

## **Exchange rate volatility effects on export competitiveness. Romanian Case**

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**Abstract.** *In this paper we determine and analyze the impact of the exchange rate variation over the international trade of Romania. We highlighted the sense of the relationship between exchange rate and exports or imports, but the intensity between the variables and the lags that characterize the interdependency between them. In the context of actual great imbalances in the global economy and other risks (financial, political or social) that drive to the decrease in aggregate demand on global level, we consider that external competitiveness became one of the key variable for the economic growth in Romania like an integrated process in the European economy.*

**Keywords:** exchange rate; import; export; competitiveness; volatility.

**JEL Classification:** C5, F31, F40, F41, F43.

**REL Classification:** 8H, 8N.

## 1. Introduction

Currency and its evolution in relation with other currencies are important for both: *internal stability* of the national economy (employment and NAIRU, price stability, domestic money demand and supply, interest rate) and *external stability* (in terms of sustainable current account deficit). Furthermore, inflation and nominal exchange rate are interdependent elements which reflect the evolution of a balanced and sustainable national economy.

As a result of the subject complexity regarding the currency fluctuations (like a consequence of the national economy evolution), in this article we analyze the impact of exchange rate volatility on external trade and, in particular, on the categories of goods exported. Export is an important component in terms of economic stability in Romania and for the national economic recovery. Exchange rate volatility is the result of internal economic dynamics and economic policy measures adopted and also of the economic developments in international markets. The impact of the global developments on the national currency is justified by the size of the Romanian economy and its high degree of openness. Thus, we aimed to determine and analyze the correlation between exchange rate and the evolution of interstate trade.

We structure this paper in four parts, starting with the theoretical background offered by the literature and the evolution of the main macroeconomic indicators relevant for the topic investigated, than we applied some quantitative methods to data series for Romanian economy to determine the correlation between selected variables (exchange rate, inflation, export, import) and highlighting the results and their interpretation. Finally we draw the conclusions of the study.

## 2. Theoretical background

In the literature the subject is intense debated from the 1980s and when the international trade became more intensified. Furthermore, since 2000s the issue of exchange rate undervaluation or overvaluation is discussed in relation with economic growth, current account balance, internal consumption and exports of goods.

The studies reveal a variety of results. Razin, Collins (1999) have found that an overvaluation can hinder economic growth, and the same results was obtained by Rajan and Subramanian (2009), or Gala (2008). Other studies, have found that growth could be boosted by an undervaluation of the national currency (Berg, Miao, 2010).

The relationship between exchange rate and exports was analyzed by a numerous authors and, in particular, was analyzed the effect of the devaluation of exchange rate over the exports. Fang et al. (2006) have studied the effect over the exports of

the exchange rate depreciation for a group of economies from Asia (Malaysia, Thailand, Indonesia, Japan, Philippines, Singapore, Republic of Korea and Chinese Taipei) and they found that the effect is weak and it varies across countries.

Otherwise, Wang and Ji (2006) concluded on the China international trade (during 1986-2003) that the Chinese Yuan didn't have any influence over the exports or imports.

Some interesting results have been obtained for the Turkish lira and the influence of this currency over the imports and exports of Turkey. First of all, Aydin and al. (2004) have studied the situation from 1987 and 2003 and their conclusion was that the exchange rate doesn't have any influence over export, but it influences the imports. Secondly, Binatli and Sohrabji (2009) analyze the period 1999-2008 and have found that a depreciation of the Turkish lira has a negative effect on imports and exports.

Bernard and Jensen (2004) have focused on the economy of US for the period 1987-1992 and they have found that the variability of exchange rate was an important determinant of export increases.

Lemmers and Vancauteran (2009) analyze the Dutch economy and they had found over the period 1978-2007 that the Euro variation with 10% (in terms of depreciation) over the US dollar reduces the Dutch exports with 1.8%, but doesn't have any notable effect over imports. Also, they have focused over the effects of exchange rate on re-exports and exports of Dutch products for the period 1996 and 2007. If there is an acceleration of the depreciation of the dollar in the precedent quarter, which has a negative effect over the volume of the re-exports in the next quarter (a depreciation of dollar by 10% drive to a decrease by 2.9%).

