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# BOSNIA AND HERZEGOVINA MONETARY SYSTEM AND TRADE DEFICIT

# МОНЕТАРНИ СИСТЕМ И ТРГОВИНСКИ ДЕФИЦИТ БОСНЕ И ХЕРЦЕГОВИНЕ

**Summary:** *Currency Board system in BH gained solid confidence of BH public thanks to the relatively low inflation rate in the period since it has been introduced as well as thanks to its resistance to the shock created by current world economy crisis. Still, some economists are very suspicious about its long terms subsistence relating it to the constantly high trade deficit and low unemployment rate in the country. A discussion about satisfaction of Marshal-Lerner-Robinson's requirement for successful devaluation has arisen because the foreign currency exchange rate was one of the measures suggested by this group of economists. Tests conducted in this paper show that this requirement is not satisfied. Consequently, BH should turn to the real economy reforms instead of the measures of abandonment of present monetary system.*

**Key words:** *currency board, low inflation rates, high trade deficit, Marshal-Lerner-Robinson's requirement, structural changes in real economy.*

**JEL classification:** *E52*

**Резиме:** *Монетарни систем Босне и Херцеговине је стекао солидно повјерење јавности одкако је уведен захваљујући релативно ниским стопама инфлације, али и отпорности на шок проузрокован постојећом свјетском економском кризом. Ипак, неки економисти изражавају сумњу у његову дугорочну одрживост образлажући то константно високим стопама трговисног дефицита и високом стопом незапослености у земљи. У земљи се води дискусија о задовољености Маршал-Лернер-Робинсоновог услова зато што је промјена номиналног девизног курса једна од мјера коју заговара ова група економиста. Тестови проведени у овом раду показују да овај услов није задовољен. Посљедично, БиХ се треба окренути реформама у реалном сектору умјесто одбацивања постојећег монетарног система.*

**Кључне ријечи:** *монетарни одбор, стопа инфлације, тговинси дефицит, Маршал-Лернер-Робинсонов услов, структурне реформе.*

**ЈЕЛ класификација:** *E52*

## 1. INTRODUCTION

Recently we were witnesses of management elections in the Central Bank of Bosnia and Herzegovina (CB BH). In broader public, quite little attention has been paid to this event. Still, professional public knew that in the most of the countries elections of the bank president is very important event which has both practical and symbolic meaning, because it represents the way in which this institution (as well as monetary system) should function according to the local authorities. If we suppose to judge according to the conducted appointments, we could come to the conclusion that there will be no significant changes on this matter in the near future. Still, this might be a nice opportunity to start a discussion about benefits and eventual bad sides of the current system (currency board) for the economy of the country.
The most used arguments in this discussion were as mentioned above:

1. Pro Argument: **public confidence** gained thanks to the relatively low inflation rate since the introduction of the current system (tables 1 and 2). Current system served as

some kind of guard protecting monetary and financial system of the country from the previous chaos, typical for all societies in the early stages of the transition process.
It is commonly emphasized that this stability would not exist without the currency board system which, by its simple rules (which are obligated for local monetary authorities) has been reducing the free space for local authorities to influence on the Central Bank. For all these reasons, any change of the current system (for example, changes in the present foreign currency exchange rate keeping the currency board system or changes in system itself with keeping fixed foreign currency rate) would directly jeopardize confidence of the public and open the doors of CB BH for political interferences. Although those economists who share this opinion do not explicitly mention this particular reason, their concerns are primarily based on the lack of public confidence in the responsibility of local authorities.

2. Second important pro argument for maintaining the present system is the fact that ***it has successfully endured the first impact of the world wide economic crisis***.). Although the situation is rather complicated in this matter because of the correlation of financial and monetary system (the growth model of BH has been primarily based on extreme consumption financed by banks owned by foreign firms) and because of the mode in which banks in BH function (loans in foreign countries are more important source of financial resources than local savings), still the ability of CB BH to maintain high level of foreign currency reserves in spite of the crisis and with no changes in foreign currency exchange rate makes quite a success[1]. We must not forget that monetary authorities of much greater and more developed countries (for example Czech Republic, Hungary or Serbia) did not manage to do that.
3. Third argument for keeping the present system is ***incapability of local economy to gain benefits of possible devaluation of local currency***. This argument is the cause for most severe discussions.

We could systematically group the economists arguing for abandonment of currency board system in two groups. First one is represented by those who underestimate the true task of CB and who would prefer that CB BH could occasionally simply print enough money, especially for social needs. No matter how peculiar it may sound, recent events (troubles of the Federation of BH in satisfying IMF requirements in order to provide a new stand-by arrangement) show that there is quite a lot of "economic experts" who share this opinion. Thence some criticisms could be heard that IMF had forced BH to adopt currency board system although in that case CB BH was not being able to print money for paying pensions, disability pensions etc! This group often emphasizes that other countries are able to do so, but Bosnia and Herzegovina is not.

