

The Trade Balance of Romania - Evolutions and Correlations

Marian Zaharia^{*}, Radu Șerban Zaharia^{**}

^{*} Faculty of Economic Sciences, Petroleum-Gas University of Ploiești, Bd. București 39, 100680, Ploiești, Romania

e-mail: marianzaharia53@gmail.com

^{**} Romanian-American University, Expozitiei 1B Blvd., Sector 1, code: 012101, Bucharest, Romania

e-mail: aduhaz@yahoo.com

Abstract

Due to the economic interconnections between EU member countries and with countries outside the EU, economic flows become an increasingly important role for the development of each country. Economic developments in the last decade and the beginning of the current decade have influenced quite strongly their intensities and directions. In these conditions, Romania's foreign trade has known, as in other countries, periods of growth and decline. Based on these considerations the paper presents and analyzes evolutions of foreign trade and trade balance of Romania during 2003-2012. The analyze focuses also on the correlations between the volume of exports, the employment rate and the volume of net investments whose growth can be a way of achieving a trade balance surplus.

Keywords: *foreign trade, trade balance, statistical analysis, regression, ANOVA*

JEL Classification: *C25, F40, F47*

Introduction

The past decade of the beginning of this century, both economically and in terms of social, has been characterized by periods of growth and the crisis that led to increased instability that manifested and emphasized in this decade. These developments have had an impact on most states, including Romania and default on its foreign trade.

To highlight the intensity of trade links between Romania and the other EU member states, we considered useful to separate the analysis of the evolution of Romanian foreign trade, within the EU, of at the non-EU countries. Given that the analyze covers the period 2003-2012, the data sets used refers to EU27.

Outcome of the intensity of import and export trade flows, the trade balance highlights the efficiency of foreign trade and its impact on socio-economic development of Romania in the period. Also, for an image, as well as possible, of the evolution of Romania's trade balance in the period 2003-2013 trade balance with the EU partners are analyzed separately, and also the corresponding trade balance of foreign trade activities with partners outside the EU.

Given that both trade balance of Romania within the EU and non-EU countries were deficient throughout the period analyzed in order to identify priorities for action to achieve a trade

balance surplus we considered necessary to analyze the correlations between the evolution of exports inside and outside the EU and the rate of activity, on the one hand, and the amount of net investment, on the other.

Literature Review

Trade has emerged as a necessity since the beginning of human existence. It has grown with the development of communities and nations often favouring some and disfavouring others. Under the conditions of modern societies, international trade is a complex system of trade flows between national and multinational economic agents which runs in markets that are in a strong process of globalization.

“International trade can be positive or negative phenomena”¹. It can lead to welfare or lead to disadvantage for the poor and concentration of wealth by the rich.

The weights and how each country participate in this system depends on the level of development (economic power) and economic policy strategies applied. In the EU, in 2003, seven countries (Germany, France, Netherlands, Belgium, Italy, UK and Spain) held 77.1% of exports in the EU while the other 21 states held only 22.9%. In 2012, the same seven states still hold 72.6% of exports enter the EU.

The development of international trade has been encouraged by the development of transnational companies. “With the decisions taken in the areas of acquisitions, the production and investment have created global markets and had offered impulses to increase the interdependences.”².

Economic interconnection as a result of globalization, process which has significant implications on states and often contrary, may, in addition to positive effects and negative effects favour the spread of the negative phenomena that the system, as a whole, cannot control them. Such a phenomenon has been the economic crisis started in late 2008.

Seen in terms of the time factor, the crisis is a defined period of time characterized by major changes followed sooner or later by a profound change in situation existing prior to its triggering, the exit from this state, being a new dynamic balance of a reality different from the previous³.

Referring to the dimensions and implications of the current crisis Radu Loredana⁴ emphasizes that it can not be compared with those of previous crises, but resembling with certain economic episodes in the past, when the intensification of credit, the abundance of liquidity and the real estate boom have anticipated crisis period

Certainly, at present, the opportunities of globalization cannot be ignored. The use of these benefits and mitigate the adverse effects of threats generated by the same phenomenon depend

¹ Miron, D., *Comerț internațional*, ASE Publishing House, Bucharest, 2003, p. 20.

² Folcuț, O., *Comerț internațional: Avantaje comparative și competitive*, Universul Juridic Publishing House, Bucharest, 2005, p. 48.

