THE EXCHANGE RATE ARRANGEMENTS-GOVERNMENT FINANCE RELATIONSHIP AND THE IMPACT ON DEBT MANAGEMENT

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The choice of exchange rate regime can have a significant impact on the development of the national economy, which affects the main economic indicators. Traditionally, researchers consider the effects of certain types of exchange rate regimes on economic indicators such as gross domestic product, inflation, current account, real exchange rate and investments, but is it possible that the exchange rate regime can also reflect the country's government finance and thus influence the management of public debt?

Keywords: exchange rate arrangement, debt management, government debt, government budget balance

1. INTRODUCTION

In the modern history of exchange rate regimes, there are various types of exchange rate arrangements. They all vary in the degree to which they combine the advantages and disadvantages of the two basic exchange rate regimes - fixed and floating exchange rate regimes, which impacts the country's economic conditions. While the effects of the chosen exchange rate regime on the main economic indicators are often examined, especially in countries with a floating or a fixed exchange rate, questions about the impact of the arrangements on

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some other indicators and sectors, such as government finance, remain under researched.

The purpose of the study is to reveal whether there is a statistically significant relationship between the chosen exchange rate regime and the main government finance indicators, such as budget balance (as a percent of Gross Domestic Product - GDP) and gross government debt (as a percent of GDP), whose amendment affects the structure and the amount of government debt, which must be taken into account by the debt management authority. Even though it is difficult to establish an unambiguous relationships at a theoretical level, because of numerous ways in which exchange rates can influence and can be influenced by other macroeconomic variables, the study attempts to reveal the difference between the government finance indicators of different countries, grouped by the chosen exchange rate regime. Considering the specific exchange rate regime of the member states of the Eurozone - a "hard" peg in the member states of the Eurozone using a common currency (euro) and a floating exchange rate in the countries outside the Eurozone, the comparison between indicators for Eurozone countries and those for the countries outside the euro area, is also being investigated.

1.1. The hypothesis

In the context of our purpose we formulate three hypotheses. The first hypothesis examined in this study assumes a statistically significant relationship between the chosen exchange rate regime and the main government finance indicators, such as budget balance (as a percentage of GDP) and gross government debt (as a percentage of GDP). The second hypothesis is that there is a significant difference between these two indicators for countries depending on their exchange rate regime. The third hypothesis assumes significantly worse indicators for government debt and budget balance for the member states of the Eurozone compared to the countries with different exchange rate arrangements.

1.2. Data and methodology

In order to examine the hypotheses of the study, the International Monetary Fund (IMF) member states are classified into four groups, depending on the chosen exchange rate regime - currency board, fixed exchange rate, floating exchange rate and the last group includes the Eurozone member states, considering the specific exchange rate regime of the member states of the European Monetary Union.

According to the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (2014) the "fixed exchange rate" group includes the IMF member states with: *Conventional peg, Crawling peg, Crawl-like arrangement, Pegged exchange rate within horizontal bands*. The "floating exchange rate" group includes the IMF member states with *Floating* and *Free Floating exchange rate arrangements*, so the scope of the study excludes the countries with *No separate legal tender, Stabilized arrangement* and *Other managed arrangement*, due to the specificity of these regimes. In order to examine the relationship between the exchange rate arrangement and the main government finance indicators it is necessary to consider the dynamics of government debt and government balance for a longer time period. The selected time period is 2003-2013. Table 1 presents the IMF member states with a constant exchange rate regime for the whole time period from 2003 to 2013, which means that during the 2003-2013 time period, the countries have not been switching from a peg to float, or vice versa.

Table 1. IMF member states Exchange Rate Arrangements during the time period 2003-2013

Exchange Rate Arrangement (number of countries)	**Country**
Currency board (6)	Djibouti, Hong Kong, Bosnia and Herzegovina, Bulgaria, Lithuania (ERM II), Brunei
Fixed exchange rate (27)	Aruba, The Bahamas, Bahrain, Barbados, Belize, Eritrea, Jordan, Oman, Qatar, Saudi Arabia, United Arab Emirates, Turkmenistan, Cape Verde, Comoros, Guinea, Fiji, Kuwait, Libya, Morocco, Samoa, Bhutan, Lesotho, Namibia, Nepal, Swaziland, Botswana, China
Floating exchange rate (41)	Afghanistan, Kenya, Madagascar, Mozambique, Malawi, Papua New Guinea, Tanzania, Sierra Leone, Uruguay, Albania, Brazil, Georgia, Korea, Ghana, Iceland, Indonesia, Moldova, New Zealand, Paraguay, Peru, Philippines, Serbia, South Africa , Thailand, Turkey, Uganda, India, Mauritius, Mongolia, Zambia, Australia, Canada, Chile, Japan, Mexico, Norway, Poland, Sweden, United Kingdom, Somalia, USA
Eurozone member states (17)	Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain

Source: IMF, Annual Report on Exchange Arrangements and Exchange Restrictions 2003-2013.

