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Productivity shocks and industry specific effects on export and internationalisation: VAR approach*

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Abstract

This study examines the industry-specific effects of productivity shocks on exports and the internationalisation of the largest Croatian exporters. In order to answer two research questions: (1) Which hypothesis, the productivity-led hypothesis or export-led hypothesis, holds in the case of the largest Croatian exporters? (2) Are the effects of productivity shocks on exports and internationalization sectoral dependent, and in what way? The authors tested 300 largest exporters' micro-financial data for the 2006-2015 period by using a vector autoregression (VAR) method. Three productivity measures examined are total factor productivity, labour productivity and capital productivity. The results imply that productivity-led hypothesis holds for majority of Croatian largest exporters' sectors. Rather than a specific export-led hypothesis, a bi-directional flow has proved to have greater influence on several industrial sectors, including professional and scientific services and administrative services sectors, and to a lesser extent, transport and warehousing, accommodation and food sectors. It is predominantly negative in terms of TFP and positive in terms of labour productivity (agriculture, electricity and gas supply, wholesale and transport and warehousing, and information and communication) and capital productivity (electricity and gas supply). Managerial and policy implications of productivity shocks are discussed in the paper.

Keywords: *export, productivity, VAR, industry sectors, Croatia*

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1. Introduction

Export-led growth or productivity-based export growth hypotheses provide inconclusive results (Arnade and Vasavada, 1995). Export-led growth has shown that entering export markets leads to increases in the number of advanced technologies used, increases in foreign sourcing for advanced technologies, and improvements in the information available to firms about advanced technologies (Baldwin and Gu, 2004). Although exporting firms are more productive than non-exporting firms (Gjini, 2017), a causality of the relationship is unclear when industrial sectors become more efficient. Namley, export-led hypothesis does not hold for all countries (Kacou et al., 2022) because countries with abundant natural resources are often deprived of structural transformation (McMillan and Rodik, 2011).

The Republic of Croatia is a resource-abundant country whose GDP growth excels due to service exports connected to tourism. As heterogeneity perseveres in the productivity of Croatian firms (Iootty et al., 2014), studies on Croatia's total factor productivity do not imply a statistically significant effect of total factor productivity on the GDP growth rate (Raguž Krištić et al., 2016). Still, microeconomic studies that observe total factor productivity in Croatian firms find that total factor productivity is crucial for export competitiveness (Jakšić et al., 2020). The rationale for this study is fourfold. Firstly, total factor productivity is composed of labour productivity, capital productivity, and efficiency. Total factor productivity growth in private firms is unstable (Botrić and Broz, 2017). Although low labour productivity persists with exports in resource-abundant countries (Csordás, 2018), gains in labour productivity continue to be an integral component of real wage growth, whereby real wage growth drives the GDP growth through consumption and imports. Secondly, there are differences in Croatian industrial sectors and each is worth examining. Industrial sectors such as tourism are highly prone to seasonality and adverse global developments (Gričar et al., 2021), making increases in labour productivity in tourism highly versatile. Moreover, labour productivity is depenent on demographic trends, such as labour market participation rate (Lovrinčević, 2019). Thirdly, the Malmquist total factor productivity index shows that productivity growth in Croatia is the result of 0.67% efficiency gain, 3.01% technological progress, and 0.03% scale efficiency improvement (Jebali and Essid, 2020), making capital investment a crucial component of productivity improvement. The advancement of the economy depends on an increase in labour productivity, capital productivity, and total factor productivity. As each industrial sector has its specificities, it is important to determine differences in productivity on sectoral levels in order to arrive at appropriate policy conclusions and recommendations. Fourthly, although previous studies confirmed the existence of the productivity-led hypothesis in the case of Croatian firms (Jakšić et al., 2020), there still has not been a thorough examination of the productivity-led vs. export-

led hypothesis on the sectoral level. This paper aims to fill in this gap by identifying industry-specific effects of productivity shocks on exports and internationalisation of the largest Croatian exporters. In order to examine industry-specific evidence of whether productivity-led hypothesis or export-led hypotheses hold for Croatian industry sectors, three different productivity measures are examined in the paper: (a) total factor productivity, (b) labour productivity, and (c) capital productivity. This paper posits the following research questions:

(1) *Which of the two hypotheses, productivity-led or export-led, holds in the case of the largest Croatian exporters?*

(2) *Are the effects of productivity shocks on exports and internationalisation sectoral dependent, and in what way?*

Three hypotheses are tested based on the above stated research questions. Hypothesis 1 states that a productivity-led hypothesis rather than export-led hypothesis holds for a majority of Croatian industrial sectors. Hypothesis 2 states that the effects of productivity shocks on export and internationalisation differ between industrial sectors based on productivity measure used. Subsequently, the paper jointly explores both research questions to identify the sources of productivity-led growth by identifying sectors in which productivity-led hypothesis holds depending on the productivity measure used. Hence, Hypothesis 3 states that productivity-led hypothesis holds in cases of labour productivity and capital productivity, and not in cases of total factor productivity in case of largest Croatian exporters.

The structure of paper is as follows. The second section depicts the relevant literature in the field of productivity of industrial sectors and connected export-lef growth. The third section explains the methodology of the research, while the forth section states the results of the empirical analysis. The fifth section discussed the finding thereby providing policy implications. The paper concludes with summary of the paper's main findings, portrays research limitations and provides guidelines for future research.

2. Literature review

Export-led hypothesis states that firms looking beyond national borders to sell their products and services are motivated to increase their productivity. This hypothesis was tested using cointegration and Granger causality techniques, applied and supported in both developed and developing countries (Marin, 1992; Kwan and Kwok, 1995; Siliverstovs and Herzer, 2006). Studies examining the unidirectional causal relationship between exports and productivity is rejected in case of China as Shan and Sun (1998) find bi-directional flows between exports and output. It is

also rejected in case of Greece (Panas and Vamvoukas, 2002). In order to address the debate whether exports drive productivity growth or productivity growth induces exports, Ciarli et al. (2019) examine the already exporting companies from Chile and find that exporting does not affect productivity. Kacou et al. (2022) find that only highly open countries insulate essential productivity gains; thus, productivity gains can make domestic market production more efficient by reducing imports and improving the structure of exports, while the dependence on primary commodimaty exports is associated with lower labour productivity. Moreover, for exports to generate significant positive effect on TFP growth, a well-developed domestic market and a neutral, outward-oriented policy are necessary (Fu, 2005). While Dreger and Herzer (2013) find that the long-run effects of exports on non-export growth is negative, some studies examined only specific industries to test the export-led growth hypothesis, such as tourism (Mitra, 2019) or manufacturing (Tang and Abosedra, 2019; Athukorala and Patunru, 2022). In case of Central and Eastern Europe, export-led growth is predominantly derived from GVC participation, imports of technology and capital deepening (Hagemejer and Mućk, 2019).

The effect of productivity growth on exports is explained through the lens of productive industries or firms that are motivated to export due to higher gains in exporting (Mahadevan, 2009). Mahadevan (2009) further explains that there exist uni-directional effect of labour productivity and total factor productivity effects on exports. Hence, export-led hypothesis is revisited as productivity-led hypothesis in the Ricardian model of international trade that exemplifies models of new trade theory (Nesset, 2004). Nesset (2004) furthers his explanation of productivity-led hypothesis by explaining labour as "superexogenous" variable that explains productivity-led growth. Uni-directional relationship between productivity growth and exports has been found in cases of China, Hong Kong, Malaysia, Indonesia and the Phillippines (Liao and Liu, 2009). Hahn and Park (2012) used a bidirectional panel VAR and found a positive effect of productivity on exporting. Kunst and Marin (1989) found a positive link between productivity per unit of factor input and exports, and no causal effect of exports on productivity on a sample of Austrian firms. Burger et al. (2017) used a panel VAR approach to analyse Central and Eastern European firms' resilience to crisis whereby investments of large young firms and exporters was the most responsive to financial shocks. Hereby, exporters more than non-exporters prove to be more resilient to external demand shocks. Moreover, by using panel VAR approach on a sample of 115 countries in the period 1990-2011, manufacturing was found to be the only strategic sector that drives economic growth in majority of developing countries (Gabriel and de Santana Ribeiro, 2019). Although paper examining specific industries have been studied (e.g., Barros and Alves, 2004; Stauvermann and Kumar, 2017), as in case of exports, there is no extensive comparative study of sectoral tested flows between productivity and exports in case of Croatian economy. Hence, Hypothesis 1 states:

Hypothesis 1: Productivity-led hypothesis rather than export-led hypothesis holds for majority of Croatian industrial sectors.

Productivity measures differ based on: (a) macro/micro level measures, (b) frontier/non-frontier measures, and (c) deterministic/econometric measures (Del Gatto et al., 2011), and are often used to compare technology miss-match between countries, industries or firms whereby labour productivity between countries is examined as an ultimate differential (e.g., Acemoglu and Zilibotti, 2001). Labour productivity is examined as output per worker or output per working hour, depending on the available data. It is often inseparable to study labour productivity from capital productivity. Capital productivity is the amount of output per capital or fixed assets. As a single factor productivity measures, both labour productivity or capital productivity can be examined based on gross output or based on value added (Schreyer and Pilat, 2001). Total factor productivity includes both labour and capital inputs, their productivity levels, while the remaining factors are attributed to other inputs and efficiency. Increase in labour productivity often come from capital employment, i.e., lately from digitalisation (Varlamova and Larionova, 2020). Comparisons of different measures of productivity have been analysed in the literature, especially based on sectoral levels (e.g., Baumol and Wolff, 1984). However, there are a lack of comparative productivity studies measuring the effect of productivity on exports in Croatia. Hence, Hypothesis 2 states:

Hypothesis 2: The effects of productivity shocks on export and internationalisation differ between industrial sectors based on productivity measure used.

Hypothesis 3 stems from Hypothesis 1 and 2 due to several notions. Firstly, labour is considered as an exogenous factor driving growth, and as such a single most important factor driving export and internationalisation growth. Secondly, labour productivity comes jointly with capital productivity and both are, therefore, to have a significant effect on exports. Thirdly, Croatian economic activity is characterised with low innovation activities, lack of investment in research and development and high costs, making it unattractive for investment. Fourthly, above average productivity is seen in the following sectors: mining and querrying, professional and scientific services and other support services (Bašić et al., 2023). Hence, Hypothesis 3:

Hypothesis 3: The productivity-led hypothesis only holds in cases of labour productivity and capital productivity.

Challenges that economies must overcome to compensate for covid-19 pandemic productivity losses include productivity improvements in infrastructure equivalent to at least three times the historical average (Ahumada et al., 2022). This is especially true for transitional countries' export growth, which had been low compared with the rest of the world.

3. Methodology

This study used micro-financial data on firms from the Orbis (2016) database, provided temporarily by the Bureau Van Dijk. Data on the 300 largest exporters are extracted based on their export revenues in the period 2006-2015. All financial data was depicted in euros in nominal values. In order to make a valid comparison, data were deflated based on producer price indices obtained on the website of the Croatian National Bank (2022). Industry classification is based on European classification NACE Rev. 2, whereby A stands for agriculture, B for mining and quarrying, C for manufacturing, D for electricity and gas supply, E for water supply; sewerage, waste management, and remediation activities, F for construction, G for wholesale, H for transport and warehousing, I for accommodation and food, J for information and communication, M for professional and scientific services, N for administrative services and S for support services.