We will not discuss in this paper the facts that CB BH today exists as independent institution whose task in the first place is to maintain purchase price of money as well as that it is not up to it to deal with "short time financial conflagrations". Experience shows that covering the budget deficits by issuing new money creates nothing but inflation and is efficient as "extinguishing a fire by gasoline". We will also not theoretically dissert this phenomenon because it may be found in every good basic economic manual. Even if there are some examples of such behavior in certain countries, we should understand it as really bad behavior not to be followed (we must also leave a possibility that circumstances in that country are significantly different).

Still, there is another one, rather respective group of economic experts who argue for abandonment of currency board system. First of all, they point out potential correlation between present monetary system model and outstanding macroeconomic instabilities of BH

[1]During the FSAP the IMF had conducted the test which was just confirmed in 2008 and 2009 and which showed that BH foreign currency reserves will remain quite stable despite the shock of the world economy crisis.

(trade deficit, unemployment etc). These economists believe in capability of local authorities to initiate economic growth in BH by an interventionist economic (and among others monetary) policy. That "interventionist" monetary policy usually includes "stimulant" inflation rates and devaluation of nominal foreign currency rate. The secondly mentioned measure should help decreasing foreign-trade deficit. Although the firstly mentioned measure could be a matter of discussion, the secondly mentioned one directly conflicts opinion of the adherents of keeping the current monetary system who believe that devaluation should not have any effect (their third argument). The very point of this paper is to make a contribution in solving this particular problem.

## 2. DEFICIT OF FOREIGN TRADE ACCOUNT, MONETARY POLICY AND CONDITION OF THE REAL ECONOMY

Beside the high unemployment rate, high foreign trade deficit is marked in every report on the economical situation in BH as one of the fundamental threats for macroeconomic stability of the country. Flow of this deficit is represented by the table 1:

*Table no. 1 – Flow of BH Foregin trade deficit*

| Year | In millions of KM |
|---|---|
| 1998. | 4.077 |
| 1999. | 4.762 |
| 2000. | 4.402 |
| 2001. | 5.076 |
| 2002. | 5.958 |
| 2003. | 5.996 |
| 2004. | 6.487 |
| 2005. | 7.395 |
| 2006. | 6.224 |
| 2007. | 7.962 |
| 2008. | 9.574 |

Source: Bulletin 2/2009 CBBH / Table no. 34

As we can see, that deficit constantly grows every year and in 2008 it surpassed KM 9.5 billion. Absolutely measured, this is the maximum value until now, since 2009 brought the reduction of this deficit, but only because of very special circumstances[2]. This table is significant for its hermeneutical possibilities. From the point of view of the followers of changing the present monetary system, permanent presence of trade deficit and its growth suggests that current foreign currency exchange rate is not balanced (the 10 year period should be enough time to reach that balance!)[3]; it also suggests that every year we are more distant from the balanced rate of foreign and domestic trade. In few words: according to this group of economists, adjustment of foreign currency exchange rate is required in order to decrease or neutralize this deficit.

[2] Although exact data have not been officially published, on the basis of tendencies during first nine months of 2009 it is clear that the world economy crisis has influenced the decrease of trade deficit during that year.

[3] „Balanced real foreign currency exchange rate establishes BOP equilibrium in long terms. Wrong foreign currency exchange rate policy means that a country should live better than its capacities would allow it (which is possible as long as a country keeps loaning money). Wrong policy also includes a case of long terms trade deficit as well as a case of more spending and less investing than it is possible (if we have a trade sufficit)." – Burda – Willposh, Macroeconomics, ed. CLDS, Belgrade, 2004, p. 162 (Serbian translation).

Followers of keeping the present monetary system emphasize that theoretical explanation (on which the previous conclusion that devaluation is required has been founded) is drawn from the experience of the developed countries of West. Economic circumstances in these countries are quite different from those in BH. More precisely, some experts for the economic situation in our country consider that not even the more emphasized devaluation of domestic currency should neutralize foreign account deficit, since the roots of this deficit are in the real economy and not in the monetary issues (we have very similar situation in other countries in transition). Incapacity of monetary measures to regulate this issue has been explained by the argument on the low price elasticity of our export offer and by the low elasticity of foreign demand for our products, as well as by the limited variety and quantity of goods that we are able to offer to global market. That is why the first condition (condition sine qua non) for success of devaluation required by the theoretical rule (so called Marshal – Lerner – Robinson condition), according to which the sum of price elasticity of domestic import demand and price elasticity of foreign import demand must surpass one (1). Beside this one, there is the so called sufficient condition which says that even when the price flexibilities of import and export are high enough, there have to be enough free capacities which could be activated in order to increase export or replace export by domestic products.

