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Firm-level determinants of direct and indirect exports: empirical evidence for C.E.E. and M.E.N.A. countries

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ABSTRACT

In this paper, we study the determinants of the direct and indirect export performance of firms in Central and Eastern European (C.E.E.) and Middle Eastern and North African (M.E.N.A.) countries, both jointly and separately. In particular, we address three research questions: (i) Do the firms that export indirectly display the same characteristics as those that directly export their products?; (ii) Is the role of innovation, research and development (R&D) and human capital in export performance the same for firms that export directly and indirectly? and (iii) Is there geographical differentiation between C.E.E. and M.E.N.A. countries at the firm-level determinants of export performance? The analysis is based on a firm-level database (B.E.E.P.S. V) and covers the period between 2011 and 2014. We estimate the probability of exports, controlling for country and sector-specific effects using the probit model. We find that product innovations are more important than process innovations in determining direct export performance for the whole sample of countries. In addition, we find that the level of firm productivity, spending on R&D, human capital, foreign licences and foreign ownership are important in determining the export performance of the firms that export directly but not in the case of indirect exporters.

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1. Introduction

The growing availability of firm-level data has contributed to the development of a new strand in the trade theory literature, one that focuses on the role of firm heterogeneity in foreign market entry strategies. Since the seminal studies of Bernard and Jensen (1997, 1999), Roberts and Tybout (1997), Melitz (2003), Bernard, Jensen, and Schott (2006) and Helpman, Melitz, and Yeaple (2004), a major focus in international trade has been on the relationship between the characteristics of producing firms, most notably productivity, and their participation in international trade and foreign direct investment.

However, the original Melitz (2003) model, and the majority of its extensions, considers only those firms that export their products to foreign markets directly. At the same time, the international business literature has long argued that exporters may not only export

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directly to foreign buyers but may also use foreign wholesale affiliates or work with a trade intermediary (e.g., Peng & Ilinitch, 1998). The importance of indirect exporting has been documented by several studies. For example, Bernard, Jensen, Redding, and Schott (2010a) documented that 43% of exporting firms and 55% of importing firms in the U.S. are trade intermediaries, Ahn, Khandelwal, and Wei (2011) show that intermediary firms handle around 22% of aggregate Chinese exports, Blum, Claro, and Horstmann (2010) reported a share of 35% for Chilean imports, Akerman (2016) found that 15% of total Swedish export volume is due to wholesalers, Bernard, Grazzi, and Tomasi (2015) found that 15% of Italian goods are exported indirectly and Abel-Koch (2013) reported that only 51% of Turkish exporters do not rely on trade intermediaries.

The role of indirect exporting is also important in the context of Global Value Chains (G.V.C.) analysis. There are some recent studies, such as that of Taglioni and Winkler (2016), which show that indirect exporters constitute an important share of total exports and contribute to the creation of additional value added to the economy. This phenomenon is especially interesting and important in the case of the New Member States (N.M.S.) of the European Union. The evidence for post-Soviet and Middle Eastern and North African (M.E.N.A.) countries is very limited. In particular, there is still relatively little known about what types of firms export through intermediaries and what types of firms export directly by themselves, especially in the context of developing and transition countries.

Therefore, the main goal of this paper is to study the determinants of the direct and indirect export performance of firms in Central and Eastern European (C.E.E.) and M.E.N.A. countries, both jointly and separately for different subgroups of countries. In particular, we address three research questions: (i) Do the firms that export indirectly display the same characteristics as those that directly export their products?; (ii) Is the role of innovation, research and development (R&D) and human capital in export performance the same for the firms that export directly and indirectly?; and (iii) Is there geographical differentiation between C.E.E. and M.E.N.A. countries at the firm-level determinants of export performance?

Our paper is related to a growing literature on the role of indirect exporting in international trade. Given the importance of indirect exporting, some theoretical efforts have been made to study the role of trade intermediaries. As a result, some understanding has been gained regarding how intermediaries facilitate trade (e.g., Antràs & Costinot, 2011; Feenstra & Hanson, 2004) and how they differ from direct exporters (e.g., Ahn et al., 2011; Rauch & Watson, 2004). However, there are still few theoretical papers on the optimal organisational choice between the export modes, in particular, those that distinguish between direct and indirect ways of exporting (Bernard, Redding, & Schott, 2011; Felbermayr & Jung, 2011; Lu, Yi, & Tao, 2017). These papers emphasise that exporters include firms that organise the production and distribution of their goods abroad (direct exporters), as well as intermediaries that specialise in distribution in foreign markets and allow other firms to export their products to foreign markets indirectly.

