
Foreign trade impact on employment efficiency – an analysis using R

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ABSTRACT

The sustainable development on export means both specific market share growth and use of high-qualified human resources, able to create quality goods for export as well as technological transfer and quality of work promotion for increasing companies' competitiveness on international markets. The scope of the paper is to analyze the impact of external trade in goods on employment in Romania. The research is based on companies' typology on main activity, ownership and technological level of exported goods. Special attention is devoted to the impact of firms with FDI and high-tech products on export dynamics and sustainability and quality of employment. To reach this goal, VAR models are being conducted, using R statistical software.

The results of the analyses performed revealed an inverse relationship between export growth and developments in unit labor costs. The role of FDI in the economic development of a region and even of the economy cannot be disputed but exports provided by FDI firms remain rather limited by the restricted integrated value chains, mainly orientated to origin countries.

Keywords: foreign trade, employment, VAR models, R statistical software

JEL Classification: F14, F16, C87

INTRODUCTION

Market performance of the Romanian companies is valued, among others, on the export dimensions, production factors efficiency and ownership. FDI, labor productivity and export of the high-tech goods are major factors for enhancing a performant business model in emerging, less developed countries.

The marginal productivity of technological progress and job restructuring create the necessary prerequisites for economic growth, allowing diversification of the supply of products and services and customization for diverse end-users as a viable response to the need to stimulate aggregate demand. The low level of income in Romania, demographic decline and labor migration make it difficult to maintain consumer demand, stimulating foreign trade as the basis for increasing turnover.

Romania's global economic performance is decreasing. On the Global Competitiveness Index, Romania drops from rank 62 in 2016/17 to 68 in 2017/18 (score of 4.28 of maximum 7), registering on medium-term trend of slight growth but short-term deterioration (The Global Competitiveness Report 2017-2018). This unfavorable development was accompanied by a declining trend of the capacity of innovation and technological transfer, and also by a relatively constant foreign market size index. With this slow performance trend, Romania remains in the groups of countries in transition from the efficiency-driven stage to the innovation-driven one (similar to the EU member states as Croatia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, but with lower performance).

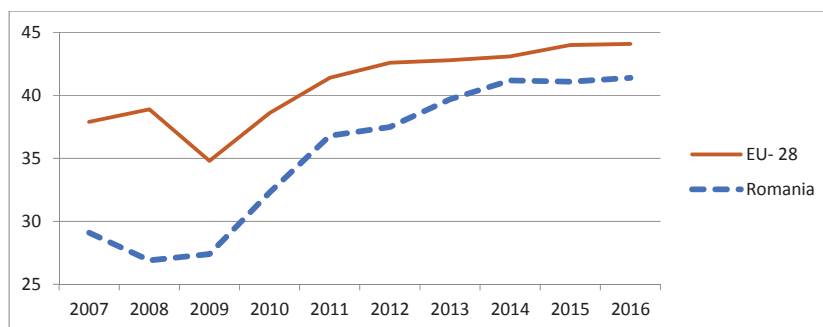
The economic performance and productivity generates fluctuation of employment based on dynamics of job restructuring. The sustainable development on export means both specific market share growth and use of high-qualified human resources, able to create quality goods for export as well as technological upgrade needed for maintaining and increasing companies' competitiveness on markets.

The decline of quality of the education system and the low involvement of employers for training of their employees, associated with weak correlation between pay and productivity diminished considerably and steadily the country capacity to retain talents. FDI and active processing are the main drivers for export. Romanian-owned companies face many constrains for foreign trade- enhancing from technological level, insufficient investment sources to external market oriented supply of goods.

Romania's export, as share of GDP was increasing after accession, but is remaining lower than EU average.

Exports of goods and services in % of GDP

Graph 1



Source: Eurostat database

Compared to other NMS countries, Romania had a positive dynamics after 2009, but without achieving the performance of Hungary, Poland or the Czech Republic.

