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The Competitiveness of exporters from Croatian manufacturing industry

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Abstract

This paper explores the competitiveness of exporters from Croatian manufacturing industry. A dynamic panel system GMM technique is applied to the sample of firms distributed across all sectors of manufacturing industry and observed over period between 1999 and 2007. The competitiveness of firms is modelled as function of their activities, characteristics and features of their environment. The results of investigation are in line with theoretical predictions about behaviour of price competitive firms. In building their international position, Croatian exporters rely on cost reductions and improvements in labour productivity. The sensitivity of these firms to wage increases suggests that labour costs still play a major role in their success on international markets. In overcoming barriers to exporting these firms rely on own resources, previous experience and cost and knowledge sharing agglomeration externalities. The positive and significant relationship between export intensity and the firms' location in small urban areas or free trade zones suggest that some of policies undertaken by Croatian government in analysed period such as investment in infrastructure or development of export-targeting policies may have produced beneficiary effects on the competitiveness of exporters.

Keywords: Competitiveness, manufacturing industry, Croatia, exports, dynamic panel analysis

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1. Introduction

Exporting is often recognised as a straightforward way for firms to overcome size limitations of domestic markets and to secure their success and survival in a globalised world. The competitive profiles of exporters have important implications for economic growth of nations (Lall, 2000). The technology intensive products offer better prospects for growth as they are not easily imitable and they may trigger the development of new skills and knowledge in downstream and upstream industries. In contrast, standardised products are said to be easily imitable, grow only slowly and are more sensitive to price movements. With this in mind, understanding the competitive profile of exporters becomes an important factor for assessment of competitiveness of their nations.

The growth of small and open economies, such as Croatia, is closely related to the success of their firms on international market. In financing their imports, these economies, among other things, rely on foreign exchange generated by exporters to other countries. Also, the horizontal and vertical spillovers of knowledge and technology from foreign markets are important factors in explaining competitiveness of their industries. For a long time exporters from transition economies, and among them Croatian exporters, competed in standardised products (Stojcic and Hashi, 2011). Hence, it is important to examine whether their competitive profiles changed over time.

This paper investigates the competitiveness of Croatian exporters paying special attention to the role of enterprise restructuring and its manifestations in efficiency, human capital, technology and innovativeness. The investigation also takes account of the characteristics of firms recognised as important by the relevant literature and addresses several issues which, to our knowledge, have received little or no attention in context of transition economies such as agglomeration effects or government policies. A dynamic panel

analysis is applied to panel of firms from Croatian manufacturing industry between 1999 and 2007 extracted from the firm level database Amadeus collected and compiled by Bureau van Dyke. Next two sections discuss determinants of firms' success on international market and the model of investigation respectively. Section 4 brings stylised facts about analysed exporters. Section 5 discusses methodology. Empirical findings are presented in Section 6. Finally, Section 7 concludes.

2. Determinants of success on international market

It is often stated that factors and forces which are used in the general analysis of competitiveness at firm level may also apply to firms' performance on international market. One set of models links the competitiveness of exporters with improvements in cost efficiency and labour productivity (Iyer, 2010) or innovations, technology and human capital (Singh, 2009). Such propositions have been supported by large number of empirical studies (Wagner, 1995; Stiebale, 2008; Wignaraja, 2008). However, there are considerable differences in competitive profiles of exporters which may be related to characteristics of their industries. While cost reductions improve the competitiveness of firms in low technology industries innovations and improvements in human capital have positive influence on the competitiveness of exporters from high technology intensive industries (Bleaney and Wakelin, 2002; Duenas-Caparas, 2006).

Participation on international market requires specific skills, knowledge, experience and assets which are costly and difficult to obtain for small firms. Studies based on resource-based view associate size of firms with ease of access to finance, possession of specific organisational and human resources and economies of scale. Another line of research, based on the transaction costs approach, suggests that the risk of failure makes small firms averse towards exporting while the fear of the hold-up problem prevents them from

obtaining export-specific resources through market interactions (Bonaccorsi, 1992; Roberts and Tybout, 1997; Majocchi et al., 2005).

Barriers to exporting may be easily overcome by firms with more experience (Becchetti and Rossi, 2000; Singh, 2009). The values, routines and traditions accumulated by firms through their working lives are factors that can help them make optimal choices in the current period. Similarly, exporting experience increases familiarity with preferences of foreign consumers, distribution networks, the business culture and institutional framework (Roberts and Tybout, 1997; Filatotchev et al., 2001; Stiebale, 2008; Bellone et al., 2010).. Finally, in the emerging and some transition economies, foreign ownership has been found to increase the competitiveness of exporters by providing them with access to new technology, knowledge and the networks established by their owners (Wignaraja, 2008; Singh, 2008).

