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IMPLEMENTATION OF CURRENCY INTERVENTIONS OF THE CENTRAL BANK OF ARMENIA WITH FINANCIAL DERIVATIVES

ABSTRACT

Purpose: The main goal of the paper is to develop financial derivatives of the Republic of Armenia (RA) as hedging tools for foreign exchange risk management for financial organizations and other entities. The secondary goal is to substantiate the efficiency and expediency of the use of financial derivatives as alternative tools for the implementation of foreign exchange interventions of the Central Bank of Armenia (CBA).

Methodology: In order to evaluate the currency interventions carried out by the Central Bank of Armenia (CBA), the interventions and their impact were studied by applying causal-comparative analysis and synthesis methods based on the CBA and International Monetary Fund (IMF) data. The most efficient intervention tools were revealed as a result of such analysis. The forward prices were calculated based on the swap intervention data and using the principle of impossibility of arbitrage.

Results: The present study substantiated that the application of a forward contract for difference can ensure the same goals like those pursued by foreign exchange interventions with no impact on foreign reserves and no need for sterilization.

Conclusion: It was proposed to divide the swap agreements used by the CBA into spot and forward, which will ensure the realization of the same goals along with engaging a large number of non-financial companies. At the same time, the application of a forward contract for difference during the implementation of foreign exchange interventions will lead to the development of the financial derivatives market and ensure the matching of foreign exchange cash flows received by businesses in different periods.

Keywords: Derivative financial instruments, foreign exchange interventions, foreign exchange reserves, financial risk management

1. Introduction

During the implementation of economic activity, many risks, including financial risks, are associated with changes in market prices of assets. Financial risk is greater for those companies that are exposed

to foreign currency exchange, for example, capital investments, import or export, etc. Risks related to exchange rate fluctuations need to be recognized, monitored and managed, otherwise the investors and businesses will lose income and the country will lose investment.

To mitigate these fluctuations, the Central Bank of the Republic of Armenia (CBA) carries out foreign exchange interventions by buying or selling foreign currency in the foreign exchange market of the Republic of Armenia. Currency interventions carried out by the CBA can also adversely affect financial market stability and price regulation, thus creating another problem. In particular, currency interventions cause a sharp change in Armenia's foreign exchange reserves, change the reserve adequacy ratio (ARA metric) which may affect the country's international rating, and cause the money supply to change. That is, foreign exchange interventions in the spot market further affect the country's financial system and need to be "sterilized" using other monetary policy tools as repo/reverse repo, etc. It is obvious that the "sterilization" of currency interventions through other transactions causes additional costs for the CBA, and thus for society.

The purpose of the research is to identify the problems arising as a result of CB interventions and to propose the use of such financial instruments that will ensure the achievement of the same goals, excluding the emergence of new problems.

2. Literature review

In terms of real investment, according to Avdjiev et al. (2019), local currency devaluation and the appreciation of the US dollar have a negative impact on the level of real investment in developing economies. As noted by Banerjee et al. (2020), the most important element of GDP growth is investment, particularly by companies, but their level is directly affected by the exchange rate, its changes, which create additional risks for companies.

Foreign direct investment is an important indicator of economic development (Comes et al., 2018). According to Tocar (2018), foreign direct investment is a key factor in ensuring economic growth and technological development, particularly in market economies.

Upadhyaya et al. (2020) and Barseghyan & Hambarzumyan (2018) defined that exchange rate fluctuations negatively affect both long-term and short-term exports as a result of the investments of the economic entities engaged in those spheres.

As mentioned by Carroll et al. (2017), financial risks arising in particular from currency fluctuations incur losses for companies that force companies to refrain from investing. If the magnitude of foreign exchange fluctuations and consequent potential losses were known in advance, the potential inves-

tor could somehow plan for and/or demand a return that could offset possible losses from foreign exchange rate fluctuations. However, the problem is that the range of these fluctuations cannot be accurately predicted, which leads to uncertainty and increases the risk of subsequent activities. In the case of high risk, the investor may demand a higher return, which may offset the risk, or may refuse to invest at all.