**Exports of goods and services in selected countries,
in the period 2007-2016 (% of GDP)**

Table 1

	2016 (%)	2016-2007 (percentage points)	2016-2009 (percentage points)	2016-2015 (percentage points)
EU-28	44.1	6.2	9.3	0.1
United Kingdom	28.2	3.3	2	0.6
France (the lowest share after Brexit)	29.3	2.2	5.2	-0.4
Luxembourg (the highest share)	221.3	38.4	57.2	-1.4
Hungary	92.5	14.2	17.7	1.8
Poland	52.3	13.7	15.1	2.8
Czech Republic	79.5	13.1	20.8	-1.5
Romania	41.4	12.3	14	0.3
Bulgaria	63.6	11.2	21.3	-0.5
Greece	30.2	7.7	11.2	-1.7
Italy	29.8	2.4	7.3	-0.1

Source: Eurostat database

Export as a factor of stimulating labor-intensive growth has an impact on the sustainability of external trade relations only to the extent that it is associated with a qualitatively significant change in the external trade structure, oriented towards the production and export of medium and high-processed products with sustainable growth of high-tech products.

Export as a stimulating factor for labor-intensive growth has an effect on the sustainability of external trade relations only if is associated with a qualitatively important change of the assortment structure, i.e. if is oriented towards the production of medium and high-processed products, with the substantial increase of the high-tech products.

METHODOLOGY

For analyzing the foreign trade and labor market in Romania, the present paper aims to test three multivariate VAR models, in terms of number of employees, export of goods, labor costs per unit of export, general labor productivity, and export intensity.

For the purpose of this study, the international trade in goods statistics (ITGS) database, structural business statistics (SBS) database and information from Statistical Business Register of INS Romania have been used. The reference period took into consideration was 2008-2015, because of data availability in all databases.

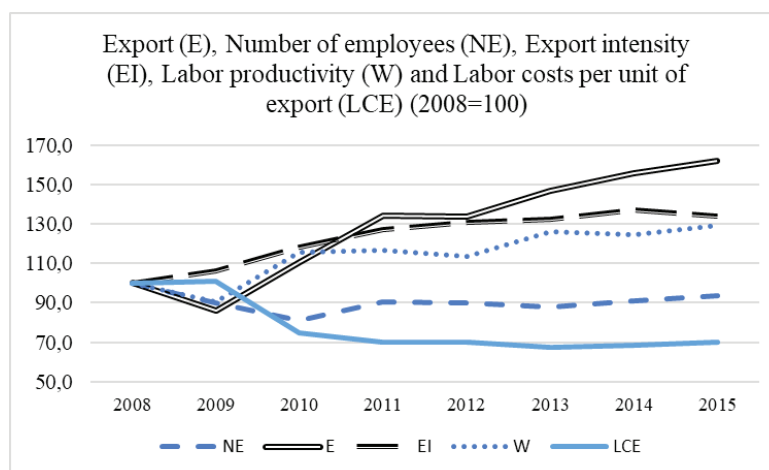
The software used for the analysis is R, with the package `vars` (Pfaff, 2008), which is specific for the VAR, SVAR and SVEC analyzes. R has been chosen for the analysis since it is by far the most used open source statistical software among academic communities. The statistical software R shows the advantages of an open source system: low costs (related only with training of users), easy customization of the applied methodology, technical support provided by a large community of users, continuous upgrade and linkage with the way statisticians think and work (Dobre et. al, 2013).

The paper aims to build some multivariate VAR models, using macroeconomic data from Romania, in the period 2008-2015. The variables used in the model are described below:

1. Export (E), meaning the value of exported goods, by type of companies,
2. Number of employees (NE), meaning the total number persons employed on each company,
3. Labor costs per unit of export (LCE), meaning the payment in return of 1 euro exported (gross labor cost/value of exports),
4. Export intensity (EI), meaning the share of exports of goods in total company's turnover (export of goods /turnover*100),
5. General labor productivity (W), calculated as turnover per number of employees.

