International Production Networks and Economic Growth: The Case of the Western Balkan Countries

Journal:	*Eastern European Economics*
Manuscript ID:	MEEE-2015-0018
Manuscript Type:	Original Article - Pay with Wire Transfer
Keywords:	International production networks, Inward processing trade, Western Balkan countries, Economic growth, Panel data models
Abstract:	With the recent integration of the Western Balkan countries (WBC) into the global markets, an increasingly large share of their trade flows entails intermediate and unfinished goods. The purpose of this work is to analyze the impact that different degrees of participation in international production networks (IPN) have on the economic performance of the WBC, and to test the hypothesis that trade created by IPN generate different effects on their growth than trade in final goods does. Using alternative estimation methods, our results show that the degree of involvement in IPN significantly affects the economic performance of the WBC.

International Production Networks and Economic Growth: The Case of the Western Balkan Countries

ABSTRACT

The recent globalization of the world economy has given rise to new trade patterns through intensification of international production networks (IPN). This phenomenon has enabled countries to undergo a more in-depth specialization in niche parts of the production chain, with important benefits for their economic activity and growth. In this process, the Western Balkan countries (WBC) have proven to be no exception. With their recent integration into the global markets, an increasingly large share of their trade flows entails intermediate and unfinished goods that are eventually processed and exported. Thus, the purpose of this work is twofold. On the one hand, this paper seeks to analyze the impact of different degrees of participation in IPN on the economic performance of the WBC. On the other hand, it aims to test the hypothesis that trade created by international fragmentation of production may generate different effects on economic growth than trade in final goods does. In doing so, we employ a set of panel data models taking into consideration several control variables and alternative estimation methods. Given the availability of data, we focus on the period 2002-2013. Our results show that the degree of involvement in IPN significantly affects the economic performance of the WBC, which partly explains the observed differences in their growth rates. We also find that the positive influence of processing trade on economic growth far outweighs that of traditional trade.

JEL classifications: C33; F14; F15

Key words: International production networks, Inward processing trade, Western Balkan countries, Economic growth, Panel data models

Note: the views expressed in this paper reflect the personal views of the authors and may not be representative of the official views of the respective institutions to which they are affiliated.

I. INTRODUCTION

Apart from the 'usual' forms of firm internationalization studied in traditional trade models, i.e. trade in final goods and foreign direct investment, another form of globalization termed international fragmentation of production[1] has recently been the subject of increasing attention. This phenomenon, whereby productive activities are segmented into several stages taking place in different countries, allows firms to select the best-suited locations in terms of factor endowments or productivities for each stage. Multinational firms may thus adopt more complex strategies involving exports of intermediate goods to and from third countries and intra-firm trade. According to a recent report, intermediate products trade reached more than seven trillion US dollars in 2011, accounting for around 40 percent of the total world trade. Moreover, this type of trade has been increasingly important for developing countries, as their share has experienced constant growth over the past decade (UNCTAD 2013).

As Athukorala and Yamashita (2006) stated, the international division of the production process may give a country a comparative advantage in one or more production stages even when the country is not the most efficient producer of the final good. Greater participation in the international production networks (IPN) might therefore have important implications for a country's trade pattern and economic behavior. In this process, the Western Balkan countries (WBC), comprising Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Serbia, have proven to be no exception. Recent economic modernization and increasing openness of the WBC has led to a significant expansion of processing trade in these economies (Shimbov et al. 2013). This paper examines precisely the impact this phenomenon has on their economic performance.

Increased sophistication of production, declining service link costs and foreign direct investment by multinational enterprises have been the main driving forces for reorganizing the production process in a setting of increasing competition and economic growth. Firms are constantly exposed to new opportunities for cutting costs and improving productivity by adapting their strategies to new business models through innovation, technological spillovers and catch-up. Likewise, the comparative advantages of the countries in which they operate also undergo continuous change (Mudambi and Venzin 2010). A highly-integrated world economy thus creates new opportunities from cross-country differences, which results in a process where each country specializes in a particular stage of the production process, and where intermediate and capital goods are actively traded (Arndt 1997; Jones and Kierzkowski 1990, 2001; Deardorff 1998, 2001). This increased trade in intermediate and capital goods leads to increased output and economic growth, as indicated by Baldone et al. (2007) and Foster et al. (2013). According to these authors, integration in IPN allows countries to achieve a better economic performance.

Following the fall of the former Soviet Union and the consequent events in Eastern European countries, the WBC began a process of economic transition to replace their former planned economic systems with market economies. The WBC embarked on extensive reform programs that pursued aims such as liberalization, stabilization and privatization[2]. The general purpose of these measures was to build a business-friendly environment with minimal disruption to transport and communication between production segments, allowing the WBC the chance to integrate in the pattern of international productive specialization. This economic transformation has indeed

resulted in a significant increase in their processing trade. In fact, trade in parts and components in these countries has outpaced the rate of increase in final goods trade, with the former growing at more than twice the rate of the latter (Shimbov et al. 2013). The WBC have thus become more integrated into the production-sharing networks, especially with the European Union, which accounted for more than 80 percent of the overall processing trade exports of the region. Nevertheless, to the best of our knowledge, the impact of this integration process on output growth in these countries has yet to be examined.

In this paper, we try to fill this gap by analyzing the links between the increasing internationalization of production and the economic performance of the WBC. In doing so, we elaborate an index that captures the involvement of the different WBC in the process of international fragmentation of production. This allows us to evaluate more precisely the specific effects of this phenomenon on economic growth divergences and to test the hypothesis that trade created by IPN may generate a different impact on output than trade in final goods does. Our results suggest that the international division of production has a significant and positive effect on economic growth. More precisely, we find that the diverse economic growth paths among WBC may be partly explained by their different degree of participation in the international production network. Additionally, our estimates confirm the idea that processing trade may generate distinct effects on growth as compared to trade in final goods.

The rest of the paper is organized as follows. Section 2 provides a brief overview of the literature analyzing the links between participation in IPN and the related impact on economic growth. Section 3 contains some relevant stylized facts on this ongoing process of international fragmentation of production in the WBC. We present several indicators to show the scope and the distribution (in both geographical and industrial terms) of the processing trade and to reveal similarities and differences across the WBC in this respect. The econometric specification and estimation results are presented in Section 4. The final section concludes with a policy discussion and suggestions for future developments on the topic.

II. RELATED LITERATURE

It is a well-known fact that international trade is not limited to situations in which each partner country is specialized in products from different industries, as explained by traditional comparative advantage theories based on relative endowments or technological differences. These traditional models of inter-industry trade flows between developing and developed economies neglect, however, the international fragmentation of the production and therefore the shipment of intermediate and unfinished goods between countries. To properly understand the growing share of trade in intermediate and unfinished goods within the same industry occurring even between countries with similar levels of development, and the consequent implications for their economies, we need to rely on other theories that take into account the division of the production process across countries.

The publication of the seminal work by Grubel and Lloyd (1975) and the developments of the "new" trade theory, which introduced scale economies and product varieties, shed new light on the notion that different products within the same industry are produced and traded by different countries, giving rise to intra-industry trade (IIT). The understanding of this type of trade was further formalized in theoretical terms by

Krugman (1980) and Helpman and Krugman (1985), who provided seminal contributions along the lines of Dixit and Stiglitz (1977). According to these models, trade flows between industrialized countries should not be characterized by comparative advantages. On the contrary, the exchange of homogeneous goods (horizontal IIT) is driven by imperfect competition and variety preferences. However, these early models do not fully explain international trade flows in intermediate and unfinished goods that result from the IPN. This type of trade seems to be better explained by literature on vertical IIT[3] and fragmentation of production.

The first general framework to analyze the fragmentation of the production process was introduced by Jones and Kierzkowski (1990)[4]. They argued that by segmenting the production into several stages, firms have an opportunity to match and optimize the different factor endowments and productivities with the specific requirements of each production stage. Thus, the process of international fragmentation of production implies that a certain product may not be entirely produced in one country and then exported as final good to another country. Rather, it is likely that the production process and consequently the final product will be characterized by an increasing share of inputs from other countries and by offshoring parts of the production, allowing firms to specialize in niche parts of the production (value) chain. The international production networks allow so for a more in-depth specialization to take place within a single industry or product, and for increasing trade in intermediate and unfinished goods (Deardorff 1998, 2001). The rising internationalization of production may therefore have important implications for a country's trade and output growth. For Samuelson (2001) and Ramondo and Rodríguez-Clare (2009), among others, intermediate goods trade may generate an impact on output in a different manner than traditional trade does. The role played by IPN and intermediate goods trade has indeed been broadly studied both in theoretical and empirical papers, especially over the past decade.