Empirical evidence that is based on the theory is also limited. For example, with regard to Swedish firms, Abel-Koch (2013) showed that as a proportion of total exports, the share of direct exports increases with the size of the firms. This finding is also confirmed in Ahn et al. (2011). McCann (2013) shows that in Eastern Europe and Central Asia, firms exporting through a trade intermediary, as predicted by the theoretical literature, lie between domestic firms and direct exporters for a range of performance measures. More recently,

Lu et al. (2017) more directly address the hierarchy prediction of the theory, showing that as productivity increases, the likelihood of moving up the hierarchy from non-exporter through indirect exporter to direct exporter increases.

We depart from the previous studies by investigating what types of producers export directly and which firms indirectly export their goods. A further advantage of our approach is the differentiation between C.E.E. and M.E.N.A. countries. Our study is based on a firm-level database (Business Environment and Enterprise Performance Survey, B.E.E.P.S. V) and covers the period between 2011 and 2014. We estimate the probability of exports, controlling for country and sector-specific effects using the probit model. We find that product innovations are more important than process innovations in determining direct export performance for the whole sample of countries. In addition, we find that the level of firm productivity, spending on R&D, human capital, foreign licences and foreign ownership are important in determining the export performance for the firms that export directly but not in the case of indirect exporters. These findings should also contribute to a better understanding of the different ways in which managers and marketing specialists in the C.E.E. and M.E.N.A. countries enter foreign markets.

The structure of this paper is as follows. In the next section, we discuss the theoretical framework and the research methodology. We then discuss the properties of the data-set. Subsequently, we present our estimation results. Finally, we summarise and conclude with directions for further research.

2. Theoretical framework and research methodology

The new strand in trade theory argues that the level of firm productivity is critical for exporting. In particular, Melitz (2003) relaxed the key assumption of the firm symmetry in the Krugman (1980) monopolistic competition model and introduced firm heterogeneity in terms of labour productivity. In his model, productivity differences among firms are exogenously given and each firm has to pay fixed costs of entry into domestic and foreign markets. The model predicts that the most productive firms with the lowest marginal costs can cover the fixed cost of entry and become exporters. Each unit of export incurs a constant, iceberg trade cost. This explains why, in reality, a significant fraction of firms in an industry do not export and these non-exporting firms are, on average, small. The Melitz (2003) model can be used to study the whole range of various issues. In particular, it can be used to study the effects of trade liberalisation. A reduction in the cost of exporting reduces the threshold level of productivity that firms need to export and, consequently, the productivity that non-exporters can attain in order to enter the new export markets. The majority of empirical studies find support for the theoretical prediction of the Melitz (2003) model, i.e., that more productive firms self-select into foreign markets.[1]

In our paper, we refer to the self-selection hypothesis. In particular, we follow the recent approach proposed by Lu et al. (2017), which can be viewed as an extension of the original Melitz (2003) model. Their theoretical analysis builds upon a standard trade framework: a home country plus N foreign countries, two sectors and one production factor (i.e., labour). They take the homogeneous good (X) as a numeraire and assume the utility function for the differentiated goods (Y) to be a constant elasticity of the substitution function to derive the demand function for any variety of the differentiated goods (Y) in a country. The production of the differentiated goods (Y) takes place only in the home country, as in Melitz (2003).

They assume that sales in the home country do not involve any fixed costs so that any firms with positive production always sell in the home country. Meanwhile, firms can choose to export to a foreign country (i) either directly by themselves or through intermediaries. For the case of direct exporting, they assume that there is a fixed cost of exporting to each of the foreign countries, as in Chaney (2008). For the case of exporting through intermediaries, firms do not need to incur the fixed cost of direct exporting. However, it is assumed that in this case, firms have to share a portion of their exporting revenue with the intermediaries. Meanwhile, there is the fixed cost of dealing with the intermediaries, which is assumed to be lower than the fixed cost of direct exporting.

Using this framework, Lu et al. (2017) show that as a firm's productivity increases, it switches from only having sales in the home country to having sales in both the home country and exporting. The methods of exporting also change as a firm's productivity increases. First, it begins by exporting through intermediaries, then proceeds to both direct exporting and exporting through intermediaries and finally to direct exporting.

Our dependent variable indicating the export status of firm i is denoted by Y_i^*. Instead of observing the volume of exports, we observe only a binary variable, Y_i, indicating the sign of Y_i^*, i.e., whether the firm sells its output in the domestic market (local, regional or national) or exports its output. Moreover, we assume that the variable Y_i^* follows $Y_i^* = \mathbf{X_i}\boldsymbol{\Theta} + \varepsilon_i$, where the error term ε_i is independent of $\mathbf{X_i}$, which is a vector containing explanatory variables that affect exports with the first term equal to unity for all i, $\boldsymbol{\Theta}$ is the vector of parameters on these variables that needs to be estimated and ε_i is assumed to be normally distributed with a zero mean.