The data on the number of employees, turnover, cost of employees, fixed assets, total assets, tangible fixed assets, export revenues, value-added, operating revenue, material costs, inventory, and capital were used in the following way: (1) Export revenue (EX) as a logarithm of export revenue; (2) Export intensity (EI) as a logarithm of the ratio of export revenue to operating revenue; (3) value added (VA) as a logarithm of sales minus material costs minus inventory (Bournakis and Mallick, 2017); (4) Total factor productivity (TFP1) as a logarithm of TFP calculated as (log(sales) – β1log (tangible fixed assets) – β2log(costs of employees) – β3log (material costs)) (Dvoulety and Blažkova, 2021); (5) Total factor productivity (TFP2) as a logarithm of TFP calculated as (log(added value) – β1log (cost of employees) – β2log(fixed assets)) (Bournakis and Mallick (2017) based on Levinsohn and Petrin/ (2003) and Olley and Pakes (1996)); (6) Total factor productivity (TFP3) is logarithm of TFP calculated as (log(added value) – β1log (cost of employees) – β2log(capital)) (Bournakis and Mallick (2017) based on Levinsohn and Petrin/ (2003) and Olley and Pakes (1996)); (7) Labour productivity (LP) as a logarithm of the ratio of turnover to employment; and (8) Capital productivity (CP) as a logarithm of the ratio of turnover to capital. Firstly, production functions were estimated for each industry present in the sample (Appendix Table A1), then total factor productivities were calculated based on coefficients estimated in production functions. Descriptive statistics and cross-correlations per industry are available from authors upon request. Cross-correlations between export revenue and export intensity are relatively high, above 0.6, apart from the accommodation and food sector and professional services sector.

Dynamic relationships among the variables is tested using vector autoregression (VAR), i.e., the Granger causality test, and impulse response functions. A VAR model as a system of regression equations, is utilized to determine the dynamic interdependences of several time series (Sims, 1980). It uses standard ordinary least

squares (OLS) framework that should meet the assumption of no autocorrelation (LM), no autoregressive conditional heteroscedasticity (ARCH) and Doornik–Hansen normality. A hypothetical VAR:

$$Z_t = A_0 + A_1 Z_{t-1} + \ldots + A_p Z_{t-p} + \varepsilon_t \quad (1)$$

where Z_t is a 2x1 vector of two endogenous variables X and Y, A_0 is 2x1 vector of intercept terms, $A_1 \ldots Ap$ are (2×2) matrices of coefficients and ε_t is a white noise vector process. Optimum lag lengths were estimated using VAR lag order selection criteria: AIC, Schwarz and Hannan-Quinn information criterion.

To identify dynamic responsiveness in variables, i.e., how a shock in productivity affects export growth or export intensity growth, vector autoregression analysis (VAR) on panel data was used to exhibit the effects and enable their forecasting. Panel Granger causality test is used. Granger causality tests show the extent to which one variable's past observations explain another one in the current period. Namely, for testing the Granger causality, we specify a model with dynamic error correction representation. Knowing that VAR requires stationary variables, unit roots of all variables were tested. Panel unit root tests are presented in Appendix Table A2 and Table A3. The majority of variables are stationary at the level. Those that are not were differenced, whereby the sector that includes the most non-stationary variables at level is the sector of mining and querying, and as such used in the vector autoregression analysis.

4. Empirical data and analysis

Tables A4-13 present the results of the VAR. Table A4 shows the results of the Granger effect of TFP1 on export revenue. Herein, it is noticeable that TFP1 Granger causes changes in export revenues in manufacturing, electricity and gas supply, water supply, construction, accommodation, professional services, and administrative services sectors. Table A5 shows the VAR of TFP1 on export intensity or internationalization. In electricity and gas supply, water supply, accommodation, professional and scientific services, and administrative and support services sectors TFP1 Granger causes changes in export intensity. Table A6 portrays the VAR of TFP2 on exports, while Table A7 of TFP2 on export intensity. TFP2 Granger causes changes in exports in professional and scientific service sectors, and that relationship is not only endogenous but also bi-directional. In the water supply sector, TFP2 Granger causes changes in export intensity. Tables A8 and A9 show the effect of TFP3 on exports and export intensities, respectively. TFP3 does not have a statistically significant Granger change in exports in any sector, while the Granger causes changes in export intensity in the administrative service sector being bi-directional (Table A9).

VAR exhibiting the effect of labour productivity on exports (Table A10) shows that labour productivity Granger causes changes in exports in manufacturing, electricity and gas supply, wholesale, transport, accommodation, and professional and scientific services, while in terms of export intensity labour productivity, Granger causes changes in agriculture, electricity and gas supply, wholesale, transport, accommodation, information and communication, and professional and scientific service sectors (Table A11).

Finally, in terms of capital productivity's effect on export and export intensity, capital productivity Granger causes changes in exports in agriculture, manufacturing, electricity, gas supply, and construction sectors (Table A12). Capital productivity Granger causes changes in export intensity in electricity and gas supply, professional and scientific services, and administrative and support service sectors (Table A13).

The extent of the one standard deviation shock of TFP1, TFP2, LP, and CP on export and export intensity is illustrated by using impulse response functions in Appendix, Figures A1 and A2. The effects of one standard deviation shock of TFP on exports are positive in cases of manufacturing, professional and scientific services, and negative in electricity and gas supply, water supply, construction and accommodation, and food. The effect of one standard deviation shock in labour productivity on exports is positive in manufacturing, electricity, gas supply, wholesale, transport and warehousing, and accommodation and food sectors, and negative in the professional and scientific services sectors. The effect of one standard deviation shock in capital productivity on exports is positive in agriculture, manufacturing, electricity and gas supply, and construction.

As for export intensity, one standard deviation shock of TFP are predominantly negative in the following sectors: electricity and gas supply, water supply, accommodation and food, professional and scientific services, and administrative services. Shock in labour productivity on export intensity is predominantly positive in the following sectors: agriculture, electricity and gas supply, wholesale, transport and warehousing, and information and communication; and negative in professional and scientific services. Finally, shocks in capital productivity on export intensity are positive in electricity and gas supply and negative in professional and scientific services.

5. Results and discussion

The aim of this paper is to identify industry-specific effects of shocks in total factor productivity, labour productivity, and capital productivity that affect exports and internationalisation of the largest Croatian exporters and provide industry-specific evidence of whether the productivity-led hypothesis or export-led hypothesis holds

for Croatian industry sectors. Transitional countries' export growth had been low compared with the rest of the world, making export promotion imperative for firms, labour, and infrastructure investment (Morrissey and Filatotchev, 2000). For the majority of Croatian largest exporting sectors, Hypothesis 1 cannot be rejected, i.e., the productivity-led hypothesis holds for the period 2006-2015. Bi-directional or opposite flows indicate the presence of the export-led hypothesis identified predominantly in transport and warehousing, accommodation and food, and professional and scientific services and administrative services sectors. The analysis has shown that the effects of productivity increases have been sector dependent and that Hypothesis 2 cannot be rejected. Table 1 shows the summary of Hypotheses 2 and 3, while Appendix 1 presents detailed results of the hypothesis testing.

Table 1: Summary of Hypotheses 2 and 3

	Productivity indictor	Export	Internation-alisation
Hypothesis 2: The effects of productivity shocks on export and internationalisation differ between industrial sectors based on productivity measure used.	TFP, LP, CP	C, D	D, M
	TFP, LP	I, M	-
	TFP, CP	F	N
	TFP	E, N	E, I
	LP	G, H	A, G, H, J
	CP	A	-
Hypothesis 3: The productivity-led hypothesis only holds in cases of labour productivity and capital productivity.	TFP	M	-
	LP	C, D, G, H, I	A, D, G, H, J
	CP	A, D, F	D

Source: Author's elaboration

In terms of export growth, an increase in TFP positively affects construction, professional and scientific service, and administrative service sectors, and negatively affects electricity and gas supply, water supply, construction and accommodation, and food sectors. Labour productivity's effect on exports is positive in manufacturing, electricity and gas supply, wholesale, transport and warehousing, and accommodation and food sectors, and negative in the professional and scientific services sector. The effect of a standard deviation shock in capital productivity on exports in agriculture, manufacturing, electricity and gas supply, and construction is predominantly positive.

In terms of export intensity, which interests us in terms of the global value chain inclusion of Croatian firms, an increase in TFP is mainly negative in electricity and gas supply, water supply, accommodation and food, professional and scientific services, and administrative services sectors. Shocks in labour productivity are predominantly positive in the following sectors: agriculture, electricity and

gas supply, wholesale and transport and warehousing, and information and communication; negative in professional and scientific services; while shocks in capital productivity on export intensity are positive in electricity and gas supply and negative in professional and scientific services.

This study finds that the productivity-led hypothesis holds for the majority of Croatian largest exporters' sectors. It is predominantly negative in terms of TFP and positive in terms of labour productivity (agriculture, electricity, gas supply, wholesale and transport and warehousing, and information and communication) and capital productivity (electricity and gas supply). As productivity differentials among countries are important (Irandoust, 2017), this study suggests increasing productivity. As Cassiman et al. (2010) argue, a positive link between productivity and exports depends on firms' innovation decisions, it would be useful to inspect innovation per industry and its effect on exports in future studies. As total factor productivity growth in private firms is not stable (Botrić and Broz, 2017), it can be aided by government investment whereby investment in human capital is crucial at the sectoral level (Borkovic and Tabak, 2018). Human capital is the single most important productivity growth factor that affects export growth and internationalisation growth, links to capital productivity, and is a crucial part of total factor productivity. As total factor productivity has a lower influence on export and internationalisation than labour productivity, there is a productivity loss and loss in efficiency that needs to be ameliorated in each industrial sector, which is a practical implication of this study.

6. Conclusion

This paper examined the industry specific effects of productivity shocks on exports and internationalisation. Financial data on 300 largest Croatian exporters in the period 2006-2015 were studied to arrive at three productivity measures: (a) total factor productivity, (b) labour productivity, and (c) capital productivity. Two questions were of research interest: (1) *Which hypothesis, the productivity-led hypothesis or export-led hypothesis, holds in case of the largest Croatian exporters?* and (2) *Are the effects of productivity shocks on exports and internationalisation sectoral dependent, and how?* Based on the two research questions three hypotheses were formed and tested. Hypothesis 1 tested whether a productivity-led hypothesis rather than export-led hypothesis holds for a majority of Croatian industrial sectors. Results of the VAR model confirmed this hypothesis. Productivity-led hypothesis holds for majority of the largest Croatian exporters grouped by industrial sectors. A bi-directional flow, rather than a specific export-led hypothesis holds for a minority of industrial sectors, including professional and scientific services and administrative services sectors, and to a lesser extent for ransport and warehousing, accommodation and food sectors. Hypothesis 2 examined the effects of productivity

shocks on export and internationalisation differ between industrial sectors based on productivity measure used. The effects of productivity shocks differ based on the productivity measure and industrial sector examined. Hypothesis 2 could not be rejected. Hypothesis 3 examined the productivity-led hypothesis in cases of labour productivity, capital productivity and total factor productivity. The results have shown that the productivity-led hypothesis dominates in cases of labour productivity and capital productivity, and does not in cases of total factor productivity. Hypothesis 3 also could not be rejected. The results imply that an increase in labour productivity and capital productivity lead to an increase in export revenue and internationalisation, while total factor productivity increase lead to a decrease in exports. This is an interesting finding as both labour productivity and capital productivity are included in a measure of total factor productivity. Hence, differential between the measures implies that the measure of production efficiency of Croatian largest exporters is low, i.e., the cause of the decreasing total factor productivity, and a measure of production efficiency that is lower than both labour productivity and capital productivity is the cause of the lack of effect of an increase in total factor productivity on exports or internationalisation. In terms of industrial sectors this results present a novel finding. A cause of the efficiency effect on exports or internationalisation could be due to inertia or institutional or organisational setting, which should be further examined in future research. Taking a deeper look into the predominant effect of loss in efficiency is a research limitation of this study. Lack of data on all industrial sectors, limited time span due to data availability are also research limitations. Future research should additionally addres these research limitations. Financial investment is a prerequisite for improvement, but this study shows that investment in labour and capital productivity do provide gains for largest exporters. However, it also shows where these gains are lost. It should be useful to examine whether the loss of efficiency is sector specific (institutional) or firm-related, and make to appropriate recommendations. Namely, if the loss of efficiency is sector specific, such as in cases of D, F and I, or gains of efficiency such as in case of sector M, in the future institutional support can contribute to their prevention. However, if the loss of efficiency is firm-specific, that managers should examine organisational inertia, communication channels, information technology used in order to increase efficiency.

