

An Empirical Assessment on the Relations Between the Euro Exchange Rate, Trade Balance and the Consumer Price Index: Case of Albania

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Abstract

As economic theory postulates, there are some relationships between currency exchange rates, Consumer Price Index and External Trade Balance. Normally, as exchange rates for the national currency go up, imports are supposed to go up as well, whereas exports are expected to go down. The opposite happens with a devaluing national currency. Additionally, Consumer Price Index is expected to go up with more expensive euros or dollars against ALL. More imports, particularly imports with higher prices, mean higher consumer prices, in a country relying heavily on imports. We undertake this study to empirically and statistically estimate these relationships, as far as there are no models used from Albanian institutions that deal with macroeconomic issues or forecasts. If these estimates confirm theory, this may mean that the economic principles, free and fair competition in particular, are working properly in Albania. In addition, we attempt to know how strong is correlation between these variables. Further on, we try to make short term forecasts for the exchange rates of euro. The indicators used in our model are predicting the trends and relations among exchange rate, CPI and trade balance, although the data series are limited.

1. Problem

The economic theory tells us that the exchange rate between the national currency and exports or imports, therefore the trade balance, has a connection: the depreciation of the national currency (ALL) versus foreign currencies (ex. Euro (EUR) as the main foreign currency in the Albanian economy), and this evaluation, makes the imported goods to rise in the domestic market price so it is expected an increase of the Consumer Price Index, CPI) and exported goods are sold cheaper in foreign markets. This promotes exports at a time when the goods are exported to overseas market competitive by improving the country's trade balance. On the other hand if the national currency is overvalued, the effect is the opposite. Thus, the exchange rate becomes effective regulatory mechanism in international trade competition between different countries. This is more pronounced among countries with a relatively important position in international trade (let us remember the impact of the fluctuation of currency exchange rate between the Chinese economy and that of the U.S. in trade balance between the two countries. Obviously this strong connection is expected to occur at a time when competition is perfect and variables are measured without any error (this usually expresses the trade volume and exchange rate that exists in the market). On the other hand, in terms of low weight still Albanian exports the weak competition in international market fluctuations in exchange rates between our currency and EUR ALLs will affect not with the same intensity the fluctuation in consumer prices and the trade balance of the country. Therefore, the above mentioned economic theory also explains that between CPI, Exchange Rate and Trade Balance should be a positive dependency, if the euro becomes more expensive, in an economy where imports of consumer goods are important, goods and services are expected to become more expensive, so the CPI will increase. Moreover, the trade

balance in favor of imports deepened, especially for consumer goods is expected to increase in the CPI, hence inflation. In this case we can speak of a kind of "import" of inflation, especially when the prices of these goods out grow. In this way the growth of imports may not only be due to increased physical volume of imports but also of their value due to higher prices of imports.

But these reports have not been tested or evaluated for the Albanian economy, so here is a related problem of not recognising these effects on economy.

2. Objectives

In this research we have the following objectives:

- i. Empirical assessment of the impact of the euro exchange rate on the level of the INDEX Consumer Price Index (CPI)
- ii. Empirical assessment of the impact on the trade balance level INDEX Consumer Price Index (CPI)
- iii. Empirical assessment of the impact of the euro exchange rate on the trade balance level
- iv. Build one or several alternative models for short-term prognosis exchange rate and CPI

3. Methodology and data

The methodology we used in this research is the statistical and econometric modeling, mainly:

- a. Regression models multisectorial
- b. Hammering double exponential constant (mainly Holt-Winter)
- c. ARIMA models

The data we have received from the site of the Bank of Albania. They are time series with monthly terms, starting from 2007 until the end of 2011. Before 2007 there is no data for the three variables simultaneously, so we are limited in the time period where no data for the three variables.

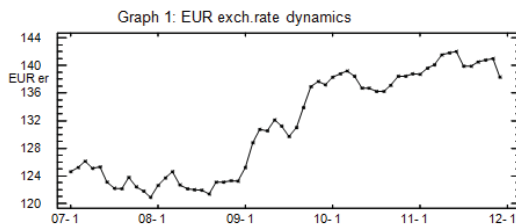
Variables for which we have data received three, as mentioned in the above discussion of the problem:

- Exchange rate of the euro expressed in lek lek for one euro, February Course
- The trade balance in euros, expressed as the difference between exports with imports, February Balance
- Consumer Price Index, expressed in%, February CPI.