Our dependent variable follows a binary distribution and takes the value 1 when the firm exports (directly or indirectly) and 0 otherwise:

$$Y_i = \begin{cases} 1 & \text{if } Y_i^* > 0 \\ 0 & \text{if } Y_i^* = 0 \end{cases} \tag{1}$$

We can obtain the distribution of Y_i given $\mathbf{X_i}$. Hence, the probability that a firm exports can be written as:

$$P\left(Y_i = 1|\mathbf{X_i}\right) = \Phi\left(\mathbf{X_i}\theta\right) \tag{2}$$

where $\Phi(\cdot)$ denotes the standard normal cumulative distribution function (cdf).

To be able to successfully employ the probit model, it is important to know how to interpret the vector of the estimated parameters on the explanatory variables Θ. Consider a specific explanatory variable x_{ij}, which is an element of vector $\mathbf{X_i}$. The partial effect of x_{ij} on the probability of exporting can be written as:

$$\partial P\left(Y_i = 1|\mathbf{X_i}\right)/\partial x_{ij} = \partial p\left(\mathbf{X_i}\right)/\partial x_{ij} \tag{3}$$

When multiplied by Δx_{ij}, Equation (3) gives the approximate change in $P(Y_i{=}1|\mathbf{X_i})$ when x_{ij} increases by Δx_{ij}, holding all other variables constant.

3. Statistical data

Our study is based on the 'E.B.R.D.-World Bank Business Environment and Enterprise Performance Survey' (B.E.E.P.S.) firm-level data, collected by the World Bank and the European Bank for Reconstruction and Development in the post-communist countries located mainly in Europe and Central Asia and in M.E.N.A. countries. The survey questions were concerned with the identification of the firm, the sector of activity, the legal and economic status, the characteristics of the managers and the size of the firm, the infrastructure of services in the analysed country, the economic performance and key characteristics of the reviewed firms, as well as the stakeholders, e.g., employer organisations, employee organisations, local government, central government, the information and communications technology (I.C.T.) industry, small and medium-sized enterprises (S.M.E.s), academics, etc.

The sample of B.E.E.P.S. V data was collected for the period 2011–2014 and consists of 22,449 observations. Almost 60% of the surveys in all countries were conducted in 2013.[2] The B.E.E.P.S. V surveys covered both the manufacturing and service sectors and are representative of the variety of firms according to sector and location within each country. The number of firms operating in the service sector was relatively small compared to the manufacturing sector. Therefore, it was not possible to perform estimations separately for the manufacturing and service sectors. Moreover, particular industries within each sector can differ with respect to their capital intensity and export performance. Therefore, in order to control for heterogeneity across industries, we used industry-specific effects in addition to individual firm characteristics in our estimating equations.

In all countries where a reliable sample frame was available, the sample was selected using stratified random sampling.[3] However, in the B.E.E.P.S. V sample, almost all data were collected for one year only. This means that the application of panel data analysis was not possible. Therefore, we used the standard probit procedure on the pooled cross-section data-set without controlling for individual firm effects but we did control for country-specific and industry-specific effects. The list of countries in our sample is shown in Table 1. In the majority of cases, the data include around 250–350 observations per country. The largest samples of firms in the whole database are available for Russia (4220), Egypt (2897), Turkey (1344) and Ukraine (1002).

In Table 1A we present the data for firms from C.E.E. countries, while Table 1B shows that from M.E.N.A. countries. In these tables, we report the split between the firms that sell their products only to the domestic market and those that export – directly or indirectly – to foreign markets. In order to gain a clear distinction between these three types of firms, we defined direct exporters as those that sell more than 1% of their products to foreign markets directly and do not export them indirectly, although some part of their total sales can also be delivered to the domestic market. The indirect exporters sell more than 1% of their products indirectly through various channels or deliver them to the domestic market but do not export them directly. Finally, the non-exporters sell all their products only in the domestic market. This categorisation meant that some observations were not included in our analysis. In some cases, the firms were exporting both directly and indirectly and were therefore categorised as exporters (in general). In addition, some observations were excluded since the firms did not provide precise information regarding the percentage structure of their sales. Thus, the total number of observations reduced from 22,449 to 16,641.

Table 1A. The number of firms from C.E.E. countries that do not export, export indirectly and export directly, and the relevant shares.