Although initially the countries were not under the stabilization arrangements with IMF, during certain periods of time (especially after the 2007/2008 financial crisis) some countries, such as Uruguay, Iceland, Serbia, Albania, Brazil, Guinea, Georgia, Ghana, Kenya, Madagascar, Malawi, Mexico, Moldova, Mozambique, Paraguay, Peru, Sierra Leone, Tanzania, Uganda, Zambia, Turkey, Cape Verde, Comoros, Jordan, Lesotho, Nepal, Cyprus Greece, Ireland and Portugal, conclude IMF stabilization programs without changing the original exchange rate regime prior to the agreement.

In order to obtain comparability the source data for gross government debt and government balance of all countries is IMF World Economic Outlook 2014. Due to the lack of data on government debt of Afghanistan, Aruba, Curacao and St. Maarten, Iran, Kosovo, Libya, Mongolia, Palau, Samoa, Somalia, San Marino, Syria, Timor-Leste and Tonga these countries are excluded from the scope of the study. The government debt and government balance data are analyzed and the hypotheses tested, using the Statistical Package for the Social Sciences (SPSS) program.

2. LITERATURE REVIEW

According to the IMF classification in the Annual Report on Exchange Arrangements and Exchange Restrictions (The classification system is based on the members' actual, de facto arrangements as identified by IMF staff, which may differ from their officially announced arrangements.), during the period 2008-2014, the number of countries with a fixed exchange rate ("soft" peg) increased, while the number of countries with a floating exchange rate decreased (Table 2).

While in 2008 the percentage of IMF member countries with a fixed or a floating exchange rate is almost the same - around 40% of all IMF member states, in the period from 2009 to 2014 the percentage of countries with a floating exchange rate decreased and it amounted to 34% in 2014, while the percentage of the countries with a "soft" peg increased to 43.5% in 2014. Meanwhile the percentage of members with a "hard" peg (including countries under currency board and countries with no separate legal tender) remained stable - around 13%. In fact, the detailed data analysis shows that although there was a general downward trend in the number of countries with a floating exchange rate compared to the countries with a fixed exchange rate during the entire period of time, only in 2009 the trend was exactly opposite. The percentage of member states with a "soft" peg decreased from 39.9% in 2008 to 34.6% in 2009, while the percentage of countries with a floating rate increased

from 39.9% to 42%, due to the inability to maintain the fixed exchange rate after the occurrence of the global financial and economic crisis and the euro area debt crisis by the end of 2008, whose negative effects have influenced not only the countries in debt crisis, but also the world economy.

Table 2. Exchange Rate Arrangements, 2008-2014 (percentage of IMF members)

Exchange Rate Arrangement	2008	2009	2010	2011	2012	2013	2014
Hard peg	**12.2**	**12.2**	**13.2**	**13.2**	**13.2**	**13.1**	**13.1**
No separate legal tender	5.3	5.3	6.3	6.8	6.8	6.8	6.8
Currency board	6.9	6.9	6.9	6.3	6.3	6.3	6.3
Soft peg	**39.9**	**34.6**	**39.7**	**43.2**	**39.5**	**42.9**	**43.5**
Conventional peg	22.3	22.3	23.3	22.6	22.6	23.6	23
Stabilized arrangement	12.8	6.9	12.7	12.1	8.4	9.9	11
Crawling peg	2.7	2.7	1.6	1.6	1.6	1	1
Crawl-like arrangement	1.1	0.5	1.1	6.3	6.3	7.9	7.9
Pegged exchange rate within horizontal bands	1.1	2.1	1.1	0.5	0.5	0.5	0.5
Floating	**39.9**	**42**	**36**	**34.7**	**34.7**	**34**	**34**
Floating	20.2	24.5	20.1	18.9	18.4	18.3	18.8
Free Floating	19.7	17.6	15.9	15.8	16.3	15.7	15.2
Residual							
Other managed arrangement	8	11.2	11.1	8.9	12.6	9.9	9.4

Source: IMF, Annual Report on Exchange Arrangements and Exchange Restrictions 2014.