Total export, number of employees, export intensity, labor productivity, labor costs per unit of export (2008=100)

Graph 2



Source: ITGS database and authors's calculations based on INS database

Concretely, the applied VAR model supposes that a vector of state variables follows a first-order VAR. This means that every state variable in period $t+1$ can be explained by a linear combination of the state variables in t and a constant deterministic regressor. All variables are measured in natural logarithms except for the labor costs per unit of export, general labor productivity and export intensity that are measured in levels. The use of log-transformed data has become a standard or at least good practice in macroeconomic forecasting with VAR models (Mayr, Ulbricht, 2007).

A preliminary step in the development process of VAR model is the application of unit root test Augmented Dickey-Fuller, which tests the unit root against a trend stationary alternative. In R software, the Augmented Dickey-Fuller test is implemented within the function `ur.df()`, from the package `urca`. The stationarity of the series implied in the models will be tested in two different ways.

Firstly, we will consider that the natural logarithms of the series follow a stochastic process autoregressive of order 1, type “trend”. Secondly, we will test if the series follow a stochastic process AR (1) autoregressive of order 1, type “drift”. The ADF test results will be compared with the critical values for the various thresholds of significance. In both cases – trend and drift - the test results are higher than the critical values of 1%, 5% and 10% in the Table 1, therefore we cannot reject the null hypothesis of the presence of unit root in the series. This means that the series are not stationary.

Critical values of 1%, 5% and 10%

Table 2

Type	Critical values 99%	Critical values 95%	Critical values 90%
Trend	-4.38	-3.60	-3.24
	8.21	5.68	4.67
	10.61	7.24	5.91
Drift	-3.75	-3.00	-2.63
	7.88	5.18	4.12

Augmented Dickey Fuller Test-statistic values for variables included in the models

Table 3

Time series	Type	Total export	Companies with FDI	Companies exporting high-tech products
NE	Trend	-13.39532	-0.9642721	-3.0981
		70.1321	5.159171	7.3222
		104.0306	0.8354738	4.8089
	Drift	-16.028	-1.026	-3.3172
		148.7651	0.6256	5.6518
E	Trend	-2.729428	-2.644609	-2.665443
		20.90051	16.15333	8.612847
		10.3991	9.935573	5.484964
	Drift	-2.8106	-2.8289	-2.2243
		4.7224	4.8893	2.5538
LCE	Trend	-7.05227	-3.572006	-3.471835
		114.9307	20.39198	6.494074
		135.2922	25.9991	8.082335
	Drift	-5.0037	-2.7231	-2.3708
		27.4529	6.3744	3.2165
EI	Trend	-0.6807113	-0.5387816	-1.62879
		4.102163	1.635722	1.881584
		6.030953	1.977715	1.893015
	Drift	-0.5154	-0.7297	-1.4308
		1.0758	0.4648	1.16
W	Trend	-3.295242	-1.953686	-2.633433
		28.23233	9.053907	6.381493
		22.05519	8.710702	6.015664
	Drift	-3.0671	-2.0016	-1.9401
		7.5097	2.9376	2.1211

There were tested several models, out of which only three were selected based on the evidence against the null hypothesis:

Model 1: NE (Number of employees), E (Export), LCE (Labor costs per unit of export)

Model 2: W (General labor productivity), E (Export), LCE (Labor costs per unit of export)

Model 3: NE (Number of employees), LCE (Labor costs per unit of export), EI (Export intensity)

These models have been tested for all the companies performing export and import activities in Romania (total export) as well as for companies performing external trade in lohn system (inward processing), companies exporting high-tech products and companies with Foreign Direct Investments (FDI) in Romania.

For companies with active processing activities, none of the performed tests were valid. This is because of the nature of activities and the processing valuations in statistics, which belongs more to the service statistics and not

to international trade in goods statistics. For this reason, there are presented below only the valid models and, in the same time, the most relevant for economic activity of companies.