4. The research results

4.1 Trends and Indicators

The data show that the exchange rate (the euro) has a positive dynamics, as shown in Chart 1 below:

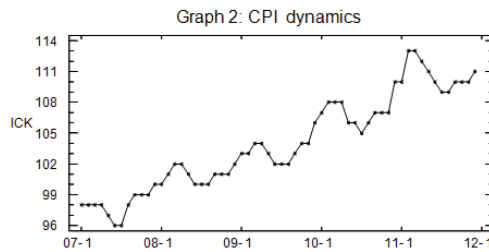


But the course dynamics is characterized by seasonal light shaking. Below we present quarterly seasonal indices of course, where the positive effects appear in the second season and the third:

Table 1: Seasonal Indices of the Exchange Rate EUR

Tremujori	1	2	3	4
Index	100,109	100,247	100,016	99,6271

A similar dynamics is also presented in CPI (Graphic 2):

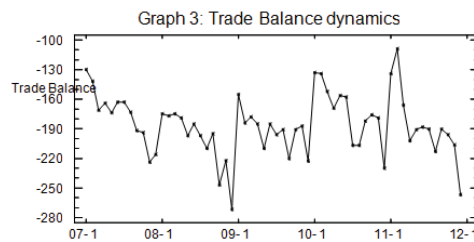


The CPI dynamics has seasonal indexes:

Table 2: Seasonal Indexes of CPI

Quarter	1	2	3	4
Index	100,061	99,9673	99,7768	100,195

As the dynamics of the trade balance is as follows:



4.2 Empirical Dependence

When viewed alone, it appears that the trade balance does not depend significantly on the exchange rate:

Table 3: Balance's dependency from the exchange rate

Variable	Coefficient	Standard Error	t	Prob.
C	-255.7995	69.07561	-3.703180	0.0005
RATE	3.329549	3.113914	1.069249	0.2895
RATE(-1)	-2.811532	3.115805	-0.902345	0.3707
R	0.033792	Avg. Var. Corr		-187.0678
Ajusted Ri	-0.000716	St. Err. Var. Corr		29.82874
Regress SE	29.83942	Akaike chrteria		9.679047
SHCM	49861.88	Shvarc chrteria		9.784684
Log likelihood	-282.5319	Stat. F		0.979260
Stat. d	1.223021	Prob(Stat. F)		0.381927

We identify the balance does not depend on the exchange rate significantly, although note that the growth rate has a tendency to balance grow!

Table 4: CPI dependence of foreign exchange and / or trade balance

Variable	Coefficient	Standard Error.	t	Prob.
C	29.64717	4.443233	6.672432	0.0000
RATE	0.566246	0.033784	16.76061	0.0000
R	0.828867	Mes. Var. Varur		104.0000

Ajusted Ri	0.825917	Gab.St. Var. Varur	4.650497
Regress SE	1.940341	Akaike chriteria	4.196370
SHKM	218.3656	Shwarc chriteria	4.266181
Log likelihood	-123.8911	Stat. F	280.9179
Stat. d	0.280060	Prob(Stat. F)	0.000000

CPI statistically depends on the exchange rate, the rate increased by 1 ALL CPI is expected to rise by 0.55%, but the error term is autokorrelacion first order of important. (See table below):

Table 5: Correlations for the error term

Autocorrelation	Parcial Correlation		AC	PAC	Stat-Q	Prob
. *****	. *****	1	0.828	0.828	43.195	0.000
. *****	. .	2	0.675	-0.031	72.450	0.000
. ****	. *.	3	0.513	-0.119	89.638	0.000
. ***	. *.	4	0.365	-0.065	98.492	0.000
. **	. *.	5	0.213	-0.118	101.55	0.000
. *	. .	6	0.104	0.016	102.30	0.000

CPI depends on the course without delay, about the same as from the course with a delay, but the course is too late kolinear with a course without delay and need not be kept in the model.

To eliminate the effect of the first order autocorrelation in the series back and CPI Course in stationary chain through differentiation, after which we assess:

Table 6: Dependence chain CPI differences on exchange rate difference

Variable corr: D(IÇK)				
Variable	Coefficient	Standard Error	t	Prob.
C	0.169136	0.123568	1.368769	0.1764
D(RATE)	0.220509	0.097069	2.271669	0.0269
R	0.083019	Avg. Var. Corr		0.220339
Ajusted Ri	0.066931	St. Err.Var. Corr		0.966112
Regress SE	0.933220	Akaik Criteria		2.732960
SHKM	49.64133	Shwarc Criteria		2.803385
Log likelihood	-78.62232	Hannan-Quinn Criteria		2.760451
Stat. F	5.160482	Stat. d		1.719545
Prob(Stat. F)	0.026899			

We notice that the difference in the exchange rate affects significantly increase in the difference of the CPI increase.

