

VULNERABILITY TO THE CURRENCY CRISIS: THE CASE OF SERBIA

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ABSTRACT: The aim of this paper is to assess the external liquidity and currency stability of the Serbian economy. For this purpose, the following indicators were used: coverage of short-term external debt by foreign exchange reserves, coverage of imports by foreign exchange reserves and the exchange market pressure (EMP) index of the Republic of Serbia. Global events such as the coronavirus pandemic and the crisis in Ukraine have also affected the national financial market, so it is important to investigate this impact and compare it with the previous crisis of 2008-2009. The research shows that the Republic of Serbia has an optimal level of foreign exchange reserves in order to preserve the stability of the exchange rate and finance the balance of payments deficit, as well as a relatively low degree of vulnerability to the currency crisis. Based on that, it can be assessed that the monetary policy was conducted adequately in the previous period of the health crisis. However, some caution is needed due to the growing value of the EMP index as a result of increased demand for foreign exchange due to market panic, global uncertainty and the current geopolitical situation.

KEY WORDS: foreign exchange reserves, exchange rate, exchange market pressure (EMP) index, currency crises, currency sustainability, financial stability.

1. INTRODUCTION

We are witnessing more and more frequent global economic, financial and political crises. Since 2000, there has been a global financial crisis from 2008-2009, a health and economic crisis from 2020-2021 due to the COVID-19 pandemic, as well as global economic problems due to the Ukrainian crisis from 2022. The financial crisis is triggering a whole wave of socio-economic disorders. That is why scientists are increasingly interested in assessing the potential effects of the crisis on the financial system, the real sector and the economy as a whole.

One of the basic goals of economic policy is to ensure economic stability. Financial and currency stability are important factors of economic stability. The development strategy of any economy is based on the predictability of the exchange rate. If the exchange rate moves in an undesirable direction, there may be a currency crisis, and then an economic crisis. Identifying the degree of financial vulnerability is important to prevent a future crisis that can quickly spread to the real sector (Kuek et al., 2021). These are the circumstances that threaten to cause financial and economic disruptions in the future due to the increased risk of potential shocks (Puah, Kuek & Arip, 2017).

The main institution in charge of currency stability is the central bank. The central bank manipulates foreign exchange reserves and interest rates in order to prevent currency crises. The experience of many countries has shown the importance of a central monetary institution for financial stabilization. Russia, Argentina, Brazil, Mexico are countries that have had significant currency crises in the past. Although currency crises can be present in any economy, unfavourable exchange rate movements are especially dangerous for developing countries.

The exchange rate is one of the key macroeconomic variables. From the point of view of direct notation, it shows the price of foreign money expressed in the national currency. Each country chooses the exchange rate regime in accordance with its economic characteristics. The decision is made in relation to a number of indicators. The most important of which are: the origin of shocks, the credibility of monetary policymakers, the

level of inflation, the openness of the economy and import dependence. It should be noted that there is no universal solution, even for similar countries in economic sense. But the chosen exchange rate regime must ensure the internal and external balance of the economy in the medium term (Marković & Marjanović, 2021). Internal macro balance implies ensuring low and stable inflation rates, as well as positive economic growth rates. External macroeconomic balance indicates balance of payments equilibrium and controlled borrowing. That is why this choice is a very important issue for the economic policymakers, especially in small open economies (Vinokurov et al., 2017).

The main indicator in almost all currency crisis warning systems is the exchange rate. Therefore, Figure 1 shows the movement of the dinar exchange rate against the euro in the Republic of Serbia. In the period from 2007 to 2013, the exchange rate depreciated by 45%, while in the remaining analysed period the exchange rate was stable, especially since 2017.



Figure 1. Evolution of the nominal exchange rate of the dinar against the euro

Source: Presentation of the authors based on data from the National Bank of Serbia, 2022.

The National Bank of Serbia occasionally intervenes on a daily basis in preserving financial stability and preventing speculation on the foreign exchange market. For this purpose, it has foreign exchange reserves. In this way, they use it to maintain exchange

rate stability, external liquidity and short-term financing of balance of payments imbalances. The managed floating exchange rate regime, as the official (*de jure*) regime, enables more flexible conduct of monetary policy and prevention of vulnerability to the currency crisis. The conclusion on the pressure on the foreign exchange market is made on the basis of the frequency and amount of interventions by the National bank of Serbia.

