | -0.014 | -0.009 | -26.873 | 13.850 |
| | | [0.016] | [0.013] | [0.015] | [0.052] | [0.013] | [0.006] | [0.012] | [0.026] | [28.334] | [13.100] |
| | 6th-10th years | 0.035** | -0.001 | 0.026** | 0.067 | 0.015 | 0.007 | 0.012** | 0.024 | 67.591** | -4.963 |
| | | [0.014] | [0.010] | [0.011] | [0.050] | [0.012] | [0.005] | [0.006] | [0.020] | [34.118] | [12.596] |
| n=100 | Number of observations | 41,242 | 36,021 | 36,021 | 13,275 | 41,242 | 41,242 | 41,242 | 41,242 | 41,242 | 41,242 |
| | Number of firms | 5,216 | 5,032 | 5,032 | 2,009 | 5,216 | 5,216 | 5,216 | 5,216 | 5,216 | 5,216 |
| | R-squared | 0.713 | 0.031 | 0.789 | 0.843 | 0.934 | 0.016 | 0.959 | 0.358 | 0.360 | 0.030 |
| | Ho: no serial correlation | | | | | | | | | | |
| | $\rho$(rho) | -0.004 | 0.002 | -0.000 | 0.010 | -0.000 | 0.026 | 0.001 | -0.004 | -0.041 | 0.033 |
| | p-value | 0.673 | 0.387 | 0.985 | 0.560 | 0.980 | 0.448 | 0.913 | 0.467 | 0.522 | 0.596 |
| | 1st-2nd years | 0.133*** | 0.080** | 0.046** | 0.079 | 0.040* | 0.016*** | -0.001 | 0.047 | -28.413 | 17.027 |
| | | [0.031] | [0.034] | [0.023] | [0.177] | [0.023] | [0.002] | [0.010] | [0.038] | [37.809] | [20.228] |
| | 3rd-5th years | 0.033** | -0.013 | 0.041*** | 0.180*** | 0.011 | 0.009 | -0.014 | -0.015 | -36.504 | 14.027 |
| | | [0.016] | [0.013] | [0.015] | [0.052] | [0.013] | [0.006] | [0.012] | [0.026] | [30.108] | [13.516] |
| | 6th-10th years | 0.035** | -0.002 | 0.027** | 0.070 | 0.012 | 0.005 | 0.011* | 0.019 | 63.019* | -7.854 |
| | | [0.014] | [0.010] | [0.011] | [0.051] | [0.012] | [0.005] | [0.006] | [0.020] | [35.244] | [12.688] |
| n=50 | Number of observations | 27,301 | 23,872 | 23,872 | 9,769 | 27,301 | 27,301 | 27,301 | 27,301 | 27,301 | 27,301 |
| | Number of firms | 3,426 | 3,308 | 3,308 | 1,454 | 3,426 | 3,426 | 3,426 | 3,426 | 3,426 | 3,426 |
| | R-squared | 0.706 | 0.029 | 0.786 | 0.838 | 0.931 | 0.020 | 0.959 | 0.368 | 0.341 | 0.032 |
| | Ho: no serial correlation | | | | | | | | | | |
| | $\rho$(rho) | -0.005 | 0.002 | -0.000 | 0.006 | 0.004 | 0.016 | -0.007 | -0.006 | -0.065 | 0.051 |
| | p-value | 0.638 | 0.493 | 0.972 | 0.770 | 0.881 | 0.705 | 0.673 | 0.387 | 0.397 | 0.590 |
| | 1st-2nd years | 0.129*** | 0.078** | 0.041* | 0.089 | 0.033 | 0.013*** | 0.001 | 0.042 | 7.088 | 7.088 |
| | | [0.031] | [0.033] | [0.024] | [0.188] | [0.024] | [0.003] | [0.011] | [0.039] | [31.584] | [20.084] |
| | 3rd-5th years | 0.031* | -0.008 | 0.040*** | 0.202*** | 0.005 | 0.010* | -0.012 | -0.021 | 1.042 | 11.736 |
| | | [0.016] | [0.013] | [0.016] | [0.058] | [0.014] | [0.006] | [0.011] | [0.027] | [26.088] | [13.772] |
| | 6th-10th years | 0.036** | -0.001 | 0.027** | 0.053 | 0.005 | 0.004 | 0.013** | 0.012 | 71.512** | -7.706 |
| | | [0.014] | [0.010] | [0.011] | [0.054] | [0.012] | [0.005] | [0.006] | [0.020] | [31.525] | [13.313] |
| n=10 | Number of observations | 8,585 | 7,525 | 7,525 | 3,43 | 8,585 | 8,585 | 8,585 | 8,585 | 8,585 | 8,585 |
| | Number of firms | 1,060 | 1,026 | 1,026 | 509 | 1,060 | 1,060 | 1,060 | 1,060 | 1,060 | 1,060 |
| | R-squared | 0.705 | 0.048 | 0.789 | 0.844 | 0.937 | 0.048 | 0.963 | 0.391 | 0.572 | 0.082 |
| | Ho: no serial correlation | | | | | | | | | | |
| | $\rho$(rho) | -0.010 | 0.001 | 0.007 | 0.030 | 0.004 | -0.007 | 0.010 | -0.010 | -0.012 | -0.021 |
| | p-value | 0.602 | 0.908 | 0.661 | 0.310 | 0.938 | 0.896 | 0.759 | 0.395 | 0.793 | 0.668 |

Notes: (a) Estimates of lagged dependent variable model on common support. (b) All regressions include six lags of the outcome variable, year, industry-year, province-year, multinational-year, type of corporation-year dummies, age and age squared. (c) Robust standard errors in parentheses. (d) ***, **, * statistically significant at 1%, 5%, and 10%.