³ Bonciu, F., Baicu, G., *Economia mondială sub lupă; de la crize acute la crize economice*, Pro Universitaria, Publishing House, Bucharest, 2010, p. 24

⁴ Radu, L., *Criza economică în Uniunea Europeană - o perspectivă comunicatională*, Comunicare.ro Publishing House, 2012, p. 20

on the ability of governments to set realistic goals and to efficiently allocate resources for their economic and social development⁵.

Research Methods

To analyze the evolution of Romania's foreign trade in the period 2003-2012 the data series of EUROSTAT databases were used, representing annual volumes of foreign trade of Romania (all products) inside and outside the EU. Each series contains 10 components (annual values).

To identify patterns of evolution and quantitative analysis were used regression analysis and ANOVA⁶ as well as statistical analysis with SPSS⁷. Also, such statistical analysis can be done using Excel⁸. Significance threshold chosen is $\alpha = 0.05$; it corresponds to the probability of 95%.

Since data sets contain a small number of components (10 values) only linear models were tested, ratio values of correlation (R) being in this case equal to the linear correlation coefficients (r). Based on these models values of exports for various scripts on the employment rate were projected, and also the net investment.

Trade balance evolution

Due to the policies of the governments of Romania in the period 2003-2008 which stimulated consumption by increasing household incomes and development of investments the foreign trade recorded an ascending process, but in which the imports significantly surpassed exports. The result was the increase of the trade balance deficit of about 4.2 times, from 5.588 billion euro in 2003 to 23.469 billion euro in 2008.

Economic and financial crisis triggered in late 2008 seriously affected a number of economic sectors and branches from Romania. One consequence of this was a significant reduction of imports, which resulted in reducing the trade balance deficit, which in 2009 recorded -9.862 billion euro.

The period 2010-2012 is one of economic recovery bringing some changes in the ratio between imports and exports, so although both recorded growth, the trade balance deficit, recorded a slight decrease, reaching in 2012 -9.619 billion euros, with 243 million less than in 2009.

Trade balance with EU countries, during the whole period 2003-2012, is deficient (Figure 1). Evolutions of the total exports volume, within the EU (E_{I_UE27}), and of the total imports volume, from within the EU (I_{I_UE27}), are approximately linear. Their general trends are given by the equations:

$$E_{I_UE27}(t) = 2269.2 \cdot t + 9221.1 \quad (1)$$

⁵ Russu, C., International Competitiveness of Industries in the European Union and Romania. Complements and Capitalization of Competitive Advantages, *Economic Insights – Trends and Challenges*, Vol. II (LXV), No. 3/2013, p.42.

⁶ Gogonea, R.M., Zaharia, M. (2008). *Econometrie cu aplicații în comerț, turism, servicii*, Universitary Publishing House, Bucharest, 2008, pp. 141-183

⁷ Jaba, E., Grama, A., *Analiză statistică cu SPSS sub Windows*, Polirom Publishing House, Iași, 2004, pp. 232-258

⁸ Oprea, C., Zaharia, M., *Elemente de analiza datelor și modelare utilizând Excel*, Universitary Publishing House, Bucharest, 2011, pp. 99-122.

for which the determination coefficient $R^2 = 0,953$ respond respectively:

$$I_{I_UE27}(t) = 2836.6 \cdot t + 14102 \quad (2)$$

for which the determination coefficient $R^2 = 0.764$.

Although in model (2) the coefficient of determination is relatively small, in the circumstances, for comparability, we accept the hypothesis of linearity. Relations (1) and (2) points out that if conditions are maintained, the trade balance deficit of Romania within the EU would continue to rise because average annual growth of the volume of imports (2836.6 million euro) is higher than that of exports (2269.2 million euro).