In international practice, businesses use derivative financial instruments to hedge against financial risks. Bartram (2019) studied the activities of 6,896 non-financial companies operating in 47 countries around the world. According to Angela & Gabriel (2008), companies are able to control the impact of fluctuations in their exchange rate and interest rate fluctuations by hedging through financial derivatives. Moreover, Carroll et al. (2017) emphasize that company size is a factor significant for the use of interest rate derivatives, while it is not significant for the use of foreign currency derivatives. Currency fluctuations are considered as a possible factor in the use of currency derivatives (Raguideau, 2020). As mentioned by Sikarwar (2018), if companies do not use appropriate financial derivatives for hedging, then unforeseen changes in the exchange rate affect the return on equities and the value of the company as a whole. According to Szlązak (2016), the main way to reduce company's currency risk is to use derivative financial instruments. Gibson (2010) points out that the OTC derivatives market has become one of the most important segments of the financial market over the last thirty years. It ensures the reduction of investment risks, which are used by all sectors of the economy (Duc Hong et al., 2019).

Of course, central banks regularly carry out foreign exchange interventions, which aim to mitigate sharp exchange rate fluctuations. Upadhyaya et al. (2020) state that central banks from time to time intervene to mitigate exchange rate fluctuations. According to Moreno (2005) and Indonesia (2019), a central bank intervenes in the foreign exchange market in order to mitigate exchange rate fluctuations, ensure the liquidity of the foreign exchange market, and change the level of foreign exchange reserves.

As mentioned by Patel et al. (2019), there are several ways for evaluating the foreign exchange reserve level for the country. The IMF declares 4 indexes (Ratio of reserve/ARA metric, Reserves/Broad Money, Reserves/Short-term Debt (STD), and Reserve/(Import/12)) for a country's reserve adequa-

cy, which can be used to assess reserve adequacy and other financial indexes of countries. Foreign exchange interventions by central banks, which change the level of foreign exchange reserves, may affect the published indicators. Therefore, inappropriate change of currency's reserves can have a negative impact on the country's financial performance.

3. Data and methodology

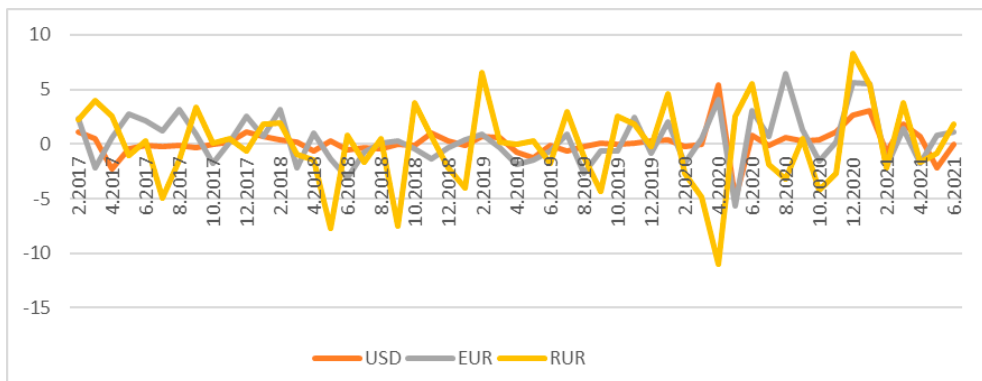
International professional literature, scientific articles, research publications, internet data and publications have been used as a theoretical, informative and methodological basis for the study. Based on the purpose and direction of the article, the causal-comparative method was used. In addition, the methods of scientific analysis, synthesis, generalization and qualitative reasoning were applied at the empirical and the theoretical level. The interventions carried out by the CBA on the RA foreign exchange market and the impact of these interventions on foreign exchange reserves and other financial indicators were identified by applying positive and normative analysis. The impact of these interventions, the possibilities of using alternative instruments on the financial market and the possible effects on the exchange rate, liquidity, reserve level, as well as the need to sterilize the negative impact of the interventions were studied. For the analysis of the research, a study of international scientific publications was carried out with the aim of identifying the relevance of the topic, as well as the urgency of taking appropriate measures by the governments and policy makers of different countries. The source of research information was the

publications of the International Monetary Fund (IMF), the World Bank, the Bank for International Settlements (BIS), the CBA and other relevant international and local organizations.

4. Analysis

To study the impact of exchange rate fluctuations, it is necessary to consider the volatility of the exchange rate of the US dollar, the euro and the Russian ruble, since the Armenian economy has mostly economic relations with investors interested in those currencies. During the last 5 years, the exchange rate of the US dollar has changed about 0.8% per year on average during the observed period, but the exchange rate has changed about +/-5% on a monthly basis, which means that depending on when to invest and when the repayment of interest and investment was made, an investor's income can change up to 5% on a monthly basis, and on a daily basis this change can be much higher. The problem becomes more significant for investors who register their assets in euro (EUR) or in rubles (RUR), since in the case of these currencies, an investor's cash flows in euros can change on a monthly basis by +/-6.5% on average, and in the case of ruble +/-11%. Such a change in the amount of cash flows received for foreign currency investments can have a significant impact on investment decisions, especially if we take into account that the current rate of return on investment is quite low. In the event that there is a probability of losing some amount from the investment, the investor should demand an appropriate compensation, which may be reflected in an increase in interest rates.