Foreign exchange reserves are another important variable in systems for assessing and forecasting currency and financial crises. Whether a crisis will occur often depends on whether foreign exchange reserves are kept at an optimal level. Figure 2 shows the movement of foreign exchange reserves in the previous fifteen-year period. It is noticed that since the middle of 2018, there have been significant purchases of foreign currency on the foreign exchange market from the central bank due to the favourable economic situation and the low degree of financial vulnerability.

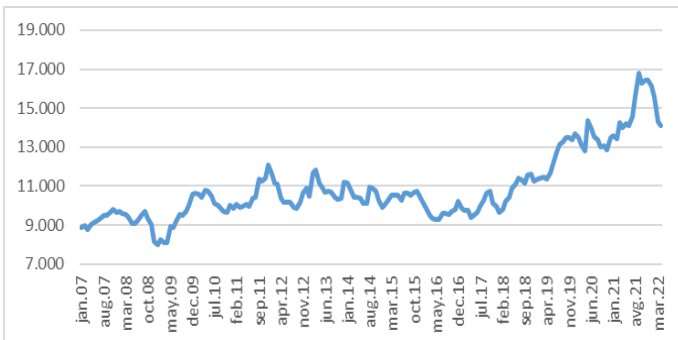


Figure 2. Evolution of foreign exchange reserves of the National Bank of Serbia (in millions of EUR)

Source: Presentation of the authors based on data from the National Bank of Serbia, 2022a.

The growing globalization of financial markets and the increasing frequency of global crises are leading to increased interest in calculating the optimal level of foreign exchange reserves. Vulnerability to the crisis in such circumstances is usually transmitted through financial markets (Kuek, Puaah & Arip, 2020). At the same time, the excess of foreign exchange reserves above the optimal level can lead to inflation due to the disproportion of money supply and goods in the market, while the deficit can lead to investor distrust. Having in mind the fact that the lack of foreign exchange reserves is much more dangerous, an increasing number of countries decide to keep foreign exchange reserves at the highest possible level, so there is a global trend of accumulating foreign exchange reserves. It is present in developed countries as well as in developing countries. Kovačević (2021) points out that disturbances in the international flows of goods, services and capital are the key reason for the tendency of increasing foreign exchange reserves in the world. Practice shows that a higher level of foreign exchange reserves enabled the calming of the financial market and market disturbances, as well as the prevention of currency crises (Céspedes & Chang, 2020).

However, higher levels of foreign exchange reserves increase the cost of holding foreign exchange reserves, while lower levels increase the possibility of financial crises. Having in mind the shortcomings of exceeding the lower and upper limits of foreign exchange reserves, the authors single out two criteria for assessing the optimality of foreign exchange reserves:

- coverage of short-term external debt by foreign exchange reserves, and

- coverage of average monthly imports by foreign exchange reserves.

These indicators are also used to assess the financial vulnerability of the economy (together with the EMP index). Financial and currency crises are usually multidimensional phenomena that require the use of more than one indicator (Kenourgios, Samitas & Paltalidis, 2011).

2. MATERIALS AND METHODOLOGY

The sources of data, on the basis of which the criteria for the optimality of foreign exchange reserves and the sustainability of the applied exchange rate regime were calculated, are the databases of the National Bank of Serbia. As the absolute values of economic and monetary indicators do not have great analytical significance, relative data were used in the analysis. The two most important indicators that guide monetary policymakers in the management of foreign exchange reserves are: coverage of short-term external debt by foreign exchange reserves and coverage of average imports by foreign exchange reserves. Accordingly, Jeanne & Rancière (2006) defined two monetary rules to preserve currency and financial stability: i) the value of foreign exchange reserves must fully cover short-term external debt and ii) the amount of foreign exchange reserves must be sufficient to cover the quarterly value of imports.

Coverage of short-term external debt by foreign exchange reserves is one of the most commonly used criteria for the adequacy of foreign exchange reserves and external liquidity of the country. The logic of this indicator is simple. Foreign exchange reserves must cover the total short-term external debt at all times. Therefore, the value of this indicator should be more than 100% so that the country would not be vulnerable to financial and currency crises in the future (Green & Torgeson, 2007). Also, in this way, the national economy is insured if the conditions of borrowing on the financial market significantly worsen.