Several theoretical papers have emphasized the importance of intermediate goods trade for output growth. In a seminal work, Samuelson (2001) developed a Ricardian model of international trade in which each of two final goods could be used as an intermediate good in the production of the other good. The model shows that international trade results in a much larger expansion of output than would otherwise be obtained if goods could not be used as intermediate inputs. This model was further extended by Shiozawa (2007), with a multi-country and multi-commodity study, obtaining similar findings. More recently, Ramondo and Rodríguez-Clare (2009) in a multi-country general-equilibrium Ricardian model confirm this outcome showing that the gains from trade including multinational production can be much greater than those obtained if only trade in final goods is considered. Likewise, for Jones (2011), intermediate goods provide links between sectors that create a multiplier effect similar to the one associated with capital accumulation in neoclassical growth models. According to his model, the intermediate goods share used in the economy is a crucial parameter that enables a country to achieve a substantially larger output and income, thus helping to explain differences in economic performance across countries.

These theoretical developments have been also accompanied by empirical works that attempt to evaluate the effects of the IPN and the resulting processing trade on economic growth. For instance, using a panel data approach, Egger et al (2001) find that outsourcing to the East, by Austrian manufacturing firms, significantly improves domestic growth and productivity in the origin country. In addition, Helg and Tajoli (2005) show that it is not only trade flows that are affected by the international

fragmentation of production, but that the industries involved may also increase their total output and productivity due to growth in the relative demand for the abundant factor. Similarly, Amiti and Wei (2009) find that services offshoring has a positive impact on manufacturing industries productivity in the US. For Baldone et al. (2007) participating in IPN significantly affects economic growth, with impacts that go beyond those generated by the final goods trade. This is also confirmed by Foster et al (2013) who analyze the effects of international fragmentation on 40 advanced and emerging economies. These authors conclude that countries which successfully integrate production at a regional or global level performed better in terms of economic growth. Moreover, focusing on OECD countries, Miroudot et al. (2009) show that trade in intermediate goods and FDI positively contribute to output growth, and the effect is even greater than that due to changes in capital or labor.

Nevertheless, to the best of our knowledge, the effects of participation in IPN and processing trade on growth performance has never been empirically tested for the WBC. Thus, in an effort to shed more light on this subject, in the remaining part of the paper we will empirically investigate the influence that this form of international division of production has on the economic activity of the WBC.

III. DATA AND STYLIZED FACTS

To empirically analyze the role played by international fragmentation of production in the WBC, we employ data on processing trade (that is, information about trade in goods that are exported or imported for reasons of processing). We include the following countries of the Western Balkan region: Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Serbia.[5] The analysis of the processing trade is based on their bilateral trade relations with the rest of the world. Specifically, we use data collected by Eurostat for the following four trade flows: i) imports of goods for processing in a Western Balkan country, coming from another country; ii) the consequent exports of the processed goods to the country of origin; iii) exports of goods for processing from a Western Balkan country; and iv) the resulting imports of the processed goods by the Western Balkan country. The first two flows represent the so-called inward processing trade (IPT), while the latter two are defined as outward processing trade (OPT). Thus this dataset allows us the possibility of assessing each country's relative position in the production chain both as a receiver and a source of processing trade, and also enables to see the importance of this kind of trade across sectors.

a) Scope and distribution of processing trade in the WBC

Table 1 below shows the relevance of IPT and OPT flows in the WBC during the period 2002-2013. On the one hand, these figures clearly show that the WBC are far more likely to be a destination of processing trade than a source of this kind of trade, as can be seen by the significantly greater weight of IPT compared to OPT with respect to final goods trade. Moreover, this tendency remains largely similar throughout the analyzed period, with a minor decline during the period 2010-2012 as a result of the international economic crises, before rebounding in 2013. It is also worth noting that IPT exports have represented more than 40 percent of the corresponding amount of final trade exports every year, with rates exceeding 100 percent in the first years of the sample period.[6] This reveals the importance of this type of trade for these countries.

INSERT TABLE 1 HERE

Additionally, looking in this table at the difference between IPT imports and their consequent exports (which represents the value added in the country by processing the goods), we observe that this gap has increased significantly over time. In fact, it has more than doubled in the observed period, reaching more than 3 percent of GDP in recent years. This provides an additional insight into the relevance of this trade for the WBC economies.

On the contrary, the above figures show a much lower weight of OPT compared to final goods trade than IPT; furthermore, we observe a constant decline over the past decade, reaching historic lows in the last three years. This may be a consequence of the relatively low level of technological complementarity that exists between the WBC and their main partner, the EU (which accounts for two-thirds of total OPT on average over the analyzed period in this area). As indicated by Görge (2000), OPT usually plays a more significant role when there are technological similarities between trading partners, especially in relatively more knowledge intensive industries. For that reason, in the empirical analysis that follows we consider IPT as representative of processing trade.

INSERT TABLE 2 HERE

Table 2 gives a detailed picture of the geographical distribution of the processing trade in the WBC. As can be seen, the EU countries are by far the most important destination and source of processing trade. Throughout the analyzed period, the EU accounted on average for more than 80 percent of this type of trade. The second most important destination and origin of processing trade in the WBC is represented by other European countries, with percentages around 10 per cent during the last years of the observed period. The same distributional pattern is maintained in general when we look at the individual countries of the Western Balkans[7].

INSERT FIGURE 1 HERE

Similar concentration is observed in the industrial structure of processing trade of the WBC. Figure 1 shows that processing trade in the WBC largely centers on apparel, basic metals, electrical and mechanical machinery and more recently, to a certain extent on furniture and motor vehicles. Nevertheless, it can be seen that the WBC which started with a relatively high share of low value added industries (such as apparel, leather and footwear), managed to increase their share of processing trade in higher value-added industries over the years, giving them the possibility of reinforcing sharing of know-how, productivity and output, as indicated by Stehrer and Wörz (2009). Behind this shift are the multinational firms that located part of their production chain in the region and were basically represented by industries such as electrical machinery, machinery and mechanical appliances, and motor vehicles. At the level of individual countries, we observe that the biggest shift in the industrial structure occurred in Serbia and Montenegro, where there was an approximately fourfold decrease in the share of apparel, while at the same time the share of higher value-added industries such as electrical machinery, motor vehicles and rubber products, increased. Macedonia and Croatia also experienced a rise in the share of industries such as basic metals, and machinery and mechanical appliances, respectively (see Appendix A1 for more details).

These stylized facts clearly show three important features about processing trade in the WBC. First, these countries are a far more important destination of processing trade than a source of this kind of trade. Second, processing trade in these economies has increased significantly over the past years, with the EU being by far the most important trading partner. Finally, we observe a positive structural shift towards relatively higher value-added industries. In order to properly understand the relevance of these facts in terms of the economic behavior of the WBC, we need to look more closely at their capability of participating in the production-sharing networks.

b) Measuring the WBC participation in processing trade

With the aim of analyzing the impact that the involvement in the IPN has on the WBC, following Baldone et al. (2007), we elaborate an index that captures the relative tendency of each country to participate in this process. This index is defined as,

$$IIF_{ij} = (PT_{ij}/FT_{ij})/(PT_{WBC,j}/FT_{WBC,j})$$

where IIF_{ij} is the index of international fragmentation (i and j refers to the corresponding country and industry); FT represents final trade flows, and PT measures processing trade. This index captures the tendency of a country to participate in processing trade, using the average WBC level as a benchmark.

The IIF is in fact a Balassa-type revealed comparative advantages index in which the emphasis is on measuring the fragmentation in production. This is the reason why ratios used in constructing the index incorporate both types of trade, processed and final. The index as it is defined shows, however, a biased range. Values higher than one express levels of fragmentation above the regional (WBC) average, whereas the opposite is true for values between one and zero. The non-symmetric outcome of the results from the calculation introduces an evident difficulty when interpreting this index. This methodological shortcoming can be overcome by using a logarithmic conversion (log IIF_{ij}). The resulting range of values will be symmetric: positive when the country has a comparative propensity to undertake processing trade and negative if the reverse is true. Furthermore, index values which are the same but with a different sign can be understood as equivalent but opposite behavior in terms of a fragmented productive and trade specialization.

INSERT TABLE 3 HERE

As can be observed in Table 3, although most WBC have a comparative propensity to undertake processing trade, there are noticeable differences between individual countries. Albania and Bosnia-Herzegovina, for instance, are the only two countries that managed to maintain a higher propensity to participate in the IPN throughout the analyzed period (even though the period for Bosnia and Herzegovina is shorter), yet we observe a gradual decline of the index values over the years. A similar decrease can be observed in Macedonia's index over the analyzed period, but contrary to Albania and Bosnia-Herzegovina, the index turns negative in the last years of the sample. Croatia's index varies from year to year, but it also clearly declines in the last few years. Finally, the index of Serbia and Montenegro rose significantly and rapidly caught up to that of the other countries, showing an increasing differential-trend with respect to processing trade.