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Šokovi u produktivnosti i specifični učinci industrije na izvoz i internacionalizaciju: Pristup VAR modela

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Sažetak

Ova studija ispituje specifične učinke šokova u produktivnosti na izvoz i internacionalizaciju najvećih hrvatskih izvoznika. Kako bi se odgovorilo na dva istraživačka pitanja: (1) Koja hipoteza: o rastu vođenom produktivnosti ili rastu vođenom izvozom, je aplikabilna u slučaju najvećih hrvatskih izvoznika?, te (2) Jesu li učinci šokova produktivnosti na izvoz i internacionalizaciju sektora ovisni i na koji način? Autori su testirali mikro-financijske podatke 300 najvećih izvoznika za razdoblje od 2006.do 2015. godine koristeći metodu vektorske autoregresije (VAR). Ispitane su tri mjere produktivnosti: ukupna produktivnost faktora proizvodnje, produktivnost rada i produktivnost kapitala. Rezultati pokazuju da hipoteza o produktivnosti koja vodi rastu izvoza vrijedi za većinu industrijskih sektora najvećih hrvatskih izvoznika. Umjesto specifične hipoteze o izvozu, pokazalo se da dvosmjerni protok ima veći utjecaj na nekoliko industrijskih sektora, uključujući znanstveni i stručni sektor te administrativni sektor, a u manjoj mjeri na sektore prijevoza i skladištenja, smještaja i prehrane. Utjecaj ukupne faktorske produktivnosti većinom je negativan, a pozitivan prema utjecaju produktivnosti rada (poljoprivreda, opskrba električnom energijom i plinom, trgovina na veliko, promet i skladištenje te informacije i komunikacije) i produktivnosti kapitala (opskrba električnom energijom i plinom). Rad zaključuje s raspravom o implikacijama šokova produktivnosti za privatni sektor i donosioce ekonomske politike.

Ključne riječi*: izvoz, produktivnost, VAR, industrijski sektori, Hrvatska*

JEL klasifikacija*: F10, D24, F14, F17*

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Appendices

Table A1: Production function estimates: industry-based

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	A			**B**			**C**			**D**		
	y_1	y_2	y_3	y_1	y_2	y_3	y_1	y_2	y_3	y_1	y_2	y_3
constant	0.12*	-7.18*	-5.74**	0.78*	2.01	1.75	0.03	0.25***	0.52***	-0.04	0.05	0.13†
	(0.05)	(2.23)	(1.71)	(0.35)	(1.32)	(3.06)	(0.04)	(0.07)	(0.08)	(0.12)	(0.08)	(0.07)
cost of employees	-0.03	6.53†	4.51	0.03	-0.84	0.38	0.15***	0.51***	0.75***	0.20	1.18***	1.05***
	(0.02)	(3.00)	(2.72)	(0.15)	(0.56)	(0.40)	(0.03)	(0.04)	(0.03)	(0.15)	(0.06)	(0.06)
material costs	0.94***			0.73***			0.84***			0.95***		
	(0.06)			(0.05)			(0.02)			(0.07)		
tangible fixed assets	0.07			0.12			0.06**			-0.11		
	(0.05)			(0.13)			(0.02)			(0.08)		
fixed assets		-1.12			1.26*			0.39***			0.07	
		1.46			(0.46)			(0.04)			(0.05)	
capital			-0.22			0.20			0.14***			0.19***
			(2.89)			(0.79)			(0.03)			(0.04)
Number of observations	60	14	14	30	28	28	1535	1192	1197	85	57	73
Number of firms	6	3	3	3	3	3	156	150	150	9	9	9
R2	1.00	0.99	0.99	1.00	0.99	0.98	0.97	0.95	0.94	0.97	0.98	0.97
Adjusted R2	1.00	0.98	0.98	1.00	0.99	0.98	0.97	0.94	0.93	0.96	0.97	0.96
S.E. of regression	0.07	0.13	0.13	0.05	0.18	0.20	0.23	0.31	0.35	0.48	0.28	0.30
Log likelihood	76.47	12.04	11.60	52.21	11.76	7.86	151.61	-216.14	-346.27	-51.64	-1.24	-8.61
Probability (F-statistic)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Akaike info criterion	-2.25	-1.01	-0.94	-3.08	-0.48	-0.20	0.01	0.62	0.83	1.50	0.43	0.54
Schwarz criterion	-1.93	-0.78	-0.72	-2.80	-0.24	0.03	0.56	1.27	1.48	1.84	0.82	0.88
Hannan-Quinn criterion	-2.13	-1.03	-0.96	-2.99	-0.41	-0.13	0.22	0.86	1.08	1.64	0.58	0.67
Durbin-Watson statistic	2.44	3.32	3.22	1.94	1.41	1.84	1.46	1.43	1.37	2.07	1.60	1.12

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, †$p < 0.1$

Fixed effect OLS. Dependent variables: y_1 sales revenue, y_2 and y_3 value added. All variables are deflated and in log form.

Source: Author's calculations based on data form Orbis database (2016)

Table A1: Production function estimates: industry-based (continued)

	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
	E			**F**			**G**			**H**		
	y_1	y_1	y_2	y_3	y_2	y_3	y_1	y_2	y_3	y_1	y_2	y_3
constant	-0.17	-0.04	0.71*	-2.43	-3.56**	-3.35***	-0.05	-0.10	0.74***	0.12†	0.03	0.14†
	(0.90)	(0.29)	(0.30)	(1.63)	(1.06)	(0.71)	(0.14)	(0.15)	(0.18)	(0.07)	(0.07)	(0.07)
cost of employees	-0.26	0.34†	0.93***	0.85	2.51**	2.62***	0.26***	0.89***	0.51***	0.35***	0.76***	0.64***
	(0.52)	(0.19)	(0.09)	(0.90)	(0.64)	(0.50)	(0.06)	(0.11)	(0.07)	(0.07)	(0.06)	(0.06)
material costs	0.99**			1.91***			0.78***			0.80***		
	(0.36)			(0.43)			(0.04)			(0.05)		
tangible fixed assets	0.27			-1.04*			0.11*			-0.06*		
	(0.40)			(0.40)			(0.05)			(0.03)		
fixed assets		0.61**			-0.38			0.21*			0.27***	
		(0.19)			(0.31)			(0.09)			(0.05)	
capital			-0.09			-0.59†			0.39***			0.40***
			(0.08)			(0.33)			(0.09)			(0.06)
Number of observations	50	40	41	30	21	21	365	209	227	229	216	218
Number of firms	5	5	5	3	3	3	38	34	35	23	23	23
R2	0.86	0.98	0.97	0.74	0.93	0.93	0.94	0.94	0.89	0.99	0.98	0.98
Adjusted R2	0.83	0.97	0.96	0.69	0.91	0.91	0.93	0.93	0.87	0.98	0.98	0.98
S.E. of regression	0.77	0.27	0.34	1.02	0.34	0.32	0.45	0.45	0.60	0.23	0.25	0.26
Log likelihood	-53.78	-0.98	-10.01	-39.74	-4.21	-3.23	-204.34	-108.86	-187.33	23.26	4.97	-0.89
Probability (F-statistic)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Akaike info criterion	2.47	0.40	0.83	3.05	0.88	0.78	1.34	1.39	1.98	0.02	0.19	0.24
Schwarz criterion	2.78	0.69	1.12	3.33	1.13	1.03	1.78	1.96	2.53	0.41	0.58	0.63
Hannan-Quinn criterion	2.59	0.51	0.94	3.14	0.93	0.84	1.52	1.62	2.20	0.18	0.34	0.39
Durbin-Watson statistic	2.30	0.56	0.92	1.52	1.10	1.24	1.45	0.92	0.82	2.07	1.42	1.31

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, †$p < 0.1$

Fixed effect OLS. Dependent variables: y_1 sales revenue, y_2 and y_3 value added. All variables are deflated and in log form.

Source: Author's calculations based on data form Orbis database (2016)

Table A1: Production function estimates: industry-based (continued)

	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)
	I			**J**			**M**			**N**		
	y_1	y_2	y_3	y_1	y_2	y_3	y_1	y_2	y_3	y_1	y_2	y_3
constant	-0.05	0.06	0.10*	0.33*	0.46***	0.40***	11.45***	1.25	0.47	0.06	0.41**	0.71**
	(0.10)	(0.04)	(0.04)	(0.149	(0.07)	(0.09)	(1.58)	(0.90)	(0.84)	(0.11)	(0.15)	(0.21)
cost of employees	1.31***	1.44***	1.17***	0.74***	0.42***	1.01***	0.28	0.61*	0.72**	0.18*	0.53***	0.85***
	(0.10)	(0.09)	(0.07)	(0.09)	(0.08)	(0.04)	(0.34)	(0.27)	(0.21)	(0.06)	(0.06)	(0.06)
material costs	-0.08			0.33***			-1.85***			0.70***		
	(0.09)			(0.07)			(0.40)			(0.04)		
tangible fixed assets	-0.08*			-0.00			0.09			0.23***		
	(0.03)			(0.09)			(0.14)			(0.04)		
fixed assets		-0.30***			0.55***			0.11			0.44***	
		(0.07)			(0.08)			(0.12)			(0.06)	
capital			-0.09			-0.02			0.24**			0.06
			(0.06)			(0.04)			(0.08)			(0.06)
Number of observations	190	183	184	70	66	67	58	55	55	90	87	87
Number of firms	19	19	19	7	7	7	6	6	6	9	9	9
R2	0.96	0.99	0.99	0.96	0.99	0.98	0.98	0.99	0.99	0.99	0.96	0.93
Adjusted R2	0.96	0.99	0.99	0.95	0.99	0.98	0.98	0.99	0.99	0.99	0.95	0.92
S.E. of regression	0.28	0.11	0.12	0.26	0.13	0.17	0.28	0.20	0.18	0.16	0.25	0.33
Log likelihood	-17.62	162.09	137.36	1.55	48.43	28.98	-4.54	15.46	19.95	43.57	4.07	-21.45
Probability (F-statistic)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Akaike info criterion	0.42	-1.54	-1.26	0.24	-1.19	-0.60	0.47	-0.27	-0.43	-0.70	0.16	0.75
Schwarz criterion	0.79	-1.17	-0.90	0.56	-0.90	-0.30	0.79	0.02	-0.14	-0.37	0.47	1.06
Hannan-Quinn criterion	0.57	-1.39	-1.12	0.37	-1.08	-0.48	0.59	-0.16	-0.32	-0.57	0.28	0.87
Durbin-Watson statistic	1.90	1.75	1.72	2.01	0.96	0.42	2.04	0.98	1.25	1.24	1.15	1.36

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, †$p < 0.1$

Fixed effect OLS. Dependent variables: y_1 sales revenue, y_2 and y_3 value added. All variables are deflated and in log form.