Traditionally, researchers consider the effects of certain types of exchange rate regimes on economic indicators such as gross domestic product, inflation, current account, real exchange rate and investments, but almost unexplored remains the effect on government balance and government debt. Probably because the fixed exchange rate is often used as a nominal anchor in the countries aiming to reduce inflation rates, most researchers are focused especially on this effect on the economy.

Since the fixed exchange rate is usually used in combination with IMF stabilization programs, the so called *"Exchange Rate Based Stabilization (ERBS) syndrome"* takes place in the given countries. Accordingly, almost all studies are trying to explain either the ERBS syndrome or the reasons for the

failure of ERBS programs after a period of time. For example, Frenkel and Rodriguez (1982) focus on the effects of inflation inertia that lead to the initial lower interest rates, while Calvo and Vegh (1991) first presented the lack of confidence in the stabilization program as a driving force of the syndrome.

According to Calvo (1986) consumers expect the government to return to its old inflation policy in the near future, therefore they increase current consumption of goods and reduce future consumption. Rebelo and Vegh (1996) develop a model of *"ERBS syndrome",* based again on the lack of consumer confidence and inflation inertia. Despite the fact that all models conclude that ERBS initially lead to a boom and then to a recession, so far none of them has been able to comprehensively explain the *"ERBS syndrome"*. Krugman (1979) and Rebelo (1997) explore the relationship between fiscal and monetary policy especially under a fixed exchange rate, but in general the studies are not focused neither on the effects of the exchange rate regime on government finance indicators, such as public debt and government balance, nor on establishing a relationship between them.

Because of the many ways in which exchange rates can influence and be influenced by other macroeconomic variables, empirical studies typically find no clear link between the exchange rate regime and macroeconomic performance, especially government debt.

Several studies take different approaches in studying the relationship between these variables. Hakkio (1996) revealed the impact of budget deficit reduction on the exchange rate in several countries, while Saheed, Sani and Idakwoji (2015), revealed the impact of public external debt reduction on the exchange rate in Nigeria. Saysombath and Kyophilavong (2013) researched whether there was cointegration or causality between budget deficit and real exchange rate in Lao. On the other hand, the possibility of the exchange rate regimebeing reflected on the budget deficit or public debt is discussed by the researches from the Buoyant Economies (2012) and by Nersisyan and Wray (2010).

3. EXCHANGE RATE ARRANGEMENTS, GOVERNMENT BALANCE AND GOVERNMENT DEBT – IS THERE ANY RELATIONSHIP?

In order to examine whether there is a statistically significant relationship between the chosen exchange rate regime and the government finance indicators

- government balance and gross government debt as a percentage of GDP, an analysis of variance is applied (Table 3).

Table 3. Results of exchange rate arrangement and government balance and debt analysis of variance

Levene Statistic	**Government Balance Significance**	**Government Debt Significance**
5.481	**0.002 < 0.05***	
3.416		**0.021 < 0.05***
	Government Balance	**Government Debt**
Chi-Square	7.466	10.091
Degrees of freedom	3	3
Significance	0.058 > 0.05	**0.018 < 0.05***

* Significance level α=5%
a. Kruskal-Wallis Test
b. Grouping Variable: Exchange Rate Arrangement.

Source: Research results.

The Levene test of homogeneity of variances of the government balance and the government debt shows a significance level of respectively 0.002 and 0.021, which is less than the probability of error of 0.05 (or 5%). Therefore, we can reject the null hypothesis of homogeneity of variances for both indicators and we should apply a nonparametric analysis of variance (The Kolmogorov-Smirnov test shows a normal distribution of gross government debt and government balance for all groups of countries, so the assumption of the analysis of variance for a normal distribution of the response variable is also met.). The Kruskal-Wallis test indicates a level of significance of 0.058 for budget balance and 0.018 for government debt respectively.

Therefore, regarding the budget balance we can't reject the null hypothesis of no impact of the exchange rate regime on the budget balance. Regarding the government debt, however, as the level of significance is less than the probability of error, we can reject the null hypothesis and conclude that there is a statistically significant relationship between the exchange rate regime and the gross government debt as a percentage of GDP. The results of the analysis of variance suggest researching whether there is a significant difference between government debt and budget balance across different groups of countries.