### 2.1. Export – import structure: indirect elasticity indicators

Although, according to our information, exact measurement of domestic export and import price elasticity has never taken place, there is general consensus in expert public that we can gain approximate evaluation of these indicators by export/import structure analysis. This attitude is based on empirically proved fact that different groups of products are featured by different rate of price elasticity. Generally, high price elasticity is characteristic for homogenous products and easily substitutable products while low price elasticity is characteristic for differenced products, products which are not easily substitutable, and products necessary for maintenance of economic activities and basic needs of population.
Export structure data are given in the table no. 2[4]:

*Table no. 2 – The most importance export products of BiH*

| Structure of Export by goods | Amount Januar – September 2008. ( in millions of KM) | As percentage distribution (%) in total Export |
|---|---|---|
| Base metals & articles thereof | 1.434 | 27,8 |
| Machine & mechanical appliances | 636 | 12,4 |
| Electric energy | 609 | 11,8 |
| Textile & Footwear | 540 | 10,5 |
| Wood & wood product | 381 | 7,4 |

Source: Bulletin 3/2009 CBBH / Table no. 37

From the data given above it is easy to spot that basic metals (iron, aluminum), machines, electric energy, textile, wood and wood products dominate in the structure of BH export. These five products group together create approximately 70% of general export. Basic metals, electric power and wood (together containing almost 50% of the domestic export) are homogenous products, meaning that these are products with high price elasticity, as well. Relatively low price decrease would create a market for more significant export of these

[4] We have taken data form 2008 since it is the last year in the row (we follow the last decade) in which the adequate data have not been influenced by the world financial crisis.

products form BH. Still, we must here include another factor of limitation – capacities of BH economy. It is impossible to increase electric energy production in the short period, because the present capacities work with high level of exploitation. Natural resources (wood, for example) are limited by the annual growth (of wooden mass) and production of aluminum and steel is limited by present production capacities: these capacities are often based on quite obsolete technology (steel mills, at the first place) which produces at high expenses on the product unit. Slightly better situation is present in the machines and textile production, because there are some still unused capacities. However, we can conclude that monetary measures could not have significant impact on the increase of export because we simply do not have anything to export. Instead, it makes sense that export increase is conditioned by the reforms in the real economy, i.e. investing in new production capacities.

There are similar problems in the import, as well. Import structure data are given in the table:

*Table no. 3 – The most important import products of BiH*

| Structure of Export by goods | Amount January – September 2008. ( in millions of KM) | As percentage distribution (%) in total Import |
|---|---|---|
| Petrol oil & petrol derivates | 2.146 | 17,3 |
| Machine & mechanical appliances | 1.964 | 15,9 |
| Base metals & articles thereof | 1.555 | 12,6 |
| Chemical products | 1.058 | 8,6 |
| Prepared foodstuff | 1.037 | 8,4 |
| Transportation equipment | 999 | 8,1 |
| Animals & Vegetable products | 804 | 6,5 |

Source: Bulletin 3/2009 CBBH / Table no. 38

From the table given above it is obvious that seven groups of products create almost 80% of BH import. Individually, petrol oil and petrol derivates represent the largest item in the BH import: there are no adequate substitutes on our market (we have previously mentioned that possibilities of electric power production increase are at the moment restricted by current capacities). This means that demand elasticity for these products is quite low. Also, for its mountain geographical configuration, not even with the greatest efforts could BH produce sufficient quantities of some agriculture products (grains, for example) so the price elasticity of these products is low as well. As proof of low elasticity of domestic demand for foreign food products we can give the fact that it is only issue of import which had not decreased in 2009[5], although entire import decreased by 26% in average, compared to 2008. Demand for basic metals (types of steel and aluminum which can not be produced by BH and thereby can not be substituted) is conditioned by the level of activity in domestic metallurgy. We can suppose slightly higher level of price elasticity for machines, tools and means of transportation, although there are no adequate substitutes for these products in BH as well (there is no car factory in BH and high-technology production has not reached higher level). For all these reasons, we can draw conclusion very similar to that we have drawn analyzing export: low level of import price elasticity is a consequence of the fact that there is nothing in our production to replace import products.

***All this means that reform of real economy makes the prerequisite for successfully conducted devaluation*** – from this reform a new economy structure of BH would occur

[5] However, it is more about income elasticity than price elasticity that we are talking about here.

which is supposed to be able to make benefits from the devaluation by increasing the export and substituting export products by domestic ones.

If we now look back at the beginning of our analysis, we must add one more prerequisite to those we have previously mentioned: ***there is the necessity of more extensive public confidence in the monetary authorities of the country*** so those rare changes in nominal foreign currency exchange rate would not automatically result in the collapse of public confidence in monetary and financial system of the country. It seams that at this very moment we are quite far from those conditions.