For the Romanian case, Ghiba (2010) analyze the relation between exchange rate and international trade (period 2005-2010, monthly data series) and shows that the depreciation of Romanian leu has a small effect of the exports increase and the relation with imports is extremely weak.

Our study is concentrated over the period 2006-2011 for data series with monthly frequency. We chose the 2006 year because in this year was the full liberalization of capital account and the capital flows have increased volatility on the Romanian market from that moment. We estimate the elasticity of exports and imports at variation of exchange rate, and also we estimate the elasticity of different groups of goods exported by Romania.

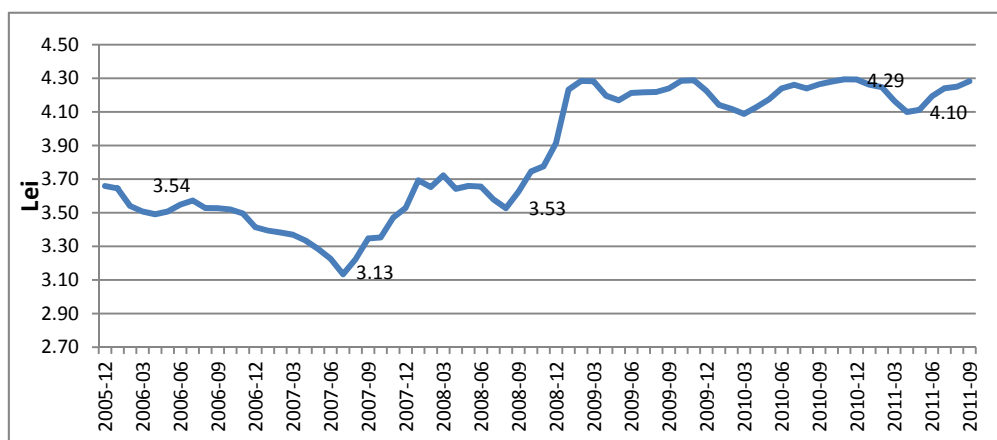
The groups of good exported was defined like the Eurostat database in:

- Raw materials;
- Mineral fuels, lubricants and related materials;
- Food, drinks and tobacco;

- Chemicals and related products;
- Other manufactured goods;
- Machinery and transport equipment.

In the following paragraphs are presented the evolutions in the period 2006-2011 of the exchange rate and of the other factors that, in our opinion, have a big influence over the Romanian exports and the external competitiveness of them. Obvious, just a depreciation of national currency can't make the exported goods most demanded to foreign markets. Some internal and external factors influence the demand from international partners and we focused over imports of main trade partners, industrial production, foreign direct investments, intermediate imported goods and used for export goods and fiscal incentives.

In the analyzed period the trend of exchange rate was descending between 2006 and 2007 and after the last quarter of 2007 the national currency started to depreciate and reaching a maximum average level of about 4.3 lei for one Euro. How the next figure shows, in the last two years the national currency was found in a band of variation of 4.1 and 4.3 lei for one Euro.

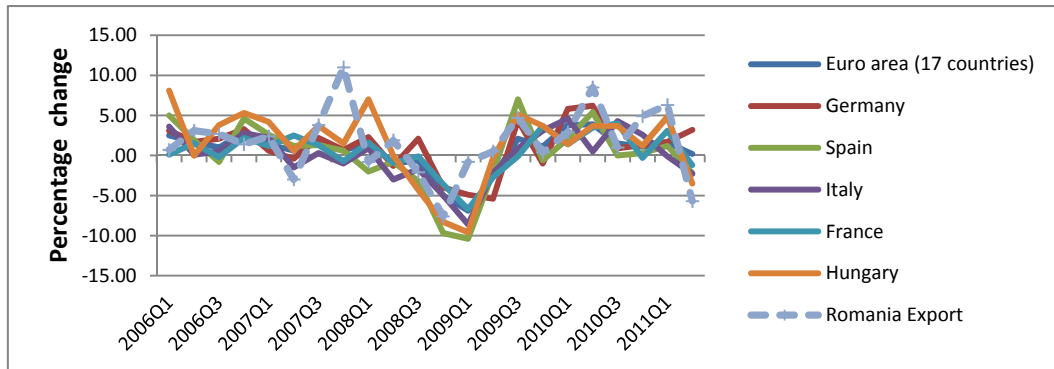


Source: BNR.

