Export Performance and Geography in Croatia

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WORLD BANK GROUP

Trade and Competitiveness Global Practice Group

August 2014

Abstract

This paper uses the gravity model to analyze whether the varying export performance of Croatian counties can be explained by their proximity to border gates, ports, and other county-specific characteristics. The analysis finds that longer distances to border gates increase trade frictions significantly for many product categories, although these frictions have been decreasing between 2007 and 2012. The paper analyzes the county specific factors that are associated with variation in export performance, net of distance. Results show that exports are strongly and positively correlated with motorway and road density, the size of the labor force, low-skill ratio, and the number of patents. These variables are also associated with a greater diversity

of exports in terms of products and destinations. Several general policy implications are highlighted. The significant association between motorway and road density and export volume, number of destinations, as well as the diversity of exported products may indicate that improvements in connectivity and facilitation of transport could still play a significant role in enhancing regional trade outcomes. Similarly, good performance in research and development may significantly help to spur competitiveness and allow local producers to enter new markets in products and destinations, which in turn can increase the level of diversification and boost resilience to global economic shocks.

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JEL Classification: F14, F15, R11

Keywords: Export performance, economic geography, transportation

Erhan Artuc is at DECTI, World Bank; Mariana Iooty and Ana Pirlea are at the Trade and Competitiveness Global Practice, World Bank. We thank Arabela Aprahamian, Ana Paula Cusolito, Russell Hillberry, Paulo Correa and workshop participants at the World Bank office in Zagreb in March 2014 for comments and suggestions. All errors are our own. The paper was prepared as part of the Croatia Smart Specialization Technical Assistance. Financial support by the Competitive Industries and Innovation Program trust fund is acknowledged.

Introduction

Croatia has been heavily affected by the global economic crisis and per capita GDP has remained stagnant since 2009. The country experienced sustained and relatively high rates of economic growth during the years preceding the global crisis. This was the result of a boom in domestic investment and consumption financed by large inflows of foreign capital. However, the Croatian economy was seriously affected by the global economic crisis and the local economy has been in recession since 2008. After plunging to -7 percent in 2009, growth has remained negative and registered -0.6 percent in 2013. This performance lags behind that of many new EU member states which have managed to achieve positive growth starting with 2010.¹ Unemployment remains a challenge and has continued to worsen, reaching 16.6% in 2013,² significantly higher than in many comparator EU members.

The poor economic record of recent years can be traced in large measure to a lackluster trade performance. Croatia's openness to trade is lower than what would be expected when considering the country's income per capita level. The economy has been particularly affected by the recession in the Eurozone as approximately half of its export activity is concentrated in the Euro-area, which is also the source of about three-quarters of foreign direct investment in the country. While Croatia's goods and services balance is neutral, the country posts an important deficit in goods trade. In addition, export competitiveness, as measured by export market share changes, even declined. Sectoral specialization, market orientation, and domestic supply-side factors all concurred to the negative performance. Although the level of complexity of local exports is higher than its level of income would suggest, it lags behind regional peers. The main export sectors are furthermore low in capital content and dominated by industries where price competition is more important than competing in terms of quality.

In order to better understand the country's export dynamics and inform policy solutions, it is important to analyze trade performance not only at the national but also at the local level. It has been recognized that the main challenges which shape trade patterns and development are different based on geographic scale. This is because, far from being uniform, economic activity and growth tends to become spatially concentrated over time. In the case of Croatia, although all of its regions contribute to the country's export activity, export performance varies significantly across counties. The goal of this paper is to shed some light on the differences in export performance between Croatian counties.

In the first stage, this paper uses the gravity model to analyze whether the varying export performance of Croatian regions can be explained by their proximity to export destinations. The gravity model is probably one of the most empirically successful models in the trade literature and shows that geography and distance can explain a significant portion of the variation in trade flows and that trade volume is negatively correlated with the distance between trading partners.

¹ These include: Poland, Lithuania, Hungary, or Bulgaria (source IMF WEO Database)

² IMF World Economic Outlook (October 2013) estimates

In general, the gravity model can explain trade between countries, as well as trade between regions within countries. For example, Anderson and Van Wincoop (2002) fit the trade data between North American regions to a gravity model, in order to quantify the border effects. This paper employs a similar gravity model to explain the significance of proximity to border gates and trading partners in the varying export performance of Croatian counties. Although Croatia is geographically small compared to other EU members, we find that distance to border gates within the country affects export volumes significantly (for most of the product categories).

Using the gravity model, we identify the impact of distance on export volume. Then, *in the second stage*, we analyze the local county specific factors that lead to variation in export performance, net of distance to border gates. The paper then seeks to answer the following questions: How are county-specific demographical factors such as population and low skill ratio correlated with the variation in export volume? Are infrastructure indicators, such as motorway and road density, as well as wages, GDP per capita, or the number of entrepreneurs associated with increased export volume?

In addition to the export volume, export diversity is also an important indicator of export performance. It has been shown in the literature that there is a fixed cost of entry to new markets, as in Hillberry and Hummels (2008), Lincoln and McCallum (2011) and Eaton et al (2014). This fixed cost implies that an initial, even small, trade flow to a specific destination could potentially lead to more trade in the future. Therefore, diversifying export destinations can help exporters to enter new markets and set-up new partnerships. Moreover, relying on a single destination would make exporters exposed to destination-specific demand shocks. In particular, Croatia is at risk since most of its exports are to the EU members. For example, countries that have diverse export portfolios were affected less severely from the 2007 global financial crisis which was particularly pervasive in the EU and US. Global demand and supply for different products and commodities are also subject to shocks; therefore countries that rely on the export of a single commodity are affected from such shocks significantly. Thus, countries that have a diverse export portfolio can reduce the exposure and better navigate economic downturns.

This paper develops two simple indices to calculate export diversity of products and destinations. It then uses these indices to shed light on the following questions: How are export diversity in destinations and products correlated with county specific demographic and economic factors such as low skill ratio, working age population, average wages, per capita GDP, or the number of entrepreneurs? Are infrastructure and research and development – related indicators, such as the number of patents, associated with more diversity in exports?

The paper is organized as follows: First, we estimate a gravity model using trade data between county origins to country destinations to pin down the export supply parameters of counties and the impact of distance to border gates and ports. We use county export data for NACE 2 digit product classification from 2007 to 2012 for the gravity estimation. Then, in a following econometric analysis, we show how the export supply parameters vary with county characteristics. Finally, we estimate the correlation of export diversity with county

characteristics. We find that longer distance to border gates increases trade frictions significantly for many product categories; however these frictions have been decreasing between 2007 and 2012. We find that exports increase with motorway and road density, but more so with motorway density. We also find that the size of labor force and the density of motorways are associated with a greater diversity of exports in terms of products and destinations.