The geographical proximity of exporters to each other, their location near borders or in large urban areas and specific business zones can ease the access of firms to the pool of skills and expertise, facilitate their networking with laboratories and institutions and provide them with amenities such as lower administrative fees, tax and customs exemptions, cost-sharing activities and knowledge spillovers (Malmberg et al., 2000; Koenig et al., 2010). However, the net benefits from these agglomerations will be disproportionately accrued to firms in high technology intensive industries which have a higher demand for highly skilled labour and knowledge base than in low technology intensive industries which base their production on standardised production processes. For this reason the former firms are more likely to remain in urban areas while low-end firms are more likely to move to low cost smaller urban centres (Venables, 1996).

Industry specific factors such as economies of scale, concentration or technological intensity of industries are considered as important for the ability of firms to compete abroad (Singh, 2009). Hence, for firms in low technology intensive industries the ability to underprice their rivals is considered as their main source of competitive advantage while in the high technology intensive ones product differentiation and quality improvements will be more important (Lall, 2000). Finally, based on the views current in institutional economics, different elements of the legal development and institutional infrastructure (Correa et al., 2007) and the access of firms to subsidies (Becchetti and Rossi, 2000; Bellone et al., 2010) have been included in some models.

Over past decades the export competitiveness of Croatian manufacturing industry has been investigated by number of authors (Mikic and Lukinic, 2004; Vuksic, 2007; Buturac, 2009; Stojcic and Hashi, 2011; Stojcic et al., 2012). The general message coming from this literature is that reductions in unit labour costs, improvements in productivity and inflow of foreign direct investment have beneficial effect on the competitiveness of Croatian exporters (Vuksic, 2006; Stojcic et al., 2012). Furthermore, the competitive profile of exporters from Croatian manufacturing sector bears resemblance to price-competitive producers. To this end, the bulk of exports is concentrated in less sophisticated industries with low technology intensity and low value added (Mikic and Lukinic, 2004; Buturac, 2009; Stojcic and Hashi, 2011). However, all of above mentioned studies are undertaken at industry level. For this reason, an econometric analysis at firm level is needed in order to obtain further insights on the competitiveness of Croatian exporters from manufacturing industry.

Putting these pieces together, the competitiveness of exporters may be linked to elements of their behaviour and characteristics and features of their environment. However, much of existing evidence comes from cross-sectional datasets which prevent tracing of firm

behaviour over time. Furthermore, existing studies have mainly failed to recognise the potential sources of endogeneity such as the dependence of present export competitiveness on its past realisations or the correlation between improvements in firm behaviour and unobserved firm, industry and country specific factors (Wagner, 1995; Bechetti and Rossi, 2000; Malmberg et al., 2000; Majocchi et al., 2005; Wignaraja, 2008).[1] Finally, existing studies are disproportionately distributed between developed and developing countries in favour of the former. This problem is particularly emphasised for transition economies where most evidence are of qualitative nature.

3. Model specification

The investigation of the competitiveness of exporters from Croatian manufacturing industry is based on the model which in its simplest form the model of investigation can be written as:

$$CI_{it} = f(CI_{it-1}, A_{it}, C_{it}, E_{it}) \quad (1)$$

where CI stands for competitiveness index, measured by export intensity, i.e. export/sales turnover ratio, of a firm and A, C and E are the activities and characteristics of the firm and features of the firm's environment. The lagged dependent variable captures the impact of accumulated knowledge, established networks of distributors, familiarity with business culture and customer network externalities on the ability of firms to compete on international market.

Among activities of firms model includes unit labour costs and unit material costs as well as labour productivity as proxies for improvements in the efficiency of firms. For former

[1] Studies addressing these issues have mainly relied on the GMM method of dynamic panel analysis (Filatotchev et al., 2001; Stiebale, 2008; Bellone et al., 2010).

two a negative sign can be expected while the latter is expected to be positive. Also, model includes investment in machinery and equipment, proxy for new technology, measure of innovations and wage premium, proxy for the quality of human capital in order to capture the ability of firms to compete through differentiation and improvements in quality of their products.[2] Having in mind that primary objective of this paper is to evaluate competitive profiles of exporters it can be expected that two groups of elements of firm behaviour have a different impact on price-competitive firms from those which compete through quality. Accordingly, former could be expected to place more emphasis on cost reductions and improvements in labour productivity while latter would build their international position through investment in new machinery and equipment, innovations and human capital.[3]

Among the characteristics of firms the model includes their size, measured by the number of employees, and age as proxy for general business experience. It is expected that larger firms would be more easily able to overcome barriers to exporting and to outperform their

[2] The effect of innovation activities is captured by a dummy variable which takes the value 1 if a firm reports positive level of intangible fixed assets in its balance sheet, similar to Stiebale (2008). While not being a perfect measure of innovation activities it is the closest proxy available in the dataset.