Source: Author's calculations based on data form Orbis (2016)

Table A1: Production function estimates: industry-based (continued)

	(37)	(39)	(40)
	S		
	y_1	y_2	y_3
constant	1.05 (0.64)	6.05*** (1.36)	5.38*** (1.22)
cost of employees	0.03 (0.12)	-0.08 (0.23)	-0.12 (0.23)
material costs	0.77*** (0.08)		
tangible fixed assets	0.08 (0.08)		
fixed assets		-0.28 (0.28)	
capital			-0.10 (0.28)
Number of observations	20	20	20
Number of firms	2	2	2
R2	0.90	0.88	0.87
Adjusted R2	0.88	0.86	0.85
S.E. of regression	0.13	0.25	0.25
Log likelihood	15.84	1.84	1.31
Probability (F-statistic)	0.00	0.00	0.00
Akaike info criterion	-1.08	0.22	0.27
Schwarz criterion	-0.84	0.42	0.47
Hannan-Quinn criterion	-1.04	0.26	0.31
Durbin-Watson statistic	1.11	2.44	2.12

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, †$p < 0.1$

Fixed effect OLS. Dependent variables: y_1 sales revenue, y_2 and y_3 value added. All variables are deflated and in log form.

Source: Author's calculations based on data form Orbis (2016)

Table A2: Panel unit root tests

Industry	Variable	Method	Statistic	Probability	Cross-sections	Observations
A	Export	Levin, Lin & Chu	-4.81	0.00	6	53
		Hadri Z-stat	3.58	0.00	6	60
	Export intensity	Levin, Lin & Chu	-3.83	0.00	6	50
		Hadri Z-stat	3.46	0.00	6	57
	TFP1	Levin, Lin & Chu	-9.00	0.00	6	52
		Hadri Z-stat	1.63	0.05	6	60
	TFP2	Levin, Lin & Chu	-3.57	0.00	1	8
		Hadri Z-stat	2.90	0.00	2	13
	TFP3	Levin, Lin & Chu	-3.58	0.00	1	8
		Hadri Z-stat	1.81	0.04	1	10
	LP	Levin, Lin & Chu	-6.98	0.00	6	50
		Hadri Z-stat	4.03	0.00	6	57
	CP	Levin, Lin & Chu	-10.28	0.00	6	49
		Hadri Z-stat	2.45	0.00	6	57
B	Export*	Levin, Lin & Chu	-4.19	0.00	3	25
		Hadri Z-stat	1.37	0.08	3	30
	Export intensity	Levin, Lin & Chu	-2.26	0.01	3	25
		Hadri Z-stat	2.17	0.02	3	30
	TFP1	Levin, Lin & Chu	-3.11	0.00	3	26
		Hadri Z-stat	2.20	0.01	3	30
	TFP2	Levin, Lin & Chu	-3.25	0.00	3	23
		Hadri Z-stat	2.25	0.01	3	28
	TFP3*	Levin, Lin & Chu	-4.01	0.00	3	24
		Hadri Z-stat	2.24	0.01	3	28
	LP	Levin, Lin & Chu	-1.05	0.15	3	25
		Hadri Z-stat	0.56	0.29	3	30
	CP	Levin, Lin & Chu	-0.93	0.18	3	26
		Hadri Z-stat	2.09	0.02	3	30
C	Export	Levin, Lin & Chu	-106.16	0.00	155	1354
		Hadri Z-stat	15.40	0.00	156	1560
	Export intensity	Levin, Lin & Chu	-61.11	0.00	154	1285
		Hadri Z-stat	13.79	0.00	155	1487
	TFP1	Levin, Lin & Chu	-235.40	0.00	153	1315
		Hadri Z-stat	11.80	0.00	154	1523
	TFP2	Levin, Lin & Chu	-99.01	0.00	124	922
		Hadri Z-stat	9.85	0.00	138	1172
	TFP3	Levin, Lin & Chu	-48.88	0.00	117	893
		Hadri Z-stat	11.02	0.00	135	1156
	LP	Levin, Lin & Chu	-23.06	0.00	153	1274
		Hadri Z-stat	15.54	0.00	154	1470
	CP	Levin, Lin & Chu	-15.06	0.00	154	1288
		Hadri Z-stat	18.89	0.00	155	1492

Note: * all variables included intercept apart from those marked(*) which included intercept and trend
Source: Author's calculations based on data form Orbis (2016)

Table A2: Panel unit root tests (continued)

Industry	Variable	Method	Statistic	Probability	Cross-sections	Observations
D	Export	Levin, Lin & Chu	-24.16	0.00	7	62
		Hadri Z-stat	3.09	0.00	9	90
	Export intensity	Levin, Lin & Chu	-2.02	0.02	8	47
		Hadri Z-stat	3.82	0.00	8	58
	TFP1	Levin, Lin & Chu	-6.86	0.00	9	71
		Hadri Z-stat	1.28	0.10	9	85
	TFP2	Levin, Lin & Chu	23.80	1.00	7	38
		Hadri Z-stat	11.96	0.00	8	56
	TFP3	Levin, Lin & Chu	-5.06	0.00	8	51
		Hadri Z-stat	2.76	0.00	9	73
	LP	Levin, Lin & Chu	-56.90	0.00	8	48
		Hadri Z-stat	2.74	0.00	8	57
	CP	Levin, Lin & Chu	-7.05	0.00	7	40
		Hadri Z-stat	2.71	0.00	9	60
E	Export	Levin, Lin & Chu	-2.61	0.00	5	45
		Hadri Z-stat	3.11	0.00	5	50
	Export intensity	Levin, Lin & Chu	-3.43	0.00	5	39
		Hadri Z-stat	2.74	0.00	5	44
	TFP1*	Levin, Lin & Chu	-35.91	0.00	5	44
		Hadri Z-stat	13.68	0.00	5	50
	TFP2*	Levin, Lin & Chu	-2.52	0.01	4	27
		Hadri Z-stat	6.24	0.00	5	40
	TFP3	Levin, Lin & Chu	-6.91	0.00	4	24
		Hadri Z-stat	1.98	0.02	5	41
	LP*	Levin, Lin & Chu	-11.89	0.00	4	35
		Hadri Z-stat	5.20	0.00	5	44
	CP	Levin, Lin & Chu	-4.33	0.00	5	36
		Hadri Z-stat	2.92	0.00	5	44
F	Export*	Levin, Lin & Chu	-2.31	0.01	2	16
		Hadri Z-stat	2.41	0.01	3	30
	Export intensity	Levin, Lin & Chu	-1.67	0.05	2	17
		Hadri Z-stat	2.08	0.02	3	28
	TFP1*	Levin, Lin & Chu	-27.70	0.00	3	26
		Hadri Z-stat	3.20	0.00	3	30
	TFP2	Levin, Lin & Chu	-3.59	0.00	3	17
		Hadri Z-stat	1.89	0.03	3	21
	TFP3	Levin, Lin & Chu	-3.53	0.00	3	17
		Hadri Z-stat	2.25	0.01	3	21
	LP	Levin, Lin & Chu	-0.25	0.40	3	25
		Hadri Z-stat	2.29	0.01	3	29
	CP*	Levin, Lin & Chu	-2.63	0.00	3	26
		Hadri Z-stat	3.57	0.00	3	29

Note: * all variables included intercept apart from those marked(*) which included intercept and trend
Source: Author's calculations based on data form Orbis (2016)

Table A2: Panel unit root tests (continued)

Industry	Variable	Method	Statistic	Probability	Cross-sections	Observations
G	Export	Levin, Lin & Chu	-12.70	0.00	35	304
		Hadri Z-stat	6.28	0.00	37	370
	Export intensity	Levin, Lin & Chu	-8.95	0.00	32	267
		Hadri Z-stat	6.34	0.00	36	337
	TFP1	Levin, Lin & Chu	-13.45	0.00	36	307
		Hadri Z-stat	3.34	0.00	37	360
	TFP2	Levin, Lin & Chu	-16.91	0.00	23	146
		Hadri Z-stat	6.62	0.00	28	202
	TFP3	Levin, Lin & Chu	-10.71	0.00	22	147
		Hadri Z-stat	6.73	0.00	30	218
	LP	Levin, Lin & Chu	-10.04	0.00	34	279
		Hadri Z-stat	8.20	0.00	35	328
	CP	Levin, Lin & Chu	-3.74	0.00	32	270
		Hadri Z-stat	7.56	0.00	34	316
H	Export	Levin, Lin & Chu	-94.66	0.00	23	201
		Hadri Z-stat	6.51	0.00	23	230
	Export intensity	Levin, Lin & Chu	-2.17	0.02	21	166
		Hadri Z-stat	6.11	0.00	23	201
	TFP1	Levin, Lin & Chu	-11.68	0.00	23	198
		Hadri Z-stat	3.40	0.00	23	229
	TFP2	Levin, Lin & Chu	15.50	1.00	23	182
		Hadri Z-stat	4.70	0.00	23	216
	TFP3	Levin, Lin & Chu	-9.35	0.00	21	175
		Hadri Z-stat	4.34	0.00	23	218
	LP	Levin, Lin & Chu	-64.46	0.00	21	169
		Hadri Z-stat	5.50	0.00	23	201
	CP	Levin, Lin & Chu	-1.91	0.03	23	175
		Hadri Z-stat	6.64	0.00	23	202
I	Export	Levin, Lin & Chu	-85.06	0.00	19	165
		Hadri Z-stat	5.49	0.00	19	190
	Export intensity	Levin, Lin & Chu	-66.35	0.00	19	154
		Hadri Z-stat	4.85	0.00	19	179
	TFP1	Levin, Lin & Chu	-4.15	0.00	19	164
		Hadri Z-stat	2.55	0.00	19	190
	TFP2	Levin, Lin & Chu	-5.80	0.00	18	153
		Hadri Z-stat	3.72	0.00	19	183
	TFP3	Levin, Lin & Chu	-5.98	0.00	18	156
		Hadri Z-stat	4.18	0.00	19	184
	LP	Levin, Lin & Chu	-11.79	0.00	19	153
		Hadri Z-stat	4.65	0.00	19	179
	CP	Levin, Lin & Chu	-3.83	0.00	19	154
		Hadri Z-stat	5.97	0.00	19	179

Note: * all variables included intercept apart from those marked(*) which included intercept and trend
Source: Author's calculations based on data form Orbis (2016)

Table A2: Panel unit root tests (continued)