Everything we have remarked until now suggests us that this is not an appropriate moment for devaluation because, even if it would be possible, it would not have effect by reducing the trade deficit, but by disturbing the public confidence in the CB BH and monetary system in general. We will try to examine this conclusion in the rest of this paper. Before we do so, we must remark that previous analysis constitutes almost unsolvable problem for the adherents of economical interventionism. Namely, if the devaluation is the only possible way to help domestic economy, than we are in a vicious circle. Only the implementation of required conditions would make BH a member of developed countries community and it is questionable if the devaluation would be necessary in that case at all. On the other hand, despite being at the low level of development this country has to implement those prerequisites so the devaluation would give certain results.

## 3. EMPIRICAL CONFIRMATION OF THE HYPOTHESIS

Even if our conclusion on inefficiency of devaluation is quite correct, every objective reader may notice that above given analysis is founded almost entirely on theoretical insights without proper mathematical and statistical basis that would support it.

It is well known that economics, as social science can not conduct experiments for the purpose of testing some hypotheses or conclusions. That is why it is forced into verification of its hypothesis through analyses and interpretations of past and present events. In order to check hypothesis on inefficiency of devaluation in BH at this moment, we will undertake such analysis. It will start from the analysis of the influence of foreign currency exchange rate variation on the BH trade deficit in past period. It will be based on the following postulates:

- *Nominal foreign currency exchange rate (BAM – Euro) is de facto fixed, but real foreign currency exchange rate is not since it has been under the influence of the difference in inflations between BH and Euro zone.*
- *Real foreign currency exchange rate (and not the nominal) is the one influencing the trade deficit, under certain conditions (Marshal – Lerner – Robinson's condition and existence of sufficient free capacities)*
- *Purpose of possible devaluation is influence on real foreign currency exchange rate and thus on the trade deficit.*
- *By means of comparison of variations in real foreign currency exchange rate (BAM – Euro) and in the trade deficit of BH for the past period (1998-2008) we can establish whether BH satisfies all requirements for successful devaluation. More precisely, we will calculate correlation and determination coefficients between these two variables. If the values of those coefficients are high, then the trade deficit reacts on the variations in the real foreign currency exchange rate. This means that BH satisfies requirements for successful devaluation. In opposite case, devaluation will not have expected results.*

### 3.1. Variation in real foreign currency exchange rate

Data on the variation of real foreign currency exchange rate have been prepared and presented by the CB BH in its Bulletins (annual reports). The first year in which this annual report was published is 2002. Since for the purposes of our analysis we needed data starting from the year of 1998, we have decided to calculate variation of this value in the simplest way. We start form the notion that variations in real foreign currency exchange rate are effected by domestic and foreign inflation and by the nominal foreign currency exchange rate. These factors are given in the equation:

$$\sigma = P \times S/P^*$$

The values are as follows:

σ – real foreign currency exchange rate; P – price level in the country; P* - price level abroad; S – nominal foreign currency exchange rate.

As auxiliary instrument we will use table 4:

*Table no. 4 – Inflation rate in BiH and Euro Area ( by Ratail Price Index)*

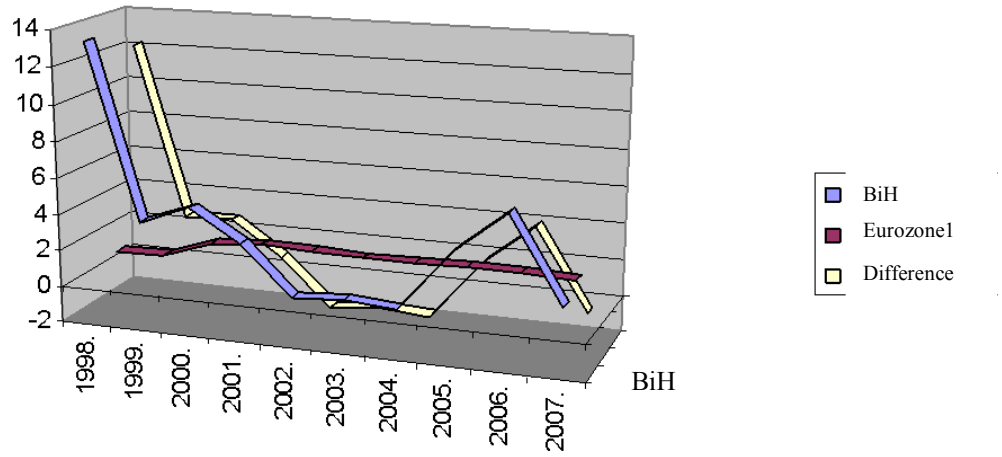
| Year | БиХ | Euro Area[6] | Differences | S | σ (1999=base) |
|---|---|---|---|---|---|
| 1998. | 13,3 | 1,1 | 12,2 | 1.972 | 2.209 |
| 1999. | 3,7 | 1,2 | 2,5 | 1.9558 | 2.004 |
| 2000. | 4,8 | 2,2 | 2,6 | 1.9558 | 2.055 |
| 2001. | 3,1 | 2,4 | 0,7 | 1.9558 | 2.069 |
| 2002. | 0,4 | 2,3 | -1,8 | 1.9558 | 2.0307 |
| 2003. | 0,6 | 2,1 | -1,5 | 1.9558 | 2.0009 |
| 2004. | 0,4 | 2,2 | -1,6 | 1.9558 | 1.9656 |
| 2005. | 3,8 | 2,2 | 1,6 | 1.9558 | 1.9964 |
| 2006. | 6,1 | 2,2 | 3,9 | 1.9558 | 2.0726 |
| 2007. | 1,5 | 2,1 | -0,6 | 1.9558 | 2.060 |
| 2008. | 7,4 | 3,3 | 4,1 | 1.9558 | 2.1422 |
| Cumulatively: | | | 22.1 (22.1%) | | 22.4% |