The Gravity Model

The gravity model is one of the most successful empirical models in the international trade literature. Similarly to the gravity equation in Newtonian physics, two economic masses attract each other. As the economic size increases, the volume and variety of production increases, which in turn results in expansion of the supply and the volume of exports. Similarly, as economic size becomes larger demand also increases, which in turn leads to growth in imports. Thus the trade between an origin location and a destination location is directly correlated with their economic sizes. However, as the distance between origin and destination increases, the transportation costs also increase, and the trade volume decreases.³

Following the literature, we develop a gravity model to explain exports originating from counties in Croatia to destination countries around the world. Our goal is to identify the changes in geographical trade frictions and in the comparative advantage of different regions.

The standard gravity equation for exports $x_{k,t}^{ij}$ is equal to:

$$x_{k,t}^{ij} = \exp(c_{k,t}^i + d_{k,t}^j + B_{k,t}b_{k,t}^{ij}) + e_t^{ij},$$

Where: $c_{k,t}^i$ is the origin fixed effect (the push variable) for county “i” and product “k” at time “t”, $d_{k,t}^j$ is the destination fixed effect (the pull variable) for country “j”, $b_{k,t}^{ij}$ is the distance between “i” and “j”, $B_{k,t}$ is the coefficient of the distance variable, and e_t^{ij} is the regression residual.

In the international trade literature, the gravity equation is used to explain trade flows between countries, as in Eaton and Kortum (2002) or between regions of large countries (such as the US and Canada), as in Anderson and Van Wincoop (2002). The origin fixed effects capture all supply conditions, and the destination fixed effects capture all destination specific demand conditions. Therefore, the gravity equation does not include any other origin or destination specific variables. For example, GDP is a potential explanatory variable for both supply and demand. However, the fixed effects capture all variation related to GDP and therefore it is almost never used within the gravity equation. The usual bilateral variables are distance, common language, trade agreements between origin and destination, colonial link, etc. Earlier studies

³ Anderson (2011) provides a detailed review of the literature on gravity model.

have used Ordinary Least Squares (OLS) to estimate the gravity equation; however after Santos Silva and Tenreyro (2006), the Poisson Pseudo Maximum Likelihood (PPML) estimation replaced the OLS estimation. The PPML has several advantages over OLS because it easily allows zero trade between some origins and destinations and it is consistent with the trade theory.

Different from the mainstream use of the gravity equation, this paper explains the exports from the counties of Croatia to destination countries (as opposed to explaining trade between countries). The departure from the usual specification creates several challenges:

First, we cannot use any bilateral variable other than distance. This is because the usual bilateral variables, like the common trade union, apply to all counties at the same time, while others, such as a common language and cultural links between certain Croatian regions and neighboring countries, cannot be easily measured. For example, being part of the EU can be considered as a bilateral variable but it does not vary from county to county. Therefore the “EU” bilateral variable is fully captured by the origin and destination fixed effects and it cannot be used as an explanatory variable. Thus, the only possible bilateral variable is the distance between origin counties and destination countries.

Second, the distance between origin counties is very small relative to the distance between Croatia and destination countries. For example, the distance between Canada and Dubrovnik is virtually identical to the distance between Canada and Zagreb. Therefore, the lack of sufficient variation in the distance between origin counties and destination countries prevents us from using the actual distance. To overcome this challenge, we use the distance between the county and the export gate rather than the distance between the county and destination country. We identify the border gate or port (if the destination is overseas) which is closest to each destination country). Then we calculate the shortest distance between border gates (or alternatively ports) and origin counties, and use this distance rather than the actual distance between the Croatia and the destination country. Of course, the actual distance also matters but the frictions related to actual distance between Croatia and destinations will be captured by the destination fixed effects.⁴

Third, because of the small economic size of counties, we observe zero exports to some countries. For example, exports to Costa Rica can be zero for many years (for all possible origins), because Costa Rica is a small and distant country. The probability of zero exports decreases with the economic size of the destination country and increases with the distance. Therefore, we need to aggregate products and destinations, in order to maintain a reasonable volume of exports for each destination and product. The important trade partners of Croatia are not aggregated into groups, and remain as distinct destinations, while the less important partners, especially the countries that are far away from Croatia are clustered into groups. For example, Bosnia and Herzegovina is a destination by itself, while all Latin American countries are

⁴ See Atkin and Donaldson (2013) for a model of intra-national trade. Similar to this paper, they also calculate the frictions associated with transporting goods within a country.

aggregated into a single destination. We aggregate the traded products and services following a similar intuition.

Exports and Geography

The distance coefficient of the gravity equation explains the variation in exports that can be attributed to the proximity of origins and destinations. All demand specific variation will be captured by the destination fixed effects and all supply specific variation will be captured with the origin fixed effects. Therefore the comparative advantage of each origin county can be summarized by the origin fixed effects.

The gravity equation coefficient, $c_{k,t}^i$ is the export push variable (origin fixed effect) for county “i” and product “k” at time “t”. It is possible to run a regression using the export push variable (origin fixed effect) as a dependent variable, and county specific explanatory variables to identify factors that are correlated to each county’s comparative advantage. The linear regression equation is

$$c_{k,t}^i = a_{0,t} + a_{1,k,t} + A_t X_i + u_{i,k,t},$$

where $a_{0,t}$ is the intercept, $a_{1,k,t}$ is the product fixed effect, A_t is the vector of coefficients to be estimated, X_i is the vector of county-specific explanatory variables, and finally $u_{i,k,t}$ is the regression residual.

In a following regression analysis, as an alternative to the export push variable, we regress the number of destinations for each product-county pair over county specific explanatory variables.

The gravity equation explains the significance of a county’s proximity to ports and border gates. Another important variable is the export diversity of each county. We can measure the diversity (or the degree specialization) by comparing the variance of exports for each county. Assume that a county exports only a single product. This would mean that the particular county is fully specialized in one product. Alternatively, another county might be exporting all products, in similar quantities. This would mean that the particular county is not specialized and has a diverse export portfolio. The diversity index for county “i” at time “t” is denoted as H_t^i , and can be calculated using the following equation

$$H_t^i = \frac{\sum_k \left(\sum_j (\log x_{k,t}^{ij})^2 \right)}{\text{Var}_k (\sum_j \log x_{k,t}^{ij})}$$

It is possible to calculate destination diversity of a county, by calculating the variance of exports to different destinations using the following equation

$$Q_t^i = \frac{\sum_j \left(\sum_k (\log x_{k,t}^{ij})^2 \right)}{\text{Var}_j (\sum_k \log x_{k,t}^{ij})}$$

Similarly, we can measure origin diversity of a product, to examine if a product is exported from multiple origins or not. For example, if a product is exported from a single origin, then this means the production of the particular product is concentrated. However, if the product is exported from many different origins, the production is not concentrated. We denote the concentration index of product “k” at time “t” as Z_t^k , and calculate it using the following equation

$$Z_t^k = \frac{\sum_i \left(\sum_j (\log x_{k,t}^{ij})^2 \right)}{\text{Var}_i (\sum_j \log x_{k,t}^{ij})}$$

In the last part of the analysis, we regress diversity indices on county specific variables (and various fixed effects), to explore the relation between county characteristics, specialization and diversity.⁵ The regression analysis shows the correlates of export potential, export diversity and county characteristics. Unfortunately, the data is not rich enough to address potential endogeneity problems and other econometric issues; therefore our goal is to illustrate possible correlations rather than the direction of causality.