[3] Transition literature has highlighted several characteristics of firms and features of their environment such as quality of management or ownership which can affect behaviour of firms and their competitiveness (Grosfeld and Roland, 1996; Djankov and Murrell, 2002). The inability to control for some of these elements leads to potential endogeneity. Also, the lagged dependent variable is by construction correlated with time-invariant elements in the error term. For this reason, unit labour and material costs, labour productivity, investment in new machinery and equipment, innovations and human capital as well as lagged dependent variable are treated as potentially endogenous and instrumented with proper instrumentation as it will be explained in Section 5.

rivals on international markets better than their smaller domestic rivals.[4] The life cycle theory of the firm implies nonlinear relationship between age of firm and its market success. In this context, it is suggested that younger and older firms are more likely to compete with standardised products as the former will face obstacles with respect to access to finance while the organisational complexity of latter will reduce their incentives for innovation. Hence, if Croatian exporters compete in terms of prices a U-shaped relationship between their age and export intensity can be expected while an inverse U-shape relationship would be expected if they compete in terms of quality. For this reason both age and its quadratic form are included in model.

The impact of agglomeration economies on the competitiveness of exporters is modelled with several variables. A categorical variable is introduced for location of firms in large urban areas.[5] Firms placing more emphasis on innovations in building their competitiveness are more likely to be located near the sources of innovation while those competing on prices are more likely to move to less costly areas.[6] Hence, a positive sign

[4] Size is treated as an endogenous variable as it has been suggested that the decisions of firms about the desired level of employment (size) and about the allocation of output between domestic and foreign markets (export intensity) will be determined with the characteristics of their managers and the type of ownership which we are unable to control for (Koenig et al., 2010).

[5] These include Zagreb, Osijek, Rijeka and Split

[6] The agglomeration literature distinguishes between centripetal forces attracting firms to dense urban areas and centrifugal forces driving firms away from large urban centres because of the negative externalities and adverse effects on the firm's exporting behaviour. The former include access to upstream firms, better pool of skills and expertise and also better flow of information between firms which facilitates their access to up-to-date techniques. The latter include higher costs of labour and other inputs arising from geographical proximity of firms in one location (Krugman, 1980; Venables, 1996).

on the above mentioned variable can be expected in the former case and negative sign in the latter case.

In addition to location in large cities model controls for location of firms in municipalities with entrepreneurial and free trade zones with two categorical variables. Entrepreneurial zones offer firms various infrastructural amenities and lower administrative fees. Free trade zones offer firms reductions in taxes and customs payments. Although they may be considered as indicators of the agglomeration economies they may also reflect factors from the firm's external environment such as government policies intended to boost competitiveness of exporters.

The externalities in terms of mutual information exchange between the firms located in proximity of each other are modelled with two variables representing urbanisation and localisation economies. It is expected that these economies help firms to reduce barriers to exporting such as acquisition of skills, knowledge and technology. For both variables a positive sign can be expected. Final measure of agglomeration economies is categorical variable for firms located in regions which have land-border with Bosnia-Herzegovina (BiH), one of Croatia's main trading partners. Firms in border regions find it less costly (because of transportation costs) to export to BiH than to sell their products on the domestic market. Also, firms in border regions benefit from the knowledge spillovers arising from cooperation with firms on the other side of the border.

Finally, in order to control for industry-specific factors three variables are included for the technological intensity of firm's industry based on OECD (2007) taxonomy of industries. It is expected that firms from low technology intensive industries trade price-competitive products while industries of higher technological intensity would be

characterised with quality-driven competitiveness. Table 1 gives the full definitions of the variables included in the empirical work.

Table 1: Description of variables

Dependent variable	
Exint	Export to sales ratio – Export intensity
Independent variables	
Empl	Number of employees - size
Capinv	Investment in machinery and equipment – the change in tangible fixed assets between the two periods (1000 EUR)
Innov	Dummy for innovative activity, 1 if firm reported intangible fixed assets in its balance sheet in a given year
Ulc	Unit labour costs – costs of employees divided by sales revenue
Umc	Unit material costs – costs of material divided by sales revenue
Prod	Labour productivity – turnover (1000 euro) per employee
WPremium	Wage Premium, 1 if firm pays average annual wage higher than that in its 3-digit NACE industry
Lgcit	Dummy for large cities, 1 if located in cities with more than 100 000 inhabitants
Entzone	Dummy for entrepreneurial zone, 1 if located in entrepreneurial zones
Openzone	Dummy for free trade zone, , 1 if located in free trade zones
Urbef	Number of other exporters in firm's region in relation to total number of firms in that region – measure of urbanisation economies
Locef	Number of other exporters in firm's 4-digit NACE industry in its region in relation to number of exporters from other industries in that region – measure of localisation economies
Border	Dummy for border with BiH, 1 if firm is located in regions bordering with Bosnia and Hercegovina
Age	Years since the year of incorporation – experience
Agesq	Quadratic term of age
Mlow	Dummy for type of technology, 1 if firm operates in medium-low technology industries
Mhigh	Dummy for type of technology, 1 if firm operates in medium-high technology industries
High	Dummy for type of technology, 1 if firm operates in high technology industries