The second indicator is expressed in the number of months of imports that can be financed by foreign exchange reserves. It shows the ability of the national economy to pay for imported goods from foreign exchange reserves. In the literature, it is considered that the optimal level of this indicator is from 3 to 6 months (Popov, 2019; Marković & Marjanović, 2021). Therefore, this criterion is used in assessing the sensitivity to the financial crisis of the current part of the balance of payments (Marković & Marjanović, 2021). In practice, smaller countries maintain this indicator at the very upper limit of optimality (in this case, the value of foreign exchange reserves should be sufficient to finance about 6 months of average imports).

The EMP index is a useful tool for assessing currency crises. It is an *ex post* approach to looking at crises in the past. Based on it, it is estimated which macroeconomic factors in the crisis period contributed to the increase in the value of this index. Episodes of currency crises are estimated on a monthly basis. Boonman (2017, p. 7) defines the EMP index as an “approach of speculative pressure”, because speculative attacks are the most common triggers of currency crises. It is usually calculated as follows (Kaminsky, Lizondo & Reinhart, 1998; Marković & Marjanović, 2021a; Nikolić, 2009; Tatomir, 2009):

$$EMP_t = \frac{\Delta e_t}{e_{t-1}} - w \frac{\Delta R_t}{R_{t-1}} \quad (1)$$

where:

EMP_t - foreign exchange market pressure index (monthly),

Δe_t - monthly absolute change in the nominal exchange rate,

e_{t-1} - nominal exchange rate of the dinar against the euro in the previous month,

w - ratio of standard deviation of the rate of change of the nominal exchange rate of the dinar against the euro and standard deviation of the rate of change of foreign exchange reserves on

$$\text{a monthly basis: } w = \frac{\sigma e_t}{\sigma R_t},$$

ΔR_t - monthly absolute change in the level of foreign exchange reserves,

R_{t-1} - the level of foreign exchange reserves in the previous month.

Based on the formula, it is clear that the value of the EMP index depends on: *i*) relative changes in the nominal exchange rate of the dinar against the euro and *ii*) weighted relative changes in foreign exchange reserves of the central bank - the National Bank of Serbia. All changes are reviewed on a monthly basis. A higher value of this index in relation to the projected limit is a signal for the central bank to intervene in the foreign exchange market by selling foreign exchange.

There are different interpretations of the threshold of this index. The study will use two criteria to determine the limit: the first, which shows that the currency crisis in the country is present if the value of the EMP index in a month exceeds the sum of 3 standard deviations of the EMP index and its arithmetic mean (Kaminsky, Lizondo & Reinhart, 1998); and another, a more rigorous approach, according to which currency crises are identified if the value of the EMP index exceeds 1.5 standard deviations above the mean value of the EMP index (Abubakar, Utari & Azwar, 2020).

The paper investigates vulnerability to the currency crisis in the period from 2007 to 2022. An additional goal is to compare the current financial vulnerability in the Republic of Serbia in relation to the period of the global financial crisis from 2007-2008 and the health and economic crisis caused by the pandemic from 2020-2021.

3. RESEARCH RESULTS AND DISCUSSION

Figure 3 shows the coverage of short-term external debt by foreign exchange reserves of the National Bank of Serbia. According to the latest data from the end of 2021, there is a high coverage (over 250%) in relation to the previously defined minimum criteria. In the analysed period, the lowest coverage was during the financial and economic crisis of 2008, when this indicator was slightly above 150%. The Republic of Serbia has accumulated sufficient foreign exchange reserves to cover short-term external debt without jeopardizing the financing of these liabilities for a period of one year (Zehri, 2020), so that according to this indicator there is a low degree of vulnerability to the currency crisis.