Industry	Variable	Method	Statistic	Probability	Cross-sections	Observations
J	Export	Levin, Lin & Chu	-3.34	0.00	7	63
		Hadri Z-stat	2.25	0.01	7	70
	Export intensity*	Levin, Lin & Chu	-5.90	0.00	7	58
		Hadri Z-stat	4.40	0.00	7	67
	TFP1	Levin, Lin & Chu	-8.82	0.00	7	60
		Hadri Z-stat	2.91	0.00	7	70
	TFP2	Levin, Lin & Chu	-4.59	0.00	7	54
		Hadri Z-stat	3.03	0.00	7	66
	TFP3	Levin, Lin & Chu	-4.72	0.00	7	56
		Hadri Z-stat	3.63	0.00	7	67
	LP	Levin, Lin & Chu	-11.55	0.00	7	56
		Hadri Z-stat	3.73	0.00	7	66
	CP	Levin, Lin & Chu	-3.82	0.00	7	56
		Hadri Z-stat	3.40	0.00	7	67
M	Export	Levin, Lin & Chu	-8.62	0.00	5	43
		Hadri Z-stat	2.19	0.01	6	60
	Export intensity	Levin, Lin & Chu	-2.42	0.01	5	45
		Hadri Z-stat	2.72	0.00	5	50
	TFP1	Levin, Lin & Chu	-8.75	0.00	5	42
		Hadri Z-stat	1.80	0.04	5	50
	TFP2	Levin, Lin & Chu	-7.21	0.00	6	47
		Hadri Z-stat	3.32	0.00	6	55
	TFP3	Levin, Lin & Chu	-5.85	0.00	5	41
		Hadri Z-stat	2.12	0.02	5	47
	LP	Levin, Lin & Chu	-5.06	0.00	5	40
		Hadri Z-stat	2.52	0.01	5	49
	CP*	Levin, Lin & Chu	-2.77	0.00	5	43
		Hadri Z-stat	5.17	0.00	5	50
N	Export*	Levin, Lin & Chu	-5.95	0.00	9	79
		Hadri Z-stat	3.93	0.00	9	90
	Export intensity*	Levin, Lin & Chu	-4.10	0.00	8	70
		Hadri Z-stat	5.47	0.00	9	84
	TFP1	Levin, Lin & Chu	-5.87	0.00	9	79
		Hadri Z-stat	3.32	0.00	9	90
	TFP2	Levin, Lin & Chu	-8.28	0.00	9	72
		Hadri Z-stat	3.54	0.00	9	87
	TFP3	Levin, Lin & Chu	-2.50	0.01	9	72
		Hadri Z-stat	2.58	0.00	9	87
	LP	Levin, Lin & Chu	-17.33	0.00	9	74
		Hadri Z-stat	4.29	0.00	9	84
	CP	Levin, Lin & Chu	-55.66	0.00	9	74
		Hadri Z-stat	2.99	0.00	9	84

Note: * all variables included intercept apart from those marked(*) which included intercept and trend
Source: Author's calculations based on data form Orbis (2016)

Table A2: Panel unit root tests (continued)

Industry	Variable	Method	Statistic	Probability	Cross-sections	Observations
S	Export	Levin, Lin & Chu	-6.50	0.00	2	18
		Hadri Z-stat	1.93	0.03	2	20
	Export intensity*	Levin, Lin & Chu	-1.60	0.05	2	17
		Hadri Z-stat	2.95	0.00	2	20
	TFP1*	Levin, Lin & Chu	-0.58	0.28	2	17
		Hadri Z-stat	1.72	0.04	2	20
	TFP2	Levin, Lin & Chu	-4.40	0.00	2	16
		Hadri Z-stat	3.16	0.00	2	20
	TFP3	Levin, Lin & Chu	-3.56	0.00	2	18
		Hadri Z-stat	2.94	0.00	2	20
	LP	Levin, Lin & Chu	-4.44	0.00	2	18
		Hadri Z-stat	2.00	0.02	2	20
	CP	Levin, Lin & Chu	-1.83	0.03	2	16
		Hadri Z-stat	2.47	0.01	2	20

Note: * all variables included intercept apart from those marked(*) which included intercept and trend
Source: Author's calculations based on data form Orbis (2016)

Table A3: Panel unit root tests for non-stationary variables

Industry	Variable	Method	Statistic	Probability	Cross-sections	Observations	Variable	Method	Statistic	Probability	Cross-sections	Observations
B	D (Export)	Levin, Lin & Chu	-5.91	0.00	3	23						
		Hadri Z-stat	2.95	0.00	3	27						
	D (LP)	Levin, Lin & Chu	-2.10	0.02	3	24	D (LP,2)	Levin, Lin & Chu	-5.18	0.00	3	19
		Hadri Z-stat	0.66	0.25	3	27		Hadri Z-stat	2.29	0.01	3	24
	D (CP)	Levin, Lin & Chu	-2.72	0.00	3	24						
		Hadri Z-stat	2.69	0.00	3	27						
D	D (TFP2)	Levin, Lin & Chu	-5.01	0.00	5	21						
		Hadri Z-stat	27.67	0.00	8	41						
F	D (LP)	Levin, Lin & Chu	-8.60	0.00	3	22						
		Hadri Z-stat	3.75	0.00	3	26						
H	D (TFP2)	Levin, Lin & Chu	-12.09	0.00	22	150						
		Hadri Z-stat	6.21	0.00	23	187						
S	D (Export intensity)	Levin, Lin & Chu	-3.61	0.00	2	16						
		Hadri Z-stat	7.60	0.00	2	18						
	D (TFP1)	Levin, Lin & Chu	-2.55	0.01	2	15						
		Hadri Z-stat	3.49	0.00	2	18						

Source: Author’s calculations based on data form Orbis (2016)

Table A4: VAR: TFP1 -> Export revenue

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Industry	Number of observations	LM Autocorrelation test at lag 8	Granger causality	Lags	White test	R2	Adjusted R2	S.E. equation	F-statistic	Log likelihood	AIC	Schwarz criterion	Number of coefficients
A	42	3.66	0.53	3	63.96**	0.79	0.76	0.70	22.38	11.81	0.10	0.68	14
B	24	6.05	1.14	1	22.67*	0.05	-0.04	0.43	0.58	21.73	-1.31	-1.02	6
C	1214	0.88	11.64**	2	293.82***	0.72	0.72	0.80	764.73	-964.99	1.61	1.65	10
D	73	12.64*[1]	4.23*	1	8.39	0.73	0.72	1.34	92.46	-178.63	5.06	5.25	6
E	45	7.56	6.65**	1	12.23	0.56	0.54	1.43	26.44	-123.46	5.75	5.99	6
F	27	2.68	6.59*	1	23.34*	0.52	0.48	1.59	13.07	-84.38	6.69	6.98	6
G	250	8.75†	18.02***	3	190.63***	0.77	0.77	0.92	137.96	-451.57	3.72	3.92	14
H[2]	111	7.33	8.91	5	135.39***	0.85	0.84	0.52	58.19	-75.16	1.75	2.29	22
I	171	0.47	11.69***	1	134.57***	0.54	0.53	0.83	96.82	-240.70	2.89	3.00	6
J	63	7.73	0.84	1	50.68***	0.43	0.41	1.26	22.89	-110.21	3.69	3.89	6
M[2]	45	29.29***	92.33**	2	65.31***	0.95	0.94	0.38	188.05	-18.67	1.27	1.68	10
N	54	6.11	10.10*	4	60.37	0.59	0.51	1.21	8.01	-29.32	1.75	2.42	18
S[2]	16	7.38	0.04	1	5.22	0.01	-0.14	1.38	0.10	-5.33	1.42	1.71	6
Total	1644	2.77	16.57**	4	567.58***	0.68	0.68	2.04	431.21	-5015.19	6.12	6.18	18

Note: *** p – value < 0.001 ** p – value < 0.01 * p – value < 0.05 † p – value < 0.1. [1] only significant at 8th lag. All other lags show insignificant LM correlations.[2] Granger causality in the opposite direction.

Source: Author's calculations based on data form Orbis (2016)

Table A5: VAR: TFP1 -> Export intensity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Industry	Number of observations	LM Autocorrelation test at lag 8	Granger causality	Lags	White test	R2	Adjusted R2	S.E. equation	F-statistic	Log likelihood	AIC	Schwarz criterion	Number of coefficients
A	51	3.19	0.38	1	47.23***	0.90	0.89	0.03	208.39	155.01	-5.84	-5.62	6
B	27	7.76	0.22	1	17.51	0.74	0.72	0.05	34.36	84.52	-5.82	-5.53	6
C	844	1.25	2.12	4	168.88***	0.74	0.74	0.04	293.79	2069.39	-4.86	-4.76	18
D	38	1.03	7.62*	2	46.09**	0.53	0.47	0.09	9.12	23.62	-0.72	-0.29	10
E	29	2.09	10.53*	3	39.80	0.50	0.36	0.07	3.60	10.01	0.28	0.94	14
F	24	2.16	0.69	1	22.49*	0.08	-0.01	0.09	0.89	-5.36	0.95	1.24	6
G	219	1.27	1.35	3	190.30	0.62	0.61	0.07	56.91	154.88	-1.29	-1.07	14
H	132	18.16**	1.51	3	189.66***	0.73	0.72	0.03	56.89	293.54	-4.24	-3.93	14
I[2]	160	0.79	6.56*	1	100.05	0.20	0.19	0.06	19.85	201.40	-2.44	-2.33	6
J	60	10.14*	1.16	1	41.62***	0.66	0.64	0.07	54.28	66.64	-2.02	-1.81	6
M	45	2.24	20.18***	1	44.02***	0.84	0.84	0.04	112.95	62.98	-2.53	-2.29	6
N	48	7.17	9.72*	4	80.69**	0.59	0.51	0.06	7.12	125.55	-4.48	-3.78	18
S	16	5.83	0.12	1	8.70	0.05	-0.10	0.06	0.32	37.08	-3.89	-3.60	6
Total	706	0.57	27.81***	7	718.52***	0.58	0.58	0.13	69.47	-27.31	0.16	0.36	30

Note: *** p – value < 0.001 ** p – value < 0.01 * p – value < 0.05 † p – value < 0.1. [1] only significant at 8[th] lag. All other lags show insignificant LM correlations.[2] Granger causality in the opposite direction.