4. THE CURRENCY BOARD OR THE EUROZONE – THE BEST AND THE WORST PERFORMANCE

In order to examine whether there is a significant difference between government debt and budget balance across countries with different exchange rate arrangements, the average group values of both indicators are presented in Table 4.

Table 4. Average government balance and average government debt in the four groups of countries (as a percentage of GDP)

Exchange Rate Arrangement	Number of countries	Government Balance		Government Debt	
		Mean	Standard Deviation	Mean	Standard Deviation
Currency Board	6	1.9279	7.16416	23.7426	19.36790
Fixed Exchange Rate	24	1.0926	8.85633	46.8319	34.24100
Floating Exchange Rate	38	-1.9264	3.52787	50.7690	31.06870
Eurozone Countries	17	-3.1337	2.38350	63.3625	31.59831
Total	85	-1.0434	5.85377	50.2683	32.35982

Source: IMF, World Economic Outlook 2014, research results.

With an average budget surplus of 1.93 percent of GDP, the countries with currency boards are the group with the best performance according to the government balance. Also this is the group with the lowest average government debt - about 24% of GDP and the lowest standard deviation – about 19%. The countries under fixed exchange rate also achieved a surplus – about 1% of GDP, although this budget surplus is smaller than that for the countries in the currency board group. In this group, however, the highest standard deviation is 8.86%. The worst average government balance occurs in the countries of the Eurozone. Not only the government balance is negative – the average budget deficit of countries in this group is 3.13% of GDP, but the deviation in the group is the smallest – 2.38%, indicating that almost all of the countries have the balance close to these average negative values. Also this is the group with the highest government debt – on average about 63% of GDP. The countries with a floating exchange rate also have a negative budget balance – an average of 1.93% of

GDP, and respectively with higher average government debt – about 51% of GDP. It is noteworthy, however, that in the group of countries under floating exchange rate, extreme values of the indicator for Japan are observed – 243.20% of GDP in 2013 and 203.10% of GDP on average for the 2003-2013 time period, which strongly distorts and increases the mean value of the government debt for the whole group. For example, if we excluded Japan from the group of countries under floating exchange rate, the average government debt of this group would be 46.65% instead of 50.77%. Therefore Japan is excluded from the group of studied countries.

The difference between the average values of government balance and government debt for the groups of countries requires researching whether the difference is significant or is caused entirely by random chance. The results of the statistical hypothesis testing of significance of the difference between the average budget balance and government debt across the groups of countries are presented in Table 5.

Table 5. Statistical hypothesis testing results

Independent Samples Test	**Government Balance**		**Government Debt**	
	Levene's Test for Equality of Variances	*t-test for Equality of Means*	*Levene's Test for Equality of Variances*	*t-test for Equality of Means*
1. Currency Board/Fixed	0.654	0.833 > 0.05	0.153	0.126 > 0.05
2. Currency Board/Floating	0.061	**0.046 < 0.05***	0.936	**0.007 < 0.05***
3. Currency Board/Eurozone	0.03	0.146 > 0.05	0.30	**0.009 < 0.05***
4. Fixed/Floating	0.002	0.139 > 0.05	0.003	0.981 > 0.05
5. Fixed/Eurozone	0.01	**0.034 < 0.05***	0.598	0.124 > 0.05
6. Floating/Eurozone	0.484	0.157 > 0.05	0.037	0.055 > 0.05

* Significance level α=5%

Source: Research results.

Results of the statistical hypothesis testing of significance of the difference between the average government balance in countries with different exchange rate regimes shows that there is a statistically significant difference between the

values for countries under currency board and under floating exchange rate and between the values of the countries with a fixed exchange rate and countries in the Eurozone. Countries with currency boards have statistically significantly better budget balance as a percentage of GDP than the countries under floating exchange rate, while countries with a fixed exchange rate have a statistically significantly better budget balance as a percentage of GDP than countries in the Eurozone. The lack of statistical significance of the differences between other groups is mainly due to the heterogeneity of the variances, as shown by the low values of significance of the Levene test.