4. Stylised facts about exporters from Croatian manufacturing industry

The investigation is conducted on the sample of exporting firms from Croatian manufacturing industries observed in the 1999-2007 period. The lack of data prevented extension of analysis to more recent years. The data comes from pan-European database Amadeus provided by Bureau van Dyke which contains financial as well as general information on firms such as location, age and type of industry. In total, there are about 2000 firms distributed unevenly across years leading to total of 11000 observations.

Table 2: Stylised facts about exporters from Croatian manufacturing industry 1999-2007

Variable	*Value*
Export intensity (Exint)[a]	0.30
Number of employees (Empl)[a]	121
Investment in machinery and equipment (Capinv)[a]	177
Unit labour costs (Ulc)[a]	0.22
Unit material costs (Umc)[a]	0.67
Labour productivity (Prod)[a]	87
Urbanisation economies (Urbef)[a]	0.48
Localisation economies (Locef)[a]	0.02
Experience of firm (Age)[a]	20.4
Location in large urban area (Lgcit)[b]	38
Location in municipality with entrepreneurial zone (Entzone)[b]	23
Location in municipality with free trade zone (Openzone)[b]	14
Wage Premium (WPremium)[b]	32
Innovation activity (Innov)[b]	36
Location in region with border to Bosnia-Herzegovina (Border)[b]	20
Firms in low technology intensive industry (Low)[b]	42.5
Firms in medium low technology intensive industry (Mlow)[b]	30
Firms in medium high technology intensive industry (Mhigh)[b]	19
Firms in high technology intensive industry (High)[b]	8.5

Source: Author's calculations based on Amadeus database
Note: Values with decimal places have been rounded.
[a] *Refers to mean value*
[b] *Refers to % of categorical variable taking value of 1*

Stylised facts in Table 2 indicate that Croatian exporters sell about one third of their output on international markets. On average, they are medium sized firms. Unit labour costs are somewhat lower than unit material ones. As the indicators of agglomeration effects show the geographical concentration of Croatian exporters is relatively low; they tend to be dispersed across the country. However, the proximity of other firms in administrative region is somewhat higher about 50%. The age variable indicates that, on average, firms in sample in the period of investigation were about 20 years old, i.e., a very large number were established in the period of transition.

The majority of exporters were located outside of large cities with about 23% of them in municipalities with entrepreneurial zones and even less (14%) in those with free trade zones. About 20% of firms are located in regions with land border with Bosnia and Herzegovina. About one third have paid annual wages higher than the average wage in their 3-digit industry. Finally, over a third of firms have reported a positive value of intangible fixed assets (proxy for innovation) in their balance sheet.

5. Methodology

The longitudinal nature of dataset used in this paper suggests that suitable estimator should be looked for in family of panel estimators. Furthermore, previous discussion has highlighted several methodological issues which need to be taken into account in modelling the competitiveness of exporters. Primarily, this relates to problem of endogeneity due to correlation between lagged dependent variable and variables reflecting firm behaviour and size with error term. The methodology capable of addressing all of these issues is dynamic panel GMM-type estimator (Greene, 2002).

On the basis of GMM two types of dynamic estimators are developed – a difference GMM estimator (Arellano and Bond, 1991) and a system GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998). With only one lagged dependent variable as an explanatory variable, such a model takes the following form:

$$y_{it}=\beta_1 y_{it-1}+\eta_i+v_{it}, \qquad |\beta|<1 \qquad (2)$$

where η_i stands for the individual time invariant effects and v_{it} for the idiosyncratic errors. The time invariant nature of the former effects implies that they are correlated with dependent variable and with its past realisations on the right-hand side of model.

The difference estimator solves the problem of time invariant effects by differencing the model and instrumenting potentially endogenous variables with their lagged differences or lagged levels (Arellano and Bond, 1991). However, it has been found to be biased and inefficient in situations when the lagged levels of series are close to random walk (Blundell and Bond, 1998). The system GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998) has an advantage in this situation. This builds a stacked dataset with twice the observations, one for the levels equation and one for the differenced

equation.[7] Nevertheless, the system is treated as a single equation and the same linear relationship is believed to apply to both the transformed (differenced) and untransformed (level) variables (Roodman, 2009b). Another advantage of system estimator is its ability to include time-invariant variables. Finally, supplementing instruments for differenced equation with those for the levels equation, the system estimator increases efficiency of an estimation.[8]

In this paper the system dynamic panel estimator is used. There are four reasons which can justify such choice. First, the dynamic panel analysis enables to control for potential endogeneity of other variables caused by their correlation with unobserved time-invariant characteristics in the same way as the relationship between these characteristics and lagged dependent variable is controlled for. Second, modelling of several variables of interest as dummy variables makes it more reasonable to use the system estimator which allows inclusion of time-invariant variables. Third, in the presence of random walk or near random walk processes system estimator is more efficient. Finally, as it will be explained soon, the dynamic analysis provides an opportunity to discern the short-run from the long-run effects of explanatory variables.