Source: Author's calculations based on data form Orbis database (2016)

Table A6: VAR: TFP2 -> Export revenue

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Industry	Number of observations	LM Autocorrelation test at lag 8	Granger causality	Lags	White test	R2	Adjusted R2	S.E. equation	F-statistic	Log likelihood	AIC	Schwarz criterion	Number of coefficients
A[3]	11	0.97	0.11	1	10.07	1.00	1.00	0.03	5502.11	27.89	-3.98	-3.76	6
B	17	4.03	0.69	2	29.81	0.13	-0.16	0.50	0.45	3.63	0.75	1.24	10
C	803	9.84*	0.29	2	117.32***	0.79	0.79	0.73	734.06	-990.05	2.49	2.55	10
D	29	0.07 (7th lag)	0.54	1	23.02*	0.88	0.87	0.96	91.63	-45.42	3.55	3.83	6
E	31	3.91	2.96†	1	31.71**	0.65	0.63	1.27	26.48	-38.26	2.86	3.13	6
F	17	1.95	2.80†	1	13.68	0.28	0.18	1.93	2.77	-36.51	5.00	5.30	6
G	162	7.84†	0.74	1	37.66***	0.75	0.75	1.07	244.51	-314.53	3.96	4.07	6
H[2]	136	22.91*	0.89	2	111.70***	0.75	0.74	0.78	96.04	-162.14	2.53	2.75	10
I[2]	125	1.83	5.23	3	132.20***	0.66	0.64	0.64	37.76	-9.30	0.37	0.69	14
J	57	13.17*	0.11	1	20.07†	0.42	0.39	1.30	19.22	-47.23	1.87	2.08	6
M[2]	48	5.57	8.38**	1	30.95**	0.76	0.75	0.91	70.24	-40.71	1.95	2.18	6
N	75	2.60	0.05	1	12.92	0.49	0.48	1.48	35.12	-131.34	3.66	3.85	6
S	18	2.65	0.54	1	17.79	0.16	0.05	1.34	1.40	-28.66	3.85	4.15	6
Total	1538	15.12**	0.31	2	271.40***	0.74	0.74	2.03	1092.48	-4883.68	6.36	6.40	10

Note: *** p – value < 0.001 ** p – value < 0.01 * p – value < 0.05 † p – value < 0.1. [1] only significant at 8th lag. All other lags show insignificant LM correlations.[2] Granger causality in the opposite direction. [3] VAR does not satisfy the stability condition.

Source: Author's calculations based on data form Orbis database (2016)

Table A7: VAR: TFP2 -> Export intensity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Industry	Number of observations	LM Autocorrelation test at lag 8	Granger causality	Lags	White test	R2	Adjusted R2	S.E. equation	F-statistic	Log likelihood	AIC	Schwarz criterion	Number of coefficients
A	9	2.09 (7^{th} lag)	1.31	2	14.59	0.89	0.86	0.00	24.79	46.08	-8.91	-8.78	6
B	24	20.72***	0.88	1	21.70*	0.73	0.70	0.05	28.40	50.81	-3.73	-3.44	6
C	620	6.26	2.74	3	136.13***	0.80	0.80	0.04	418.67	1125.07	-3.58	-3.48	14
D	17	2.45 (3^{rd} lag)	0.21	1	23.09*	0.54	0.48	0.09	8.32	10.06	-0.48	-0.18	6
E	25	1.04	5.52*	1	23.00*	0.65	0.61	0.04	20.14	55.36	-3.95	-3.66	6
F	17	4.81	0.01	1	13.75	0.01	-0.13	0.09	0.10	15.81	-1.15	-0.86	6
G	133	2.35	0.77	1	94.29***	0.45	0.44	0.08	53.68	82.80	-1.15	-1.02	6
H^2	143	10.30*	0.73	1	73.61***	0.43	0.42	0.04	52.69	240.11	-3.27	-3.15	6
I^2	115	0.33	1.87	3	46.69	0.19	0.15	0.06	4.35	346.52	-5.78	-5.45	14
J	54	14.18**	0.91	1	16.08	0.64	0.63	0.07	45.57	110.07	-3.85	-3.63	6
M	42	2.85	1.07	1	27.75**	0.88	0.87	0.03	147.59	102.72	-4.61	-4.36	6
N	69	0.89	1.14	1	16.74	0.49	0.48	0.07	32.19	86.57	-2.34	-2.14	6
S	16	4.69	0.18	1	18.30	0.05	-0.10	0.06	0.35	17.86	-1.48	-1.19	6
Total	1142	1.68	1.84	3	227.80***	0.67	0.67	0.12	382.63	-205.35	0.38	0.45	14

Note: *** p – value < 0.001 ** p – value < 0.01 * p – value < 0.05 † p – value < 0.1. [1] only significant at 8^{th} lag. All other lags show insignificant LM correlations.[2] Granger causality in the opposite direction.

Source: Author's calculations based on data form Orbis database (2016)

Table A8: VAR: TFP3 -> Export revenue

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Industry	Number of observations	LM Autocorrelation test at lag 8	Granger causality	Lags	White test	R2	Adjusted R2	S.E. equation	F-statistic	Log likelihood	AIC	Schwarz criterion	Number of coefficients
A[3]	11	4.44	12.22***	1	14.02	1.00	1.00	0.03	5432.24	27.85	-3.97	-3.76	6
B	21	13.20*	1.02	1	27.12**	0.05	-0.05	0.45	0.52	-2.88	0.85	1.14	6
C	807	9.68*	1.27	2	117.79***	0.79	0.79	0.73	747.87	-1064.72	2.66	2.72	10
D	56	11.44*	1.07	1	16.27	0.84	0.83	1.03	136.01	-77.74	2.99	3.21	6
E	26	1.01	0.10	2	46.11**	0.87	0.85	0.75	35.19	-15.12	1.93	2.42	10
F	17	1.91	2.91†	1	13.17	0.29	0.19	1.92	2.84	-36.89	5.05	5.34	6
G	108	1.22	3.37	3	44.83	0.78	0.77	1.05	61.02	-214.36	4.23	4.58	14
H	189	0.88	0.01	1	38.85***	0.71	0.71	0.96	233.76	-266.16	2.88	2.98	6
I[2]	126	0.71	5.55	3	149.67***	0.66	0.64	0.64	38.23	-19.49	0.53	0.85	14
J	58	8.80†	1.88	1	19.64†	0.43	0.41	1.27	20.99	-43.08	1.69	1.91	6
M	48	0.95	0.51	1	20.62†	0.72	0.70	0.99	56.57	-52.57	2.44	2.67	6
N	43	2.56	6.28	4	84.44***	0.60	0.50	1.35	6.27	-65.48	3.88	4.62	18
S	18	1.89	0.28	1	15.59	0.14	0.03	1.35	1.25	-27.53	3.73	4.02	6
Total	1538	13.19*	0.37	2	311.35***	0.74	0.74	2.03	1092.54	-4943.94	6.44	6.48	10

Note: *** p – value < 0.001 ** p – value < 0.01 * p – value < 0.05 † p – value < 0.1. [1] only significant at 8th lag. All other lags show insignificant LM correlations.[2] Granger causality in the opposite direction. [3] VAR does not satisfy the stability condition.

Source: Author's calculations based on data form Orbis database (2016)

Table A9: VAR: TFP3 -> Export intensity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Industry	Number of observations	LM Autocorrelation test at lag 8	Granger causality	Lags	White test	R2	Adjusted R2	S.E. equation	F-statistic	Log likelihood	AIC	Schwarz criterion	Number of coefficients
A	9	1.33 (7^{th} lag)	1.06	1	15.69	0.88	0.85	0.00	23.83	45.54	-8.79	-8.65	6
B	24	22.84***	0.98	1	17.98	0.73	0.71	0.05	28.57	44.28	-3.19	-2.90	6
C	623	4.83	5.17	3	187.63***	0.80	0.80	0.04	422.60	1121.99	-3.56	-3.46	14
D	39	0.54	1.96	1	12.60	0.55	0.52	0.08	21.94	41.30	-1.81	-1.55	6
E	26	3.46	2.99†	1	19.02†	0.61	0.57	0.05	17.79	50.88	-3.45	-3.16	6
F	17	4.47	0.00	1	13.10	0.01	-0.13	0.09	0.10	15.39	-1.10	-0.81	6
G	146	3.50	1.98	1	108.06***	0.46	0.46	0.08	61.54	83.83	-1.07	-0.94	6
H^2	165	6.35	1.33	1	64.86***	0.58	0.57	0.04	111.12	287.88	-3.42	-3.30	6
I^2	116	0.40	3.51	3	63.99**	0.22	0.18	0.06	5.15	359.98	-5.97	-5.63	14
J^2	55	11.08*	2.58	1	15.58	0.64	0.63	0.07	46.07	119.11	-4.11	-3.89	6
M	42	2.85	0.00	1	20.39†	0.88	0.87	0.03	143.14	93.30	-4.16	-3.91	6
N^2	69	1.73	5.18*	1	19.81†	0.52	0.51	0.07	36.12	67.40	-1.78	-1.59	6
S	16	2.96	0.16	1	22.18*	0.05	-0.10	0.06	0.34	18.71	-1.59	-1.30	6
Total	1391	4.62	4.03	2	305.05***	0.68	0.68	0.12	737.45	-435.52	0.67	0.70	10

Note: *** p – value < 0.001 ** p – value < 0.01 * p – value < 0.05 † p – value < 0.1. [1] only significant at 8^{th} lag. All other lags show insignificant LM correlations.[2] Granger causality in the opposite direction. [3] VAR does not satisfy the stability condition.

Source: Author's calculations based on data form Orbis database (2016)

Table A10: VAR: LP -> Export revenue

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Industry	Number of observations	LM Autocorrelation test at lag 8	Granger causality	Lags	White test	R2	Adjusted R2	S.E. equation	F-statistic	Log likelihood	AIC	Schwarz criterion	Number of coefficients
A	51	1.71	2.86†	1	36.00***	0.88	0.88	0.55	182.93	-8.59	0.57	0.80	6
B	15	7.49	0.49	3	41.52	0.22	-0.37	0.51	0.37	4.03	1.33	1.99	14
C	1162	2.50	42.54***	2	264.39***	0.64	0.63	0.76	505.41	-877.93	1.53	1.57	10
D	49	0.71	6.98**	1	34.10***	0.60	0.58	1.17	33.92	-132.21	5.64	5.87	6
E	39	1.26	2.36	1	55.31***	0.30	0.26	1.43	7.57	-63.15	3.55	3.80	6
F	23	20.72***	0.06	1	27.96**	0.31	0.24	1.92	4.46	-76.42	7.17	7.46	6
G	291	0.67	12.19***	1	30.60**	0.73	0.73	0.83	399.08	-418.97	2.92	3.00	6
H	178	0.72	21.90***	1	60.17***	0.64	0.64	0.70	158.09	-95.77	1.14	1.25	6
I	103	1.18	10.37*	4	49.82	0.49	0.44	0.58	11.36	-6.16	0.47	0.93	18
J	58	13.11*	2.82†	1	13.26	0.61	0.59	0.94	42.73	-68.63	2.57	2.79	6
M^2	43	2.66	17.95***	1	62.38***	0.72	0.71	0.27	52.68	14.25	-0.38	-0.14	6
N	66	5.92	4.67†	2	58.05***	0.46	0.42	1.36	12.96	-68.38	2.38	2.71	10
S	16	12.44*	0.44	2	30.85	0.06	-0.29	1.47	0.16	-19.49	3.69	4.17	10
Total	2049	2.31	65.87***	2	400.37***	0.64	0.64	1.91	897.35	-5575.18	5.45	5.48	10

Note: *** p – value < 0.001 ** p – value < 0.01 * p – value < 0.05 † p – value < 0.1. [1] only significant at 8th lag. All other lags show insignificant LM correlations.[2] Granger causality in the opposite direction. [3] VAR does not satisfy the stability condition.