When we look at the industrial distribution of the index of international fragmentation among the WBC (Appendix A2), we observe a common pattern of having a comparative advantage in the production of textile, apparel and leather and footwear (with the exception of Serbia and Montenegro). Apart from this, each county appears to have specialized in different industries, although with a gradual shift towards industries with higher value-added.[8]

In short, the above discussion reveals that processing trade plays an increasingly important role in the WBC, especially in recent years (when the value added of trade in these economies has increased significantly). However, in terms of their comparative propensity to undertake processing trade there are significant differences across countries during the analyzed period. Accordingly, a natural extension is to establish the extent to which their participation in IPN affects the growth performance of these countries and whether the impact on growth from the resulting processing trade differs from that of traditional trade.

IV. WHAT IS THE IMPACT OF INTERNATIONAL FRAGMENTATION ON WBC GROWTH PERFORMANCE?

In this section, we rely on panel data estimation methodology to test the effects of international fragmentation of production on WBC economic activity. In particular, following the recent literature[9], we assume that the relative intensity of processing trade constitutes a separate item in the overall aggregate demand in a given country and thus its changes will affect the level of economic activity and GDP growth. Based on this idea, we seek to verify whether the differences in the degree of participation of the WBC in the IPN help us to explain the observed differences in their GDP growth rates and to determine the distinctive influence of the resulting processing trade.

In our estimation model, the variable to be explained is defined as the difference between the GDP growth rate of the WBC and the region's average GDP growth rate. For comparative purposes, we have also estimated the GDP growth rate of each Western Balkan country separately. This variable is explained by the propensity index of international fragmentation (in logs), defined in the previous section, as our main regressor. Additionally, to control for other factors that might influence the aggregate demand and thereby the GDP growth rates, we consider elements of both domestic and foreign demand. In particular, we include the level of final consumption and gross capital formation to capture changes in domestic demand, on the one hand, and exports to account for variations in foreign demand, on the other. We have also added FDI inflows to evaluate the positive influence that the establishment of multinational firms may exert on the recipient country's economic performance, as has been broadly highlighted in the literature (see, for instance, Alguacil et al. 2011).

More specifically, the estimating equation takes the following form,

$$gdpgd_{it} = \beta_0 + \beta_1 liif_{it} + \beta_2 exp_{it} + \beta_3 fincons_{it} + \beta_4 capform_{it} + \beta_5 fdi_{it} + \lambda_t + \mu_{ij} + \varepsilon_{it}$$

where *i* stands for each Western Balkan country and *t* denotes time. The level of capital formation, *capform*, total and final exports, *exp*, and the net inflows of foreign direct investment, *fdi*, are all expressed as a percentage of GDP. The variable *fincons* represents the difference between final consumption growth rate of country *i* and the

weighted average of the growth rate of final consumption in the WBC. The error terms λ_t and μ_{ij} comprise time effects and unobserved bilateral effects, respectively. The remaining error ε_{it} is assumed to be independent across countries and over time. The analyzed period is from 2002 to 2013. The definitions and sources of all variables are detailed in in the Appendix A3.

As previously mentioned, the above equation is estimated using a panel data approach. This methodology allows us to control for country-specific differences that are time invariant in domestic and external demand, foreign direct investment and the level of involvement in international fragmentation, thus avoiding the misspecification problems that individual heterogeneity involves[10]. Moreover, it is a well-known fact that panel data provide more degrees of freedom, less collinearity and therefore more efficiency. For the sake of robustness, we employ different specifications and estimation methods.

INSERT TABLE 4 HERE

INSERT TABLE 5 HERE

As a first assessment of the impact of the propensity to participate in IPN on growth, we run initially a baseline model, with the index of international fragmentation as the sole regressor. Next, and in line with previous empirical works, an extended model is estimated by considering the effects of domestic and foreign factors of demand on economic growth. In Table 4, we present the results obtained from the estimation of these models using the random-effects methodology. The decision regarding whether to consider unobserved country-specific effects as random was made on the basis of the Hausman test.[11] For the sake of comparison and to deal with the problem of reverse causality or simultaneity, we also show in Table 5 the coefficients of the extended model using TSLS and GMM Instrumental Variable (IV) techniques.[12] The plausibility of both the potential positive impact of an increase in trade and FDI on GDP growth and the possibility of these external factors being enhanced by a higher rate of economic growth are well documented in the literature (Borensztein et al. 1998). Ignoring these effects might lead to the impact of these variables being overstated and to significant relationships being found where they do not in fact exist.[13]

As can be seen, our outcomes strongly support the hypothesis that greater participation in the international fragmentation of production exerts a beneficial influence on the economic behavior of the WBC. This is a very robust result as the variable *liif* is positive and highly significant in all regressions for both the economic growth differences and the country's GDP growth rate.[14] Our findings also sustain the hypothesis that the international fragmentation of production may generate an impact on economic growth which differs from that of trade in final goods. In particular, although the variable measuring final trade is strongly significant, the coefficient on *liif* in the extended model is higher than in the baseline model and even greater than the one for *finexp*, confirming that trade created by international fragmentation of production may stimulate greater growth in output than trade in final goods. Similar results are obtained by Baldone et al. (2007) for the EU countries. Additionally, the estimates corroborate the idea that the growth-enhancing impact of this phenomenon exceeds the underlying growth effect of an increase in total trade. The coefficient of the index of international fragmentation is substantially larger than the one obtained for total trade in the different estimation models.

Our results also show the importance of taking into consideration the role played by multinational firms in the WBC. Regardless of the domestic and foreign demand, foreign direct investments appear to be an important factor in the explanation of their differences in terms of economic growth. As can be seen in Tables 4 and 5, *fdi* has a positive and a very significant coefficient in all models considered. On the contrary, the coefficient of the domestic demand variables, despite having the expected sign, are not always statistically significant. According to the results of the estimation of random effects, *capform* has a significant and positive effect on the economic growth of these countries. However, in the regressions by instrumental variables the significance of this variable disappears once the endogenous nature of the explanatory variables is considered. Conversely, domestic consumption is insignificant in the random effects estimation but is significant in most specifications of the IV estimation. The endogeneity and over-identification tests reported at the bottom of Table 5 confirm both the endogenous character of some of our regressors and the correct specification of the different models.

CONCLUSIONS

As part of their recent modernization and economic development, the WBC have played an active role in international production networks. Data clearly show that the WBC are a far more important destination of processing trade than a source of it. In fact, inward processing trade reaches as much as 40 percent of the corresponding amount of final trade exports, with the EU being the main partner for it. Therefore, it is of particular interest to analyze the impact of a higher degree of participation in the international fragmentation of production on the economic performance of these countries.

To capture the relative tendency of each country to participate in international production networks, we have elaborated a Balassa-type index of international fragmentation that considers both types of trade: processed and final. A descriptive analysis of this index has revealed two relevant facts. First, it confirms the increasing role played by inward processing trade in the WBC during the analyzed period, although with a different magnitude depending on countries and sectors. Second, a more disaggregated analysis of this index reveals that the WBC have undergone a positive structural shift in industrial distribution towards higher value-added industries.

The econometric analysis undertaken confirms the positive influence of the increased processing trade in these countries. Through the estimation of a set of panel data models, our results reveal that the relative tendency of each country to participate in this globalization process offers a significant explanation of the variations in the economic performance of the WBC, measured in terms of differential GDP growth. Moreover, the effects of processing trade appear to be far greater and more relevant than those associated with final or total exports. The beneficial impact that the establishment of multinational firms has on economic growth is also verified by the sign and magnitude of our estimates. This outcome shows how relevant multinational firms' global strategies are for the trade pattern and economic activity of these countries.

Overall, our findings support the idea that policies designed to promote the openness and participation of the WBC in the international division of production should be considered as an important precondition to generate economic growth. The promotion of a certain type of economic policies may induce these countries to better exploit their

comparative advantages improving so their likelihood of a successful economic modernization. Further research should focus on a more disaggregated approach, considering the increased relevance of sectors with higher valued added.

References

Alfaro, L., and A. Charlton. 2007. "Intra-Industry Foreign Direct Investment." NBER Working Paper no. 13447.

Alguacil, M., Cuadros, A., and V. Orts. 2011. "Inward FDI and growth: The role of macroeconomic and institutional environment." *Journal of Policy Modeling* 33, no. 3: 481-496.

Amiti, M., and S-J. Wei. 2009. "Service offshoring and productivity: Evidence from the US." *The World Economy* 32, no. 2: 203-220.

Arndt, S.W. 1997. "Globalization and the open economy." *North American Journal of Economics and Finance* 8, no. 1: 71–79.