[7] The introduction of levels equation in the model is explained by the argument that past changes may be more predictive of current levels than the levels can be of future changes of potentially endogenous variables when the series are close to random walk.

[8] While being superior to the difference estimator in many aspects, the system estimator is also not without flaws. It is sensitive to the number of instruments used. In finite samples large number of instruments may weaken the ability of relevant diagnostics (Hansen test) to reject the null hypothesis of instrument validity (Roodman, 2009a). It is taken as rule of thumb that number of instruments should not exceed number of groups (cross-sectional units) used in estimation.

Dynamic estimators can be estimated in one-step and two-step procedures. As the one-step estimator is not robust to heteroscedasticity or cross-corelation a two-step estimator is applied. However, the standard errors obtained in the two-step procedure are known to be downward biased when the number of instruments is large. This problem can be greatly reduced with the use of Windmeijer's (2005) corrections for the two-step standard errors which are being applied.

Finally, dynamic analysis allows discerning between the short -and long-run effects. Supposing that equation (2) includes additional explanatory variable x this can be written as

$$y_{it}=\beta_1 y_{it-1}+\beta_2 x_{it}+\eta_i+v_{it}, \qquad |\beta|<1 \qquad (3)$$

In equation (3), the coefficient β_2 is the estimated coefficient and is known as the short-run multiplier which represents only a fraction of the desired change (Greene, 2002). The long-run effect can then be calculated algebraically as product of the coefficient β_2 and the long-run multiplier $\frac{1}{1-\beta_1}$. The standard error and the corresponding t-statistic for coefficient obtained this way can be then calculated using delta-method (Papke and Wooldridge, 2005).

Bearing above said in mind a following baseline model specification is applied in order to investigate the behaviour of exporters from Croatian manufacturing industries:

$$\ln(exint)_{it}=c+\beta_1\ln(exint)_{it-1}+\beta_2\ln(empl)_{it}+\beta_3 capinv_{it}+\beta_4 innov_{it}+\beta_5\ln(ulc)_{it}+\beta_6\ln(umc)_{it}$$
$$+\beta_7 lgcit_{it}+\beta_8 entzone_{it}+\beta_9 openzone_{it}+\beta_{10} urbef_{it}+\beta_{11} locef_{it}+\beta_{12} border_{it}+\beta_{13} age_{it}+\beta_{14} agesq_{it} \qquad (2)$$
$$+\beta_{15} mlow_{it}+\beta_{16} mhigh_{it}+\beta_{17} high_{it}+\sum_{t=2000}^{2007} year_t+u_i+v_{it}$$

Export intensity, employment and costs variables are in natural logarithms while investment in machinery and equipment, urbanisation and localisation effects and age are in levels. Since unit labour costs and productivity are highly correlated two separate

models are estimated, each including one of these variables. The model also includes time dummies as controls for cross-section dependence. Furthermore, the long-run effects of variables are computed. Finally, given that the data for the average wages, a proxy for skilled labour, is available only for the 2001-2007 period the model including this variable is estimated separately as its inclusion implies dropping two years of observations.

6. Discussion of findings

In all models the usual diagnostics relevant to the dynamic panel GMM models are satisfactory (Table 3). Hence, there is insufficient evidence to reject the null hypothesis of valid overidentifying restrictions in the Hansen's test for the validity of instruments. Also, the null hypothesis of no first order autocorrelation was rejected but there is insufficient evidence to reject the null hypothesis of no autocorrelation of second order. The null hypothesis that the variables jointly have no explanatory power is rejected with very high probability in all specifications. Finally, the number of instruments in all models is relatively low in comparison with the number of groups of observations.[9]

Table 3: Model diagnostics

	SPECIFICATIONS			
	1	2	3	4

[9] The validity of model was also scrutinised with additional tests. Hence, in the difference-in-Sargan tests for validity of subsets of instruments for the levels equation and for the lagged dependent variable suggest that there is insufficient evidence to reject the null hypothesis of valid overidentifying restrictions which implies that the system GMM estimator is preferred to the difference GMM estimator and that the model satisfies the steady state assumption. The values of coefficient on lagged dependent variable have been compared with the same coefficient obtained with OLS and FE estimations as the true estimator of this coefficient should be lower than the coefficient obtained by OLS but higher than the coefficient obtained with the FE technique. In all four cases the coefficient lies within the boundaries. Detailed printouts of estimations and additional tests are available upon request.