⁵ In particular, we use modified version of diversity indices such as $h_t^{ij} = (\sum_k \log x_{k,t}^{ij}) / \text{Std}_k (\log x_{k,t}^{ij})$.

Data and Descriptive Statistics

The export data by origin county and destination country in NACE 2 digit product classifications is provided by the Croatian Bureau of Statistics (CBS). The export data covers the years from 2007 to 2012. Only total exports from a specific county to a specific destination are observed, i.e. the port, border gate, exporting firm, or any other transaction level information is unobserved. There are some minor changes in the classifications over the years, for example exports to Montenegro and Kosovo were jointly classified as exports to Serbia in the initial years.

Tables 1-3 present the origin counties, destination country groups, and product categories used for the gravity estimation, along with the relevant abbreviations.⁶ After the aggregations, we have 20 counties, 25 destination country groups, and 12 product categories.

Export volumes for all destinations are listed by year in Table 4. Italy, Bosnia Herzegovina, and Germany are the largest destinations for Croatian exports, while West Asia is the smallest in terms of the export volume as shown in Figure 1 which lists each destination country and region according to total export values for 2007 and 2012. Export quantities have been increasing for many destinations over time. The five largest destinations in terms of volume accounted for approximately 68 percent of total exports in 2012.

⁶ All tables are presented in the Annex.

Figure 1: Exports by destination country or region

Source: Staff elaborations based on data from the CBS. All numbers are in billion HRK

Exports by county are presented in Table 5 while Table 6 shows the number of export destinations by county. Recent indicators show that Zagreb, Varadzin, Istria, and Sisak-Moslavina are currently the most important exporting counties in terms of volume (Figure 2). Over the six year period for which data is available, exports originating from Zagreb (city and county combined) account for approximately one third (35%) of total exports from Croatia. The second biggest exporter is Istria with only 10% of the total exports, while the smallest exporter in terms of volume is Lika-Senj with about 0.1% of the total. When it comes to the number of destinations, Zagreb exports to all 25 possible locations, followed by Primorje, Split and Istria, which export to about 20 countries and country groups. Lika shows the smallest value in terms of the number of destinations, only 5.

Figure 2: Export volume by county

Source: Staff elaborations based on data from the CBS. All numbers are in billion HRK

The *export product diversity index* by county is shown in Figure 3 and Table 7. In 2012 Lika-Senj, Šibenik-Knin, Virovitica-Podravina, and Požega-Slavonia were the most specialized counties, displaying only a small level of diversity in export products, whereas Zagreb, Istria and Varadzin emerged as the most diverse counties. A number of origin locations, including Karlovac, Osijek, Primorje, and Zagreb appear to have become more specialized over the preceding six years. In regard to destination diversity, Table 8 and Figure 4 present the *export destination diversity index* by county. Istria and Zagreb are the most diverse counties, exporting to the widest number of destinations, while Lika-Senj and Požega are currently the least diverse counties.

Figure 3: Export diversity index by county

Source: Staff calculations based on data from the CBS. No units.

Figure 4: Destination diversity index by county

Source: Staff calculations based on data from the CBS. No units.

The county specific variables that are used in the analysis are summarized in Table 9. Average wages are the average monthly salaries in thousand HRKs for 2010. We observed the highest average wage in Zagreb with 5799 HRKs. GDP data for 2010 is expressed in million

HRKs. The highest per capita GDP is in Zagreb which displays more than the double of many other counties' per capita GDP. Motorway and road densities are calculated by dividing their length to the area of county. When it comes to infrastructure indicators, Zagreb has the highest motorway density while Krapina has the highest state road density. Low skill ratio is the ratio of working age population without higher education divided by the total working age population. The population variable is defined as the size of the working age population. The patent variable shows the number of yearly patents per 10,000 adults. The entrepreneurs indicator provides the number of entrepreneurs per 1000 people in 2012.

The decomposition of exports by product categories is presented in Figure 5 and Table 10. Chemicals and Pharmaceuticals account for the largest share of exports, followed by metals, food products, and textiles. As can be observed in the chart below, the export structure has remained relatively constant between 2007 and 2012. Table 11 shows the origin diversity index by category. Manufacturing electrical equipment, transportation, as well as other manufacturing, display the highest degree of concentration, whereas manufacturing of rubber and other non-metal minerals show the highest degree of origin diversity.⁷

Figure 5: Total exports by product category

Source: Staff calculations based on data from the CBS

⁷ According to our calculations, around 15 counties export rubber

Results

This section presents four sets of analytical results: the impact of distance on exports which is calculated using the gravity equation; the relation between export volume, the number of export destinations, diversity indices and various county-specific variables; and the results of two proposed counterfactual exercises, along with the estimation of the elasticity exports to county characteristics.

We estimate the gravity equation using PPML, with origin and destination dummies. The distance variable is calculated by finding the minimum distance between the origin county and the border gate (or port) closest to the destination. The gravity equation is estimated for each year and product separately. Table 12 shows the estimate of distance coefficient, for the first year in the sample, 2007, for the last year, 2012, for the average between 2007 and 2012 (the origin and destination dummies are not reported). As expected, the distance variable is negative and statistically significant for many product categories. The distance coefficient is significant at 1% level and negative for agriculture, textiles, wood, chemicals, rubber, machinery, and other manufacturing sectors. For the metal sector, it is positive and significant at 5% level, and it is insignificant for the rest.

We find that the distance coefficient has been decreasing over time (in absolute terms) for agriculture, food, textiles, chemicals, machinery, and other manufacturing sectors. This means the trade frictions have been decreasing for these sectors. This decrease cannot be explained by the increase in demand or supply, such as Croatia's entry process to EU, growth, or macroeconomic shocks. All the demand and supply related factors are encompassed by origin and destination fixed effects, thus the distance variable will only capture factors that are related to transportation of goods and services.

The relation between export volume and various county-specific variables is shown in Table 13. The econometric analysis is conducted by regressing origin fixed effects (export push variables) from the gravity equation over explanatory variables (county characteristics). A similar analysis could be conducted using export volumes rather than origin fixed effects. We chose to use exports push variables from the gravity equation, instead of exports, because exports are correlated with trade frictions and do not necessarily reflect the comparative advantage. We find that most of the explanatory variables are positive and significant. Similarly to the previous table, we report the year 2007 coefficients, the year 2012 coefficients and the average coefficients between 2007 and 2012. On average, wage is positive and significant at 10% level; GDP per capita is positive but not significant; motorway density, road density and low skill labor ratio, labor force, and patent coefficients are positive and significant at 1% level; the entrepreneurs coefficient is negative and insignificant.