Athukorala, P., and N. Yamashita. 2006. "Product fragmentation and trade integration: East Asia in global context." *North American Journal of Economics and Finance* 17: 233–256.

Baldone, S., Sdogati, F., and L. Tajoli. 2007. "On Some Effects of International Fragmentation of Production on Comparative Advantages, Trade Flows and the Income of Countries." *The World Economy* 30, no. 11: 1726- 1769.

Borensztein, E., De Gregorio, J., and J-W. Lee. 1998. "How does foreign direct investment affect economic growth?" *Journal of International Economics* 45, no. 1: 115-135.

Deardorff, A.V. 1998. "Fragmentation across cones." Research Seminar in International Economics, Working papers no. 427, University of Michigan, Ann Arbor.

Deardorff, A.V. 2001. "Fragmentation in simple trade models." *North American Journal of Economics and Finance* 12, no. 2: 121–137.

Dixit, A.K., and J.E. Stiglitz. 1977. "Monopolistic competition and optimum product diversity." *American Economic Review* 67, no. 3: 297–308.

Egger, P., Pfaffermayer, M.; and Y. Wolfmayer-Schnidzer. 2001. "The international fragmentation of Austrian manufacturing: The effects of outsourcing on productivity and wages." *The North American Journal of Economics and Finance* 12, no. 3: 257-272.

Feenstra, R.C. 1998. "Integration of trade and disintegration of production in the global economy." *Journal of Economic Perspectives* 12: 31–50.

Feenstra, R.C.; and G.H., Hanson. 1997. "Foreign direct investment and relative wages: evidence from Mexico's Maquiladoras." *Journal of International Economics* 42, 371–393.

Foster, N., Stehrer, R.; and M. Timmer. 2013. "International Fragmentation of Production, Trade and Growth: Impacts and Prospects for EU Member States." wiiw Working Paper, no. 387, Vienna.

Görg, H., 2000. "Fragmentation and trade: US inward processing trade in the EU." *Review of World Economics* (*Weltwirtschaftliches Archiv*) 136: 403–422.

Grubel, H., and P.J. Lloyd. 1975. Intra-industry trade: theory and measurement of international trade in differentiated products. New York: John Wiley.

Helg, R. and L. Tajoli. 2005. "Patterns of international fragmentation of production and the relative demand for labor." *The North American Journal of Economics and Finance* 16, no. 2: 233-254

Helpman, E. and P. Krugman. 1985. Market structure and foreign trade: increasing returns, imperfect competition, and the international economy. Cambridge, MA: MIT Press.

Hsiao, C. 1986. Analysis of panel data. Cambridge: Cambridge University Press.

Hummels, D., Ishii, J.; and K-M. Yi. 2001. "The nature and growth of vertical specialization in world trade." *Journal of International Economics* 54, no. 1: 75–96.

Jones, R.W., and H. Kierzkowski. 1990. "The role of services and production in international trade: a theoretical framework." In: R.W. Jones and A.O. Krueger, eds. The political economy of international trade: essays in honour of Robert E. Baldwin. Malden, MA: Basil Blackwell: 31–48.

Jones, R.W. and H. Kierzkowski. 2001. "A framework for fragmentation." In: S.W. Arndt and H. Kierzkowski, eds. Fragmentation: new production patterns in the world economy. Oxford: Oxford University Press: 17–34.

Jones, C. 2011. "Intermediate Goods and Weak Links in the Theory of Economic Development." *American Economic Journal: Macroeconomics* 3: 1- 28.

Krugman, P. 1980. "Scale economies, product differentiation and the pattern of trade." *American Economic Review* 70: 950–959.

Krugman, P. 1995. "Growing world trade: causes and consequences." *Brookings papers on economic activity* 1: 327–377.

Makki, S.S., and A. Somwaru. 2004. "Impact of Foreign Direct Investment and Trade on Economic Growth: Evidence from Developing Countries." *American Journal of Agricultural Economics* 86, no. 3: 795-801.

Miroudot, S., Lanz, R., and A. Ragoussis. 2009. "Trade in Intermediate Goods and Services." OECD Trade Policy Papers, no. 93, OECD Publishing.

Mudambi, R. and M. Venzin. 2010. "The strategic nexus of offshoring and outsourcing decisions." *Journal of Management Studies* 47, no. 8: 1510-33.

Ramondo, N. and A. Rodríguez-Clare. 2009. "Trade, Multinational Production, and the Gains from Openness." NBER working paper, no. 15604.

Samuelson, P.A. 2001. "A Ricardo-Sraffa Paradigm Comparing Gains from Trade in Inputs and Finished Goods." *Journal of Economic Literature* 39, no. 4: 1204–1214.

Shimbov. B., Alguacil. M., and C. Suárez. 2013. "Fragmentation and parts and components trade in the Western Balkan countries." *Post-Communist Economies* 25, no. 3: 371-391

Shiozawa, Y. 2007. "A new construction of Ricardian trade theory – A many-country, many-commodity case with intermediate goods and choice of production techniques." *Evolutionary and Institutional Economics Review* 3, no. 2: 141-187.

Stehrer, R. and J. Wörz. 2009. "Industrial Diversity, Trade Patterns, and Productivity Dynamics", *Review of Development Economics* 13, no. 2: 356-372.

UNCTAD. 2013. "Key Trends in International Merchandise Trade." United Nations Conference on Trade and Development, New York and Geneva: United Nations.

[1] The same process has been labeled differently by different authors. For example, slicing up the value chain (Krugman 1995), outsourcing (Feenstra and Hanson 1997), disintegration of production (Feenstra 1998), intra-product specialization (Arndt 1997), vertical specialization (Hummels et al. 2001) or fragmentation (Jones and Kierzkowski 1990; Deardorff 2001).

[2] Barriers to trade including non-tariff barriers were removed and customs systems and legal practices were aligned with those in the EU. The trade and transport facilitation program for South Eastern Europe helped customs reforms and improved coordination between border control agencies, as well as eliminating bottlenecks at border crossings in the region.

[3] Vertical IIT is defined as the simultaneous exporting and importing of products in the same industry but at different stages of production.

[4] Other important contributions to the theory of fragmentation can be found in Arndt (1997), Arndt and Kierzkowski (2001), Jones and Kierzkowski (2001) and Deardorff (1998, 2001).

[5] We include Montenegro and Serbia together given that they formed one country during half of the analyzed period.

[6] These figures might be explained by the high amount of processing trade in apparel, textile and leather, especially in Albania, but also in Croatia and Macedonia.

[7] Data are available on request.

[8] Further extension of this analysis should concentrate on a sectoral approach to the phenomenon we are studying here. Productive specialization logically implies different patterns of processing trade for specific sectors or products.

[9] See for example Samuelson (2001), Helg and Tajoli (2005) or Ramondo and Rodríguez-Clare (2009).

[10] See Hsiao (1986).

[11] The results of this test are presented at the bottom of Table 4. As can be seen, the random-effects estimation is preferred to the fixed-effect estimation in all cases.

[12] One of the major problems with the TSLS estimation method is the difficulty in identifying instruments that are highly correlated with the explanatory variables but not with the error terms. This problem is solved in the standard GMM estimator (Arellano and Bond, 1991) as the lagged levels of all the right

hand side variables are used as instruments, which eliminates the arbitrariness in the selection of instruments.

[13] Following the existing literature (see, e.g., Alfaro and Charlton 2007; Borensztein et al. 1998; Makki and Somwaru 2004), we use the lagged values of FDI and the log of the real effective exchange rate as instruments for FDI.

[14] The correlation matrix already revealed a positive correlation coefficient between the index of international fragmentation and GDP growth (on request).

TABLES

Table 1. Processing and final goods trade in the Western Balkan countries: 2002-2013.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Inward Porcessing Trade (in mill. EUR)												
Imports	2,08s4	2,221	2,268	2,881	3,404	3,973	5,501	3,882	4,328	4,016	4,310	3,687
Exports	3,434	3,237	3,451	4,003	4,781	5,762	7,531	6,050	7,046	7,361	7,790	7,092
as % over the corresponding final goods trade flow												
Imports	*16.63*	*16.34*	*15.26*	*11.39*	*11.35*	*10.85*	*11.13*	*10.50*	*11.12*	*9.96*	*9.95*	*10.97*
Exports	*141.41*	*111.29*	*91.13*	*53.77*	*48.77*	*47.07*	*51.17*	*49.92*	*44.67*	*41.86*	*41.77*	*46.49*
Outward Porcessing Trade (in mill, EUR)												
Imports	40	35	30	69	83	83	151	94	94	118	109	83
Exports	133	302	241	257	363	456	596	166	213	98	101	96
as % over the corresponding final goods trade flow												
Imports	*0.32*	*0.26*	*0.20*	*0.27*	*0.28*	*0.23*	*0.30*	*0.26*	*0.24*	*0.29*	*0.25*	*0.25*
Exports	*5.49*	*10.39*	*6.37*	*3.46*	*3.71*	*3.72*	*4.05*	*1.37*	*1.35*	*0.56*	*0.54*	*0.63*
Final Goods Trade (in mill, EUR)												
Imports	12,528	13,596	14,860	25,291	29,990	36,602	49,406	36,968	38,917	40,304	43,331	33,609
Exports	2,428	2,908	3,787	7,446	9,803	12,241	14,719	12,120	15,775	17,583	18,651	15,253

Source: author's calculations based on Eurostat Comext database.