Number of observations	11096	11089	9261	9260
Number of groups	2039	2037	1977	1976
Wald test	872.95	837.26	725.39	722.82
Prob>chi2	0.000	0.000	0.000	0.000
Sargan/Hansen J Statistic	173.24	148.10	163.30	152.57
Prob> chi2	0.224	0.574	0.233	0.360
Arellano-Bond test for AR(1) in first differences	-12.47	-12.21	-11.30	-11.05
Prob>chi2	0.000	0.000	0.000	0.000
Arellano-Bond test for AR(2) in first differences	1.48	1.29	0.22	0.20
Prob>chi2	0.139	0.195	0.827	0.843
Instrument count	186	178	176	172

Source: Author's calculations based on Amadeus database

The results of estimation for both the short and long run are presented in Table 3. The first two specifications report the results with productivity and unit labour costs respectively for the period 1999-2007 while the latter two columns also include the proxy for skilled labour which restricts the sample to the 2001-2007 period. The findings are consistent across all four specifications as all significant coefficients maintain their signs and in majority of cases also their significance.

Table 4: Dynamic panel system GMM estimation for Croatian exporters, 1999-2007 (dependent variable: ln(Exint))

	SPECIFICATION 1		SPECIFICATION 2		SPECIFICATION 3		SPECIFICATION 4	
	SR	LR	SR	LR	SR	LR	SR	LR
Lagged dependent variable	0.48*** (0.000)	-	0.47*** (0.000)	-	0.48*** (0.000)	-	0.47*** (0.000)	-
SIZE								
Employment: ln(*Empl*)	0.09* (0.079)	0.18* (0.079)	0.08** (0.028)	0.16** (0.028)	0.08* (0.101)	0.16* (0.101)	0.06 (0.131)	0.12 (0.131)
RESTRUCTURING								
Investment in machinery and equipment (*Capinv*)	3.29e-07 (0.860)	6.32e-07 (0.860)	2.74e-07 (0.820)	5.19e-07 (0.820)	4.76e-07 (0.746)	9.09e-07 (0.746)	4.01e-07 (0.719)	7.54e-07 (0.719)
Innovation (*Innov*)	0.06 (0.317)	0.12 (0.316)	0.04* (0.525)	0.08* (0.524)	0.07 (0.337)	0.14 (0.337)	0.06 (0.409)	0.12 (0.409)
Unit labour costs: ln(*Ulc*)	-	-	-0.42*** (0.000)	-0.80*** (0.000)	-	-	-0.42*** (0.000)	-0.78*** (0.000)
Unit material costs: ln(*Umc*)	-0.39** (0.038)	-0.75** (0.036)	-0.56*** (0.004)	-1.05*** (0.004)	-0.60*** (0.003)	-1.13*** (0.003)	-0.66*** (0.002)	-1.24*** (0.003)
Labor productivity: ln(*Prod*)	0.36*** (0.000)	0.69*** (0.000)	-	-	0.38*** (0.000)	0.73*** (0.000)	-	-
Wage Premium (*WPremium*)	-	-	-	-	-0.28** (0.031)	-0.54** (0.030)	0.01 (0.972)	0.01 (0.972)
AGGLOMERATION ECONOMIES								