According to the government debt, there is statistically significant difference between both average values for countries with a currency board and a floating exchange rate, and also between countries with a currency board and countries in the Eurozone, i.e. countries with a currency board have statistically significantly lower level of government debt as a percentage of GDP compared to the euro area countries and to the countries with a floating exchange rate.

5. CONCLUSIONS

Even though it is difficult to establish unambiguous relationships between the chosen exchange rate regimes and the government finance indicators at a theoretical level, because of numerous ways in which exchange rates can influence and can be influenced by other macroeconomic variables, according to analysis of variance applied in this study, the exchange rate regime statistically significantly influences the gross government debt as a percentage of GDP, as far as the testing of hypothesis showed that countries with currency board have statistically significantly lower level of government debt relative to the euro area countries and countries with a floating exchange rate. On the other hand, the countries in the Eurozone have significantly worse average values for government finance indicators compared to other groups of countries, for some of which the values are statistically significantly worse, especially compared with the countries with a currency board.

Since the countries using a common currency are unable to conduct an independent monetary policy, they focus on using fiscal policy instruments to reduce the negative effects on the economy resulting from the last global financial crisis. Despite the government deficit and debt restrictions, set by the Maastricht criteria and Stability and Growth Pact, obligatory for this group of countries, the highest average budget deficit and government debt is observed exactly in this group of countries.

Although the analysis of the budget balance does not show equally strong results for the impact of the exchange rate regime, the countries under currency board still have a significantly better budget balance compared to other groups of countries. The better average government finance values observed in these countries are mainly due to the increase of fiscal discipline as a result of the introduction of the currency board, which is actually one of its main advantages. Because of the inability to finance the government deficits from the central bank, the countries with a currency board should maintain at least a balanced budget or in case of deficit, it should be temporary, because constant budget deficits lead not only to the increase of government debt, but also to the lack of confidence of economic agents in the currency board. The exchange rate regime may impact the government finance, even if indirectly and in combination with other variables, and therefore should be considered by the public debt management authority.

REFERENCES

1. Calvo, G., (1986). Temporary Stabilization: Predetermined Exchange Rates. *Journal of Political Economy*, 94 (6), 1319-1329.
2. Calvo, G., Vegh, C. (1991). Exchange-rate-Based Stabilization under Imperfect Credibility. *International Monetary Fund Working Papers,* 77, 5-9.
3. Frenkel, J., Rodriguez, C. (1982). Exchange Rate Dynamics and the Overshooting Hypothesis. *Staff Papers*, 29 (1), 1-30.
4. Hakkio, C. (1996). The Effects of Budget Deficit Reduction on the Exchange Rate. *Federal Reserve Bank of Kansas City Economic Review*, 81 (3), 1-8.
5. Nersisyan, Y, Wray, L. R., (2010). Does Excessive Sovereign Debt Really Hurt Growth? A Critique of This Time Is Different, by Reinhart and Rogoff. *The Levy Economics Institute Working Paper Collection,* 603, 5-10.
6. Rebelo, S. (1997). What Happens When Countries Peg Their Exchange Rates? (The Real Side of Monetary Reforms). *Rochester Center for Economic Research Working Papers*, 441, 1-42.
7. Rebelo, V. (1996). Real effects of exchange rate-based stabilization: An analysis of competing theories. *National Bureau of Economic Research Working Papers,* 5197, 1-9.
8. Saheed, Z., Sani, I., Idakwoji, B. (2015). Impact of Public External Debt on Exchange Rate in Nigeria. *International Finance and Banking,* 2 (1), 1-4.
9. Saysombath, P., Kyophilavong, P. (2013). Budget deficit and Real exchange rate: Further Evidence from cointegration and causality test for in

the Lao PDR. *Handbook on the Economic, Finance and Management Outlooks*, 1, 1-5.

ODNOS IZMEĐU VALUTNOG TEČAJA I DRŽAVNIH FINANCIJA TE UTJECAJ NA UPRAVLJANJE DUGOM

Sažetak

Izbor tečajnog sustava može imati značajan utjecaj na razvoj nacionalne ekonomije, tj. na glavne ekonomske indikatore. Istraživači tradicionalno pažnju povećuju utjecaju određenih tipova tečajnih sustava na ekonomske indikatore poput bruto nacionalnog proizvoda, inflacije, tekućeg računa proračuna, realnog tečaja i ulaganja, no je li moguće da tečajni sustav utječe na državne financije i samim time, na upravljanje javnim dugom?