**Figure 1.** Evolution of exchange rate (2006-2011, average monthly data series)

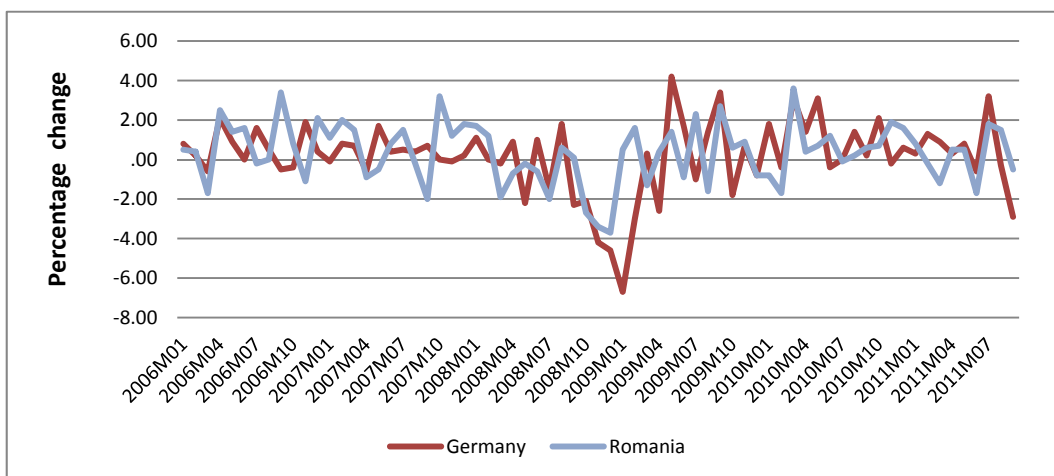
Figure 2 shows the evolution of Romanian exports and the imports evolution from the main trade partners (Germany, Italy, France, etc.). A very big part of Romanian exports is with countries from the Euro Zone and European Union and we can see that is a positive relationship between external demand from these countries and the Romanian exports. Also, Germany is first commercial partner Romania (with a share of 18.5% in total exports in 2011) and the evolutions from Germany have a strong influence over Romanian exports. Figure 3 shows a similar evolution of

industrial production in these two countries and that an increase in Germany will lead to an increase in industrial production from Romania.



Source: Eurostat.

**Figure 2.** Evolution of external demand (imports) for the core trade partners and the exports of Romania (quarter-to-quarter)



Source: Eurostat.

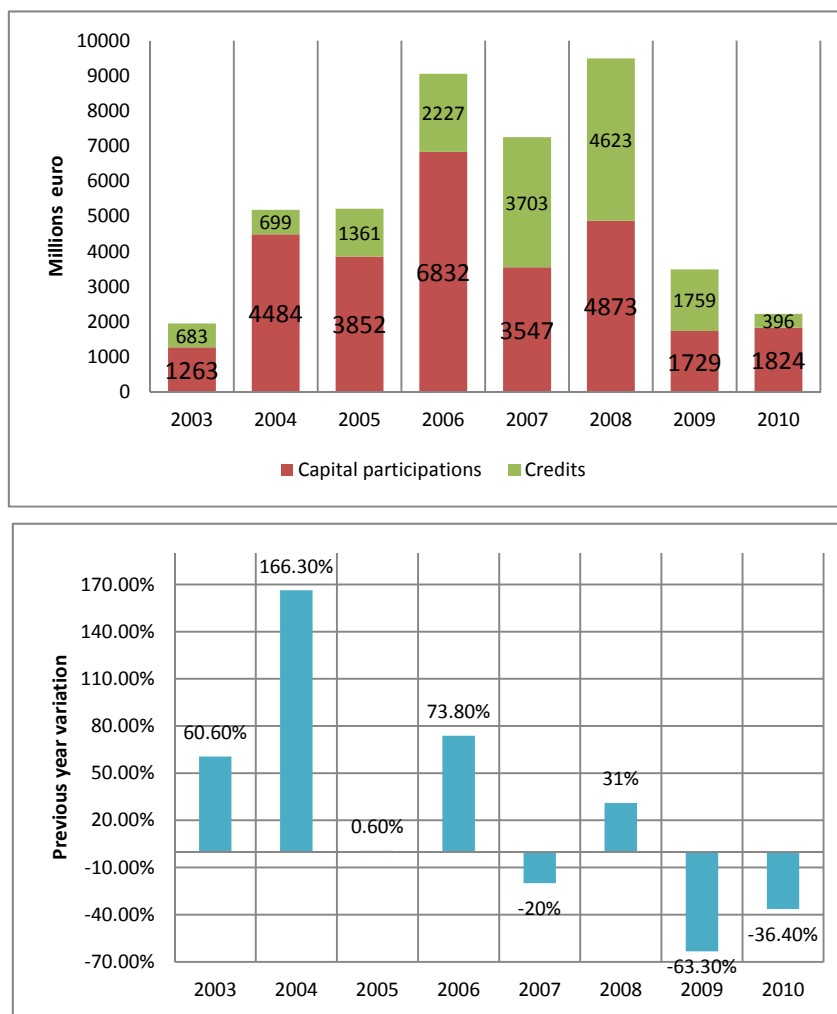
**Figure 3.** Evolution of industrial production in Romania and Germany (month-to-month)