Note that our analysis does not show the direction of the causality due to likely endogeneity between the independent and the explanatory variables. For example, exports increase with wages, but most likely exports increase labor demand and wages, not the other way

around. The size of labor force (working age population) is significantly correlated with exports, and this correlation can have several possible explanations: First, labor supply is larger in more populous counties pushing wages down and increasing profitability and exports. Second, exports might be concentrated in relatively labor intensive products requiring more workers than other sectors. Third, migration might increase the number of workers in more productive counties, which are also larger exporters. We cannot test which scenario is correct, and it is also possible that all are correct at the same time, but we can conclude that there is a positive correlation between the size of labor force and exports.

Per capita GDP is positively correlated with exports, which is expected because both exports and GDP per capita are highly correlated with productivity. Moreover, we find that the coefficient of motorway density is larger than the coefficient of the road density, therefore the density of motorways shows a stronger correlation with exports. The most surprising finding is the positive correlation between low skill labor ratio and exports. Normally, exporting firms demand relatively more skilled workers compared to non-exporting firms. The correlation between exporting firms and skilled labor demand is a robust finding in the literature. Among others Verhoogen (2008), Matsuyama (2007), and Brambilla et al (2012) report this phenomenon. However, we find that in this case exports are positively correlated with low skill labor ratio (and thus negatively correlated with high skilled labor ratio). This correlation may not be pervasive and may be driven by low skill intensive manufacturing and commodity exports. For example, Zagreb has the smallest low skill labor ratio but it is also the largest exporter. Moreover, although the literature generally points to a different kind of dynamic between skill levels and exports than the one identified by this analysis, previous studies of firm-level data for Croatia suggest some potential explanations for the current findings. Specifically, as Stojcic (2012) highlights in a recent evaluation of the competitiveness of Croatian manufacturing exporters, it is apparent that local companies still rely on low labor costs in order to maintain a successful international performance. This is due to the fact the largest share of exports originating from the country is composed of low-technology products, which are likely to require primarily low-skill labor inputs.

Finally, the number of entrepreneurs per capita seems to be negatively correlated with exports (although not statistically significant). This finding might sound surprising at first, but it is perfectly consistent with the findings of recent trade literature. Researchers, following Metlitz (2003), showed that there is a positive correlation between the productivity, size and export volume of firms. After trade liberalization, smaller firms exit the market, and their market shares are usually captured with larger firms. Therefore, it is unsurprising to see a negative correlation with the number of firms and the volume of exports, since trade volume is strongly associated with larger firms.

The correlation between the number of export destinations and county characteristic is presented in Table 14. The explanatory variables are identical to the ones that are reported in Table 12. Again, similar to Table 12, most of the coefficients are positive and statistically

significant. On average, GDP per capita, low skill ratio and labor force coefficients are positive and significant at 1% level; road density and patents coefficients are positive and significant at 5% level; motorway density coefficient is positive and significant at 10%; wage and entrepreneurs coefficients are insignificant. We find that, in general the factors that are correlated with export volumes are also relevant for the number of export destination in similar ways.

The correlation between the diversity indices and county characteristics is presented in Tables 15 and 16. GDP per capita, low skill ratio, labor force, the number of patents, road density and motorway density coefficients are positive and statistically significant at 5% level (or at 1% level in some cases). Wages and entrepreneurs coefficients are positive but statistically insignificant. The size of labor force seems to be increasing the diversity of exports. This is expected, since larger counties probably have more variation in their production and exports. Similarly, motorway density is positively correlated with the diversity indices. Natural resource intensive exports are probably concentrated in rural areas which have a less dense motorway network and a higher level of specialization. Research and development activity appears to be associated with a higher level of diversity. The low skill ratio also seems to be positively correlated with diverse exports, which is probably caused by the large urban areas' attractiveness for low skill migration, otherwise we would expect high skill ratio to be positively correlated with diverse exports.

In order to get a better sense of the relative importance of the available county-level characteristics associated with trade dynamics, two types of counterfactual analyses are performed. The first, presented in Table 17, gives an indication of the increase in export potential associated with a change in a specific county characteristic from the current level to the level of the best performing county (or the benchmark) for that particular variable. Export potential appears to be most sensitive to changes in population levels and least affected by average wage levels. The second, presented in Table 18, suggests how many new export destinations could potentially be added in each origin if the indicator for a particular location would reach the level of the best performing county for that characteristic. As for the previous counterfactual exercise, the number of destinations seems to be most affected by the overall labor supply (or population). Third, the elasticity of exports to county characteristics is also explored (Table 19). Results suggest that export potential is particularly sensitive to increases in the low skill ratio, most likely due to the low-technological level of a large segment of exported products.

Conclusion and Policy Considerations

The current analysis has shown that differences in export performance between Croatian counties are significantly associated with distance and local characteristics of the exporting region. Similar to previous studies which employ the gravity model this paper finds that longer distances to border gates or ports increase trade frictions for the majority of exported products.

This finding is somewhat surprising since the previous studies focused mostly on geographically large and economically heterogeneous countries such as the United States and Canada. The strong negative correlation between the distance to border gate and trade volume, even for a geographically small country such as Croatia, highlights the importance of improvements in connectivity to support trade performance. These frictions have been shown to decrease over the recent period under analysis (between 2007 and 2012), which could be the result of investments in infrastructure carried out in the years prior to EU accession. Moreover, while proximity to border gates and ports appears to have an impact on almost all types of products, it does not seem significant when it comes to the export of services. While this indicates that exports such as tourism or IT services could be less sensitive to distance, Croatia may still need to address challenges related to connectivity at the local level in order to effectively support the rebalancing of the country's deficit in the trade of goods.

County characteristics are also strongly associated with export performance, both in relation to the overall comparative advantage of the county as well as when it comes to the diversity of exports and products. The results of the assessment indicate that export volume is strongly correlated with all county-level characteristics including the size of the labor force, motorway and road density, and number of patents. Although, due to the nature of the data, the analysis in our case does not allow to infer a direct causal relationship between export performance and county-level variables, these should be explored in subsequent studies based on data availability. The significant association between motorway and road density and export volume, number of destinations, as well as the diversity of exported products may indicate that improvements in connectivity and facilitation of transport could still play a significant role in trade performance. Similarly, a good research and development performance (proxied here by the number of patents) may significantly help to spur competitiveness and allow local producers to enter new markets in terms of both products and destinations, which in turn can increase the level of diversification and boost resilience to global economic shocks.