Source: Builten 3/2010 CbbH, Eurostat

From the table 4 we can see that differences in the inflation for each year are mainly not relatively high (column 3, table 2, graph no. 1). Its values are varying between -2% and + 4 % except in the year of 1998. Variations in real foreign currency exchange rate do not oscillate heavily (graph no. 2).

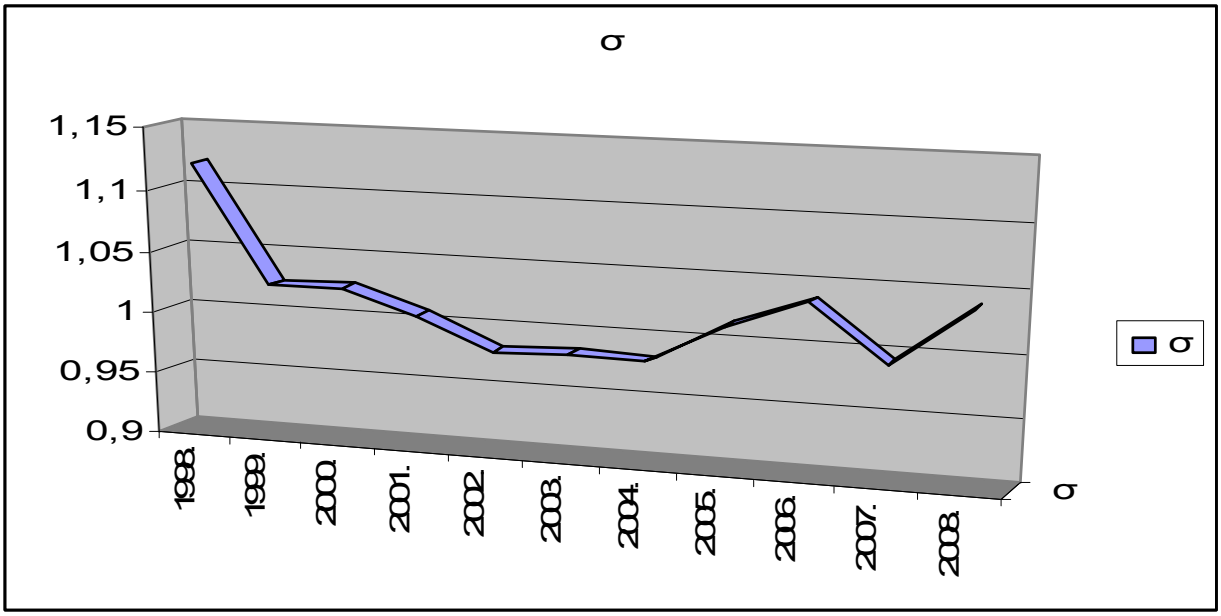
[6] Before Euro was established, KM was paged for DM. That is reason why would be more precise to find deference between rate of inflation in BiH and Germany for that period. It would be even harder task for BiH because inflation rate was even lower in Germany than Euroarea.

*Graph no. 1. – Inflation rate in BiH and Euro Area*




Source: Table no. 4

Graph no. 2 - Flow of Real Exchange Rate




Source: Table no. 4

Cumulatively seen, differences in the inflation for the whole period 1998-2008 equals 24 % - foreign currency exchange rate has appreciated for this value. However, if we exclude 1998 (in this year introduction of BAM was finally concluded), then the real foreign currency exchange rate BAM – Euro appreciated for about 10% in the ten years period. This number shows how much potential competitive capacity of domestic economy decreased in comparison to countries of Euro-area, or, in other words, for this value the correlation between export and import prices has been adjusted.

### 3.2. Correlation in the variations of real foreign currency exchange rate and trade deficit

In order to establish whether there is correlation between the variations of real foreign currency exchange rate and trade deficit, we will conduct certain tests. These tests are different only by the means of calculation, i.e. by the source of data on the variation in real foreign currency exchange rate and trade deficit.