In Figure 4 is presented the evolution of FDI inflows in Romania. Inflows reached a maximum in 2006 and 2008, about 9 billion Euro. After year 2008, the FDI have collapsed in 2009 (decrease of 63.3% from previous year) and in 2010 (decrease of 36.4% from 2009).

Literature considers FDI an essential factor for catching-up process between developed and developing countries and a pillar for economic competitiveness. In

terms of Romanian economic sectors, (according National Bank of Romania – Report about FDI inflows for 2010), the FDI were mainly located in manufacturing sector (32% from total). In this sector the best industries are oil processing, chemical products, rubber and plastic materials (6.9% from total) metallurgy (5.3%), transport equipment (4.9%) and foods, drinks and tobacco (3.9%).

Other significant activities are financial intermediation and insurance (representing 19.1% of total FDI), retail and wholesale trade (12.4%), construction and real estate (9%), information and communications technology (5.9%).



Source: BNR.

Figure 4. Evolution of FDI inflows

The next important factor is represented by the fiscal incentives that could have a direct impact over exports, or an indirect impact if are for stimulate the production

of goods that could be exported. In this last case, an decisive role may be owned by Eximbank (the state bank for export) that could help Romanian firms in obtain funds for increasing them external competitiveness. Also, beside the internal influences, could be external influence on the exports due to “economic programs” that have place in some countries. An example for that situation are the incentive programs for auto industry from Germany in 2009, that have boosted exports of the countries from Central and Est Europe, like Romania, Czech Republic and Poland, that counted an increase of car exports.

The last analyzed element is represented by the intermediate imported goods. These goods are used then for the production of final goods (for internal demand or for external markets). The next table shows that the share of intermediate goods is the highest in the all imported goods (both 2008 and 2009) and could explain that these goods are very important for future exports.

**Table 1.** Imports on production stages

	2008 (millions euro)	2009 (millions euro)	Structure (%)	
			2008	2009
TOTAL	52834	35955	100.0	100.0
Raw materials	7269	3953	13.8	11.0
Intermediate goods	24511	18345	46.4	51.0
Capital goods	12646	6619	23.9	18.4
Consumer goods	8408	7038	15.9	19.6

Source: INS, BNR.

### 3. Empirical analysis for Romania

The first dependence we decided to study is the one between the exogenous variable exchange rate and the dependent variable IPC (Table 2) using a time series data for the period 2006-2011(monthly series). After we removed the seasonal factors that could disrupt the normal evolution we could establish the dependency ratio that exists between the two variables. The simple regression showed us there is a strong dependency relationship for our country. We can see from the model there is a very low probability the exchange rate variable coefficient to be zero.

Result also shows when exchange rate increases by one unit the rate of inflations moves in the same way indicating a direct dependency. It is very important to understand that the relationship of dependency does not imply a causal relationship between variables. A causal relationship means exchange rate depreciation causes inflation increases and can be demonstrated by Granger Test.