RESULTS OF ANALYSES

Total export

On total export, the Model 1: NE (Number of employees), E (Export), LCE (Labor costs per unit of export) and Model 2: W (General labor productivity), E (Export), LCE (Labor costs per unit of export) are relevant for equation *Export*:

Estimation results for equation Export in Model 1 (NE, E, LCE):

$$E = NE.11 + E.11 + LCE.11 + \text{const}$$

Estimation results for equation Export in Model 1 (NE, E, LCE)

Table 4

	Estimate	Std. Error	t value	Pr(> t)
NE.11	-2.3716	1.4761	-1.607	0.2065
E.11	1.2166	0.9104	1.336	0.2738
LCE.11	0.9057	1.8114	0.500	0.6515
const	12.0359	4.8876	2.463	0.0907

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.04117 on 3 degrees of freedom

Multiple R-Squared: 0.9074, Adjusted R-squared: 0.8149

F-statistic: 9.805 on 3 and 3 DF, p-value: 0.04645

The model reveals there is an inverse relationship between export and number of employees in the previous year and a direct relationship between export and labor costs per unit of export. The dependency relationship is unidirectional, meaning that neither the number of employees nor the company's performance in terms of labor costs per unit of export are influenced by the level of the other variables recorded in the previous year. This aspect is evidenced by the lack of representativeness of the tested models in this respect. However, the value of exports is influenced by a higher level of labor productivity and higher remuneration for employees. A higher financial incentive for a smaller number of employees may lead to an increase in exports of the companies concerned. Analyzing by type of company will reveal the importance of higher remuneration of employees to increase the degree of their interest in achieving the objectives of the companies.

Model 2 : W (General labor productivity), E (Export), LCE (Labor costs per unit of export), is also relevant only for equation Export:

Estimation results for equation Export in Model 2 (W, E, LCE):

$$\text{Export} = \text{W.11} + \text{Export.11} + \text{LCE.11} + \text{const}$$

Estimation results for equation Export in Model 2 (W, E, LCE)

Table 5

	Estimate	Std. Error	t value	Pr(> t)
W.11	2.3611	1.4796	1.596	0.2088
E.11	-1.1514	0.8134	-1.416	0.2518
LCE.11	0.8904	1.8139	0.491	0.6572
const	12.0495	4.9032	2.457	0.0911

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.0413 on 3 degrees of freedom

Multiple R-Squared: 0.9069, Adjusted R-squared: 0.8137

F-statistic: 9.737 on 3 and 3 DF, p-value: 0.04688

Model 2 is relevant to supporting theoretical assumptions according to which export is directly influenced by the level of overall company productivity and labor cost per unit of export.

Model 3: NE (Number of employees), LCE (Labor costs per unit of export), EI (Export intensity) is valid for the evolution of export intensity and labor cost per unit of export.

Estimation results for equation LCE in Model 3 (NE, LCE, EI):

$$\text{LCE} = \text{NE.11} + \text{LCE.11} + \text{EI.11} + \text{const}$$

Estimation results for equation LCE in Model 3 (NE, LCE, EI)

Table 6

	Estimate	Std. Error	t value	Pr(> t)
NE.11	1.0512	0.3294	3.191	0.0497 *
LCE.11	-0.6537	0.4914	-1.330	0.2755
EI.11	-1.6135	0.7125	-2.265	0.1085
const	-5.5208	1.9098	-2.891	0.0630

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01777 on 3 degrees of freedom

Multiple R-Squared: 0.912, Adjusted R-squared: 0.8239

F-statistic: 10.36 on 3 and 3 DF, p-value: 0.04316

The labor cost per unit of export have an inverse relationship with export intensity in previous year (export / turnover), according to the results of the applied model. The lack of knowledge and skills required in firms with

FDI, as well as the overwhelming percentage of these companies in total foreign trade activity, leads to reduced possibilities for Romanian employees to negotiate wage packages and the rest of the benefits they could get. Considering that the companies with FDI account for about 65% of the total export of Romania, only 6% of the total number of foreign trade companies but concentrating about 40% of the total number of employees at the level of exporting and importing companies, we can observe the tendency of financial oligarchy of FDI companies on the labor market in Romania.