Country	Total No. of firms	No. of indirect exporters	No. of direct exporters	No. of non-exporters	Indirect as a % of non-exporters	Direct as a % of non-exporters
Albania	360	14	33	313	4.5	10.5
Armenia	360	7	34	319	2.2	10.7
Azerbaijan	390	5	4	381	1.3	1.0
Belarus	360	26	63	271	9.6	23.2
Bosnia-Herzegovina	360	22	71	267	8.2	26.6
Bulgaria	293	16	51	226	7.1	22.6
Croatia	360	19	84	257	7.4	32.7
Czech Republic	254	18	77	159	11.3	48.4
Estonia	273	33	65	175	18.9	37.1
FYR Macedonia	360	32	65	263	12.2	24.7
Georgia	360	11	21	328	3.4	6.4
Hungary	310	20	38	252	7.9	15.1
Kazakhstan	600	18	16	566	3.2	2.8
Kosovo	202	16	34	152	10.5	22.4
Kyrgyzstan	270	17	22	231	7.4	9.5
Latvia	336	21	73	242	8.7	30.2
Lithuania	270	21	57	192	10.9	29.7
Moldova	360	23	15	322	7.1	4.7
Mongolia	360	15	14	331	4.5	4.2
Montenegro	150	12	8	130	9.2	6.2
Poland	542	28	80	434	6.5	18.4
Russia	4220	146	218	3856	3.8	5.7
Romania	540	24	100	416	5.8	24.0
Serbia	360	9	95	256	3.5	37.1
Slovak Republic	268	22	58	188	11.7	30.9
Slovenia	270	5	132	133	3.8	99.2
Tajikistan	359	28	18	313	8.9	5.8
Ukraine	1002	91	77	834	10.9	9.2
Uzbekistan	390	11	20	359	3.1	5.6
Total	14,539	730	1643	12,166	**6.0**	**13.5**

Source: own calculations based on B.E.E.P.S. V database.

Table 1B. The number of firms from M.E.N.A. countries that do not export, export indirectly and export directly, and the relevant shares.

Country	Total No. of firms	No. of indirect exporters	No. of direct exporters	No. of non-exporters	Indirect as a % of non-exporters	Direct as a % of non-exporters
Egypt	2897	130	338	2429	5.4	13.9
Israel	483	31	95	357	8.7	26.6
Jordan	573	31	156	386	8.0	40.4
Lebanon	561	32	178	351	9.1	50.7
Morocco	407	29	74	304	9.5	24.3
Tunisia	592	45	226	321	14.0	70.4
Turkey	1344	220	291	833	26.4	34.9
Total	**6857**	518	1358	4981	**10.4**	**27.3**

Source: own calculations based on B.E.E.P.S. V database. The data for West Bank and Gaza are omitted (one observation in some categories).

The overall distribution of firms is roughly in line with the firm-level data analysed for individual countries in other studies (see e.g., Bernard et al., 2011). The indirect exporters constituted 7.7% of non-exporting firms, the share of direct exporters was equal to 18.8% of non-exporters, whereas around 75% of firms sold their products exclusively in the domestic

market. However, the differences among individual countries were very significant. The proportion of direct exporters to non-exporters in some former Soviet republics (Azerbaijan, Russia, Tajikistan, Uzbekistan) and Mongolia was very small and did not exceed 5%. In those countries, the share of indirect exporters was fairly similar or even larger. In other countries, the proportion of direct exporters was much larger, frequently exceeding 30%, and above 50% in some rare cases (Czech Republic, Lebanon, Slovenia, Tunisia).[4] The proportion of indirect exporters was usually two to three times lower in comparison to direct exporters. The smaller and more developed countries, with higher G.D.P. per capita, usually had a larger share of exporting firms in the whole sample. Moreover, the firms in M.E.N.A. countries were more export-oriented in comparison to those from C.E.E. countries. The proportion of indirect exporters to non-exporters was 10.4% among M.E.N.A. countries and 6% in the case of C.E.E. countries. The proportion of direct exporters was also much higher in the case of M.E.N.A. countries (27.3%) in comparison to C.E.E. countries (13.5%). This result is mainly driven by the performance of firms from Russia and other (trans-Caucasian) post-Soviet countries.

In our study, we analysed the firm-level determinants of different forms of export performance. In particular, we investigated whether these determinants differ significantly between indirect and direct exporters. Our dependent variable, indicating the export status of the firm, takes the form of a binary variable. It takes value zero if the firm sells its output only in the domestic market and one otherwise, i.e., if it also sells some of its output abroad. We distinguish here – as already explained – between direct and indirect exports.

In our study, we selected a number of independent variables that should reflect the important characteristics of firms[5] and their innovation efforts. Thus, apart from standard independent variables, reflecting the stock of human capital and R&D activities, in our study, we also take into consideration the various forms of innovation, i.e., product, process, marketing and management, reported by individual firms.

The descriptions of all variables used in the empirical study are presented in Table 2.

The summary statistics and correlations between independent variables for the whole sample are shown in Tables A1 and A2 in the Annex. The levels of bilateral correlations between variables are small, with the exception of innovation variables. In particular, the correlation between product innovations and process innovations is equal to 0.494, while that between marketing and management innovations is equal to 0.538. Thus, the interpretations of the estimations of innovation variables should be treated with caution.