**Table 2.** *The relation CPI – exchange rate*

Dependent Variable: IPC\_SA  
 Method: Least Squares  
 Date: 11/10/11 Time: 09:42  
 Sample (adjusted): 2006M02 2011M02  
 Included observations: 61 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CURS_SA1	1.500294	0.796391	1.883866	0.0545
C	100.4947	0.057115	1759.505	0.0000
R-squared	0.056739	Mean dependent var		100.5095
Adjusted R-squared	0.040751	S.D. dependent var		0.451119
S.E. of regression	0.441831	Akaike info criterion		1.236460
Sum squared resid	11.51768	Schwarz criterion		1.305669
Log likelihood	-35.71203	Hannan-Quinn criter.		1.263584
F-statistic	3.548951	Durbin-Watson stat		1.898344
Prob(F-statistic)	0.004514			

**Source:** Results obtained with Eviews 5 program.

Further we focus on the export response to exchange rate fluctuations (Table 3) and for this we decided to perform a regression for these variables. This indicates that depreciation of the Romanian currency will have a positive effect on exports and will register an increase. There is a very low probability for the exchange rate coefficient to be zero, Durbin-Watson coefficient is about 2.24 placing them in a frame interval proving very weak autocorrelation of errors. R-squared test result is not significantly closer to economic reality but it must be said the importance of this indicator for unifactorial linear models is very low.

**Table 3.** *Relation exports – exchange rate*

Dependent Variable: EXPORTURI\_SA1  
 Method: Least Squares  
 Date: 11/10/11 Time: 09:52  
 Sample (adjusted): 2006M02 2011M02  
 Included observations: 61 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CURS_SA1	651.9715	429.1610	1.519177	0.0341
C	34.22076	30.77842	1.111843	0.0707
R-squared	0.037644	Mean dependent var		27.77907
Adjusted R-squared	0.021333	S.D. dependent var		240.6760
S.E. of regression	238.0950	Akaike info criterion		13.81545
Sum squared resid	3344664.	Schwarz criterion		13.88466
Log likelihood	-419.3713	Hannan-Quinn criter.		13.84258
F-statistic	2.307899	Durbin-Watson stat		2.242139

**Source:** Results obtained with Eviews 5 program.



The results from the simple regression of imports and exchange rate (Table 4) indicates an indirect relationship between the two variables analyzed, in other words we can say that an increase in exchange rate can be translated as a currency depreciation leading to a decrease in imports. Indirect relationship can be observed through the exchange rate coefficient value (-241.30).

**Table 4.** *Relation imports – exchange rate*

Dependent Variable: IMPORTURI\_SA  
Method: Least Squares  
Date: 11/10/11 Time: 10:00  
Sample (adjusted): 2006M02 2011M02  
Included observations: 61 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CURS_SA1	-241.3084	997.2541	-0.241973	0.0096
C	3582.977	71.52073	50.09704	0.0000
R-squared	0.180009	Mean dependent var		3585.361
Adjusted R-squared	0.165941	S.D. dependent var		548.9106
S.E. of regression	553.2684	Akaike info criterion		15.50180
Sum squared resid	18060247	Schwarz criterion		15.57101
Log likelihood	-470.8049	Hannan-Quinn criter.		15.52892
F-statistic	0.058551	Durbin-Watson stat		2.235341
Prob(F-statistic)	0.009640			

**Source:** Results obtained with Eviews 5 program.

Another thing we focus is the disaggregated export effect by development status of the trading partners and by type of sector involved in trade. Given the rise of some developing countries in world trade and the change in the composition of world trade during the last decades it is important to understand how export responses to shocks may vary by trading partners and by sectors to explain aggregate responses. Moreover this exercise informs the existing debate on the substitution elasticity between domestic and foreign goods.

The values of the correlation coefficient (about 0.367, respectively 0.3360) are supporting the idea that relationship between trade and exchange rate is relatively low and there are other factors that influences commercial process.