Estimation results for equation EI in Model 3 (NE, LCE, EI):

$$EI = NE.II + LCE.II + EI.II + \text{const}$$

Estimation results for equation EI in Model 3 (NE, LCE, EI)

Table 7

	Estimate	Std. Error	t value	Pr(> t)
NE.II	-0.29639	0.11689	-2.536	0.0850
LCE.II	0.08534	0.17436	0.489	0.6581
EI.CA.II	0.77275	0.25283	3.056	0.0551
const	1.87535	0.67770	2.767	0.0697

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.006307 on 3 degrees of freedom

Multiple R-Squared: 0.9721, Adjusted R-squared: 0.9441

F-statistic: 34.79 on 3 and 3 DF, p-value: 0.007863

The export intensity at the level of companies with foreign trade activity has a direct relationship with the labor cost per unit of export and an inverse relationship with the number of employees. This means that the intensity of the export is closely related to the efficiency of the use of the labor factor and the productivity achieved in the previous year.

Companies with FDI in Romania

The most relevant results by applying Model 1: NE (Number of employees), E (Export), LCE (Labor costs per unit of export), were obtained for equation *Number of employees* and *Labor cost per unit of export*.

Estimation results for equation NE in Model 1 (NE, E, LCE):

$$NE = NE.II + E.II + LCE.II + \text{const}$$

Estimation results for equation NE in Model 1 (NE, E, LCE)

Table 8

	Estimate	Std. Error	t value	Pr(> t)
NE.I1	-0.6402	0.5330	-1.201	0.316
E.I1	0.6526	0.2574	2.535	0.085
LCE.I1	1.0160	0.5971	1.702	0.187
const	2.5209	1.5051	1.675	0.193

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01058 on 3 degrees of freedom

Multiple R-Squared: 0.9084, Adjusted R-squared: 0.8168

F-statistic: 9.917 on 3 and 3 DF, p-value: 0.04575

At the level of FDI firms, the value of exports and the labor cost for exported unit have a direct and positive influence on the number of their employees. This fact indicates the orientation towards the export activity of the companies with foreign capital, which make benefits from the low salary level compared to other European states and the potential for development. The natural resources existing on the territory of Romania represent another attraction for these companies, through the possibilities of their exploitation primarily in terms of legislation (permissive legislation). Minimal protection provided by national legislation, at least strategic resources (forests, waters, mining resources), is necessary to ensure a sustainable development of Romania by exporting processed products rather than raw resources.

Estimation results for equation LCE in Model 1 ((NE, E, LCE):

$$LCE = NE.I1 + E.I1 + LCE.I1 + const$$

Estimation results for equation LCE in Model 1 ((NE, E, LCE)

Table 9

	Estimate	Std. Error	t value	Pr(> t)
NE.I1	2.3639	0.3939	6.001	0.00927 **
E.I1	-0.6784	0.1903	-3.565	0.03768 *
LCE.I1	-0.8195	0.4413	-1.857	0.16031
const	-6.2862	1.1125	-5.651	0.01097 *

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.00782 on 3 degrees of freedom

Multiple R-Squared: 0.9646, Adjusted R-squared: 0.9293

F-statistic: 27.29 on 3 and 3 DF, p-value: 0.01116

The labor costs for exported unit is higher as the number of employees is greater and the export is lower.

