

LEARNING BY EXPORTING AND SELF-SELECTION HYPOTHESES: EVIDENCE FROM CROATIA

Kladiola Gjini³⁰

Kolë Prenga³¹

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Abstract: *In this paper we estimate the probability to export by adopting a (random effect panel) Probit model for Croatian firm level data over the 2002-2013 periods. We strongly support the hypothesis that self-selection into export markets occurs for more productive firms. The effects of total factor productivity in export are shown to be in the long run. Furthermore, we find a significant effect for lagged productivity on export participation. Our findings support the learning by exporting hypothesis, that export participation has a positive strong effect on productivity. Given the importance of the subject, this paper invites further research in firm performance-export relationship for Croatia.*

Key words: *export, self-selection hypothesis, learning by exporting hypothesis, productivity*

INTRODUCTION

This paper is an extension of a larger research linked to Croatia [see (Gjini., 2018) (Gjini., 2017)]. The main objective of this paper is to investigate two main hypotheses which link firm's productivity and export: self-selection and learning-by-exporting (hereafter SS and LBE). The novelty of this paper lies on the large dataset we use for Croatia³² for the 2003-2012 period of time. To the best of our knowledge research related to this topic is not fully covered, and we want to contribute to the large body of the literature for better policy making.

We use a sample of 64.712 firms (unbalanced panel data), obtained from Bureau Vank Dijk Electronic Publishing (BvDEP) the Amadeus database. Firms report information regarding their balance sheet and their profit/loss accounts. Firms are classified according to: their *size* into micro, small, medium and large; their *ownership* into foreign/domestic firms; their *sector* into manufacture/service firms and their *export status* into exporting/non-exporting firms.

The remaining of paper is organized as follows: section two provides the literature review on the two hypotheses SS and LBE. Section three presents the methodology used to test the two non-exclusive hypotheses (LBE) and (SS), and the methodology used to check for possible structural breaks. Section four provides the empirical results from different estimations and section five concludes.

³⁰ Lecturer University 'Aleksandër Xhuvani' Economics Department, Elbasan Albania; PhD candidate University of Tirana, Albania

³¹ University of Tirana Albania, Economics Department

³² Croatia is the last country to join European Union (1st of July 2013)

LITERATURE REVIEW ON SS AND LBE

The self-selection hypothesis does not exclude the learning by exporting hypothesis. The discussion of the direction of the causality: *exports increase productivity* or *productivity increases exports*, has been a point of debate among researchers. Entering the export market involves large sunk costs and high entry/exit barriers, so firms need higher profits to overcome these fixed costs. (Harris and Li, 2007) state that firms prior to enter the export market have a higher productivity compared to non-exporters. (Wagner, 2007) suggests that firms that are more productive tend to self-select into export markets, and he finds that it is not necessary that exporting enhances productivity. In their research (Vu et al., 2016) argue that using a Probit model to test the self-selection hypothesis can lead to biased or inconsistent estimates³³. In the trade literature many authors support the self-selection hypothesis i.e. (Bernard and Jensen, 1999), (Girma et al., 2002), (Wagner, 2007), (Delgado et al., 2002). They provide evidence on how more productive firms self-select into exporting markets. Only in few studies there is evidence i.e. (Greenaway and Kneller, 2004) that exporters do not outperform non-exporters. Examples are from United Kingdom by (Bleaney and Wakelin, 2002), from Sweden by (Greenaway and Kneller, 2005), from Slovenia by (Damijan et al., 2005). Based on the empirical evidence we find mixed conclusive findings for the LBE hypothesis. When we compare exporters to non-exporters the difference is significant and affects firm's participation into export markets. (Fernandes and Isgut, 2005) make a parallel between learning by doing and learning by exporting. (Arrow, 1971) argues that experience and repetition are associated with learning. For domestic firms learning happens during activities where probably some problems might occur. If the same problem repeatedly occurs over time, it is subject to diminishing returns. In order to improve firm's performance there is need not only for repetition but also for evolution over time. According to (Clerides et al., 1998) productive firms with a lower marginal cost will benefit from exporting (in terms of higher gross profits). But not all firms export, so they conclude that only firms that exceed sunk costs and with higher profits can make export activities. To better capture the effect of learning by exporting (Fernandes and Isgut, 2005) propose two ideas: (1) focusing on young plants³⁴ and (2) focusing in export experience rather than export participation. Other authors i.e. (Isgut, 2001), (Fafchamps et al., 2002) and (Delgado et al., 2002), (Castellani, 2002), (De Loecker, 2007) and (Arnold and Hussinger, 2005) support the learning by exporting hypothesis.

METHODOLOGY

Learning by exporting and self-selection hypotheses

We will test the two non-exclusive hypotheses LBE by using a fixed effect (FE) regression as in equation (1) and SS by using a dynamic Probit regression as in equation (2). Results for the self-selection hypothesis are reported in table 1, and results for the learning by exporting hypothesis are reported in table 2.