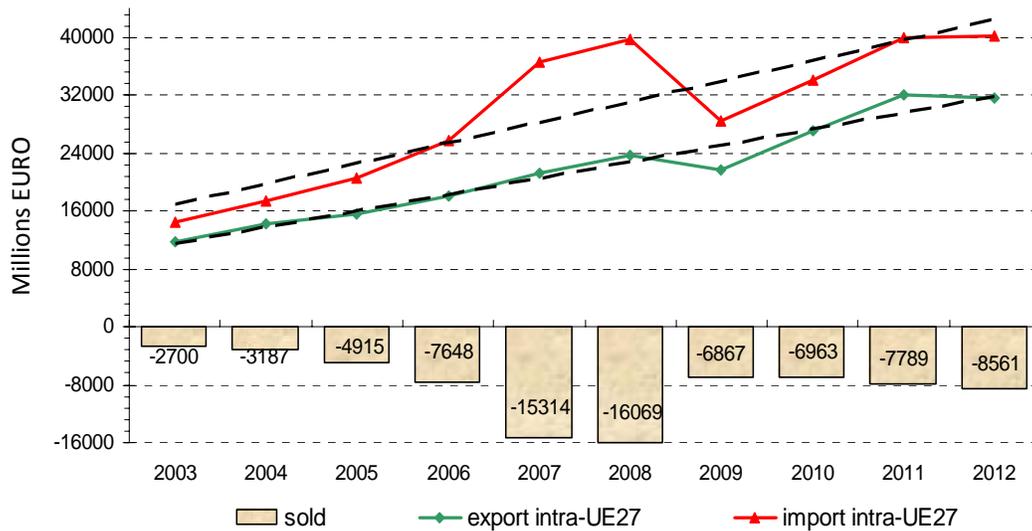


Fig. 1. Evolution of Romania's trade balance with EU countries in the period 2003-2012

Source: own construction based on EUROSTAT data series, *Intra and Extra-EU trade by Member State and by product group [ext_lt_intratrd]*, Retrieved on 10 May 2014, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

Evolution of trade balance with non-EU countries (Figure 2) presents some particularities compared to the trade balance within the EU. If in the previous economic crisis period, evolution of the total volume of exports ($E_{E_UE27_03_08}$) had a lower growth rate than the one of total volume of imports ($I_{E_UE27_03_08}$), which increased the deficit, starting with 2010 the situation has reversed.

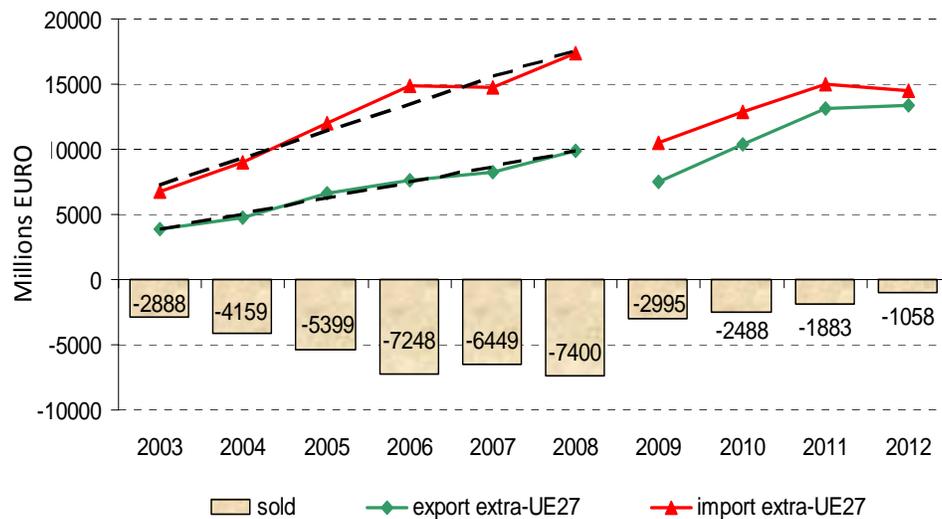


Fig. 2. Evolution of Romania's trade balance with non-EU countries in the period 2003-2012.

Source: own construction based on EUROSTAT data series, *Intra and Extra-EU trade by Member State and by product group [ext_lt_intrad]*, Retrieved on 10 May 2014, http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

These evolutions are highlighted by trend equations of the two indicators. In the period 2003-2008 these models are:

$$E_{E_UE27_03_08}(t) = 1103.4 \cdot t + 2688.9 \quad \text{with } R^2 = 0.9832 \quad (3)$$

$$I_{E_UE27_03_08}(t) = 2087.1 \cdot t + 5151.5 \quad \text{with } R^2 = 0.9537 \quad (4)$$

Relations (3) and (4) describe the linear evolutions of the two indicators in the period 2003-2008, showing that annual growth of the volume of imports from outside the EU (2087.1 million euro) is 1.89 times of the volume of exports outside the EU (1103.4 million euro) so that if, in 2003, the trade balance deficit outside the EU, was -2888 million euro in 2008 it reached -7,400 million euro. For the period 2009-2012 the relations (3) and (4) become:

$$E_{E_UE27_09_12}(t) = 2049.4 \cdot t - 6315.4 \quad \text{with } R^2 = 0.9161 \quad (5)$$

$$I_{E_UE27_09_12}(t) = 1407.8 \cdot t + 1244.2 \quad \text{with } R^2 = 0.8058 \quad (6)$$