4. Estimation results

In Table 3 we present the results of the estimations carried out for total exports, direct exports and indirect exports using three different definitions of dependent variables and three sets of countries. First, we discuss the results obtained for all countries covered in the B.E.E.P.S. V database. In column (1) we discuss the results for firms that export at least some output; in column (2) the results for firms that are direct exporters; and in column (3) the results for those firms that export their products only indirectly. We then present, in a similar way, the estimation results for the M.E.N.A. countries (columns (4)–(6)) and for C.E.E. countries (columns (7)–(9)).

In column (1) of Table 3, we report the benchmark results for the whole sample of countries. We estimated the relationship between various innovation activities and overall

Table 2. Variables used in the empirical analysis.

Dependent variables used in separate estimations:	Description of variables:
Export	Binary variables that take the value 1 if the establishment is exporting and zero if not.
Direct export	Binary variables that take the value 1 if the establishment is exporting directly and zero if not.
Indirect export	Binary variables that take the value 1 if the establishment is exporting indirectly and zero if not.
Independent variables:	Description of variables:
Lprod	Logarithm of productivity expressed as the total amount of annual sales per full-time employee.
Age	The number of years since the establishment of the company.
Share_gov	Percentage of capital owned by government/state.
Innov_product	Binary variable describing whether new products/services had been introduced over the last three years.
Innov_process	Binary variable describing whether new production/supply methods had been introduced over the last three years.
Innov_management	Binary variable describing whether new organisational/ management practices had been introduced over the last three years.
Innov_marketing	Binary variable describing whether new marketing methods had been introduced over the last three years.
R_D	Binary variable describing whether there had been a spending on R&D over the last three years.
Uni	Percentage of full-time employees who had completed a university degree.
Lsize	Logarithm of the number of permanent, full-time employees in this firm at the end of the last fiscal year.
Multi[a]	100 minus the share of the main product in total sales. This variable measures whether the firm is producing many (multiple) products (zero means that the main product represents 100% of supply).
Fo	Binary variable indicating whether the percentage owned by private foreign individuals is larger than zero.
Folicences	Binary variable describing whether the firm used technology licenced from a foreign-owned company.

[a]The role of product mix for exporters is analysed e.g. in Mayer, Melitz, and Ottaviano (2014).
Source: own calculations based on B.E.E.P.S. V database.

Table 3. The results of probit estimations carried out for total exports, direct exports and indirect exports for all countries, M.E.N.A. and C.E.E. countries, controlling for country and sector-specific effects.