In equation (1) the main interest variable is export. To disentangle the learning by exporting we employ lagged productivity and lagged export as factors that can motivate a firm to start exporting. In equation (2) productivity is the main interest variable. In this model we include firm characteristics as in other studies i.e. (Aw et al., 2007) and (Roper et al., 2006).

³³ Non evaluating the impact of some unobserved factors such as business & marketing strategy, managerial skills, product specifications

³⁴ Young plants are more open to new stimulating ideas in order to solve organizational/technical problems.

Previously, (Gjini., 2018) has estimated total factor productivity³⁵ by using the semi-parametric estimator of (Levinsohn and Petrin., 2003) which solves issues like simultaneity and/or endogeneity [using levpst STATA (12.1) programme written by (Petrin et al., 2004)].

$$TFP_{it} = \beta_0 + \beta_1 TFP_{i,t-1} + \beta_2 EXP_{i,t-1} + \beta_3 CONTROLS_{it} + e_{it} \quad (1)$$

$$Prob(EXP = 1) = \varphi(\alpha TFP_{i,t-1} + \alpha_1 EXP_{i,t-1} + \alpha_2 CONTROLS_{it}) + d_i + \psi_{it} \quad (2)$$

Table 1: Random effects dynamic Probit models

	est1	est2	est3	est4
export	β/p	β/p	β/p	β/p
ln_tfp	0.476*** (0.00)		0.467*** (0.00)	
age	-0.055*** (0.00)	-0.116*** (0.00)	0.023 (0.05)	0.022 (0.07)
size	0.723*** (0.00)	0.830*** (0.00)	0.728*** (0.00)	0.823*** (0.00)
foreign	2.215*** (0.00)	2.641*** (0.00)	2.266*** (0.00)	2.727*** (0.00)
sector	0.761*** (0.00)	0.762*** (0.00)	0.764*** (0.00)	0.775*** (0.00)
lag_tfp		0.168*** (0.00)		0.178*** (0.00)
Iyear2004			0.064** (0.00)	-0.031 (0.15)
Iyear2005			0.076*** (0.00)	-0.029 (0.18)
Iyear2006			0.039 (0.07)	-0.052* (0.02)
Iyear2007			0.048* (0.03)	-0.035 (0.11)
Iyear2008			-0.241*** (0.00)	-0.346*** (0.00)
Iyear2009			-0.298*** (0.00)	-0.468*** (0.00)
Iyear2010			-0.155*** (0.00)	-0.346*** (0.00)
Iyear2011			-0.110*** (0.00)	-0.289*** (0.00)
Iyear2012			-0.070** (0.00)	-0.271*** (0.00)
cons	-8.171*** (0.00)	-4.863*** (0.00)	-8.189*** (0.00)	-5.103*** (0.00)
lnsig2u				
cons	1.623*** (0.00)	1.740*** (0.00)	1.646*** (0.00)	1.776*** (0.00)
N	256794	256793	256794	256793

³⁵ Output here is calculated by using the value added (as the difference between sales and intermediate inputs)

Table 2 presents the results from 4 FE estimations in order to explain the LBE hypothesis. In the first columns we use the export variable to estimate its impact on productivity. In the second column we add the one-period lagged export variable. On the third column of table 2 we add the one-period lagged productivity variable, and in the fourth column of table 2 we have both effects of one-period lagged export variable and one-period lagged productivity variable on the firm's productivity.

Table 2: Fixed effects for LBE

	est1	est2	est3	est4
	<i>beta/p</i>	<i>beta/p</i>	<i>beta/p</i>	<i>beta/p</i>
export	0.104*** (0.00)		0.102*** (0.00)	
age	-0.154*** (0.00)	-0.153*** (0.00)	-0.162*** (0.00)	-0.161*** (0.00)
size	0.110*** (0.00)	0.067*** (0.00)	0.101*** (0.00)	0.056*** (0.00)
foreign	0.163 (0.17)	0.104 (0.47)	0.143 (0.23)	0.090 (0.53)
lagexp		0.017*** (0.00)		0.005** (0.01)
lagtfp			0.041*** (0.00)	0.101*** (0.00)
cons	11.257*** (0.00)	11.569*** (0.00)	10.834*** (0.00)	10.596*** (0.00)
N	256794	63570	256793	63570

Structural break test

We perform the Chow test according to (Chow, 1960) to examine any possible structural breaks in our data. We want to test if the link *total factor productivity* and firm characteristics *export*, *age*, *size*, *foreign* and *sector* remains stable before and after the global financial crisis. Do firms in Croatia have similarities in productivity before and after the financial crisis of 2009? We create a new variable *fincrisis* which is coded 0 for the period before 2009, and is coded 1 for the period after 2009. Most of our observations belong to prior global financial crisis. In the sample about 55.68% of firms operate before 2009, and the remaining 44.32% operate after 2009. Our first model without any break is as below in equation (3).