Table 2. Geographical structure of the Western Balkan countries processing trade (inward processing trade): 2002-2013.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
processing trade in mill. EUR												
EU-27	2,798	2,688	2,889	3,362	3,960	4,468	5,909	4,907	5,590	5,508	5,909	5,944
Other Europe	333	282	239	296	443	678	1.042	709	828	1,129	1,011	734
North America	135	139	162	192	184	183	239	98	79	63	121	49
North Africa	10	11	10	13	24	20	32	36	47	38	25	38
Central and South America	72	11	75	42	40	158	69	49	217	196	187	15
Near and Middle Eastern countries	33	23	30	51	63	134	73	83	106	77	100	37
Other Asian countries	52	82	47	47	66	122	166	167	180	350	437	275
as % of total processing trade												
EU-27	81.5	83.1	83.7	84.0	82.8	77.5	78.5	81.1	79.3	74.8	75.9	83.8
Other Europe	9.7	8.7	6.9	7.4	9.3	11.8	13.8	11.7	11.7	15.3	13.0	10.4
North America	3.9	4.3	4.7	4.8	3.9	3.2	3.2	1.6	1.1	0.9	1.6	0.7
North Africa	0.3	0.3	0.3	0.3	0.5	0.3	0.4	0.6	0.7	0.5	0.3	0.5
Central and South America	2.1	0.3	2.2	1.0	0.8	2.7	0.9	0.8	3.1	2.7	2.4	0.2
Near and Middle Eastern countries	1.0	0.7	0.9	1.3	1.3	2.3	1.0	1.4	1.5	1.0	1.3	0.5
Other Asian countries	1.5	2.5	1.4	1.2	1.4	2.1	2.2	2.8	2.6	4.8	5.6	3.9

Source: author's calculations based on Eurostat Comext database.

Table 3. The index of international fragmentation (in log) for the Western Balkan countries: 2002-2013.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Albania	0.782	1.202	1.442	1.484	1.659	1.462	0.540	1.245	0.946	0.727	0.584	0.358
Bosnia and Herzegovina							0.718	0.469	0.541	0.468	0.458	0.306
Croatia	-0.053	-0.106	-0.104	0.261	0.171	0.105	-0.060	-0.083	0.087	0.043	-0.178	-0.476
Macedonia	0.006	0.112	0.009	0.262	0.081	-0.068	-0.027	0.065	-0.395	-0.168	-0.128	-0.283
Serbia and Montenegro				-1.034	-0.526	-0.301	-0.343	-0.356	-0.473	-0.385	-0.103	0.090

Source: author's calculations based on Eurostat Comext database.

Table 4. Estimation results using random effects: 2002-2013.

Dependent variable	GDP real growth difference			GDP real growth		
	Random effects			Random effects		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Explanatory variables						
liif	1.136***	1.399***	1.710***	1.123**	1.373**	1.680***
	(0.450)	(0.561)	(0.403)	(0.470)	(0.564)	(0.405)
totalexp		0.060*			0.059*	
		(0.032)			(0.032)	
finexp			0.106***			0.103***
			(0.027)			(0.027)
fincons		0.084	0.069		0.083	0.068
		(0.068)	(0.059)		(0.069)	(0.060)
capform		0.163***	0.139***		0.164***	0.140***
		(0.059)	(0.052)		(0.059)	(0.052)
fdi		0.279***	0.272***		0.277***	0.270***
		(0.084)	(0.061)		(0.085)	(0.061)
const	-1.314	-7.487***	-6.459***	3.055***	-3.093	-2.088
	(1.032)	(1.929)	(1.771)	(1.177)	(1.946)	(1.797)
Number of observations	50	49	49	50	49	49
Adjusted R^2	0.314	0.602	0.611	0.751	0.853	0.856
Hausman test	0.999	0.837	0.939	0.999	0.841	0.939

Robust standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01. All estimations include year effects.

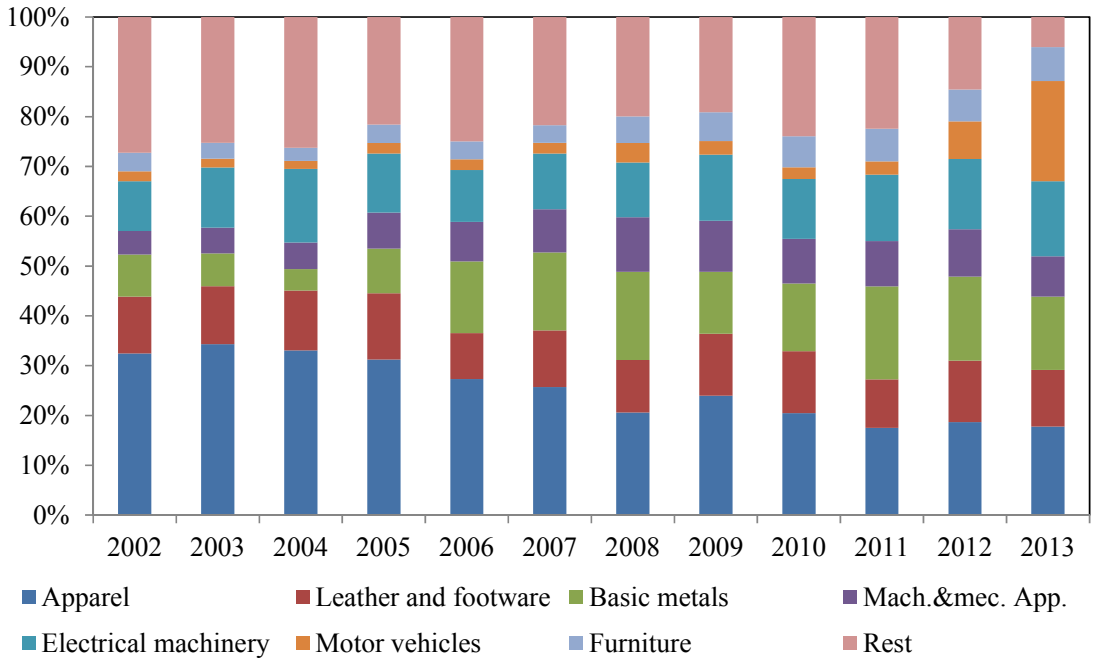
Table 5. Estimation results using TSLS and GMM Instrumental Variable: 2002-2013.

Dependent variable	GDP real growth difference				GDP real growth			
	IV		GMM		IV		GMM	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Explanatory variables								
liif	1.888***	2.228***	1.818***	2.072***	1.864***	2.202***	1.797***	2.052***
	(0.456)	(0.514)	(0.482)	(0.510)	(0.458)	(0.516)	(0.484)	(0.513)
totalexp	0.087***		0.084***		0.086***		0.083***	
	(0.026)		(0.023)		(0.027)		(0.023)	
finexp		0.138***		0.129***		0.136***		0.128***
		(0.041)		(0.037)		(0.041)		(0.038)
fincons	0.090*	0.074	0.089**	0.076*	0.090*	0.074	0.089**	0.076*
	(0.049)	(0.049)	(0.041)	(0.044)	(0.049)	(0.049)	(0.041)	(0.044)
capform	0.098	0.069	0.102*	0.079	0.098	0.069	0.102*	0.078
	(0.066)	(0.068)	(0.060)	(0.061)	(0.066)	(0.068)	(0.060)	(0.061)
fdi	0.446***	0.434***	0.418***	0.381***	0.445***	0.433***	0.419***	0.383***
	(0.109)	(0.103)	(0.132)	(0.121)	(0.110)	(0.104)	(0.134)	(0.123)
const	-6.187***	-5.169***	-6.137***	-5.107***	-5.323***	-4.325***	-5.271***	-4.259***
	(1.590)	(1.481)	(1.359)	(1.379)	(1.597)	(1.487)	(1.374)	(1.399)
Number of observations	46	46	46	46	46	46	46	46
Adjusted R^2	0.56	0.56	0.57	0.58	0.85	0.85	0.85	0.86
Overidentifying restrictions test	0.52	0.42	0.48	0.24	0.54	0.34	0.51	0.26
Endogeneity test	0.08	0.05	0.04	0.03	0.08	0.05	0.04	0.02

Robust standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01. All estimations include year effects. The methods used for the Overidentifying restrictions tests are the Sargan test and the Hansen test for the IV and GMM estimations, respectively. The figures reported for the Overidentifying restrictions tests are the p-values for the null hypothesis indicating that all instruments are uncorrelated with errors (cannot be rejected in any of the cases). The methods used for the Endogeneity tests are the Wu-Hausman test and the Differentiate-in-Sargant test (C test) for the IV and GMM estimations, respectively. We report the p-values of these tests.