Relations (5) and (6) describe also the 2009-2012 linear evolutions of the two indicators, highlighting, however, that the annual growth of imports from outside the EU volume (1407.8 million euro) is less than of the volume of exports outside the EU (2049.4 million euro), so that the trade balance deficit with non-EU countries is reduced from -2,995 million euro in 2009 to -1058 million euro, being the lowest in the entire period.

Correlations between the Volume of Exports, Employment and Investment

To achieve a positive balance of the trade balance of Romania the most effective way is to increase exports. This depends, in turn, by the international situation, by efficiency of national economy and how the government adopted measures to support exports. The increase of net investment and the level of employment might be directions of action in this regard.

Analysis of the correlation between the volume of export and the employment rate

According to Labour Force Balance⁹ “the labour resources represent the category of people who has all the physical and intellectual capabilities that allow it to perform useful work in one of the activities of the national economy”.

Active population is defined as the Romanian Statistical Yearbook¹⁰: “Economically active population (active persons) comprises all persons aged 15 years and over, providing available labour force for the production of goods and services; it includes employed population and unemployed” and employment which includes, according to the methodology of Household labour force survey “all persons aged 15 years and over, who carried out an economic activity producing goods or services of at least one hour during the reference period (one week) in order to get income as salaries, payment in kind or other benefits.”

“Employment rate represents the ratio between employed population and total population aged 15-64 years expressed as percentage” and “unemployment rate represents the ratio between the number of unemployed and active population expressed as percentage”¹¹.

Figure 3 presents the employment rates of the Romanian population both total population and by gender in 2003-2012. As it can be seen employment rates of male population are higher than those of the female population of working age.

To test the existence of linear correlation between the volume of exports within the EU, and the employment rate of the population of Romania, ANOVA was used. The results (Table 1) shows with a probability of 95% (significance threshold choice is $\alpha = 0,05$) the existence of linear correlation between the two variables.

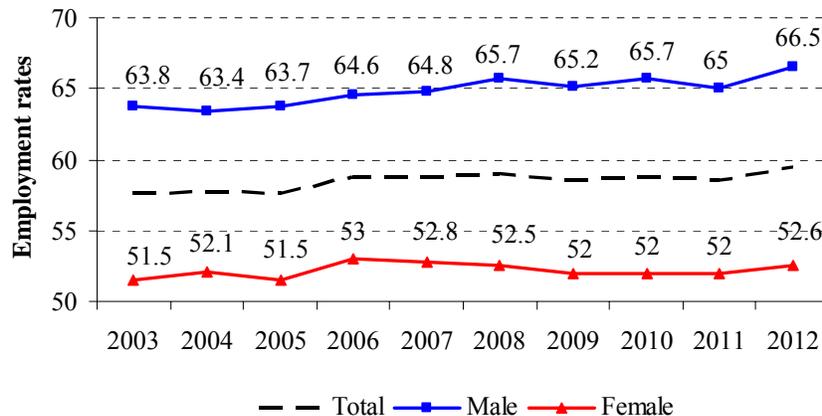


Fig. 3. Employment rates of Romania's population of 15 age 64 years

Source: own construction based on EUROSTAT, *Employment rates by sex, age and nationality (%) [lfsa_ergan]*, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_ergan&lang=en, Retrived on 20 May 2014

In these circumstances, one percentage point increase in the employment rate (R_A) increases the volume of exports in the EU with a value between 2794.8 and 13990.2 million euros. Value of the coefficient of determination (R Square = 0.599062) shows, however, that influence the

⁹ National Institute of Statistics, *Balanța forței de muncă la 1 ianuarie 2011*, NIS, Bucharest, 2011, p.7

¹⁰ National Institute of Statistics *Romanian Statistical Yearbook 2012*, NIS, p.83

¹¹ Ibidem, p.85

employment rate in the EU export volume is more than 60%, the rest of 40%, being the influence of other factors.

The model has the form:

$$E_{I_UE27} = -469177 + 8392.528 \cdot R_A + \varepsilon \tag{7}$$

where ε represents the influence of other factors (the residues).