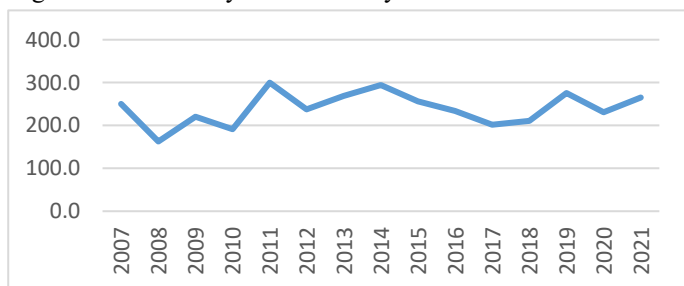


Figure 3. Coverage of short-term external debt by foreign exchange reserves of the National Bank of Serbia (in %)

Source: Authors' review based on data from the National Bank of Serbia, 2022a.

The following Figure shows the coverage of imports by foreign exchange reserves of the National Bank of Serbia. Also, this indicator was the lowest during the crisis in 2008. Since 2009, there has been a constant decrease in this indicator mainly due to the growth of imports, bearing in mind that Serbia is an import-dependent economy and that the growth of gross domestic product and exports requires a significant contingent of imported components.

However, even after that, this indicator is within the limits, i.e. optimality zones ranging from 3 to 6 months. According to the latest data, foreign exchange reserves cover nearly 6 months of the value of average imports of the Republic of Serbia. This testifies to the optimality of foreign exchange reserves, high external liquidity and a low degree of possible financial vulnerability.

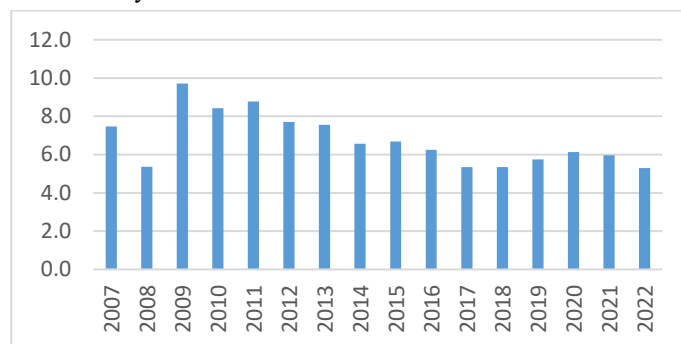


Figure 4. Coverage of imports by foreign exchange reserves of the National Bank of Serbia (in months of average imports)

Source: Authors' review based on data from the National Bank of Serbia, 2022a.

In this paper, we will use another indicator to assess the financial stability of the Republic of Serbia. It is the EMP index. Based on it, currency crises in the past period are determined on a monthly basis. The pressure on the foreign exchange market in the regime of floating exchange rates stems from changes in foreign exchange reserves, as well as from changes in exchange rate levels (Olanipekun, Olasehinde-Williams & Güngör, 2019). The EMP index will increase if the nominal exchange rate rises and / or foreign exchange reserves fall.

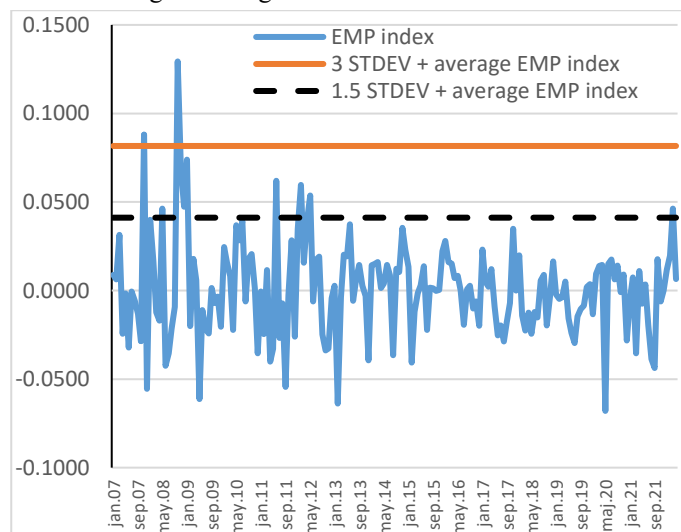


Figure 5. EMP index in the Republic of Serbia

Source: Authors' calculation based on data from the National Bank of Serbia, 2022; 2022a.