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ANNEX 1

TABLE 1: ORIGIN COUNTIES

Abbreviation	Name	Location
ZAG	Zagreb	Zagreb
KRA	Krapina-Zagorje	Central
SIS	Sisak-Moslavina	Central
KAR	Karlovac	Central
VAR	Varaždin	Central
KOP	Koprivnica-Križevci	Central
BJE	Bjelovar-Bilogora	Central
PRI	Primorje-Gorski kotar	Coastal
LIK	Lika-Senj	Other
VIR	Virovitica-Podravina	Other
POZ	Požega-Slavonia	Other
SLA	Slavonski Brod Posavina	Other
ZAD	Zadar	Coastal
OSI	Osijek-Baranja	Other
SIB	Šibenik-Knin	Coastal
VUK	Vukovar-Sirmium	Other
SPL	Split-Dalmatia	Coastal
IST	Istria	Coastal
DUB	Dubrovnik-Neretva	Coastal
MED	Međimurje	Central

TABLE 2: DESTINATION COUNTRY GROUPS

Abbreviation	Countries
Bosnia H.	Bosnia and Herzegovina
Slovenia	Slovenia
Italy	Italy
Germany	Germany
Serbia	Serbia, Montenegro and Kosovo
Austria	Austria
Hungary	Hungary
France	France
US	United States and Canada
UK	United Kingdom and Northern Ireland
Czech R.	Czech Republic and Slovakia
Macedonia	Macedonia
Netherlands	Netherlands and Belgium
Switzerland	Switzerland
N. Europe	North Europe excluding former SSR
Russia	Russia and other former SSR
Poland	Poland
Romania	Romania
Spain	Spain, Portugal and Malta
E. Europe	Bulgaria, Turkey, Greece and Cyprus
MENA	Middle East and North Africa
E. Asia	East Asia and Oceania
W. Asia	West and Central Asia excluding former SSR
LAC	Latin America and the Caribbean
Africa	Sub-Saharan Africa

TABLE 3: PRODUCT CATEGORIES

Abbreviation	Product Categories
Agriculture	Crops, Animals, Fishing, Mining, etc.
Food	Food, Beverages and Tobacco
Textiles	Textiles, Wearing and Leather
Wood	Wood, Paper and Printing
Chemicals	Chemicals, Coke and Pharmaceutical
Rubber	Rubber and other Non-metal
Metal	Basic and Fabricated Metal
Electrical	Computer and Electrical
Machinery	Machinery
Transport	Motor and Transportation
Other Man.	Furniture and Other Manufacturing
Services	Services and Utilities

TABLE 4: EXPORTS BY DESTINATION COUNTRY OR REGION

Destination	2007	2008	2009	2010	2011	2012
Bosnia H.	9.41	10.49	7.01	7.48	8.68	9.22
Slovenia	5.34	5.23	4.01	4.97	5.79	6.20
Italy	12.45	13.12	10.41	11.96	11.09	11.03
Germany	6.45	7.29	6.00	6.62	7.11	7.35
Serbia	2.56	3.78	2.92	2.53	2.79	3.16
Austria	3.96	3.95	2.93	3.38	4.03	4.72
Hungary	1.41	1.66	0.97	1.45	1.78	1.83
France	1.45	1.44	1.09	0.88	2.08	1.07
US	1.88	1.72	1.24	1.63	1.92	2.16
UK	1.27	1.64	1.20	0.97	1.06	1.15
Czech R.	0.48	0.49	0.48	0.64	0.79	0.87
Macedonia	0.62	0.70	0.63	0.61	0.71	0.73
Netherlands	0.67	0.89	0.78	0.94	2.73	1.29
Switzerland	0.70	0.61	0.75	0.53	0.57	0.53
N. Europe	0.84	0.39	0.29	0.39	1.29	0.42
Russia	0.43	0.37	0.32	0.40	0.53	0.31
Poland	0.63	0.68	0.60	0.65	0.76	0.74
Romania	0.39	0.44	0.45	0.45	0.59	0.66
Spain	0.60	0.40	0.98	0.73	0.40	0.32
E. Europe	0.45	0.57	1.15	0.97	1.44	1.13
MENA	0.48	0.43	0.63	0.60	0.65	0.63
E. Asia	0.90	0.81	0.67	0.62	0.66	0.31
W. Asia	0.05	0.06	0.06	0.11	0.30	0.10
LAC	0.52	0.32	0.08	0.19	0.51	0.66
Africa	0.12	0.05	0.37	0.30	1.18	0.40

All numbers are in billion HRK.

TABLE 5: EXPORTS BY COUNTY

County	2007	2008	2009	2010	2011	2012
Zagreb	19.13	21.03	16.45	17.50	19.11	20.86
Krapina-Zagorje	1.83	1.95	1.74	1.84	1.98	2.11
Sisak-Moslavina	3.36	3.58	2.29	2.85	3.79	3.53
Karlovac	1.21	1.34	1.18	1.17	1.34	1.37
Varaždin	4.23	4.31	3.73	4.27	5.16	5.34
Koprivnica-Križevci	1.16	1.20	1.21	1.33	1.54	1.38
Bjelovar-Bilogora	0.77	0.88	0.68	0.69	0.69	0.70
Primorje-Gorski kotar	2.01	2.69	2.31	2.60	3.81	2.58
Lika-Senj	0.06	0.04	0.03	0.04	0.08	0.12
Virovitica-Podravina	0.80	0.80	0.62	0.61	0.69	0.91
Požega-Slavonia	0.74	0.61	0.53	0.58	0.63	0.71
Slavonski Brod Posavina	0.79	1.16	0.94	0.81	0.77	1.22
Zadar	1.03	0.94	0.91	0.99	1.16	0.91
Osijek-Baranja	2.84	2.58	2.04	2.38	3.09	2.84
Šibenik-Knin	1.19	1.35	0.97	1.27	1.36	1.31
Vukovar-Sirmium	1.08	0.94	0.80	1.47	1.12	1.18
Split-Dalmatia	3.64	3.56	2.67	2.41	3.27	2.81
Istria	6.09	6.25	4.86	4.83	6.91	4.14
Dubrovnik-Neretva	0.20	0.23	0.17	0.20	0.23	0.17
Međimurje	1.89	2.10	1.89	2.16	2.74	2.81

All numbers are in billion HRK.

TABLE 6: NUMBER OF DESTINATIONS BY COUNTY

County	2007	2008	2009	2010	2011	2012
Zagreb	25	25	25	25	25	25
Krapina-Zagorje	16	16	15	16	17	18
Sisak-Moslavina	14	15	15	16	17	17
Karlovac	16	15	16	16	17	17
Varaždin	19	19	22	21	21	22
Koprivnica-Križevci	15	17	16	17	17	17
Bjelovar-Bilogora	14	14	14	15	13	14
Primorje-Gorski kotar	20	20	20	21	22	22
Lika-Senj	5	4	4	5	5	7
Virovitica-Podravina	11	11	10	11	12	12
Požega-Slavonia	11	12	11	11	12	14
Slavonski Brod Posavina	14	13	14	16	17	18
Zadar	15	16	15	17	16	15
Osijek-Baranja	18	18	18	18	19	19
Šibenik-Knin	10	9	11	10	11	13
Vukovar-Sirmium	13	13	12	13	14	14
Split-Dalmatia	21	21	20	20	21	21
Istria	21	21	21	22	22	22
Dubrovnik-Neretva	13	14	13	13	15	14
Međimurje	18	17	18	19	18	19

Note: There are 25 regions maximum, as shown in Table 2.