Model 2 : W (General labor productivity), E (Export), LCE (Labor costs per unit of export), produced the following results for equation *Labor cost per unit of export*:

Estimation results for equation LCE:

$$LCE = W.II + E.II + LCE.II + \text{const}$$

Estimation results for equation LCE in Model 2 (W, E, LCE)

Table 10

	Estimate	Std. Error	t value	Pr(> t)
W.II	-2.3704	0.3963	-5.982	0.00935 **
E.II	1.6915	0.2462	6.871	0.00631 **
LCE.II	-0.8193	0.4426	-1.851	0.16125
const	-6.3184	1.1180	-5.652	0.01097 *

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.007842 on 3 degrees of freedom

Multiple R-Squared: 0.9644, Adjusted R-squared: 0.9289

F-statistic: 27.13 on 3 and 3 DF, p-value: 0.01126

The labor cost per unit of export has an inverse relationship with the level of general labor productivity (turnover / number of employees) and directly proportional to the export level. Thus, when labor productivity at the level of companies decreases in the previous year, there is an increase in the level of labor cost per unit of export. This reveal, one more time, the great trade openness of FDI companies in Romania.

Model 3: NE (Number of employees), LCE (Labor costs per unit of export), EI (Export intensity)

Estimation results for equation NE in Model 3 (NE, LCE, EI):

$$NE = NE.II + LCE.II + EI.II + \text{const}$$

Estimation results for equation NE in Model 3 (NE, LCE, EI)

Table 11

	Estimate	Std. Error	t value	Pr(> t)
NE.II	0.4229	0.2316	1.826	0.1653
LCE.II	0.2169	0.2567	0.845	0.4601
EI.II	0.5064	0.1705	2.971	0.0590
const	3.5671	1.3675	2.608	0.0798

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.009446 on 3 degrees of freedom

Multiple R-Squared: 0.927, Adjusted R-squared: 0.8539

F-statistic: 12.69 on 3 and 3 DF, p-value: 0.03276

Estimation results for equation LCE in Model 3 (NE, LCE, EI):
 $LCE = NE.II + LCE.II + EI.II + \text{const}$

Estimation results for equation LCE in Model 3 (NE, LCE, EI)

Table 12

	Estimate	Std. Error	t value	Pr(> t)
NE.II	1.24490	0.23892	5.211	0.0137 *
LCE.II	0.08766	0.26482	0.331	0.7624
EI.II	-0.46914	0.17588	-2.667	0.0759 .
const	-7.28378	1.41083	-5.163	0.0141 *

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.009746 on 3 degrees of freedom

Multiple R-Squared: 0.9451, Adjusted R-squared: 0.8902

F-statistic: 17.21 on 3 and 3 DF, p-value: 0.02148

The more they produce, the lower the labor cost per unit of export is at the level of FDI companies. There is an inverse relationship between export developments and developments in unit labor costs. The development in unit labor costs is determined by the development in labor productivity. It should also be taken into account that international economic developments also have a strong influence on exports, especially on multinational enterprises.

Companies exporting high-tech products

Model 1: NE (Number of employees), E (Export), LCE (Labor costs per unit of export)

Estimation results for equation NE in Model 1 (NE, E, LCE):

$$NE = NE.II + E.II + LCE.II + \text{const}$$

Estimation results for equation NE in Model 1 (NE, E, LCE)

Table 13

	Estimate	Std. Error	t value	Pr(> t)
NE.II	-0.7694	0.8847	-0.870	0.4485
E.II	0.4072	0.5106	0.797	0.4835
LCE.II	0.2384	0.9662	0.247	0.8210
const	5.7019	1.5486	3.682	0.0347 *

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01172 on 3 degrees of freedom

Multiple R-Squared: 0.9108, Adjusted R-squared: 0.8216

F-statistic: 10.21 on 3 and 3 DF, p-value: 0.04399

Increasing the degree of openness to the foreign markets of these companies leads directly to the increase of the number of employees and the possibility of additional production increase, assortment extension, innovation,

etc. It is essential for these companies to invest in research and development as in the era of present technology any initiative can lead to sustainable growth and expansion of the company.