Source: Author's calculations based on data form Orbis database (2016)

Table A11: VAR: LP -> Export intensity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Industry	Number of observations	LM Autocor-relation test at lag 8	Granger causality	Lags	White test	R2	Adjusted R2	S.E. equation	F-statistic	Log likelihood	AIC	Schwarz criterion	Number of coefficients
A	45	2.09	7.10*	2	52.30***	0.91	0.90	0.03	96.46	136.95	-5.64	-5.24	10
B	21	5.86	1.67	1	18.50	0.69	0.65	0.05	19.91	45.24	-3.74	-3.44	6
C	853	3.45	7.42	4	155.99***	0.74	0.74	0.04	296.42	1841.71	-4.28	-4.18	18
D	47	2.47	12.44***	1	20.05†	0.63	0.61	0.07	37.61	29.18	-0.99	-0.75	6
E	39	1.81	0.01	1	48.28***	0.27	0.23	0.08	6.74	45.19	-2.01	-1.75	6
F	21	4.69	0.58	1	16.74	0.06	-0.05	0.09	0.54	22.53	-1.57	-1.28	6
G	252	1.97	11.16**	2	58.36***	0.64	0.64	0.07	111.49	363.68	-2.81	-2.67	10
H	178	3.52	5.93*	1	49.31***	0.70	0.69	0.04	201.20	411.52	-4.56	-4.45	6
I^2	160	0.39	0.01	1	88.17***	0.17	0.16	0.06	15.91	295.76	-3.62	-3.51	6
J	58	15.52**	4.07*	1	10.83	0.83	0.82	0.05	131.39	101.19	-3.28	-3.07	6
M^2	38	2.35	62.30***	2	36.60*	0.92	0.91	0.03	94.84	105.84	-5.04	-4.61	6
N	66	4.65	3.53	2	48.91**	0.47	0.43	0.07	13.37	125.63	-3.50	-3.17	10
S^2	18	1.12	0.23	1	20.83†	0.05	-0.09	0.06	0.38	32.16	-3.27	-2.98	6
Total	1759	5.06	12.46**	3	217.34***	0.69	0.69	0.12	659.24	504.53	-0.56	-0.51	14

Note: *** p – value < 0.001 ** p – value < 0.01 * p – value < 0.05 † p – value < 0.1. [1] only significant at 8th lag. All other lags show insignificant LM correlations.[2] Granger causality in the opposite direction. [3] VAR does not satisfy the stability condition.

Source: Author's calculations based on data form Orbis database (2016)

Table A12: VAR: CP -> Export revenue

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Industry	Number of observations	LM Autocorrelation test at lag 8	Granger causality	Lags	White test	R2	Adjusted R2	S.E. equation	F-statistic	Log likelihood	AIC	Schwarz criterion	Number of coefficients
A	45	2.46	17.79***	2	41.89*	0.95	0.95	0.35	194.21	25.68	-0.70	-0.30	10
B	18	2.04	4.04	3	38.70	0.49	0.21	0.40	1.77	17.02	-0.34	0.36	14
C	1182	0.62	12.05**	2	430.41***	0.65	0.65	0.79	545.16	-720.06	1.24	1.28	10
D	50	1.90	6.41*	1	9.79	0.61	0.60	1.47	37.20	-148.77	6.19	6.42	6
E	29	5.01	2.95	3	50.03†	0.33	0.15	1.55	1.80	-28.37	2.92	3.58	14
F	26	5.86	5.30*	1	13.11	0.48	0.43	1.64	10.59	-29.23	2.71	3.00	6
G	283	3.82	1.89	1	78.69***	0.75	0.75	0.84	417.70	-485.69	3.47	3.55	6
H	179	4.29	0.00	1	83.81***	0.60	0.59	0.77	130.29	-235.74	2.70	2.81	6
I	141	0.64	0.47	2	46.21**	0.38	0.36	0.59	20.58	219.97	-2.98	-2.77	10
J	60	8.36†	0.52	1	30.01**	0.39	0.37	1.23	18.32	-85.17	3.04	3.25	6
M	45	0.22	0.04	1	20.59†	0.08	0.03	0.88	1.72	-81.69	3.90	4.14	6
N	75	4.03	0.06	1	45.97***	0.39	0.38	1.40	23.45	-183.13	5.04	5.23	6
S	16	7.80	1.89	2	23.07	0.16	-0.14	1.39	0.53	-31.25	5.16	5.64	10
Total	2066	2.74	16.67***	2	705.14***	0.63	0.63	2.03	895.42	-6066.38	5.88	5.91	10

Note: *** p – value < 0.001 ** p – value < 0.01 * p – value < 0.05 † p – value < 0.1. [1] only significant at 8th lag. All other lags show insignificant LM correlations.[2] Granger causality in the opposite direction. [3] VAR does not satisfy the stability condition.

Source: Author's calculations based on data form Orbis database (2016)

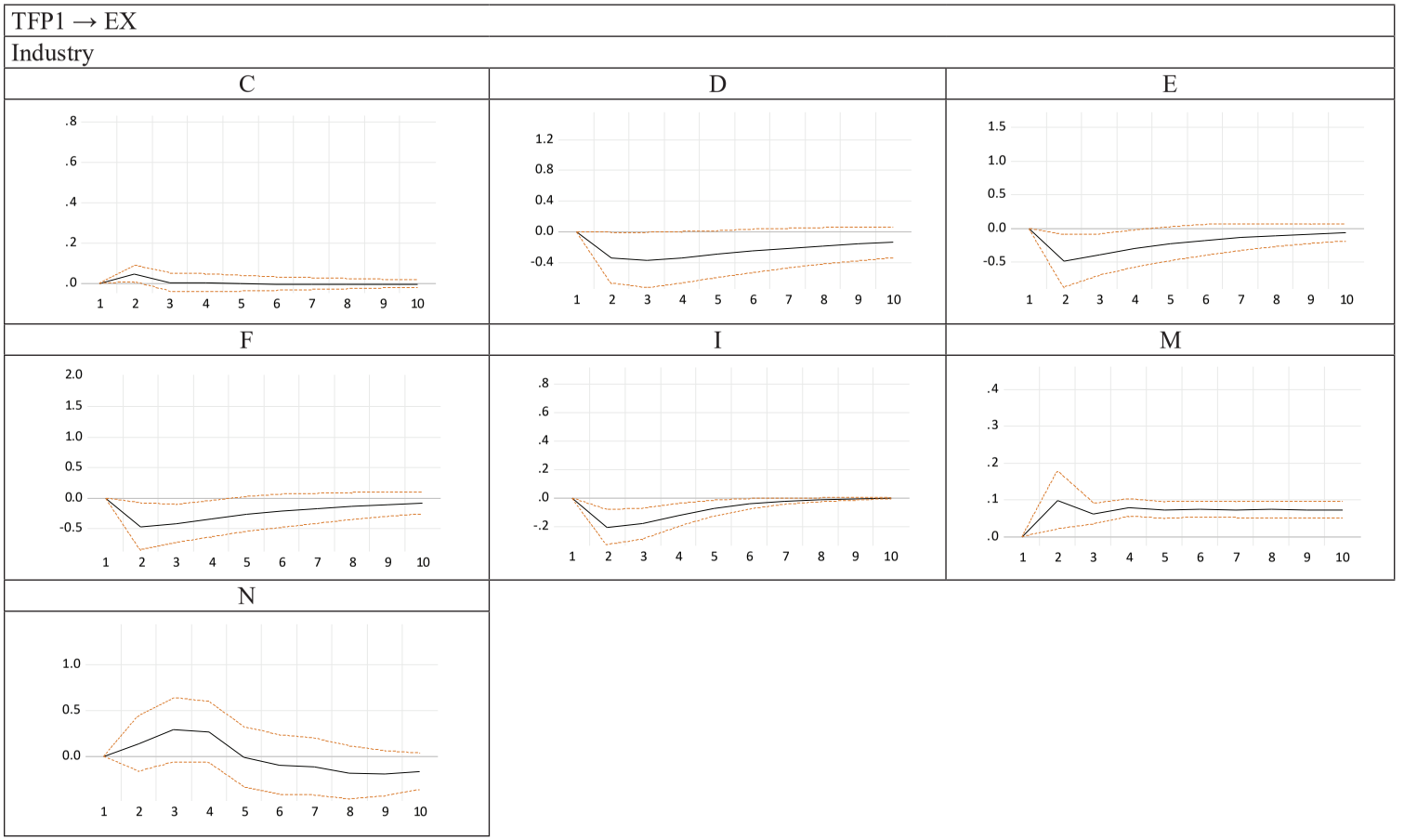
Table A13: VAR: CP -> Export intensity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Industry	Number of observations	LM Autocor-relation test at lag 8	Granger causality	Lags	White test	R2	Adjusted R2	S.E. equation	F-statistic	Log likelihood	AIC	Schwarz criterion	Number of coefficients
A	45	4.59	0.94	1	55.46***	0.89	0.88	0.04	82.54	130.60	-5.36	-4.96	10
B	24	3.85	0.38	1	5.64	0.70	0.68	0.05	25.49	62.57	-4.71	-4.42	6
C	1176	2.32	3.13	2	333.47***	0.74	0.74	0.05	851.00	2640.20	-4.47	-4.43	10
D	39	0.61	8.38**	1	14.22	0.54	0.51	0.09	20.84	-5.85	0.61	0.86	6
E	39	12.44*	0.67	1	20.14†	0.29	0.25	0.08	7.19	26.56	-1.05	-0.80	6
F	24	4.35	0.13	1	8.76	0.05	-0.04	0.09	0.60	42.03	-3.00	-2.71	6
G	243	3.38	4.05	2	95.10***	0.62	0.61	0.07	95.88	201.94	-1.58	-1.44	10
H	177	1.77	1.08	1	84.04***	0.69	0.69	0.04	196.00	286.66	-3.17	-3.06	6
I	160	1.49	2.11	1	42.60***	0.18	0.17	0.06	17.18	621.97	-7.70	-7.58	6
J	60	6.22	3.02†	1	18.18	0.67	0.65	0.07	56.93	85.75	-2.66	-2.45	6
M	45	1.92	4.45*	1	25.04*	0.79	0.78	0.05	79.07	51.76	-2.03	-1.79	6
N	40	8.94†	14.01*	4	90.58**	0.59	0.44	0.06	4.11	68.94	-2.35	-1.42	22
S	16	0.09	1.02	1	13.65	0.11	-0.03	0.06	0.79	13.35	-0.92	-0.63	6
Total	1762	6.42	10.29*	3	608.26***	0.68	0.68	0.12	615.59	-148.79	0.18	0.23	14

Note: *** p – value < 0.001 ** p – value < 0.01 * p – value < 0.05 † p – value < 0.1. [1] only significant at 8th lag. All other lags show insignificant LM correlations.[2] Granger causality in the opposite direction. [3] VAR does not satisfy the stability condition.