TABLE 7: EXPORT DIVERSITY INDEX BY COUNTY

County	2007	2008	2009	2010	2011	2012
Zagreb	3.03	2.95	2.73	2.76	2.65	2.35
Krapina-Zagorje	1.09	1.27	1.22	1.16	1.55	1.31
Sisak-Moslavina	0.53	0.63	0.60	0.57	0.41	0.55
Karlovac	0.91	0.86	0.53	0.50	0.40	0.40
Varaždin	1.42	1.48	1.34	1.68	1.89	1.73
Koprivnica-Križevci	0.35	0.44	0.37	0.32	0.38	0.50
Bjelovar-Bilogora	0.94	1.25	0.75	0.70	0.62	0.75
Primorje-Gorski kotar	2.14	1.41	1.52	1.17	1.23	1.22
Lika-Senj	0.22	0.13	0.09	0.21	0.18	0.19
Virovitica-Podravina	0.28	0.12	0.23	0.18	0.19	0.21
Požega-Slavonia	0.17	0.19	0.17	0.22	0.70	0.38
Slavonski Brod Posavina	0.48	0.50	0.49	0.59	0.67	0.55
Zadar	0.36	0.42	0.28	0.31	0.32	0.44
Osijek-Baranja	1.77	1.77	1.43	1.30	1.11	0.89
Šibenik-Knin	0.17	0.18	0.21	0.17	0.14	0.19
Vukovar-Sirmium	0.64	0.76	0.75	0.79	0.91	1.04
Split-Dalmatia	0.80	0.76	0.71	0.67	0.56	0.59
Istria	1.95	1.61	1.13	1.18	1.23	1.80
Dubrovnik-Neretva	0.73	0.57	0.43	0.56	0.60	0.62
Međimurje	0.70	0.51	0.58	0.63	0.70	0.77

Note: No units. Used in “product diversity index” regressions (calculated using the equation described in the paper)

TABLE 8: DESTINATION DIVERSITY INDEX BY COUNTY

County	2007	2008	2009	2010	2011	2012
Zagreb	1.67	1.47	1.37	1.36	1.77	1.20
Krapina-Zagorje	0.27	0.41	0.60	0.37	0.73	0.72
Sisak-Moslavina	0.59	0.56	0.59	1.01	1.13	0.81
Karlovac	0.45	0.32	0.49	0.46	0.51	0.59
Varaždin	0.60	0.56	0.62	0.54	0.50	0.58
Koprivnica-Križevci	0.30	0.56	0.58	0.61	0.68	0.60
Bjelovar-Bilogora	0.20	0.28	0.28	0.33	0.29	0.24
Primorje-Gorski kotar	0.56	0.45	0.72	1.41	0.95	0.82
Lika-Senj	0.05	0.04	0.05	0.06	0.07	0.10
Virovitica-Podravina	0.45	0.40	0.23	0.36	0.31	0.41
Požega-Slavonia	0.12	0.19	0.13	0.30	0.16	0.17
Slavonski Brod Posavina	0.97	0.20	0.26	0.29	0.32	0.68
Zadar	0.29	0.34	0.52	0.49	0.62	0.56
Osijek-Baranja	0.55	0.91	0.78	0.66	0.71	0.90
Šibenik-Knin	0.26	0.15	0.11	0.16	0.21	0.40
Vukovar-Sirmium	0.14	0.15	0.21	0.22	0.21	0.34
Split-Dalmatia	0.44	0.52	0.39	0.70	0.71	0.96
Istria	0.70	0.78	0.58	0.84	0.97	1.42
Dubrovnik-Neretva	0.26	0.23	0.20	0.22	0.35	0.30
Međimurje	0.68	0.63	0.33	0.84	0.64	0.83

Note: No units. Used in “destination diversity index” regressions (calculated using the equation described in the paper)

TABLE 9: COUNTY SPECIFIC DATA

County	Average Wage	GDP per Capita	Motorway Density	Road Density	Low Skill Ratio	Adult Population	Patents	Entrepreneurs
Zagreb	5.80	0.11	0.06	0.09	0.70	6.27	8.35	51.06
Krapina-Zagorje	3.98	0.05	0.03	0.19	0.88	0.73	1.37	3.02
Sisak-Moslavina	4.80	0.06	0.01	0.09	0.87	0.94	1.59	6.72
Karlovac	4.63	0.05	0.02	0.10	0.84	0.70	3.70	13.68
Varaždin	3.64	0.06	0.04	0.17	0.85	0.98	4.70	15.27
Koprivnica-Križevci	4.92	0.06	0.00	0.12	0.86	0.63	4.28	7.74
Bjelovar-Bilogora	3.79	0.05	0.00	0.11	0.88	0.65	0.93	10.74
Primorje-Gorski kotar	5.37	0.09	0.04	0.14	0.76	1.72	6.96	23.41
Lika-Senj	3.61	0.06	0.02	0.10	0.86	0.26	0.38	6.98
Virovitica-Podravina	3.60	0.04	0.00	0.09	0.90	0.46	1.74	5.42
Požega-Slavonia	3.70	0.05	0.00	0.12	0.87	0.40	5.20	6.96
Slavonski Brod Posavina	3.89	0.04	0.06	0.07	0.89	0.72	1.66	11.30
Zadar	4.45	0.06	0.02	0.16	0.81	0.91	1.43	19.98
Osijek-Baranja	3.96	0.06	0.01	0.12	0.84	1.68	3.04	12.83
Šibenik-Knin	4.54	0.06	0.01	0.12	0.83	0.57	3.48	16.97
Vukovar-Sirmium	3.86	0.04	0.02	0.11	0.88	0.95	1.79	3.98
Split-Dalmatia	4.77	0.06	0.03	0.16	0.77	2.48	6.66	24.59
Istria	5.28	0.10	0.04	0.12	0.80	1.20	3.82	2.32
Dubrovnik-Neretva	4.32	0.08	0.00	0.22	0.76	0.66	3.64	28.01
Međimurje	3.78	0.06	0.03	0.12	0.87	0.62	4.80	15.11

This data is used every regression, except the gravity regression

DESCRIPTION

Average Wage	Average monthly paid off net earnings, by counties, 2010, in kuna (divided by 1000)
GDP per Capita	GDP per person 2010 (HRK, current prices, divided to 1,000,000)
Motorway Density	Motorways 2011 (in km's I believe), divided to area
Road Density	State Roads 2011, divided to area
Low Skill Ratio	Ratio of adult population with at most secondary education
Adult Population	Adult population , divided by 100,000
Patents	Number of patents between 2000 and 2010, divided to adult population, multiplied with 1000
Entrepreneurs	The number of entrepreneurs per 1000 adults in 2012

Note: The indicators for average wage, GDP per capita, motorway and road density, low skill ratio and adult population are based on data from the Croatian Bureau of Statistics. The source for the number of patents was the State Intellectual Property Office of Croatia (in “Background Report on the Innovation System of Croatia”). The source for the number of entrepreneurs is the Financial Agency of Croatia.