Table 7: Dependence of the rate of CPI, as well as a dynamic exchange with delay

Variabli corr: IÇK				
Variable	Coefficient	Standard Error	t	Prob.
C	30.14623	4.511657	6.681853	0.0000
Rate	0.478304	0.203385	2.351722	0.0222
Rate(-1)	0.084578	0.203508	0.415601	0.6793
R	0.828374	Avg. Var. Corr		104.1017
Ajusted Ri	0.822244	St. Err.Var. Corr		4.622639
Regres SE	1.948954	Akaik Criteria		4.221972
SHKM	212.7117	Shwarc Criteria		4.327610
Log likelihood	-121.5482	Stat. F		135.1453
Stat. d	0.270781	Prob(Stat. F)		0.000000

Finally, we note that in our country the exchange rate change is reflected in the change of the CPI, CPI therefore

depends on the course, but since the error term is high autocorrelation coefficient of the first order, the terms may include an AR (1) in the model. In this case there is a major upgrade of the model, because the coefficient of determination ranges from 0.828 to 0.96. This model can be used for prognosis:

Table 8: Model AR(1) for the rate

Variable corr: İÇK				
Variable	Coefficient	Standard Error	t	Prob.
C	76.76177	15.70501	4.887725	0.0000
Rate	0.240204	0.098887	2.429069	0.0184
AR(1)	0.962537	0.041179	23.37438	0.0000
R	0.960530	Avg. Var. Corr		104.1017
Ajusted Ri	0.959120	St. Err.Var. Corr		4.622639
Regres SE	0.934641	Akaike Criteria		2.752201
SHCM	48.91905	Shvarc Criteria		2.857839
Log likelihood	-78.18994	Stat. F		681.3948
Stat. d	1.695406	Prob(Stat. F)		0.000000

Another model, competitive with the first, would be as follows:

Table 9: An alternative autoregression model for the Course

Variabli i varur: KURSI				
Variabli	Coefficient	Standard Error	t	Prob.
C	2.295871	2.971653	0.772590	0.4432
Rate (-1)	1.324907	0.143251	9.248853	0.0000
Rate (-2)	-0.447166	0.230150	-1.942935	0.0573
Rate (-3)	0.105926	0.144472	0.733196	0.4667
R	0.974065	Avg. Var. Corr		131.6246
Ajusted Ri	0.972597	St. Err.Var. Corr		7.539687
Regress SE	1.248103	Akaike Criteria		3.348718
SHCM	82.56135	Shvarc Criteria		3.492090
Log likelihood	-91.43847	Stat. F		663.5301
Stat. d	1.906086	Prob(Stat. F)		0.000000

The exchange rate depends on the *dynamic delay* of up to two, in other words, the exchange is a process AR (2), this model can be used for prognosis of CPI. CPI depends on the course, but to a large extent and also the trade balance (Table 10).

CPI model with two variables supports the analysis by means of indicators Cp (Mallou), as follows. Model with two variables has little Cp with the two models with only one of the variables. The model with the two variables has the highest coefficient of determination adjusted (Table 11).

Table 10: Dependence of the rate of CPI and trade balance

Variable Corr: CPI				
Method: Least Squares				
Variable	Coefficient	Standard Error	t	Prob.
C	26.60175	4.830357	5.507202	0.0000
BALANCE	-0.012515	0.008244	-1.518098	0.1345
RATE	0.571701	0.033603	17.01322	0.0000
R	0.835517	Avg. Var. Corr		104.0000
Ajusted Ri	0.829746	St. Err.Var. Corr		4.650497
Regres SE	1.918880	Akaike Criteria		4.190067
SHCM	209.8797	Shvarc Criteria		4.294784
Log likelihood	-122.7020	Stat. F		144.7707
Stat. d	0.319577	Prob(Stat. F)		0.000000

Table 11: Cpi and the Ajusted Coefficient

Standard Average mistake	Ajusted R ²		Cp	Included variables
	R ²	R ²		
3,6821	83,5517	82,9746	3,0	AB ¹
3,76492	82,8867	82,5917	3,30462	A
21,6271	1,69492	0,0	290,45	B

But this model suffers from autocorrelation in the error term and we will prefer CPI model with only the exchange rate.

5. Prognosis exchange rate

In the short-term prognosis are exercised with exponential flattening method of Holt. This model is compared with a number of other models and statistical indicators (standard error) better than almost everyone else. Only one of them is somewhat smaller (see below) but Holt model takes into account seasonal fluctuations in prognosis, so we preferred this model.