	All countries			M.E.N.A. countries			C.E.E. countries		
VARIABLES	1	2	3	4	5	6	7	8	9
	export	direct	indirect	export	direct	indirect	export	direct	indirect
lprod	0.0798***	0.0860***	0.00839	0.0604***	0.0619***	0.00780	0.0939***	0.104***	0.00137
	(0.00894)	(0.00997)	(0.0122)	(0.0135)	(0.0149)	(0.0182)	(0.0126)	(0.0142)	(0.0173)
age	0.00158*	0.000276	0.00151	0.00181	0.000914	0.00110	0.000947	−0.000263	0.000775
	(0.000916)	(0.000978)	(0.00122)	(0.00128)	(0.00137)	(0.00174)	(0.00137)	(0.00146)	(0.00179)
share_gov	−0.00466***	−0.00391**	−0.00267	−0.00412	−0.00473	0.00145	−0.00384*	−0.00286	−0.00348
	(0.00175)	(0.00190)	(0.00246)	(0.00370)	(0.00384)	(0.00471)	(0.00200)	(0.00221)	(0.00297)
innov_product	0.227***	0.194***	0.109**	0.259***	0.170***	0.189**	0.212***	0.216***	0.0578
	(0.0319)	(0.0348)	(0.0441)	(0.0549)	(0.0583)	(0.0745)	(0.0401)	(0.0444)	(0.0560)
innov_process	0.0921***	0.0329	0.0541	0.172***	0.0618	−0.0138	0.0618	0.00965	0.107*
	(0.0355)	(0.0389)	(0.0485)	(0.0613)	(0.0652)	(0.0849)	(0.0448)	(0.0497)	(0.0606)
innov_managem	0.00964	0.0190	−0.0394	−0.0312	−0.0995	−0.0487	0.0477	0.111**	−0.0697
	(0.0367)	(0.0398)	(0.0508)	(0.0644)	(0.0671)	(0.0899)	(0.0461)	(0.0509)	(0.0638)
innov_marketing	−0.0319	−0.0980***	0.0934**	0.0433	0.00980	0.0377	−0.103**	−0.195***	0.113*
	(0.0342)	(0.0373)	(0.0467)	(0.0565)	(0.0593)	(0.0785)	(0.0441)	(0.0492)	(0.0599)
R_D	0.348***	0.206***	0.158***	0.322***	0.141**	0.192**	0.361***	0.253***	0.177***
	(0.0387)	(0.0411)	(0.0512)	(0.0654)	(0.0671)	(0.0842)	(0.0494)	(0.0531)	(0.0659)
uni	0.00157***	0.00209***	−0.000158	0.0267***	0.0474***	−0.0128	0.00196***	0.00185***	0.000936
	(0.000433)	(0.000481)	(0.000601)	(0.00818)	(0.00969)	(0.0108)	(0.000574)	(0.000654)	(0.000768)
lsize	0.273***	0.252***	0.0592***	0.303***	0.271***	0.0491**	0.255***	0.232***	0.0863***
	(0.0102)	(0.0109)	(0.0138)	(0.0161)	(0.0166)	(0.0217)	(0.0138)	(0.0151)	(0.0188)
multi	0.000717	−0.000399	−0.000411	0.00299***	−0.000212	0.00140	−0.000453	−0.000627	−0.00146
	(0.000572)	(0.000632)	(0.000810)	(0.000978)	(0.00106)	(0.00134)	(0.000728)	(0.000812)	(0.00105)
fo	0.424***	0.375***	−0.0122	0.406***	0.282***	−0.0742	0.432***	0.436***	0.0224
	(0.0428)	(0.0434)	(0.0597)	(0.0723)	(0.0701)	(0.101)	(0.0543)	(0.0564)	(0.0754)
folicenses	0.212***	0.0541	0.216***	0.193***	0.0237	0.0491	0.217***	0.0621	0.285***
	(0.0356)	(0.0387)	(0.0464)	(0.0624)	(0.0651)	(0.0832)	(0.0444)	(0.0495)	(0.0573)
Constant	−2.958***	−1.951***	−3.288***	−2.654***	0.307	−1.549***	−3.064***	−3.459***	−1.898***
	(0.167)	(0.223)	(0.189)	(0.185)	(0.213)	(0.229)	(0.211)	(0.240)	(0.284)
Observations	16,792	16,783	16,408	5,726	5,724	5,345	10,667	10,661	10,660
Log likelihood	−6977	−5602	−3271	−2701	−2305	−1253	−4082	−3146	−1935
Pseudo R2	0.253	0.272	0.0712	0.249	0.293	0.0573	0.250	0.232	0.0854

Note: Standard errors in parentheses.
Source: own calculations based on B.E.E.P.S. V database.
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

export performance obtained from the specification in which we controlled for a number of individual firm characteristics, as well as for sectoral and country effects. The innovation activities of firms included the measures of product, process, management and marketing innovations, as well as their R&D spending. The control variables included the stock of human capital (measured by the percentage of workers with tertiary degrees), firm productivity, firm ownership, firm size, profile of production (describing whether the firm has a multiple product profile) and the use of foreign licences.

The estimated parameter on the productivity (*lprod*) variable is significant at the 1% level of statistical significance, displaying a positive sign, in line with the prediction of the Melitz (2003) model. Out of four different forms of innovation outcomes, only two are statistically significant at the 1% level and display a positive sign: product and process innovations. The estimator of the product innovation variable is larger in comparison to the process innovation variable. The estimated parameters on the R&D spending and on the stock of human capital (*uni*) are also statistically significant at the 1% level and display positive signs. Moreover, the majority of our control variables are statistically significant and display expected signs. In particular, firm size (*lsize*), firm age (*age*), foreign ownership (*fo*) and the use of foreign technology (*folicenses*) are positively related to exporting. The estimated parameter on state ownership (*share_gov*) is statistically significant and displays a negative sign, indicating that state-owned firms are relatively less export-oriented. Finally, the variable describing whether the firm produces many products (*multiple*) is statistically not significant for the probability of overall exports.

In column (2) we report the estimation results obtained for all countries, in the specification in which firms directly export their products: not using intermediaries. The results are somewhat similar. In particular, the estimated parameter on the productivity variable is statistically significant at the 1% level and displays a positive sign. The results for the innovation variables are different in comparison to the benchmark results. In particular, the product innovation parameter displays a positive sign and is statistically significant at the 1% level but the process innovation variable becomes statistically not significant, whereas the marketing innovation variable became statistically significant but displays a surprising negative sign.[6] The other two variables, reflecting the stock of human capital (*uni*) and R&D activities, remained statistically significant and displayed positive signs. The estimated parameters of variables reflecting ownership status (*share_gov* and *fo*) did not change signs and remained statistically significant at the 1% level. However, the estimated parameters on two of the remaining variables, reflecting the age of firms (*age*) and usage of foreign technology (*folicenses*), lost their statistical significance.