Estimation results for equation Export in Model 1 (NE, E, LCE):
 $\text{Export} = \text{NE.11} + \text{E.11} + \text{LCE.11} + \text{const}$

Estimation results for equation Export in Model 1 (NE, E, LCE)

Table 14

	Estimate	Std. Error	t value	Pr(> t)
NE.11	-6.188	2.524	-2.452	0.0915
E.11	3.188	1.457	2.188	0.1164
LCE.11	3.700	2.756	1.342	0.2721
const	11.405	4.418	2.582	0.0817

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.03343 on 3 degrees of freedom

Multiple R-Squared: 0.9588, Adjusted R-squared: 0.9177

F-statistic: 23.3 on 3 and 3 DF, p-value: 0.014

Increasing labor productivity and wage levels by increasing the efficiency of the production price is essential for high-tech exported companies. Business turnover and economic and financial results are not dependent on the number of employees but on the efficiency of using this resource. The individual payroll performance and the development of automation under the conditions of using and producing goods that incorporate high technology are factors that devalue the success of companies on international markets. This also ensures an increase in national exports, an increase based on efficiency and productivity, allowing Romanian products to register performance in front of external competitors.

Model 2 : W (General labor productivity), E (Export), LCE (Labor costs per unit of export)

Estimation results for equation Export in Model 2 (W, E, LCE):
 $E = \text{W.11} + \text{E.11} + \text{LCE.11} + \text{const}$

Estimation results for equation Export in Model 2 (W, E, LCE)

Table 15

	Estimate	Std. Error	t value	Pr(> t)
W1.I1	6.172	2.548	2.422	0.0940
E.I1	-2.988	1.202	-2.487	0.0887
LCE.I1	3.698	2.788	1.326	0.2767
const	11.361	4.458	2.548	0.0841

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.0337 on 3 degrees of freedom

Multiple R-Squared: 0.9582, Adjusted R-squared: 0.9163

F-statistic: 22.91 on 3 and 3 DF, p-value: 0.01434

Also at the level of these companies, the export is positively influenced by the level of general labor productivity and by the salary implied for an exported unit.

Estimation results for equation LCE in Model 2 (W, E, LCE)::

$$LCE = W.I1 + E.I1 + LCE.I1 + \text{const}$$

Estimation results for equation LCE in Model 2 (W, E, LCE)

Table 16

	Estimate	Std. Error	t value	Pr(> t)
W.I1	-2.6883	0.7048	-3.814	0.0317 *
E.I1	1.3944	0.3323	4.196	0.0247 *
LCE.I1	-1.6395	0.7711	-2.126	0.1235
const	-1.1689	1.2330	-0.948	0.4131

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.00932 on 3 degrees of freedom

Multiple R-Squared: 0.9719, Adjusted R-squared: 0.9438

F-statistic: 34.61 on 3 and 3 DF, p-value: 0.007922

A low level of labor productivity leads to higher export earnings, while the increase in exports obviously leads to an increase in wage,

Model 3: NE (Number of employees), LCE (Labor costs per unit of export), EI (Export intensity)

Estimation results for equation NE in Model 3 (NE, LCE, EI):

$$NE = NE.I1 + LCE.I1 + EI.I1 + \text{const}$$

Estimation results for equation NE in Model 3 (NE, LCE, EI)

Table 17

	Estimate	Std. Error	t value	Pr(> t)
NE.I1	0.0169	0.3082	0.055	0.9597
LCE.I1	-0.2693	0.4374	-0.616	0.5816
EI.I1	0.1826	0.2997	0.609	0.5853
const	5.6760	1.7277	3.285	0.0462 *

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01217 on 3 degrees of freedom

Multiple R-Squared: 0.9038, Adjusted R-squared: 0.8076

F-statistic: 9.396 on 3 and 3 DF, p-value: 0.04916

The developments in number of employees are influence by the developments in exports and are in inverse relationship with labor cost per unit of export.