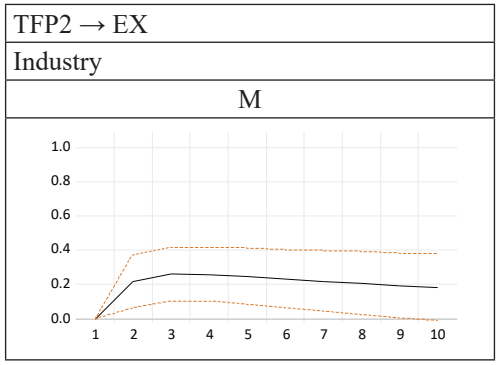
Source: Author's calculations based on data form Orbis database (2016)

Figure A1: Impulse response functions (dependent variable: Export)



Source: Author's representation based on data form Orbis (2016)

Figure A1: Impulse response functions (dependent variable: Export) (continued)



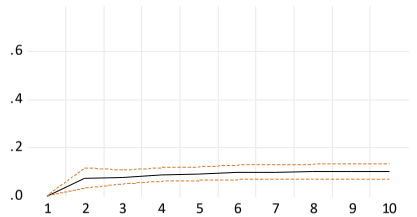
Source: Author's representation based on data form Orbis (2016)

Figure A1: Impulse response functions (dependent variable: Export) (continued)

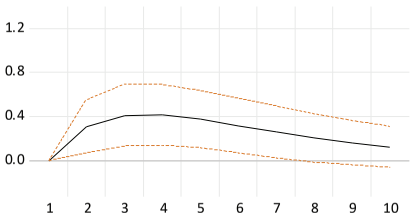
LP → EX

Industry

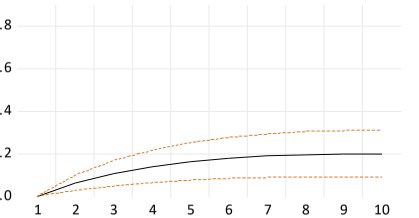
C



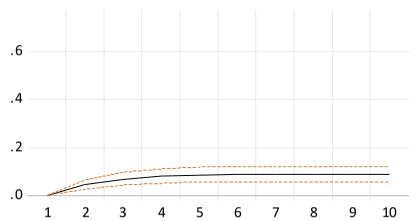
D



G



H



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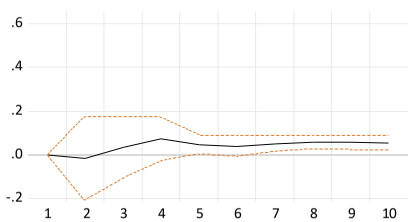
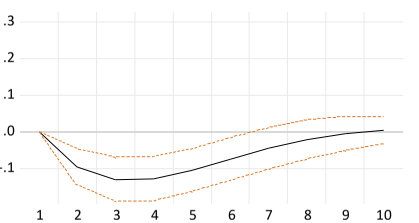


M



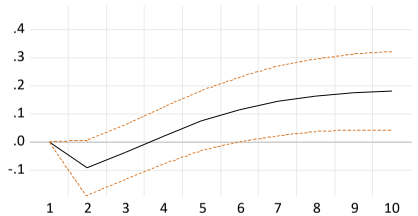
Source: Author's representation based on data form Orbis (2016)

Figure A1: Impulse response functions (dependent variable: Export) (continued)

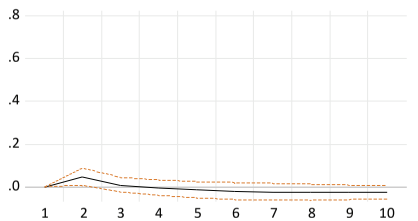
CP → EX

Industry

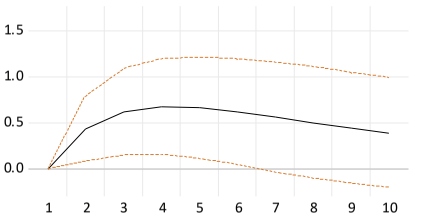
A



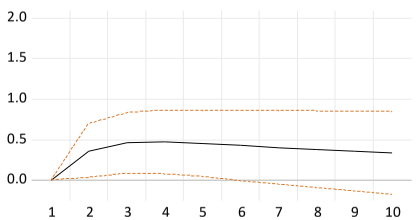
C



D

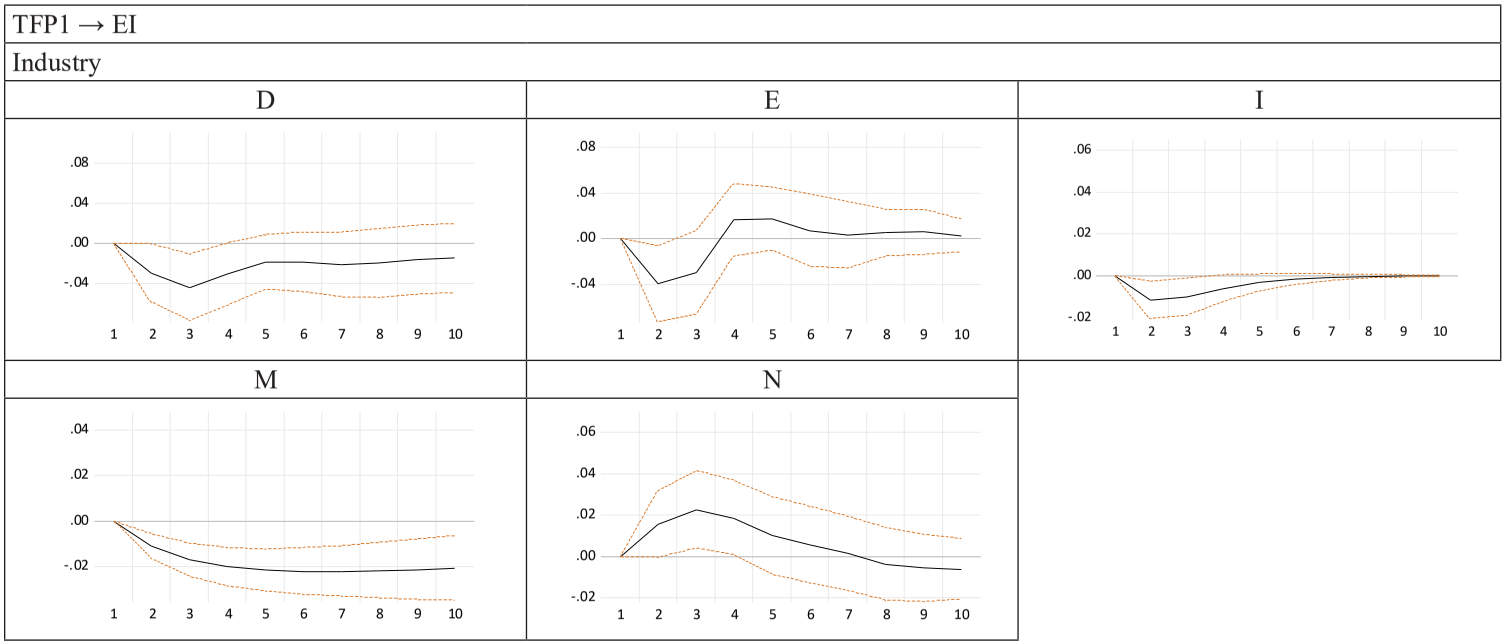


F



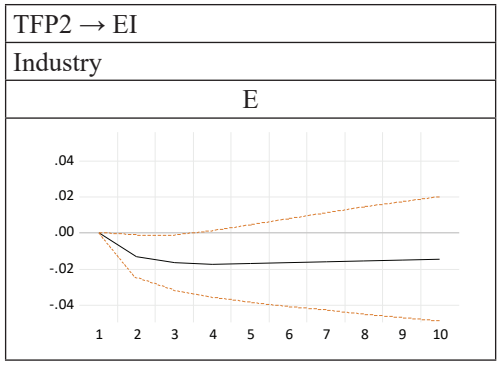
Source: Author's representation based on data form Orbis (2016)

Figure A2: Impulse response functions (dependent variable: Export intensity)



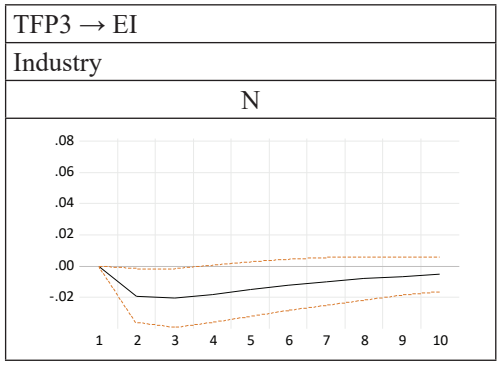
Source: Author's representation based on data form Orbis (2016)

Figure A2: Impulse response functions (dependent variable: Export intensity) (continued)



Source: Author's representation based on data form Orbis (2016)

Figure A2: Impulse response functions (dependent variable: Export intensity) (continued)



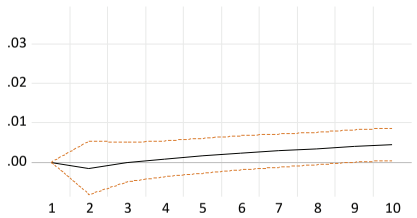
Source: Author's representation based on data form Orbis (2016)

Figure A2: Impulse response functions (dependent variable: Export intensity) (continued)

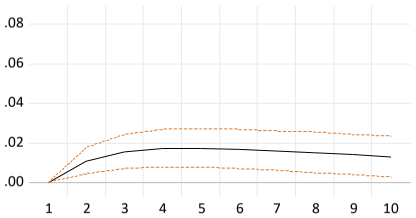
LP → EI

Industry

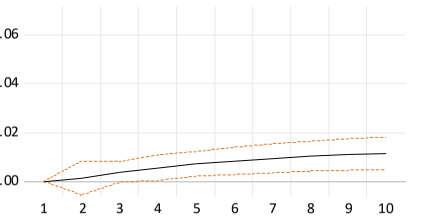
A



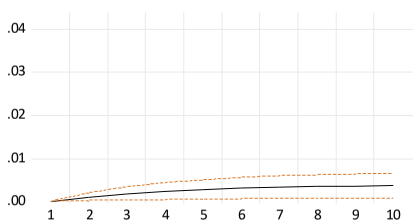
D



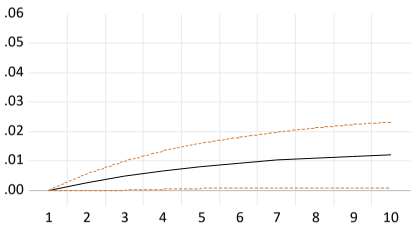
G



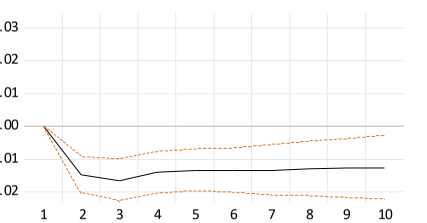
H



J

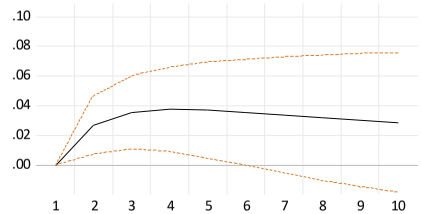
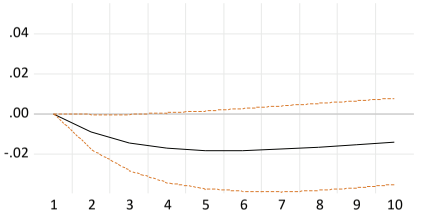
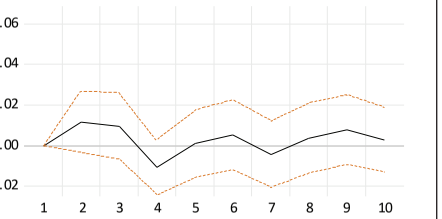


M



Source: Author's representation based on data form Orbis (2016)

Figure A2: Impulse response functions (dependent variable: Export intensity) (continued)

CP → EI		
Industry		
D	M	N
		

Source: Author's representation based on data form Orbis (2016)