- ✓ Holt model with two constants: 0.9999 and 0.0344, with error 1:23
 - ✓ linear model: rate = -149 552 +0393 * t, with error 3:08
 - ✓ flattening model with a simple exponential constant 0.9999, with error 1223
 - ✓ flattening exponential model with constant linear Brown 0.7878, with error 1295
 - ✓ flattening exponential model with three constant sheshuese Brown 0.868, 0.0001, 0.0517, with error 1361.
- Prognosis for the 12 months of 2012 with the Holt model is as following table:

Table 12: Course prognosis model of Holt

Period	Forecast	Left limit of the prognosis	Right limit of the prognosis
12- 1	139,132	136,820	141,444
12- 2	139,486	136,156	142,816
12- 3	139,326	135,187	143,465
12- 4	138,946	134,105	143,787
12- 5	139,781	134,251	145,310
12- 6	140,136	133,970	146,302
12- 7	139,974	133,221	146,727
12- 8	139,592	132,284	146,899
12- 9	140,430	132,518	148,342
12-10	140,786	132,303	149,268
12-11	140,623	131,608	149,637
12-12	140,237	130,715	149,760

The latest data on the Balance of Payments for 2012 show a net current account deficit of EUR 671,1 million at the end of Third Quarter (Q3). This is estimated as 9,2 % of nominal GDP. Trade balance amounted a deficit of EUR 1,481 million with the main indicators given in the table.

Table 13: Albania's BoP: Trade Balance

	9M 2011	9M 2012
Current Acct (EUR mln)	-769.1	-671.1
Change YOY	-16.30%	-12.80%
CA / GDP	11.10%	9.20%
Trade Balance	-1.583	-1.4814
exp fob	1.045	1.122
imp fob	-2.628	-2.603

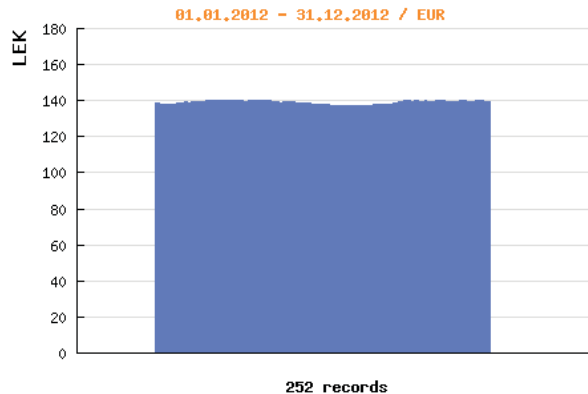
Source: Bank of Albania

¹ A=Rate, B=Balance

The level of economic activity during 2012 was slowed down with its impact at main indicators considered in this study. However the exchange rate was pretty stable with annual CPI level of 2,4 %.

According to the declarations of the Bank of Albania, the inflation rate increased progressively during first three quarters of 2012, and fell at the end of the year.

The exchange rate EUR/ALL was almost at the limits foreseen at the prognosis of the Holt model as shown in the annual data graph:



Source: Bank of Albania

6. Key Conclusions and Recommendations

The indicators used in our model are predicting the trends and relations among exchange rate, CPI and trade balance, although the data series are limited.

Some of the main conclusions drawn from the above analysis are:

- The level of consumer prices in Albania significantly affected by the exchange rate of the euro. This is due to the large share of consumer goods occupy our imports.
- Trade balance, contrary to what is expected on theoretical grounds, fails to significantly influence the way that the exchange rate. This may perhaps because competition in our economy is not yet fully in regional trade and beyond. This would require more in-depth studies to clarify.
- Consumer price level depends to some extent, though not so significant, the trade balance. This can be explained by the fact that our trade balance is very negative, and price changes in the global arena transferred through imports in the level of consumer prices in the country in what is known as imported inflation.

Some of the main recommendations are:

- Monitoring and surveillance of exchange rate can be a tool to keep under control the acceptable level of consumer prices, and maybe should be used especially when fluctuations (humiliating) sensitive to our currency.
- To assess the relative role of the exchange rate on the trade balance, we would recommend a thorough study and evaluation of factors affecting the level of trade balance, as well as an analysis of how competition works in foreign trade.
- Also analysis, could split and take into consideration the main important groups of CPI basket and main contributors on Albania's trade balance. These might give more clarifications and prove stronger linkages on the factors considered in this approach.

References

- Banka e Shqipërisë : Buletini Statistikor, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012
IMF: Exchange Rate Assessments: CGER Methodologies, Occasional paper 261, Washington DC. 2008
M.Osmani: Ekonometri, Tiranë, 2010
M.Osmani: Statistikë, Tiranë, 2011
Monetary policy report of BOA Q4 2012