TABLE 10: EXPORTS BY PRODUCT

Product	2007	2008	2009	2010	2011	2012
Agriculture	3.48	3.35	3.86	3.13	3.16	3.35
Food	4.92	5.09	4.89	5.04	5.62	5.94
Textiles	5.36	5.10	4.57	4.77	5.39	5.28
Wood	3.28	3.31	2.67	3.00	3.47	3.56
Chemicals	9.38	10.47	7.19	9.11	11.04	10.83
Rubber	3.10	3.39	2.88	3.00	3.37	3.51
Metal	4.47	4.97	3.65	4.20	5.12	6.26
Electrical	5.15	5.66	4.75	4.91	4.96	4.96
Machinery	3.72	4.07	2.85	3.13	3.88	4.02
Transport	6.14	7.59	5.17	5.50	8.53	3.95
Other Man.	2.78	2.17	1.74	1.94	1.98	2.02
Services	2.28	2.36	1.81	2.26	2.91	3.31

All numbers are in billion HRK.

TABLE 11: ORIGIN DIVERSITY INDEX BY PRODUCT

Product	2007	2008	2009	2010	2011	2012
Agriculture	1.06	0.87	0.97	1.22	1.38	1.84
Food	0.61	0.58	0.64	0.74	0.78	1.28
Textiles	0.57	0.56	0.54	0.58	0.46	0.58
Wood	1.10	1.05	0.97	0.77	0.81	0.80
Chemicals	0.40	0.39	0.38	0.25	0.27	0.27
Rubber	1.24	1.12	0.85	0.67	0.97	0.84
Metal	0.84	0.60	0.86	0.66	0.81	0.56
Electrical	0.38	0.26	0.39	0.34	0.36	0.40
Machinery	1.04	0.96	0.61	0.88	0.96	1.03
Transport	0.36	0.28	0.29	0.35	0.38	0.41
Other Man.	0.32	0.30	0.22	0.40	0.45	0.54
Services	0.43	0.56	0.45	0.47	0.46	0.61

Note: No units.

TABLE 12: GRAVITY ESTIMATION

	2007		2012		Average		
Product	Distance	T-stat	Distance	T-stat	Distance	T-stat	R²
Agriculture	-0.57	-5.94	-0.31	-6.19	-0.51	-6.45	0.91
Food	0.07	0.90	-0.31	-4.35	-0.11	-1.55	0.84
Textiles	-0.33	-3.47	-0.26	-2.33	-0.31	-3.14	0.73
Wood	-0.31	-4.29	-0.27	-3.85	-0.28	-4.27	0.66
Chemicals	-0.99	-5.57	-0.17	-1.51	-0.20	-1.30	0.91
Rubber	-0.31	-4.72	-0.36	-5.53	-0.38	-5.66	0.68
Metal	0.30	2.85	0.24	2.50	0.29	2.67	0.52
Electrical	0.07	0.56	0.04	0.35	0.01	0.05	0.45
Machinery	-0.17	-2.11	-0.09	-1.19	-0.07	-0.88	0.47
Transport	0.01	0.17	-0.44	-6.17	-0.25	-3.14	0.63
Other Man.	-0.59	-4.40	-0.32	-2.69	-0.46	-3.83	0.64
Services	-0.11	-1.31	0.03	0.40	-0.13	-1.51	0.81

**TABLE 13: REGRESSION ANALYSIS:
Export Potential and County Characteristics**

	2007		2012		Average	
Variable	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat
Wage	0.51	1.54	0.37	1.35	0.53	1.72
GDP per capita	0.31	1.55	0.30	1.77	0.28	1.53
Motorway Density	1.90	1.93	2.10	2.56	1.96	2.17
Road Density	1.63	3.18	1.42	3.30	1.59	3.32
Low Skill Ratio	2.79	2.62	3.07	3.45	2.94	2.99
Labor Force	1.06	4.16	1.01	4.77	1.03	4.37
Patents	2.10	2.00	3.21	3.66	2.68	2.78
Entrepreneurs	-4.21	-1.27	-4.58	-1.66	-4.10	-1.35

**TABLE 14: REGRESSION ANALYSIS:
Number of Destinations and County Characteristics**

Variable	2007		2012		Average	
	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat
Wage	0.27	0.48	0.57	0.90	0.39	0.66
GDP per capita	1.07	3.16	1.22	3.22	1.15	3.22
Motorway Density	2.95	1.78	4.91	2.65	3.22	1.83
Road Density	2.12	2.45	1.68	1.73	2.24	2.46
Low Skill Ratio	7.30	4.07	8.66	4.31	8.30	4.38
Labor Force	2.82	6.57	2.61	5.44	2.97	6.59
Patents	4.32	2.44	5.80	2.93	4.54	2.42
Entrepreneurs	1.11	0.20	1.63	0.26	0.44	0.08

**TABLE 15: REGRESSION ANALYSIS:
Product Diversity Index and County Characteristics**

Variable	2007		2012		Average	
	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat
Wage	-0.77	-0.43	0.47	0.32	0.09	0.07
GDP per capita	0.04	5.54	0.04	6.03	0.04	5.37
Motorway Density	8.07	2.27	13.99	4.56	10.29	3.06
Road Density	5.08	2.58	5.03	3.04	5.34	2.89
Low Skill Ratio	1.60	3.88	2.04	5.84	1.82	4.71
Labor Force	8.35	9.01	8.33	10.46	8.79	9.96
Patents	1.23	3.11	1.18	3.54	1.07	2.89
Entrepreneurs	8.73	0.70	17.77	1.66	14.54	1.24

**TABLE 16: REGRESSION ANALYSIS:
Destination Diversity Index and County Characteristics**

Variable	2007		2012		Average	
	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat
Wage	2.03	0.80	2.55	0.86	4.02	1.46
GDP per capita	0.05	4.23	0.05	3.78	0.05	4.04
Motorway Density	13.57	2.55	23.91	3.84	14.79	2.53
Road Density	6.08	2.13	6.68	2.00	7.67	2.50
Low Skill Ratio	2.67	4.43	2.72	3.85	2.98	4.58
Labor Force	9.65	6.98	8.09	4.99	9.35	6.32
Patents	1.70	2.99	2.37	3.55	1.83	2.96
Entrepreneurs	27.70	1.49	12.89	0.59	26.70	1.33