***Test no. 1***

In the first test, we will use variation of real foreign currency exchange rate previously calculated in table 4 and data on the variation of trade deficit published by Statistics Agency of Bosnia and Herzegovina. These data are in some degree different from those published by CBBH.

*Table no. 5 – Flow of Real Exchange Rate and Foregin trade deficit*

| Year | Real Exchange Rate KM/Euro | Foregin trade deficit (in millions of KM) |
|---|---|---|
| 1998. | 2.209 | 5.482 |
| 1999. | 2.004 | 6.052 |
| 2000. | 2.055 | 5.868 |
| 2001. | 2.069 | 6.470 |
| 2002. | 2.0307 | 6.892 |
| 2003. | 2.0009 | 7.180 |
| 2004. | 1.9656 | 7.193 |
| 2005. | 1.9964 | 7.749 |
| 2006. | 2.0726 | 6.661 |
| 2007. | 2.060 | 8.101 |
| 2008. | 2.1422 | 9.432 |

Source: Table no. 4, CBBH Buillten 3-2010.

By using and putting in order the given data[7] and using the auxiliary table (table 1 in the Appendix) we can calculate the correlation and determination coefficient between two variables seen above in the text on the level: $r_{xy} = 0$ , $r^2_{xy} = 0$.

For interpretation of calculated coefficient values we use the manual *Statistics* (in Serbian, authors: Blažić and Dragović) where we can find explanation of those indicators. For correlation coefficient the authors say that "it expresses (usually in percents) estimated level of correlation of dependence of y-function from x-factor" (p. 384). In the same manual for the correlation coefficient values **between 0 and 0.25 %** it is said that "there is certain weak correlation level **which we usually neglect**" (p. 389). For the determination coefficient values between 0 and 0.25 % it is said that "reciprocity level of such correlation is insignificant and **we usually neglect such reciprocity**".

[7] Before we could calculate required coefficients, we had to roughly adjust data in order to exclude influences of those factors which do not belong to the monetary economy sector. For this purpose we excluded 2006 because in that year VAT has been introduced. That non-monetary measure gave adequate results: reduction of trade deficit and increase of inflation in the country. We excluded 1998 too, since in that year the process of BAM introducing was finished so the high level of inflation in that year must not be interpretated as a result of any activity of currency board system. We also excluded 2000 since in that year external shock (NATO campagne against Yugoslavia, „5th October Events" in Serbia etc.) significantly influenced the trade deficit of BH.

***Test no 2***

Before making final conclusions, we would like to repeat previous test, but operating with data published by CB BH. Data are given in the table 6:

*Table no. 6 – Flow of Real Exchange Rate PEEP 20[8] and Foregin trade deficit*

| Year | Real Exchange Rate | Foregin trade deficit (in millions of KM) |
|---|---|---|
| 2002. | 98,93 | 5.958 |
| 2003. | 98,50 | 5.996 |
| 2004. | 100,10 | 6.487 |
| 2005. | 99,97 | 7.395 |
| 2006. | 97,73 | 6.224 |
| 2007. | 100,27 | 7.962 |
| 2008. | 98,88 | 9.574 |

Source: Bulletin 2/2009 CBBH

According to the given data and after putting some issues in order similarly to the previous test (table 2 in the Appendix), we have calculated correlation and determination coefficient on the level rxy = 0,13110, $r^2$= 0,017189. Thus we confirm conclusion drawn in the previous test which says that **trade deficit is not significantly influenced by the real foreign currency exchange rate.**

Actually, trade deficit has been varying for quite a period between 40% and 50% of GDP. For this reason we will make a hypothesis that this deficit is primarily under the influence of the variations in GDP. To test this hypothesis, we will create table no. 6 and on the basis of it we will calculate correlation and determination coefficients between these two variables (as we have done previously).

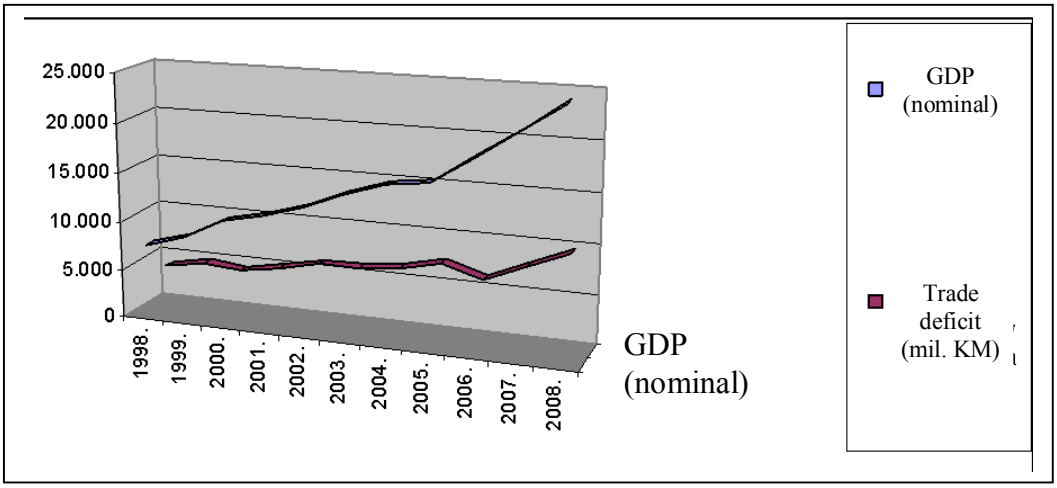
*Table no. 7. – Flow of Nominal GDP and Foregin trade deficit (In millions of KM)*