Located in large city(*Lgcit*)	-0.31*** (0.000)	-0.59*** (0.000)	-0.26*** (0.000)	-0.49*** (0.000)	-0.30*** (0.000)	-0.57*** (0.000)	-0.28*** (0.000)	-0.52*** (0.000)
Located in entrepreneurial zone (*Entzone*)	0.02 (0.746)	0.04 (0.746)	0.03 (0.617)	0.05 (0.617)	0.02 (0.770)	0.03 (0.770)	0.03 (0.599)	0.06 (0.600)
Located in free trade zone (*Openzone*)	0.19*** (0.007)	0.37*** (0.006)	0.18*** (0.005)	0.35*** (0.004)	0.14** (0.051)	0.27** (0.047)	0.16** (0.021)	0.30** (0.019)
Located in region bordering B&H (*Border*)	0.10* (0.074)	0.19* (0.071)	0.09* (0.094)	0.17* (0.093)	0.10* (0.082)	0.20* (0.080))	0.10* (0.089)	0.18* (0.089)
Urbanisation effect (*Urbef)*	1.02*** (0.001)	1.95*** (0.000)	0.81*** (0.004)	1.54*** (0.003)	0.97*** (0.001)	1.85*** (0.001)	0.81*** (0.005)	1.52*** (0.004)
Localisation effect (*Locef*)	3.33*** (0.000)	6.40*** (0.000)	2.91*** (0.000)	5.52*** (0.000)	2.82*** (0.001)	5.38*** (0.001)	2.56*** (0.002)	4.81*** (0.001)
BUSINESS EXPERIENCE								
Age – number of years since foundation(*Age*)	0.003 (0.402)	0.01 (0.401)	0.01* (0.092)	0.01* (0.093)	0.004 (0.248)	0.01 (0.246)	0.01* (0.075)	0.01* (0.075)
Quadratic term – number of years since foundation squared (*Agesq*)	-2e-5 (0.299)	-3e-5 (0.299)	-2e-5 (0.201)	-4e-5 (0.202)	-2e-5 (0.223)	-3e-5 (0.221)	-2e-5 (0.224)	-3e-5 (0.225)
TECHNOLOGY INTENSITY								
Medium-low technology intensive industry (*Mlow*)	-0.03 (0.580)	-0.06 (0.580)	0.01 (0.887)	0.01 (0.887)	-0.02 (0.726)	-0.04 (0.726)	0.01 (0.813)	0.02 (0.813)
Medium-high technology intensive industry (*Mhigh*)	0.0002 (0.998)	0.0003 (0.998)	0.07 (0.205)	0.14 (0.202)	-0.04 (0.536)	-0.08 (0.537)	0.05 (0.458)	0.09 (0.456)
High-tech intensive industry (*High*)	-0.32*** (0.004)	-0.61*** (0.003)	-0.25*** (0.009)	-0.48*** (0.009)	-0.40*** (0.000)	-0.77*** (0.000)	-0.30*** (0.002)	-0.56*** (0.002)
Constant term (*Cons*)	-3.26*** (0.000)	-	-2.77*** (0.000)	-	-3.43*** (0.000)	-	-2.82*** (0.000)	-

*Note: p-values in brackets where ***, ** and * denote statistical significance of variables at 1%, 5% and 10% level of significance respectively.*
p-values are obtained from two-step dynamic panel procedure with Windmeeijer's corrected robust standard errors. Year dummies included.

The significant and positive coefficient on the lagged dependent variable is consistent with a learning-by-exporting mechanism where firms use past accumulated experience to organise and to manage their present operations in a more efficient manner and sell more on the foreign market. The magnitude of coefficient is very similar in all four specifications about 0.47. From there, a long run multiplier can be calculated which implies that the long-run coefficients of explanatory variables are higher by about 1.92 times, as shown in the LR column under each specification.

Coefficients for investment in machinery and equipment and innovation are statistically insignificant. However, these findings should be viewed cautiously as innovations and technological improvements for small firms may be embodied in incremental changes in the production process which would not be registered as changes in tangible or intangible fixed assets. Moreover, technology and innovation may influence export intensity

indirectly by leading to improvements in the productivity of labour which we also control for in some specifications. Finally, we would expect that investment in technology and innovation are less important than cost reducing activities for firms which compete in prices (Lall, 2000).

The above conclusion is also supported by the findings for cost variables. Both unit labour and unit material costs have negative signs and are significant in line with our expectations. These findings can be taken as evidence that Croatian exporters compete on the basis of costs. Given that productivity and ulc are both proxies for labour efficiency the variable ulc is excluded from the model in Specifications 1 and 3 which include labour productivity. The estimated coefficient on productivity is positive and statistically significant in both specifications. These findings remain robust with the inclusion of the variable WPremium in Specification 3.

The inclusion of our proxy for human capital, wage premium, reduces sample by two years to the period 2001-2007. The estimated coefficient of this variable has negative sign and it is significant only in the model with productivity in Specification 3. The negative sign in front of this coefficient is another finding which we would expect from price-competitive firms.

Given the insignificant coefficients for investment in technology and for innovation as well as the negative sign for wage premium, the proxy for skills, the pattern of restructuring observed in exporting firms is what we would expect from firms from low-technology intensive industries which constitute the majority of firms in our sample. These firms participate in international markets with low quality products produced with standardized technologies, with costs, particularly costs of labour, being their main

competitive advantage. Hence, they remain competitive only by constantly improving their cost efficiency (Lall, 2000).

The findings with respect to agglomeration economies are robust across different specifications as all variables retain their sign and, except in one case, their significance. Firms located in four largest metropolitan areas in Croatia are less export intensive than their rivals located in other areas. The negative effect of location in large cities may reflect the fact that firms located in these cities exploit benefit of location in the form of easy access to domestic buyers, paying less attention to international markets and export a smaller proportion of their output. However, it may also be the case that large cities which are costlier (especially in human resources) are a disadvantage to cost conscious exporting firms that are from low-technology intensive industries and compete in prices. Furthermore, the concentration of firms outside of dense urban areas may be related to the development of a better transport infrastructure (Lall, 2000), something Croatia invested much on in period of analysis.