$$\text{Intfp} = \beta_0 + \beta_1 * \text{export} + \beta_2 * \text{age} + \beta_3 * \text{size} + \beta_4 * \text{foreign} + \beta_5 * \text{sector} + u \quad (3)$$

$$\text{Intfp} = \alpha_0 + \alpha_1 * \text{export} + \alpha_2 * \text{age} + \alpha_3 * \text{size} + \alpha_4 * \text{foreign} + \alpha_5 * \text{sector} + v \quad (4)$$

$$\text{Intfp} = \gamma_0 + \gamma_1 * \text{export} + \gamma_2 * \text{age} + \gamma_3 * \text{size} + \gamma_4 * \text{foreign} + \gamma_5 * \text{sector} + \epsilon \quad (5)$$

We re-run equation (3) including the *fincrisis* variable. Equation (4) refers to the model before 2009, and equation (5) refers to the model after 2009.

H_0 : $\alpha_0 = \gamma_0$ and $\alpha_1 = \gamma_1$ and $\alpha_2 = \gamma_2$ and $\alpha_3 = \gamma_3$ and $\alpha_4 = \gamma_4$ and $\alpha_5 = \gamma_5$ (no structural break)

H_1 : $\alpha_0 \neq \gamma_0$ or $\alpha_1 \neq \gamma_1$ or $\alpha_2 \neq \gamma_2$ or $\alpha_3 \neq \gamma_3$ or $\alpha_4 \neq \gamma_4$ or $\alpha_5 \neq \gamma_5$ (structural break)

The F-statistics is calculated as:

$$F = \frac{(RSS_6 - RSS_7 - RSS_8)/k}{RSS_7 + RSS_8/(T - 2k)} \quad (6)$$

From equations (3) (4) and (5) we get respectively RSS_6 , RSS_7 and RSS_8 . We find the F estimated value which is 295, higher than the f-critical value of 2.09. We reject the null hypothesis of no structural break.

EMPRIRICAL RESULTS

As shown from estimations the effect of *productivity* in export participation is positive and statistically significant. Furthermore, if we use *lagged productivity* variable we support the hypothesis that self-selection into exporting markets occurs for more productive firms. The significant effect of lagged productivity on export participation is a reflection of the large dataset we have, and which allows us to control for past productivity effect on current export status.

The effects of TFP in export are shown to be in the long-run. As expected the effect of *age* on export participation is negative, older firms have a lower probability to export. With regard to *size*, we find that larger firms gain a higher probability to export than micro and SME firms.

Again productivity and past productivity have a positive effect in exporting. And when adding year dummies the effect of *age* becomes positive. With regard to firm's characteristics their effect only gets stronger when adding year dummies. To estimate the effect of learning by exporting we run four estimations where the dependent variable is firm productivity (we use export status and one-period lagged export status).

Export participation has a positive statistically significant effect on productivity. This supports the learning by exporting effects of firms as stated by (De Loecker, 2007). Firm's age is useful to capture the experience in exporting activities and in production (Fernandes, 2007). The coefficient of *age* is negative and statistically significant in the four models estimated. We find that lags of export status have a significant effect on productivity. Coefficients, standard errors, t-statistics and associated p-values in the Probit model are statistically significant at the 95% of confidence interval.

CONCLUSIONS

By adopting a (random effect panel) Probit model we estimate the probability to export, and we confirm of a positive effect of *productivity* in export participation. We strongly support the hypothesis that self-selection into export markets occurs for more productive firms. The effects of TFP in export are shown to be in the long run.

Furthermore, the large dataset we have allows us to find a significant effect for lagged productivity on export participation.



Kladiola Gjini (PhD candidate) is currently a lecturer/young researcher affiliated to the University "Aleksandër Xhuvani" Economics Department Elbasan Albania. She teaches classes of Principles to Economics and Microeconomics to first-year students. Her current research projects focus on microeconomics and productivity. Mrs. Gjini areas of expertise include international trade, firm performance and economic aspects of European Integration. Mrs. Gjini is a PhD candidate at the university of Tirana Albania, Economics Department.

From the empirical results we conclude that export participation has a positive strong effect on productivity, which supports the learning by exporting hypothesis.

From the empirical evidence we confirm the existence of structural break. Our variables have a structural break in the 2003-2012 period which can be attributed to (1) the financial global crisis and/or (2) negotiations between EU and Croatia for the country accession and conclusion of 35 chapters of 'acquis'.

Due to gaps on firm performance and international trade in research that follow from our findings, these topics deserve further investigation.

Prof. Dr Kolë Prenga

has a long career at the Economics Department University of Tirana Albania. He has been in several leading positions at the faculty of Economics, and now is retired. He is author and co-author of many books in the field of macroeconomics. His main interest include fiscal policy, foreign direct investments, inflation. Prof. Prenga continues to teach as a guest professor in the public and private universities in Tirana Albania.



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