In column (3) we report the estimation results obtained for all countries in the specification in which firms only indirectly – through intermediaries – export their products. In this estimation, more variables became statistically not significant in comparison to the benchmark results. In particular, the productivity variable (*lprod*) became statistically not significant, indicating that indirect exporters are not visibly more efficient in comparison with other firms. Further, the variable reflecting stock of human capital (*uni*) lost its statistical significance. The product innovation variable remained statistically significant at the 1% level and displayed a positive sign, while the process innovation variable was statistically not significant. On the other hand, the marketing innovation variable became statistically significant at the 1% level and displayed a positive sign, indicating that marketing activities can increase the probability of indirect exporting. Moreover, the estimated parameters on

variables reflecting ownership status (*share_gov* and *fo*) lost their statistical significance, indicating that firms with foreign capital and state-owned firms do not frequently use intermediaries when exporting their goods. Finally, the estimators of the two remaining variables, reflecting the age of firms and use of foreign technology (*folicenses*), lost their statistical significance in comparison to the benchmark results; this is similar to the estimations for direct exports.

Columns (4)–(6) display the estimation results limited to M.E.N.A. countries. In column (4) we present the results for the overall exports. The signs and statistical significance are similar to the benchmark results (column (1)) but there are also some differences. The variables describing the age of firms (*age*) and the share of government ownership become statistically not significant in the case of M.E.N.A. countries. On the other hand, the multi-product firms in this group of countries are more likely to export. In column (5) we present the estimation results for direct exports for M.E.N.A. countries. The signs and statistical significance are similar to the benchmark results (column (2)) but there are also small differences. In particular, the variables reflecting government ownership and marketing innovations[7] become statistically not significant in the M.E.N.A. countries. In column (6) we present the results for indirect exports. The signs and statistical significance are somewhat similar to the benchmark results (column (3)) but there are also some minor differences. In particular, the variables reflecting marketing innovations and the use of foreign technology become statistically not significant in the M.E.N.A. countries.

Finally, columns (7)–(9) display the results limited to C.E.E. countries. In column (7) we present the results for the overall exports, which are somewhat similar to the benchmark results from column (1) but with two important differences. Specifically, the variables reflecting the age of firms and the role of process innovations become statistically not significant. In column (8) we present the results for the direct exports, which are similar to the benchmark results from column (2) but with some exceptions. The variable reflecting government ownership becomes statistically not significant, while that reflecting management innovations became statistically significant at the 5% level and displayed a positive sign. In column (9) we present the results for the indirect exports, which are very similar to the benchmark results from column (3), with two exceptions. The variable product innovations lost their statistical significance and marketing innovations became statistically less significant – only at the 10% level – in comparison to the benchmark results that displayed a 5% level of statistical significance.

5. Conclusions

In conclusion, we can state that according to our estimation results, the determinants of direct and indirect exports differ. Labour productivity – a key variable in the Melitz (2003) model – only positively affects direct exports and is not statistically significant in the case of indirect exporters. This result is in line with the predictions of the theoretical framework proposed by Lu et al. (2017). They extended Melitz's (2003) model to incorporate indirect exporters and found that the most productive firms exported directly to foreign markets, while less productive firms exported only indirectly.

We also find important differences in terms of innovation variables. On the one hand, product innovations can significantly stimulate direct exports, whereas they have only a limited impact on indirect exports. On the other hand, marketing innovations can increase

the probability of indirect exports but are statistically not significant in the case of direct and overall exports. R&D spending is important for both the direct and indirect exports of firms from both regions.

The role of the internationalisation of firms differs between direct and indirect exporters. In particular, firms with foreign capital participation (*fo*) are more likely to export directly, while the probability of indirect exporting increases when firms use foreign technology (*folicenses*). The indirect exporters more frequently use foreign licences, while foreign ownership is not important for the decision to export indirectly. These internalisation factors affect the probability of overall exports since firms with foreign capital and those using foreign technology reveal a higher probability for overall exports.

The stock of human capital, measured in terms of employees with tertiary education (*uni*), positively affects the probability of firms' direct exports but not indirect exports. Finally, the size of the firm matters for all types of exporters but the estimated parameter on the size variable is much higher in the case of direct exports, in comparison to indirect ones.

Thus, the firms that export indirectly can be less efficient in terms of labour productivity, smaller and less innovative in comparison to those firms that directly export their products. Our estimation results suggest that the characteristics of firms that are indirect exporters are different from those of direct exporters and are more similar to the firms that deliver their products only to domestic markets, however, they can frequently participate in G.V.C.s.