FIGURES

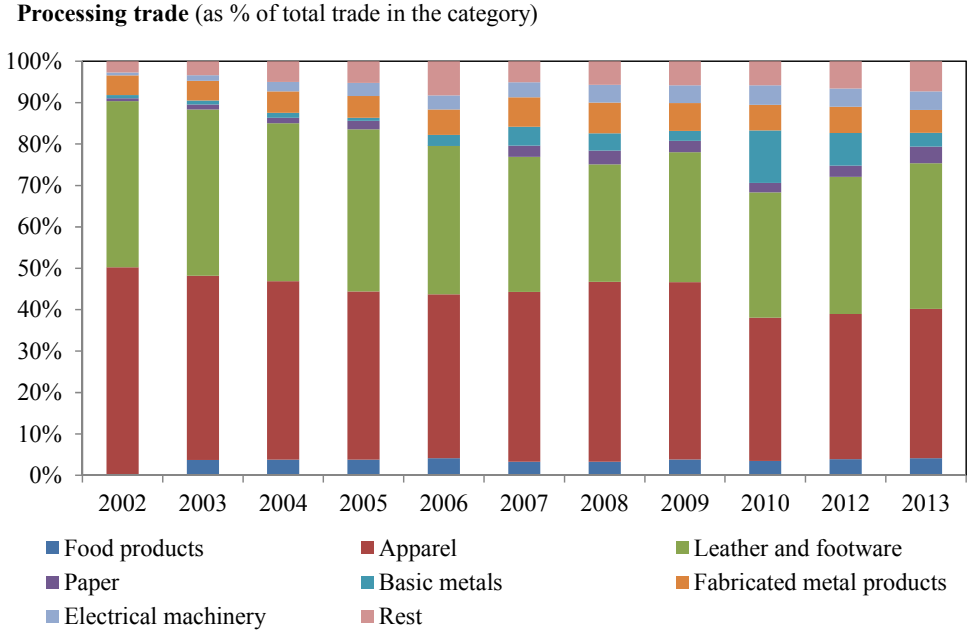
Figure 1. Industrial structure of the Western Balkans countries processing trade, as % of total trade in the category: 2002-2013.



Source: author's calculations based on Eurostat Comext database.

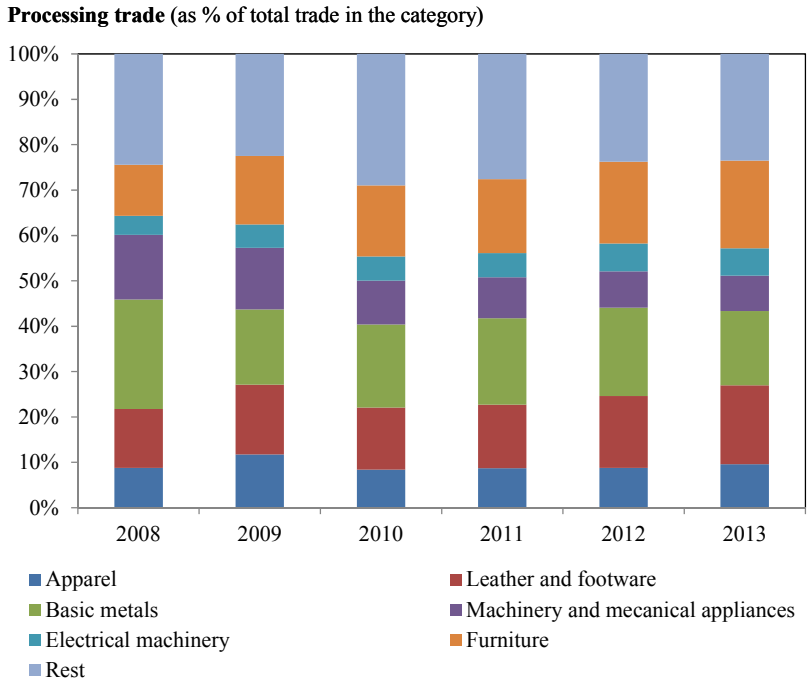
Appendix A1

Figure A1.i. Distribution of inward processing trade by industries. Albania: 2002-2013.



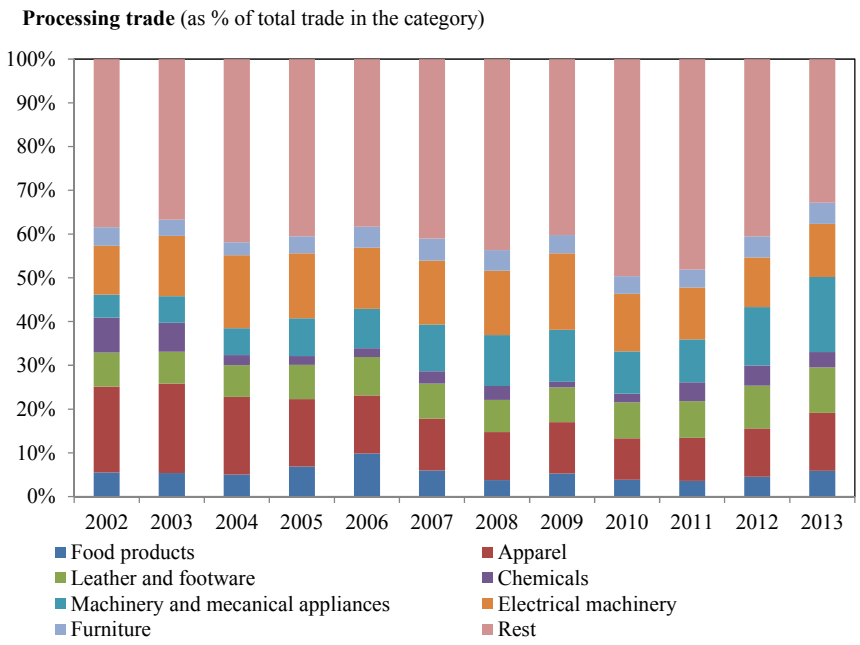
Source: author's calculations based on Eurostat Comext database.

Figure A1.ii. Distribution of inward processing trade by industries. Bosnia and Herzegovina: 2008-2013.



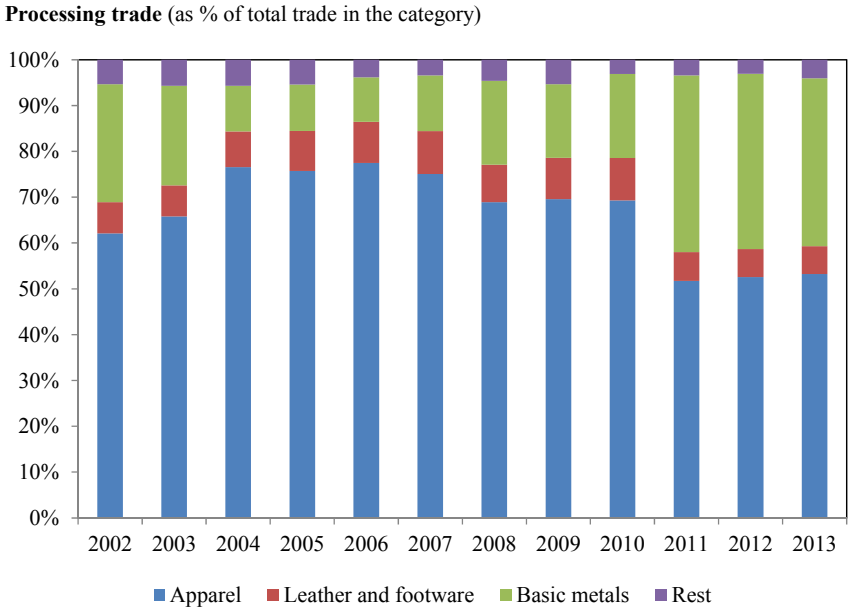
Source: author's calculations based on Eurostat Comext database.

Figure A1.iii. Distribution of inward processing trade by industries. Croatia: 2002-2013.