Table 1. Testing the correlation between the volume of export and the employment rate

Within EU	Multiple R =0.773991	R Square=0.599062		Sigificance F=0.0086	
	<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
	Intercept=-469177	-3.30431	0.010789	-796605.34	-141749
	Employment rate =8392.528	3.457343	0.008601	2794.8173	13990.24
Outside EU	Multiple R=0.783944	R Square=0.614568		Sigificance F=0.0073	
	<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
	Intercept=-216634	-3.43557	0.008882	-362041.96	-71226.4
	Employment rate =3850.153	3.571544	0.007277	1364.2623	6336.044

Source: own computation using ANOVA methodology

The existence of correlation between the volume of exports outside the EU and the employment rate has been similarly tested. The results are also shown in Table 2. In view of the Significance_F = 0.0072773 < 0.05, the hypothesis by linear correlation is accepted also in this case; econometric model is:

$$E_{E_UE27} = -216634 + 3850.153 \cdot R_A + \varepsilon \tag{8}$$

Also, because the P-value is less than the value of significance threshold ($\alpha = 0,05$), to a 95%, they are also statistically significant. The values of the ratio of correlation (Multiple R = 0.783944) and of the coefficient of determination (R Square = 0.614588) are very close to those determined above, which means that the employment rate influences the volume of exports outside the EU, in a similar way with the exports influence within the EU.

Taking into account the results obtained it can be concluded with 95% probability that a 1% increase in the employment rate of the Romanian population, exports outside the EU could increase by a value between 1364.26 and 6336.04 million euro.

Analysis of the correlation between the volume of export and net investments

To highlight the influence of the intensity of volume of investments on Romanian exports, both expressed in million was used ANOVA methodology by testing the influence of both of net investment on exports within the EU and on exports outside the EU, for a threshold of significance $\alpha = 0.05$. The results obtained are shown in Table 2.

Table 2. Testing the correlation between the volume of export and net investment

Within EU	Multiple R =0.829278	R Square=0.687701		Significance F=0.003008	
	<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
	Intercept=2837.269	0.605731	0.561481	-7964.15	13638.69
	Net investments =1.208335	4.197203	0.003008	0.544458	1.872212
Outside EU	Multiple R=0.838408	R Square=0.702928		Significance F=0.002443	
	<i>Coefficients</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
	Intercept=2837.269	-77.2346	0.97114	-4848.82	4694.35
	Net investments =1.208335	0.553323	0.002443	0.260052	0.846594

Source: own computation using ANOVA methodology

Taking into account that Significance_F = 0.003, which is much smaller than $\alpha = 0,05$, follows that linear regression model describing the relationship between the volume of exports within the EU, and net investment volume is valid (there is a linear correlation between the two variables).

Value of the ratio of correlation (Multiple R = 0.829278) shows that in the period 2003-2012, between the two variables there was a pretty strong correlation, the net investments influencing, in the extent of about 68% (R_Square = 0.687701), the developments in exports within the EU. The econometric model has the form:

$$E_{I_UE27} = 2837.269 + 1.208335 \cdot I_N + \varepsilon \quad (9)$$

Analyzing the values of P_value and the confidence interval of the two coefficients of the regression model, it follows that the constant term (Intercept) is not statistically significant (in the cases analyzed, it represent the intersections with the axis OY), but given the fact that it does not have economic significance, its value does not influence the conclusions of the analysis.

The coefficient whose value is essential is the “net investment”. Given that, for it P_value=0.003008, which is much smaller than $\alpha = 0.05$, it follows that it is statistically significant.

In conclusion, with a probability of 95%, we can consider that an increase of one monetary unit, in net investment increases exports within the EU with a value between 0.544458 and 1.872212 monetary units.

As for the results obtained regarding the correlation between the volume of exports outside the EU and the volume of net investments (Table 3), taking into account that Significance_F = 0.002443, which is much smaller than $\alpha = 0.05$, follows that linear regression model is valid, being of the form:

$$E_{E_UE27} = -77.2346 + 0.553323 \cdot I_N + \varepsilon \quad (10)$$

Value of the ratio of correlation (Multiple R = 0.838408) shows that in the period 2003-2012, between the two variables there was a strong correlation, the net investments influencing, in the extent of about 70% (R_Square = 0.702928), the developments in exports outside the EU.