There are also some differences between M.E.N.A. and C.E.E. countries. Product innovations are always statistically significant in determining all types of exports, with the exception of indirect exports in the C.E.E. countries. Marketing innovations and the use of foreign technology are statistically significant for the probability of indirect exports in the C.E.E. countries but not in the case of M.E.N.A. countries. Multi-product firms in the M.E.N.A. countries are more likely to export, whereas this variable is not statistically significant in the case of the exports of firms from C.E.E. countries. Finally, state ownership of firms, mostly reflecting the post-communist past, reduces the probability of overall exports in C.E.E. countries and is not significant for the probability of exports in M.E.N.A. countries.

Our findings have some important implications for firm managers and marketing specialists. In particular, managers running less productive and smaller firms should not attempt to directly enter foreign markets and should instead try to export their products through intermediaries and via cooperation with large multinational firms. For these firms, marketing innovations can increase the probability of indirect exports, whereas for bigger and more productive firms it is product innovations that can increase the probability of direct exporting.

Notes

1. Wagner (2007, 2012) produced surveys of the empirical evidence on the relationship between firm productivity and exporting. According to the first survey (Wagner, 2007), future exporters tend to be more productive than future non-exporters in the years before they enter the export market. This assertion was largely confirmed in Wagner's (2012) recent survey, i.e., his review provides extensive evidence in favour of the self-selection hypothesis.
2. The numbers of observations (surveys) per year were as follows: 2884 in 2011; 1833 in 2012; 13,435 in 2013; and 4287 in 2014.

3. The only exception was Albania. The details concerning the sampling methodology are explained in the Sampling Manual, available at http://www.enterprisesurveys.org/Methodology/.
4. In the case of Slovenia, the share of direct exporters exceeded the number of non-exporters. This was due to excluded observations and the high level of trade openness in Slovenia, which is a small country with the highest level of gross domestic product (G.D.P.) per capita among C.E.E. countries.
5. See, e.g., Mayer and Ottaviano (2008).
6. Given the relatively high level of correlation between the innovation variables, this result should be treated with caution.
7. The variable reflecting marketing innovations displayed a surprising negative sign in the estimation for all countries.

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Annex.

Table A1. Summary statistics for the whole sample of countries in the B.E.E.P.S. V database.

Variable	Obs	Mean	Std. Dev.	Min	Max
Lprod	17,989	12.846	2.614	−3.401	25.798
Age	22,220	16.262	13.591	0.000	190.000
share_gov	22,181	0.766	7.115	0.000	99.000
R_D	22,260	0.110	0.313	0.000	1.000
Uni	22,449	36.429	33.596	0.000	100.000
Lsize	22,274	3.095	1.304	0.000	9.952
Multi	21,613	15.043	22.001	0.000	100.000
Fo	22,449	0.085	0.279	0.000	1.000
Folicenses	22,220	0.131	0.337	0.000	1.000
innov_prod~t	22,328	0.247	0.431	0.000	1.000
innov_proc~s	22,308	0.200	0.400	0.000	1.000
innov_mana~m	22,326	0.200	0.400	0.000	1.000
innov_mark~g	22,289	0.228	0.419	0.000	1.000
direct_exp~t	22,176	0.156	0.363	0.000	1.000
indirect_e~t	22,181	0.056	0.230	0.000	1.000

Source: own calculations based on B.E.E.P.S. V database.

Table A2. Correlations between independent variables for the whole sample of countries.

	lprod	age	share_gov	R_D	uni	lsize	multi	fo	Folicen-ses	innov_ product	innov_ process	innov_ manag	Innov_market
lprod	1												
age	−0.025	1.000											
share_gov	0.100	0.088	1.000										
R_D	0.046	0.070	0.007	1.000									
uni	0.119	−0.113	−0.015	0.012	1.000								
lsize	−0.009	0.260	0.125	0.188	−0.074	1.000							
multi	0.080	0.035	0.003	0.077	−0.024	−0.018	1.000						
fo	0.025	0.007	0.011	0.080	0.025	0.201	0.004	1.000					
folicenses	−0.010	0.025	0.004	0.149	0.024	0.168	0.032	0.133	1.000				
innov_prod~t	0.071	0.063	0.000	0.340	0.001	0.131	0.137	0.077	0.141	1.000			
innov_proc~s	0.077	0.052	0.005	0.342	−0.013	0.142	0.084	0.063	0.128	0.494	1.000		
innov_mana~m	0.112	0.036	0.014	0.318	0.029	0.156	0.087	0.076	0.126	0.365	0.452	1.000	
innov_mark~g	0.090	0.027	0.010	0.294	0.038	0.124	0.103	0.066	0.115	0.359	0.393	0.538	1.000

Source: own calculations based on B.E.E.P.S. V database.