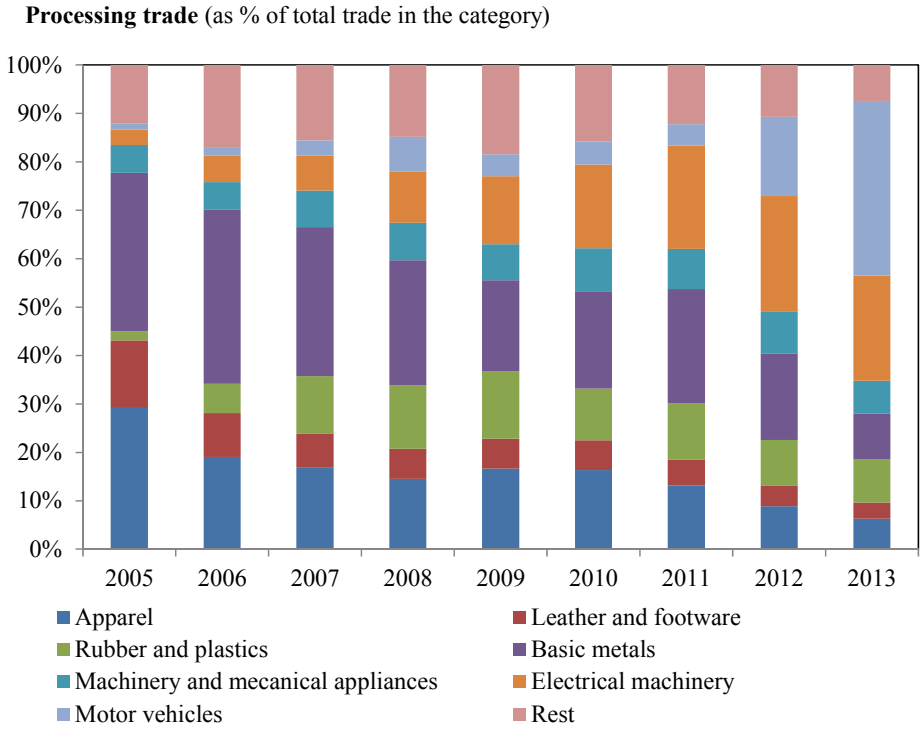
Source: author's calculations based on Eurostat Comext database.

Figure A1.iv. Distribution of inward processing trade by industries. Macedonia: 2002-2013.



Source: author's calculations based on Eurostat Comext database.

Figure A1.v. Distribution of inward processing trade by industries. Serbia and Montegro: 2005-2013.



Source: author's calculations based on Eurostat Comext database.

Appendix A2

Table A2.i. Indexes of international fragmentation per industries. Albania: 2002-2013

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Food products	-3.86	0.40	0.20	1.02	0.93	1.27	1.32	1.90	2.14	2.04	1.90	2.01
Textile	-0.55	1.09	1.19	1.23	2.23	2.02	0.56	1.91	2.60	2.35	1.72	1.39
Apparel	1.08	1.61	1.66	0.50	2.34	2.94	1.54	2.74	3.14	3.62	3.84	3.70
Leather and footware	0.35	1.40	1.74	1.10	-1.98	1.08	0.69	1.26	1.19	1.66	1.41	1.48
Wood	-0.64	1.20	1.82	2.25	3.03	3.98	2.33	2.58	3.19	3.24	3.16	3.20
Paper	2.26	2.56	2.83	4.39	-1.38	4.49	3.08	4.56	4.17	4.11	3.65	4.06
Chemicals	-1.73	-2.16	-2.60	-2.41	-2.21	-4.20	-3.08	0.66	1.44	0.32	-0.74	0.75
Rubber and plastics	-0.17	-0.27	1.53	1.06	0.72	0.75	0.01	0.48	1.17	0.80	0.41	0.38
Non-metallic products	1.33	0.66	0.79	0.62	0.06	1.14	1.15	2.01	1.97	3.05	2.94	2.77
Basic metals	-2.21	-1.49	-0.66	-1.40	-0.36	0.54	-1.07	-0.22	1.03	0.24	-0.34	-1.05
Machinery and mecanical appliances	-2.73	-0.32	0.92	-0.70	2.06	-3.18	-3.33	-4.81	-1.60	-2.09	-3.13	-0.66
Electrical machinery	-0.25	-0.26	2.03	1.39	0.10	2.26	1.33	1.50	1.48	1.37	1.46	0.97
Medical, precision and optical inst.	-0.56	0.16	-0.28	0.28	1.41	0.65	-0.56	0.11	1.16	0.51	-1.31	0.20
Motor vehicles	-2.00	-0.53	1.79	-0.07	3.61	0.45	-0.77	n.a.	-1.17	-2.40	n.a.	-2.09
Furniture	-0.91	-0.01	0.62	0.98	-2.71	0.31	-1.18	-0.99	-0.97	0.20	1.15	0.95
Other manufactured articles	2.16	2.54	3.39	3.51	3.85	2.60	1.51	0.80	0.97	1.11	1.44	1.52
Other products, nec	-4.49	-3.14	-1.98	-1.67	2.41	-1.83	-2.13	-1.26	-2.15	-2.27	-1.87	-1.39

Source: author's calculations based on Eurostat Comext database.

Table A2.ii. Indexes of international fragmentation per industries. Bosnia and Herzegovina: 2008-2013

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Food products	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.91	0.74	0.95	1.28	1.12	0.85
Textile	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.21	1.86	2.17	2.26	2.29	1.99
Apparel	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.46	1.30	1.24	1.70	1.87	1.99
Leather and footware	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.49	0.33	-0.05	0.00	-0.21	0.11
Wood	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-0.24	-0.11	0.39	0.40	0.34	0.26
Paper	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-1.77	-2.22	-2.74	-2.08	-2.09	-1.77
Publishing and printing	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.43	0.89	-0.36	-4.15	-3.55	-4.50
Chemicals	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2.16	2.19	2.17	1.64	1.95	2.55
Rubber and plastics	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.02	-0.54	-0.26	-0.33	-0.46	-0.63
Non-metallic products	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.05	-1.36	-0.64	-0.78	-0.14	-1.45
Basic metals	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.97	0.73	0.78	0.40	0.23	0.18
Fabricated metal products	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.32	0.93	1.08	1.77	1.11	1.07
Machinery and mecanical appliances	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.50	1.23	0.77	0.60	0.37	0.39
Electrical machinery	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.38	1.00	0.96	0.63	0.62	0.06
Medical, precision and optical inst.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2.05	2.17	1.95	1.83	1.94	1.47
Motor vehicles	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.38	0.23	0.32	0.33	-0.79	-1.73
Furniture	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.07	0.82	0.87	0.91	0.85	0.81
Toys, games and sports products	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.80	0.51	0.45	1.33	0.10	0.33
Other manufactured articles	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.09	0.66	-0.23	0.24	-1.33	-1.36
Other products, nec	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.62	0.11	0.43	0.32	0.46	0.88

Source: author's calculations based on Eurostat Comext database.

Table A2.iii. Indexes of international fragmentation per industries. Croatia: 2002-2013

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Food products	0.21	0.01	0.11	0.75	0.73	0.65	0.63	0.62	0.62	0.47	0.38	0.77
Textile	0.27	-0.01	-0.10	0.54	0.66	0.63	0.30	0.12	0.71	0.85	0.90	1.29
Apparel	0.15	-0.27	-0.49	-0.46	-0.69	-0.91	-0.96	-1.09	-0.98	-0.67	-0.51	-0.43
Leather and footware	0.06	-0.31	-0.47	0.05	0.37	0.14	0.17	0.04	0.47	0.85	0.67	0.03
Wood	0.02	-0.07	-0.11	0.01	-0.65	-1.48	-2.35	-2.47	-1.17	-0.14	-0.53	-0.80
Paper	0.03	-0.01	-0.06	0.74	0.57	0.04	0.34	0.53	0.73	1.51	1.15	1.36
Publishing and printing	0.04	0.13	0.00	-0.21	-2.11	-1.51	-2.62	-2.75	-1.87	-1.29	-1.11	-1.01
Chemicals	0.14	0.10	0.07	0.46	0.47	0.63	0.16	-0.42	0.01	0.46	0.35	0.32
Rubber and plastics	0.06	0.07	0.04	1.32	1.02	0.30	0.12	0.07	0.47	0.27	-0.45	-0.63
Non-metallic products	0.13	0.11	0.11	0.39	0.51	0.48	0.25	0.17	0.25	0.00	-0.55	-0.59
Basic metals	-0.31	-0.41	0.14	0.18	-0.02	-0.08	-0.57	-0.66	-0.90	-0.96	-1.35	-1.37
Fabricated metal products	-0.90	-1.02	-1.14	-0.86	0.48	-0.75	-1.26	-1.29	-1.59	-1.10	-1.95	-1.87
Machinery and mecanical appliances	0.05	0.04	0.00	0.24	0.12	0.07	-0.26	-0.13	-0.15	-0.06	0.06	0.19
Electrical machinery	0.14	0.10	0.04	0.27	0.29	0.12	-0.09	-0.17	-0.22	-0.30	-0.73	-1.07
Medical, precision and optical inst.	-0.02	0.01	0.02	0.21	0.10	-0.10	-0.13	-0.15	-0.11	0.01	-0.27	-0.41
Motor vehicles	0.48	0.33	0.23	0.59	0.26	-0.20	-0.44	-0.16	-0.47	-0.50	-0.88	-2.07
Furniture	0.10	0.04	0.02	0.10	0.30	0.29	-0.20	-0.26	-0.29	-0.33	-0.28	-0.80
Toys, games and sports products	-0.24	-0.52	-0.90	-0.56	-5.08	-6.28	-	-5.06	-4.43	-1.63	-1.04	-0.64
Other manufactured articles	-0.09	-0.11	-0.24	0.25	0.10	0.56	0.50	0.48	0.62	0.56	1.15	1.53
Other products, nec	0.21	0.19	0.14	0.45	0.10	0.48	0.39	0.55	0.75	0.70	0.68	0.63

Source: author's calculations based on Eurostat Comext database.