| Year | *Nominal GDP* | *Foregin trade deficit* |
|---|---|---|
| 1998. | 7.437 | 4.077 |
| 1999. | 8.604 | 4.762 |
| 2000. | 10.713 | 4.402 |
| 2001. | 11.599 | 5.076 |
| 2002. | 12.829 | 5.958 |
| 2003. | 14.505 | 5.996 |
| 2004. | 15.786 | 6.487 |
| 2005. | 16.289 | 7.395 |
| 2006. | 19.121 | 6.224 |
| 2007. | 21.759 | 7.962 |
| 2008. | 24.716 | 9.574 |

Source: Bulletin 2/2009 CBBH

[8] Trade partners selected in order to set up an index (Austria, Czech Republic, France, Germany, Hungary, Italy, Lithuania, Poland, Slovenia, The Netherlands, Croatia, China, UK, Macedonia, Romania, Russian Federation, USA, Serbia, Switzerland and Turkey)

*Graph no. 3 - Flow of Nominal GDP and Foregin trade deficit*




Source: Table no. 7

Results are as follows:

rxy= 0.9796 correlation coefficient
$r^2xy$ = 0,9596 determination coefficient

**These results indicate existence of almost determinative correlation between GDP and trade deficit.** All other factors compose 2% of influence. This correlation is so hard that not even introduction of VAT in 2006 (which actually changed ratio of trade deficit and GDP) has diminished this correlation because trade deficit continued to grow according to the GDP growth. Nevertheless, example of VAT shows that there are measures out of the bonds of monetary economy which may help reducing and possible neutralizing high trade deficit problem. ***Tests 1 and 2 showed that monetary policy has not influenced the trade deficit variations. Quite opposite, although real foreign currency exchange rate has appreciated by 10%, trade deficit decreased relatively (not absolutely).*** In 1998 it had amounted to 54.8 % of GDP, while in 2008 it amounted to 38.7 % which means that it decreased by 16 % of GDP. These data deprive the adherents of monetary system change of their basic argument that present monetary policy significantly influenced the trade deficit.

## 4. CONCLUSION

Central Bank of Bosnia and Herzegovina has been operating for longer than 10 years according to the currency board principles. Since the very beginning of that period a dispute has been made about the effects of that engagement. Experts diverged in two sides. No one makes a question about basic advantages of the system involved (low rate of inflation, at the first place). However, opponents of currency board system are making a question of correlation between foreign currency course and foreign trade deficit (one of the major economic problems of BH) a central issue of the dispute. Constant grow of the deficit for this group of experts is certain indicator that current foreign currency rate, according to the Central Bank of BH Law, is not a balancing one. Adherents of the current system are arguing that basic causes of this deficit should not been searched in the monetary policy but in the

state of the (real) economy sector. They are citing so called Marshal-Lerner-Robinson condition proving that change of nominal foreign currency rate will not give results. According to them, the BH structure of export-import is suggesting that total of price flexibility is lower than one, which proves devaluation will not cause significant reduction of foreign trade deficit, but will surely weaken public confidence in monetary authorities of our country. Intending to investigate arguments of both sides, we have analyzed correlations between the changes of real foreign currency rate and the changes of foreign trade deficit. This analysis was possible since real foreign currency rate between BAM and EUR has been changing according to the inflation differences, unlike the nominal foreign currency rate, which is fixed. Purpose of the domestic currency devaluation, which is pleaded by the current monetary system opponents, is its influence on the real foreign currency rate. Our analysis (tests 1 and 2) has shown that changes in foreign trade deficit have had almost no correlation with changes in real foreign currency rate (correlation coefficient in the first test was 0, in the second test – 0.13110). Unlike these two, the test in which we have measured correlation in the changes of foreign trade deficit and nominal GDP has shown almost perfect correlation (correlation coefficient 0.9796). That indirectly undermines arguments of the opponents of currency board system. These arguments could be refuted directly as well, comparing real foreign currency rate and real foreign deficit weight for years 1998 and 2008. Namely, real foreign currency rate has shown appreciation for 10 %, which is almost the same value as the difference in inflations. Foreign trade deficit has decreased from 54,8 % GDP to 38,7% GDP in the same period, which makes a reduction for almost 30%. That proves, in our opinion, that monetary system has not been negatively effected bz foreign trade deficit and that, in order to decrease this deficit in the future, reforms in the real economy sector should be performed.