Estimation results for equation EI in Model 3 (NE, LCE, EI):

$$EI = NE.I1 + LCE.I1 + EI.I1 + const$$

Estimation results for equation EI in Model 3 (NE, LCE, EI)

Table 18

	Estimate	Std. Error	t value	Pr(> t)
NE.I1	-0.3904	0.3815	-1.023	0.3815
LCE.I1	-1.4594	0.5415	-2.695	0.0741
EI.I1	-0.4422	0.3711	-1.192	0.3191
const	1.9552	2.1390	0.914	0.4281

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01506 on 3 degrees of freedom

Multiple R-Squared: 0.9402, Adjusted R-squared: 0.8804

F-statistic: 15.73 on 3 and 3 DF, p-value: 0.02437

The number of employees has an inverse relationship to the labor cost per unit of export, so a higher number of employees leads to a reduction in wage costs for exporting a unit of value. Taking into account that 75% of companies exporting high-tech products are companies with 100% foreign capital (50%) and mixed capital (25%) the employment of low-skilled and low paid employees certainly contributes to lower expenses with staff and higher profits for these companies.

CONCLUSIONS

The developments in global trade are very important for an open economy. Romania's exports are on a continuous positive trend after the crisis in 2009, both in value and quantity of the goods. There are more demand-side

explanations for export increasing than higher competitiveness for Romania's goods, based on increased value added and higher processing. The prolonged comparatively sluggish growth of Romania's export (as in case of Poland, Hungary or Czech Republic) shows a less performant domestic capital, based mainly on small and medium firms, with no solid strategic orientation for external market.

The results of the analyses performed, revealed an inverse relationship between export growth and developments in unit labor costs. The labor costs per unit of export were calculated here as compensation of employees divided by the volume of export of goods. In general, on total level of export, the labor costs per unit of export decreases in the period 2008-2016, with positive effects on exports growth. By type of companies, those exporting high-tech products registered the greatest decrease in the level of his indicator, in parallel with an increase in exports of 113% in 2015 as against 2008.

The dependence of exports on foreign-owned companies is beneficial to the Romanian economy as long as Romania's economic area is of interest and part of the development strategy of those foreign companies. When this reality changes, either a reorientation of exports to new markets or a diversification of national supply to foreign markets will be necessary, which drives the need to stimulate domestic firms to create and produce sustainable goods on the domestic and international markets.

The role of FDI in the economic development of a region and even of the economy cannot be disputed, with FDI firms importing new technologies for manufacturing goods. However, when the labor force will generate higher costs for firms, either by applying the political and / or fiscal measures taken by decision-makers at national level, when labor supply will no longer be abundant due to its emigration to countries offering bigger salary or when the price of the national primary resources will increase due to their drastic reduction, these firms, which record high levels of productivity in Romania, will focus their activity on other cheaper and resource-rich states and Romania will register spectacular cuts in export of goods, reductions corresponding to foreign trade weights by foreign firms. National policies of protectionist nature against primary resources will be needed to stop their use for the benefit of foreign firms alongside the degradation of the environment and the depletion of the regions where they still exist. These losses are irrecoverable, and to prevent Romania from becoming impoverished by the resources it has been provided with, these measures will be urgently needed.

All this aspects reveal that Romanian-owned companies are mainly struggle to survive on the external market than to consolidate their specific sector. Moreover, there are far from benefiting of the emerging Fourth

Industrial revolution, as source for economic growth and lead significant structural transformation of export. The employability in such firm is restricted not only by restrictive investment funds for upgrade specific technologies but also by the shifts and job transformation generated by the digitalization. Exports provided by FDI firms are and remain important for Romania's total export activity, but rather limited by the restricted integrated value chains, mainly oriented to origin countries. So, the main challenges for future development and for increasing Romania's competitiveness at export are: a) to accelerate the Romanian companies' reforms to foster diversification and innovation of the high value added goods and services provided for export; b) increase attractiveness for remaining on national labor market through wage-productivity related payments; c) increase the share of imports for export instead for direct final consumption; d) reconsider the opportunities for non-EU exports, as additional growth potential.

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