Table A2.iv. Indexes of international fragmentation per industries. Macedonia: 2002-2013

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Food products	-1.31	-0.70	-1.68	-0.85	-2.45	-3.38	-3.25	-3.17	-4.16	-3.88	-3.48	-2.81
Textile	-0.88	0.03	0.35	0.26	0.21	0.23	-0.14	-0.22	-0.80	-1.28	-1.67	-1.50
Apparel	-0.39	0.14	0.52	1.01	1.02	1.22	1.33	1.12	0.57	0.96	1.10	1.03
Leather and footware	-0.77	-0.60	-0.05	-0.14	0.24	0.08	0.07	0.05	0.04	0.07	0.07	0.18
Wood	-0.31	0.58	-0.59	-0.28	0.21	0.69	0.42	0.52	0.26	0.08	-0.91	-2.39
Paper	-3.07	-2.81	-1.47	0.12	0.00	-0.76	-0.53	-0.78	-1.72	-1.28	-2.16	-2.63
Publishing and printing	-0.71	-1.97	-	3.47	-0.29	-3.14	-3.83	-4.33	-4.51	-3.36	-4.25	-4.99
Chemicals	-8.07	-3.97	-6.19	-3.90	-5.67	-7.23	-7.73	-7.51	-3.90	-4.59	-4.82	-3.88
Rubber and plastics	-2.47	-3.51	-3.46	-2.84	-2.98	-4.02	-4.84	-5.05	-5.68	-5.44	-5.69	-5.93
Non-metallic products	-1.86	-2.23	-3.47	-2.56	-8.07	-7.03	-7.14	-4.43	-8.89	-4.05	-3.68	-4.90
Basic metals	0.55	0.50	-0.11	-0.30	-0.97	-1.08	-0.65	-0.09	-0.32	0.67	0.67	0.72
Fabricated metal products	-3.25	-1.41	-2.29	-1.16	-2.96	-3.55	-2.97	-3.15	-4.12	-3.10	-4.01	-3.23
Machinery and mecanical appliances	-0.78	-2.99	-1.18	-0.31	-1.24	-2.06	-2.99	-5.98	-	-5.19	-6.61	-9.13
Electrical machinery	-2.09	-1.47	-1.19	-1.53	-2.42	-2.04	-1.01	-0.81	-3.28	-2.04	-2.44	-3.47
Medical, precision and optical inst.	1.12	-4.35	-3.88	-7.91	-	-4.14	-	-2.23	-3.31	-2.28	-1.31	-1.32
Motor vehicles	-2.82	-3.30	-3.02	-3.52	-5.27	-5.65	-4.10	-5.55	-6.08	-5.29	-5.67	-5.88
Furniture	-3.23	-2.29	-2.20	-1.89	-2.05	-1.50	-1.39	-1.39	-1.50	-1.28	-1.16	-0.50
Other manufactured articles	1.54	-2.50	0.05	1.21	0.35	0.67	1.18	1.70	0.15	0.81	-0.37	-0.51
Other products, nec	-3.07	-2.79	-3.48	-3.54	-4.05	-4.80	-5.05	-5.11	-5.33	-5.51	-4.15	-4.15

Source: author's calculations based on Eurostat Comext database.

Table A2.v. Indexes of international fragmentation per industries. Serbia and Montenegro: 2005-2013

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Food products	n.a.	n.a.	n.a.	-2.35	-1.07	-0.79	-1.47	-1.48	-1.39	-0.82	-1.02	-0.80
Textile	n.a.	n.a.	n.a.	-1.33	-1.26	-0.92	-0.46	-0.59	-1.50	-1.31	-1.17	-0.93
Apparel	n.a.	n.a.	n.a.	-0.40	-0.24	-0.06	-0.21	-0.17	-0.13	-0.39	-1.15	-1.28
Leather and footware	n.a.	n.a.	n.a.	-0.83	-0.40	-0.77	-0.87	-1.06	-1.13	-0.86	-1.17	-0.99
Wood	n.a.	n.a.	n.a.	-1.50	0.34	0.21	1.25	1.25	0.06	-0.33	-0.88	-0.73
Paper	n.a.	n.a.	n.a.	-3.78	-0.70	-0.22	-0.01	-0.16	-0.12	-2.26	-1.55	-1.39
Publishing and printing	n.a.	n.a.	n.a.	-0.04	-2.21	0.64	0.65	0.67	0.77	0.60	0.65	0.64
Chemicals	n.a.	n.a.	n.a.	-2.05	-1.18	-1.66	-1.21	-0.54	-0.49	-0.72	-0.66	-0.74
Rubber and plastics	n.a.	n.a.	n.a.	-2.32	-0.80	-0.15	-0.01	0.14	-0.21	0.02	0.28	0.25
Non-metallic products	n.a.	n.a.	n.a.	-1.96	-1.46	-1.67	-0.46	-0.11	-0.66	0.36	0.60	0.43
Basic metals	n.a.	n.a.	n.a.	0.08	0.23	0.29	-0.04	-0.07	-0.19	-0.21	0.03	-0.20
Fabricated metal products	n.a.	n.a.	n.a.	-2.31	-1.07	-1.58	-1.14	-1.22	-1.26	-0.54	-1.22	-1.48
Machinery and mecanical appliances	n.a.	n.a.	n.a.	-0.88	-0.51	-0.05	-0.36	-0.38	0.02	0.09	0.26	0.29
Electrical machinery	n.a.	n.a.	n.a.	-1.64	-0.70	-0.24	0.01	0.21	0.38	0.58	0.87	0.90
Medical, precision and optical inst.	n.a.	n.a.	n.a.	-1.42	-0.46	0.31	-0.18	-0.28	-0.08	-0.29	-0.02	0.07
Motor vehicles	n.a.	n.a.	n.a.	-1.33	-0.51	0.56	0.61	0.29	0.50	0.47	0.99	1.01
Furniture	n.a.	n.a.	n.a.	-0.30	-0.70	-0.72	-1.41	-1.09	-1.28	-1.48	-1.58	-1.20
Toys, games and sports products	n.a.	n.a.	n.a.	-3.04	-1.07	0.11	-0.54	-1.23	-0.16	0.52	-1.16	-1.97
Other manufactured articles	n.a.	n.a.	n.a.	-2.17	-2.03	-1.90	-1.42	-0.88	-1.04	-1.01	-1.76	-1.48
Other products, nec	n.a.	n.a.	n.a.	-2.20	-1.27	-1.06	-1.12	-0.79	-1.54	-1.57	-1.01	-0.57

Source: author's calculations based on Eurostat Comext database.

Appendix A3

Definitions and data sources

Abbreviation	Definition	Data source
gdprealdiff	Difference between the GDP growth rate of country *i* and the weighted average of the growth rate of the Western Balkan countries.	World Development Indicators.
gdpreal	Annual percentage growth rate of GDP at market prices based on constant local currency.	World Development Indicators and authors calculations.
liif	Log of the Index of International Fragmentation.	Eurostat and author's calculations.
totalexp	Total exports as percent of GDP.	UN Comtrade.
finexp	Final exports as percent of GDP. Final exports are defined as goods exported definitely.	World Development Indicators.
fincons	Difference between final consumption growth rate of country *i* and the weighted average of the growth rate of final consumption in the Western Balkan countries.	World Development Indicators and author's calculations.
capform	Gross capital formation (or gross investment) as percent of GDP.	World Development Indicators.
fdi	Foreign direct investment as percent of GDP.	World Development Indicators.