According to the data from Figure 5 and Table 1, and according to the threshold that takes into account 3 standard deviations of the EMP index for analysis, since 2007 there have been only 2 periods with currency crises in the Republic of Serbia. The

strongest blow to financial stability was the transfer of the negative effects of the financial crisis from 2008. Then there was a strong growth of the exchange rate (depreciation of the dinar), as well as a decline in foreign exchange reserves in order to prevent excessive exchange rate fluctuations. On the other hand, according to a more rigorous criterion, there were as many as 10 months with currency crises in the Republic of Serbia. The first six periods are the result of the impact of the 2008 global crisis. The currency crises of 2011 and 2012 are the result of internal factors, i.e. poor fiscal and overall macroeconomic situation. From June 2012 until the beginning of the political crisis in Ukraine, Serbia did not record a single monthly episode of currency crises. During that period, financial consolidation, stabilization of inflation expectations and economic recovery were carried out. However, in March 2022, due to panic reactions in the market in the form of increased demand for foreign exchange, there were frequent and large interventions of the central bank to protect against speculative transactions. There was a sudden depletion of foreign exchange reserves to avoid pressure on a strong depreciation of the national currency. As floating exchange rate regimes can transfer the effects of exchange rate growth on prices, which causes cost-inflation, the National Bank of Serbia's actions in terms of selling foreign exchange to stabilize the exchange rate and negative expectations of investors are justified, especially in the current conditions of rapid inflation in the world and in the Serbian economy, too. Since the beginning of 2022, over EUR 2 billion has been spent for this purpose. Despite that, the National Bank of Serbia managed to preserve financial stability, as well as the stability of the exchange rate, thanks to the adequate level of foreign exchange reserves and timely intervention.

Table 1. Periods with currency crises in the Republic of Serbia according to the EMP index and explanatory variables

Period	Threshold		Cause
	3 STDEV	1.5 STDEV	
November 2007.	√	√	Exchange rate growth
May 2008.		√	Exchange rate growth and foreign exchange reserves decline
October 2008.	√	√	Exchange rate growth and foreign exchange reserves decline
November 2008.		√	Exchange rate growth and foreign exchange reserves decline
December 2008.		√	Decline in foreign exchange reserves
January 2009.		√	Exchange rate growth and foreign exchange reserves decline
June 2011.		√	Exchange rate growth and foreign exchange reserves decline
February 2012.		√	Exchange rate growth and foreign exchange reserves decline
May 2012.		√	Exchange rate growth and foreign exchange reserves decline
March 2022.		√	Decline in foreign exchange reserves

Source: Authors' calculation and presentation.

CONCLUSIONS

The Republic of Serbia *de jure* applies the regime of managed floating exchange rate. This is the modality of the exchange rate regime that is closest to the free floating exchange rate. The National Bank of Serbia intervenes in the foreign exchange market through foreign exchange reserves. Foreign exchange reserves aim to ensure exchange rate stability, external liquidity, as well as financing the balance of payments deficit. Their role is to finance disturbances that lead to external imbalances in the short term. In addition, foreign exchange reserves have a preventive role as they are the guarantor of the financial stability of the national economy.

The sustainability of this regime and the degree of vulnerability to the currency crisis in the Republic of Serbia was assessed on the basis of three economic indicators: *i*) ratio of foreign exchange reserves of the National Bank of Serbia to short-term external debt, *ii*) ratio of foreign exchange reserves of the National Bank of Serbia to average monthly imports and *iii*) the EMP index. Based on the presented movement of the values of all these parameters in the paper, it can be concluded that the Republic of Serbia can overcome possible financial and economic disruptions, which indicates a relatively low degree of vulnerability to the currency crisis.

The future movement of foreign exchange reserves will be affected by the adequacy of the overall macroeconomic policy, but also by external opportunities and shocks. Favourable circumstances for further maintaining the current optimal level are a stable level of public debt, stability of the exchange rate, as well as a relatively favourable situation in the budget of the Republic of Serbia.

Some of the future challenges are how to attract additional foreign direct investment, as many countries are threatened by stagflation, which could further worsen the balance of payments of the Republic of Serbia. Also, insufficiently diversified exports (over 60% of goods are exported to EU countries) can be a problem if the growth of European economies slows down. Furthermore, high capital volatility in less developed markets can pose a threat to small open economies such as the Serbian economy. However, the key problem is inflation, given the drastic shocks in the market of energy and primary agri-food products, as well as industrial raw materials due to the current global crisis due to the conflict in Ukraine.

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