We also made a multi-factorial regression between exchange rate and export and we decided to analyze how the exchange rate influences the volume of exports from a gap. That means exports will experience a delay after a longer period of time. The exchange rate at a gap of four lags shows that the national currency depreciation has an effect in order to increase exports only after four months (Table 5). Another exogenous variable is EXPORT\_SA1 and here we can discuss

about “the effect of reputation” that means that a growth of exports in the past generates increasing exports in the present.

**Table 5.** *Dependence from the past exports*

Dependent Variable: EXPORT\_SA  
 Method: Least Squares  
 Date: 04/14/11 Time: 22:45  
 Sample (adjusted): 2006M05 2011M02  
 Included observations: 58 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXPORT_SA1	0.824967	0.079206	10.41544	0.0000
CURS_SA4	-154.3347	95.27132	-1.619949	0.1110
C	-92.19979	331.8779	-0.277812	0.0822
R-squared	0.736369	Mean dependent var		2670.151
Adjusted R-squared	0.726783	S.D. dependent var		462.7236
S.E. of regression	241.8666	Akaike info criterion		13.86499
Sum squared resid	3217469.	Schwarz criterion		13.97156
Log likelihood	-399.0846	F-statistic		76.81254
Durbin-Watson stat	2.553411	Prob(F-statistic)		0.000000

**Source:** Results obtained with Eviews 5 program.

In the last part of the analysis we tested the relationship between different groups of the exported goods and in the next table we synthesized the obtained results. The coefficient of elasticity is 0.87 and indicates a strong dependence between the two variables. It must be said that the influence of exchange rate on exports of foods occurs later (there are four lags) so we can conclude a currency depreciation will not affect the export immediately. This evolution explains the existence of two parts previous contracts, these contracts are not depending on the evolution on the currency. The export of foods are influenced by the previous month export with creates “the effect of reputation”. An increase in export in the past generates an increase in the current export. Also, for transport equipment group we have a strong dependence effect of the past exports.

The relationship between exchange rate and export of fuels, capital goods and chemicals is weaker than the relationship between exchange rate and export of foods. Durbin Watson coefficient shows a lack of autocorrelation errors while F-statistics results indicate a representative model. The value of the coefficient over 0.6 in all these cases supports the accuracy of the model.

The result of these regressions shows a higher dependence between exchange rate and export of foods compared to the relationship established between exchange rate and the rest of goods.

It must be said that the model captures only a small part of the reality because are missing important exogenous variables and qualitative variables (dummy variables), that's way the veracity of the model is partial affected.

**Table 6.** Relationship between groups of exported goods and exchange rate

Dependent variable	Independent variable	Elasticity coefficient	Interpretation
Food	Food (-1) Exchange rate (-4)	0.873329	An increase with a unit of the exchange rate, food exports increase with 0.87 monetary units (m.u.)
Transport equipment	Transport equipment (-1) Exchange rate (-4)	0.174387	An increase with a unit of the exchange rate, transport equipment exports increase with 0.17 m.u.
Fuels	Fuels (-1) Exchange rate (-4)	0.028525	An increase with a unit of the exchange rate, fuels exports increase with 0.02 m.u.
Capital goods	Capital goods (-1) Exchange rate (-4)	0.228317	An increase with a unit of the exchange rate, capital goods exports increase with 0.22 m.u.
Chemicals	Chemicals(-1) Exchange rate (-4)	0.147351	An increase with a unit of the exchange rate, food exports increase with 0.14 m.u.

**Source:** Results obtained with Eviews 5 program.

#### 4. Conclusions

The exchange rate fluctuations have a significant impact on various key variables and on them evolutions. Qualitative analysis and quantitative dependencies show that there is a close dependence relationship between exchange rate and CPI in the case of Romanian economy. Also, it reveals that is a direct relationship between exchange rate and export and an indirect relationship between exchange rate and imports. It is interesting to emphasize firstly the intensity of the relationship between variables and lags with which these interdependencies are manifested, and secondly, the sense of the relationship that is in line with the economic theory.

The results of these regressions performed on data series for the Romanian economy indicates a much higher dependence between exchange rate and export of food compared with the relationship that is established between the exchange rate and the rest of exported goods (transport equipment, fuels, capital goods and chemicals). It should also be noted that in Romania a large proportion of inputs for exported goods are imported, a fact that leading to decrease the overall effect of the exchange rate on exports.

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