TABLE 17: COUNTERFACTUALS – CHANGE IN EXPORT POTENTIAL

County	Average Wage	GDP per Capita	Motorway Density	Road Density	Low Skill Ratio	Adult Population	Patents	Entrepreneurs
Zagreb	Bench	Bench	1.0%	21.1%	80.6%	Bench	Bench	Bench
Krapina-Zagorje	7.0%	22.3%	6.4%	4.2%	3.6%	75.3%	25.1%	-19.7%
Sisak-Moslavina	3.8%	17.1%	10.3%	21.5%	9.2%	71.6%	24.2%	-18.4%
Karlovac	4.5%	18.9%	8.4%	19.6%	19.6%	75.8%	16.1%	-15.7%
Varaždin	8.4%	16.6%	5.5%	8.4%	14.3%	71.0%	12.4%	-15.1%
Koprivnica-Križevci	3.3%	16.8%	13.7%	15.6%	10.8%	77.1%	14.0%	-18.0%
Bjelovar-Bilogora	7.8%	20.4%	13.7%	17.7%	4.7%	76.9%	26.9%	-16.8%
Primorje-Gorski kotar	1.6%	6.3%	5.5%	11.8%	53.1%	58.6%	4.6%	-11.9%
Lika-Senj	8.5%	17.7%	8.5%	18.5%	12.3%	83.9%	29.1%	-18.3%
Virovitica-Podravina	8.6%	22.9%	13.7%	20.2%	Bench	80.2%	23.6%	-18.8%
Požega-Slavonia	8.2%	22.1%	13.7%	15.8%	9.0%	81.3%	10.6%	-18.3%
Slavonski Brod Posavina	7.4%	23.4%	Bench	25.1%	2.9%	75.5%	23.9%	-16.6%
Zadar	5.2%	16.4%	8.9%	8.8%	30.0%	72.2%	24.9%	-13.3%
Osijek-Baranja	7.1%	18.0%	11.3%	16.5%	19.4%	59.3%	18.6%	-16.0%
Šibenik-Knin	4.8%	17.3%	10.3%	15.5%	22.4%	78.2%	16.9%	-14.4%
Vukovar-Sirmium	7.5%	22.8%	8.9%	18.3%	5.6%	71.5%	23.4%	-19.4%
Split-Dalmatia	3.9%	16.2%	7.4%	8.8%	45.2%	46.9%	5.6%	-11.4%
Istria	2.0%	4.8%	3.5%	16.1%	34.9%	67.1%	15.7%	-20.0%
Dubrovnik-Neretva	5.7%	10.4%	13.7%	Bench	50.9%	76.6%	16.3%	-10.0%
Međimurje	7.9%	17.2%	6.7%	15.5%	7.7%	77.3%	12.1%	-15.2%

TABLE 18: COUNTERFACTUALS – CHANGE IN NUMBER OF DESTINATIONS

County	Average Wage	GDP per Capita	Motorway Density	Road Density	Low Skill Ratio	Adult Population	Patents	Entrepreneurs
Zagreb	Bench	Bench	0	2	17	Bench	Bench	Bench
Krapina-Zagorje	1	8	1	0	1	14	4	1
Sisak-Moslavina	1	6	2	2	2	14	4	1
Karlovac	1	7	2	2	5	15	3	1
Varaždin	1	6	1	1	4	14	2	1
Koprivnica-Križevci	0	6	3	2	3	15	2	1
Bjelovar-Bilogora	1	8	3	2	1	15	4	1
Primorje-Gorski kotar	0	3	1	1	12	12	1	0
Lika-Senj	1	7	2	2	3	16	5	1
Virovitica-Podravina	1	8	3	2	Bench	15	4	1
Požega-Slavonia	1	8	3	2	2	15	2	1
Slavonski Brod Posavina	1	9	Bench	3	1	14	4	1
Zadar	1	6	2	1	7	14	4	1
Osijek-Baranja	1	7	2	2	5	12	3	1
Šibenik-Knin	1	7	2	2	6	15	3	1
Vukovar-Sirmium	1	8	2	2	2	14	4	1
Split-Dalmatia	1	6	2	1	11	10	1	0
Istria	0	2	1	2	8	13	3	1
Dubrovnik-Neretva	1	4	3	Bench	12	15	3	0
Međimurje	1	7	2	2	2	15	2	1

TABLE 19: ELASTICITIES OF EXPORT POTENTIAL

County	Average Wage	GDP per Capita	Motorway Density	Road Density	Low Skill Ratio	Adult Population	Patents	Entrepreneurs
Zagreb	0.22	0.34	0.12	0.13	2.41	0.66	0.27	-0.23
Krapina-Zagorje	0.15	0.14	0.07	0.28	3.12	0.07	0.04	-0.01
Sisak-Moslavina	0.18	0.18	0.03	0.12	3.05	0.10	0.05	-0.03
Karlovac	0.17	0.16	0.05	0.14	2.93	0.07	0.12	-0.06
Varaždin	0.14	0.18	0.08	0.24	2.99	0.10	0.15	-0.07
Koprivnica-Križevci	0.19	0.18	0.00	0.17	3.03	0.06	0.14	-0.04
Bjelovar-Bilogora	0.14	0.15	0.00	0.16	3.11	0.07	0.03	-0.05
Primorje-Gorski kotar	0.20	0.28	0.08	0.21	2.62	0.18	0.23	-0.11
Lika-Senj	0.14	0.17	0.05	0.15	3.02	0.03	0.01	-0.03
Virovitica-Podravina	0.14	0.13	0.00	0.13	3.17	0.05	0.06	-0.02
Požega-Slavonia	0.14	0.14	0.00	0.17	3.06	0.04	0.17	-0.03
Slavonski Brod Posavina	0.15	0.13	0.13	0.09	3.13	0.07	0.05	-0.05
Zadar	0.17	0.19	0.04	0.24	2.83	0.09	0.05	-0.09
Osijek-Baranja	0.15	0.17	0.02	0.17	2.94	0.17	0.10	-0.06
Šibenik-Knin	0.17	0.18	0.03	0.17	2.90	0.06	0.11	-0.08
Vukovar-Sirmium	0.15	0.13	0.04	0.15	3.10	0.10	0.06	-0.02
Split-Dalmatia	0.18	0.19	0.06	0.24	2.69	0.25	0.22	-0.11
Istria	0.20	0.29	0.09	0.17	2.78	0.12	0.12	-0.01
Dubrovnik-Neretva	0.16	0.24	0.00	0.32	2.64	0.07	0.12	-0.13
Međimurje	0.14	0.18	0.06	0.17	3.07	0.06	0.16	-0.07