As with the analysis of the dependence of net investment and exports within the EU, and in the case of exports outside the EU, free term (Intercept) is not statistically significant, but given the fact that it does not has economic significance, its value does not influence the conclusions of the analysis.

The coefficient “net investment” shapes their influence on the volume of exports outside the EU. Since for it P-value = 0.002443, which is much smaller than $\alpha = 0,05$, it follows that it is statistically significant. Under these conditions, with a probability of 95%, it may be considered

that an increase of one monetary unit, in net investment causes an increase with a value between 0.260052 and 0.846594 monetary units in exports within the EU.

Directions for Action

For the forecast of the employment rate influence on the volume of exports within and outside the EU, the models (7) and (8) have been used. The evolutions obtained, in the light of the confidence intervals corresponding to the probability of 95%, are shown in Table 3.

Of course, the employment increasing rate affects output and, to the extent that commercial activity on foreign markets is a beneficial one, it affects the exports. This is emphasized by the results obtained for an increase in the employment rate by 1 percentage point (from 59.5% to 60.5%) and by 2.5 percentage points (from 59.5% to 62%). The 59.5% value represents total employment rate recorded in 2012 in Romania.

If there are not significant changes in the various factors that were not considered in the correlation analysis presented above, then, one percentage point increase in employment would bring an increase of the volume of exports in the EU between 2.794 billion and 13.990 billion euro and between 1.364 billion and 6.336 billion euro for exports outside the EU.

Table 3. Probable values of the growth in export volume due to increasing total employment rate of the Romanian population in 15-64 age groups

The Increasing in the employment rate	E _{I_UE27}			E _{E_UE27}		
	Probably	Min	Max	Probably	Min	Max
From 59.5% to 60.5%	8392.5	2794.8	13990.2	3850.1	1364.2	6336.1
From 59.5% to 62%	20981.3	6987.1	34975.6	9625.3	3410.6	15840.1

Source: own computation using models (7) and (8)

On the other hand, given that one of the objectives of the EU is reaching in 2020 an employment rate of 70% (unlikely to be reached in Romania), assuming that employment rate would increase in time at 62%, the increase in export volume could be of between 6.98 billion and 34.9756 billion euro, in case of exports within the EU and between 3.41 billion and 15.84 billion for exports outside the EU.

In total, the increase of employment rate from 59.5%, in 2012, to 62% would bring an increase of the volume of exports between 10.3977 billion euro and 50.8157 billion euro, the most probable growth hovering around the 30.6067 billion euro.

For the forecast the influences on the net investment volume of exports within and outside the EU models (9) and (10) have been used. The evolutions obtained in the light of the relevant probability confidence intervals of 95%, are shown in Table 4.

As it can be seen, the increase net investments by 5% compared to 2012 could lead to an increase in the volume of the exports within the EU with values between 543.6 million and 1.8694 billion euro, and outside the EU, with values between 259.6 million and 845.3 million euro.

Table 4. Probable values of the growth in export volume due to increasing net investment (millions euro)

The increase in net investment compared to 2012 (%)	E _{I_UE27}			E _{E_UE27}		
	Probably	Min	Max	Probably	Min	Max
5 %	1206.543	543.6504	1869.4	552.5022	259.6663	845.3382
10 %	2413.085	1087.301	3738.9	1105.004	519.3325	1690.676

Source: own computation using models (9) and (10)

In total, Romanian exports could increase with values between 803.3 million and 2.7147 billion euro, the most likely being 1.759 billion euro, for a net investment increase by 5%, and between 1.606 and 5.429 billion euro, for a net investment increase by 10%, compared to the level registered in 2012, in this case most likely volume of Romanian exports growth would be about 3.518 billion euros.

Conclusions

The period before the economic crisis is characterized by significant increases in imports and exports. Since the growth rate of imports was higher exports, the trade deficit increased continuously.

The economic crisis has led to significant reductions in the intensity of trade flows. Due to more accentuated reduction of imports than exports, the trade deficit declined. This reduction is a result of inactivity, but not of positive economic performance.

The period after 2009 has brought a reconsideration of economic policies, including the international trade of Romania, whose consequence was a further reduction of the trade deficit through increased exports flow.

On the other hand, following the analysis of developments in exports, of employment rates and of net investments in the period 2003-2012 resulted that export volumes are positively affected both by employment rate and the net investments made in this period. Therefore their growth may lead to increases exports both within and outside the EU.

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