## 5. APPENDIX

### 5.1. Supporting table for finding relationship between real foreign currency exchange rate and trade deficit in test no.1

Table no. 1.

| X | Y | XY | $X^2$ | $Y^2$ |
|---|---|---|---|---|
| 2.209 | 5.482 | 12.110 | 4.88 | 30.052 |
| 2.004 | 6.052 | 12.128 | 4.016 | 36.626 |
| 2.055 | 5.868 | 12.058 | 4.223 | 34.433 |
| 2.069 | 6.470 | 13.386 | 4.281 | 41.860 |
| 2.0307 | 6.892 | 13.996 | 4.123 | 47.499 |
| 2.0009 | 7.180 | 14.366 | 4.0036 | 51.552 |
| 1.9656 | 7.193 | 14.138 | 3.863 | 51.739 |
| 1.9964 | 7.749 | 15.470 | 3.985 | 60.047 |
| 2.060 | 8.101 | 16.688 | 4.2436 | 65.626 |
| 2.1422 | 9.432 | 20.205 | 4.588 | 88.962 |
| 20.53 | 70.419 | 144.55 | 42.2 | 508.360 |

$\bar{x} = \sum x / n = 20.53/10 = 2.053$ $\qquad \bar{y} = \sum y / n = 7.0419$

$Cxy = \sum xy / n - \bar{x}\,\bar{y} = 144.55/10 - 14.45 = 0$

$rxy = Cxy / \sigma x\, \sigma y = 0$ ← correlation coefficient

$r^2 = 0$ ← determination coefficient

### 5.2. Supporting table for finding relationship between real foreign currency exchange rate and trade deficit in test no.2

Table no. 2

| X | Y | Xy | X² | Y² |
|---|---|---|---|---|
| 0,9893 | 5.958 | 5894,249 | 0,978714 | 35497764 |
| 0,985 | 5.996 | 5906,06 | 0,970225 | 35952016 |
| 1,001 | 6.487 | 6493,487 | 1,002001 | 42081169 |
| 0,9997 | 7.395 | 7392,782 | 0,9994 | 54686025 |
| 1,0027 | 7.962 | 7983,497 | 1,005407 | 63393444 |
| 0,9888 | 9.574 | 9466,771 | 0,977725 | 91661476 |
| 5,9665 | 43.372 | 43136,85 | 5,933473 | 323271894 |

$\bar{x} = \sum x / n = 0{,}994416$ $\bar{y} = \sum y / n = 7228{,}67$

$Cxy = \sum xy / n - \bar{x}\,\bar{y} = 7189{,}475 - 7188{,}3 = 1{,}16989$

$\sigma x = \sqrt{\sum x^2 / n - \bar{x}^2} = 0.988912 - 0{,}988863 = 0{,}007$

$\sigma y = 53878649 - 52253669{,}97 = 1274{,}74$

$rxy = Cxy / \sigma x\, \sigma y = 0{,}13110$ ← correlation coefficient

$r^2 = 0{,}017189$ ← determination coefficient

### 5.3. Supporting table for finding relationship between Nominal GDP and Foregin trade deficit

Table no. 3

| X | Y | Xy | X² | Y² |
|---|---|---|---|---|
| 7.437 | 4.077 | 30320649 | 55308969 | 16621929 |
| 8.604 | 4.762 | 40972248 | 74028816 | 22676644 |
| 11.599 | 5.076 | 58876524 | 134536801 | 25765776 |
| 12.829 | 5.958 | 76435182 | 164583241 | 35497764 |
| 14.505 | 5.996 | 86971980 | 210395025 | 35952016 |
| 15.786 | 6.487 | 102403782 | 249197796 | 42081169 |
| 16.289 | 7.395 | 120457155 | 265331521 | 54686025 |
| 21.759 | 7.962 | 173245158 | 473454081 | 63393444 |
| 24.716 | 9.574 | 236630984 | 610880656 | 91661476 |
| | | | | |
| 133.524 | 57.287 | 926313662 | 2237716906 | 388336243 |

$\bar{x} = \sum x / n = 14836$ $\bar{y} = \sum y / n = 6365{,}2$

$Cxy = \sum xy / n - \bar{x}\,\bar{y} = \sqrt{102923740{,}2 - 94434107{,}2} = 8489633$

$\sigma x = \sqrt{\sum x^2 / n - \bar{x}^2} = \sqrt{248635211{,}8 - 220106896} = 5341{,}19$

$\sigma y = 43148471{,}44 - 40515771{,}04 = 1622{,}56$

rxy = Cxy / σx σy = 8489633 / 8666401,25 = 0,9796 ← correlation coefficient

r² = 0,9596 ← determination coefficient

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