There is further evidence suggesting that exporting firms tend to locate themselves in areas which make them more cost competitive. The location near free trade zones is positively associated with the export intensity of Croatian manufacturers. However, location in areas with entrepreneurial zones does not seem to be relevant for them. This finding is a further support to the notion that Croatian manufacturers compete in prices on the international markets as free trade zones offer multiple cost advantages such as customs-free and tax-free imports of machinery, equipment, materials and intermediate inputs, exemption from VAT and reduced profit tax, and therefore, particularly suit firms competing in prices.

Firms located in regions with a land-border with Bosnia-Herzegovina are, ceteris paribus, more export intensive than firms in other regions, although the coefficient is only significant at the 10% level. On the one hand, it is possible that firms in these border regions find it more profitable to export into the neighbouring country than to the domestic market due to transportation costs which may be lower in international trade than in domestic trade (given the geography of Croatia). On the other hand, it is also likely that factors such as a common language and culture which are commonly identified in gravity-type models of international trade are at work here. In addition, many of these regions were hit severely by the war and many municipalities still receive subsidies and so do firms which establish their plants in these regions. Moreover, in terms of recent developments in infrastructure in Croatia these regions are well connected through the improved road network. Therefore, it is also likely that positive and significant coefficient on this variable is related to cost advantages received by firms in these regions.

The last two proxies for agglomeration are the effects of urbanisation and localisation economies. The findings for these two effects are consistent with the theory, both coefficients being statistically significant and positive. In summary, locations which provide firms with cost advantages have a positive effect on their export intensity. The evidence on the effect of urbanisation may also be interpreted as a sharing of common resources and information about threats and opportunities of foreign market which may help firms, particularly small ones to reduce costs of their export performance and also to reduce the risks of failure. A similar finding may also apply to localisation economies although it is likely that in this case the variable reflects also the effect of cooperation with other firms from the region in terms of subcontracting or joint operations on international markets (Bonaccorsi, 1992).

In all four specifications size has a positive sign and the coefficient is statistically significant in Specifications 1-3. This finding is consistent with argument that the small size of the domestic market is an important motivation for Croatian exporters to increase the share of output exported once the opportunities of the domestic market are exhausted. It is also likely that the positive relationship between size and export intensity is influenced by sunk costs of exporting. Although smaller firms can bear these costs by relying on the market instead of doing it within the firm, it is likely that market imperfections present in the turbulent environment of transition prevent smaller firms from exploiting the market mechanisms in acquiring skills and knowledge needed for successful performance on international markets. For the same reason it is argued that small firms are more risk averse as, under these imperfections, the flow of information needed for successful export performance is likely to be even more constrained (Bonaccorsi, 1992; Majocchi et al., 2005).

The findings for age and age squared, the proxy for general experience of the firm, are constant in terms of sign (positive on age and negative on the squared term) but the squared term is insignificant in all specifications while former one is significant only in some specifications at the 10% level. Finally in terms of the impact of technology intensity, based on the OECD (2007) classification there appears to be no statistical difference in export intensity between firms from low, medium-low and medium-high technology intensive industries. What is evident, however, is that firms in high-technology intensive industries export a lower share of their output than firms in low technology intensive sectors. This finding is consistent with other findings observed throughout the investigation in this paper that Croatian firms with highest export intensity come from low-technology intensive industries.

7. Conclusions

The competitive profiles of exporters from transition economies, and among them Croatian firms, have for a long time been based on low technology intensive standardised products. However, it has been postulated that such goods and services embody a lower potential for growth of firms and their economies than products rich in knowledge, technology and skills. The shift between two competitive profiles is often described as a lengthy process which requires learning, development of specific supporting infrastructure and specific government policies.

The results of investigation are in line with theoretical predictions about behaviour of price competitive firms. First, in building their international position, Croatian exporters rely on cost reductions and improvements in labour productivity. Second, the sensitivity of these firms to wage increases suggests that labour costs still play a major role in their success on international markets. Third, in overcoming barriers to exporting these firms rely on own resources, previous experience and cost and knowledge sharing agglomeration externalities. Fourth, the positive and significant relationship between export intensity and the firms' location in small urban areas or free trade zones suggest that some of policies undertaken by Croatian government in analysed period such as investment in infrastructure or development of export-targeting policies may have produced beneficiary effects on the competitiveness of exporters. When taken together, these findings indicate that Croatian exporters still rely on the same competitive advantages as the ones used in early stages of transition.

As cost advantages based on factor prices are not a long-run source of competitiveness, sooner or later a technological shift is needed for firms in order to survive and succeed. In this context, our findings raise concern over the prospects of Croatian exporters in the light of forthcoming accession to the European Union. Therefore, there is a need to investigate the role of mechanisms such as government policies, strategic alliances or

intra-industry trade through which the technological structure of Croatian exports can be improved.

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