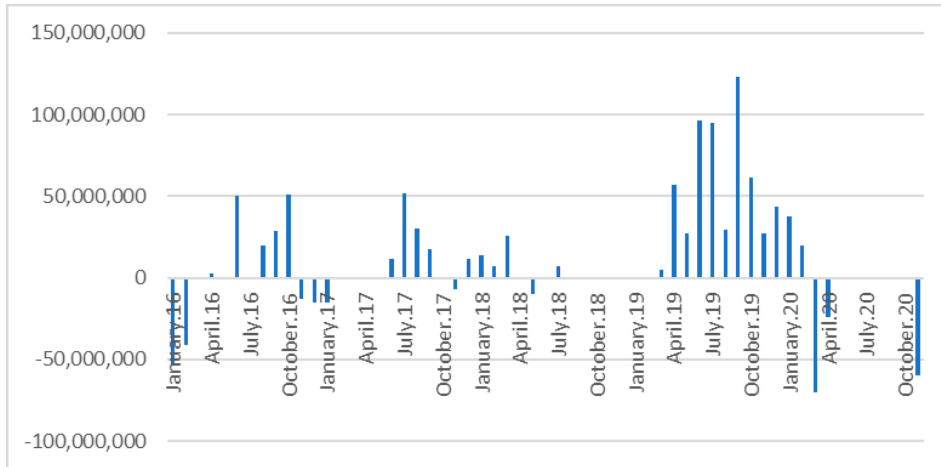
Figure 1 Monthly exchange rate fluctuations of US dollars, Russian rubles, and Euros, 2017-2021/06, expressed in percentage



Source: Calculated and compiled by the author (data source: Central Bank of Armenia - www.cba.am)

In order to mitigate exchange rate fluctuations, the CBA regularly implements currency interventions that affect the amplitude of exchange rate fluctuations.

Figure 2 Intervention of the CBA in the spot currency market 2016-2020 (USD)

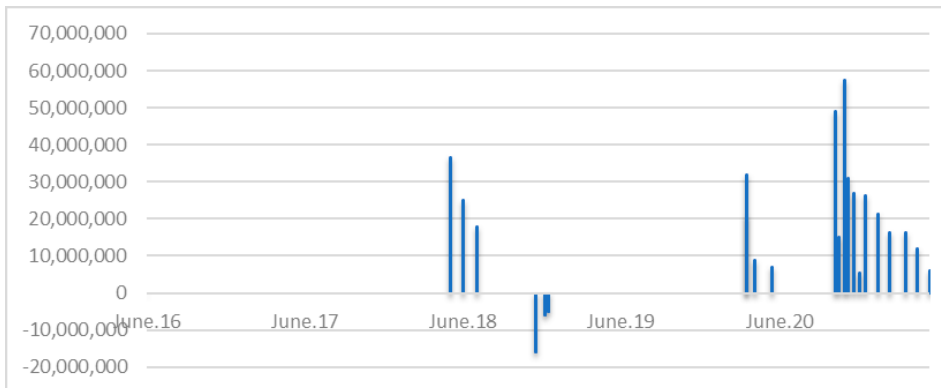


Source: Composed by the author (data source: Money Market - <http://moneymarket.am>)

Interventions with swap instruments are an alternative to the interventions carried out by central banks in the cash market. Archer (2005) states that central banks in developing countries conduct 82% of their currency interventions through the spot market. Based on surveys of 22 central banks in developing countries, Patel & Cavallino (2019)

note that 85% of the total volume of interventions in 2012 was in the spot market, and in 2018, their share decreased to about 78%. That is, the share of derivative financial instruments is growing slowly but surely. The CBA conducts regular interventions, mainly by concluding transactions on the cash market, and sometimes uses swap agreements.

Figure 3 Swap transactions of the CBA for 2016-2021/05 (USD)



Source: Composed by the author (data source: Money Market - <http://moneymarket.am>)

It can be seen from the diagram that the CBA mainly reduced foreign exchange liquidity on the foreign exchange market by carrying out foreign exchange swaps. Foreign currency swaps are or-

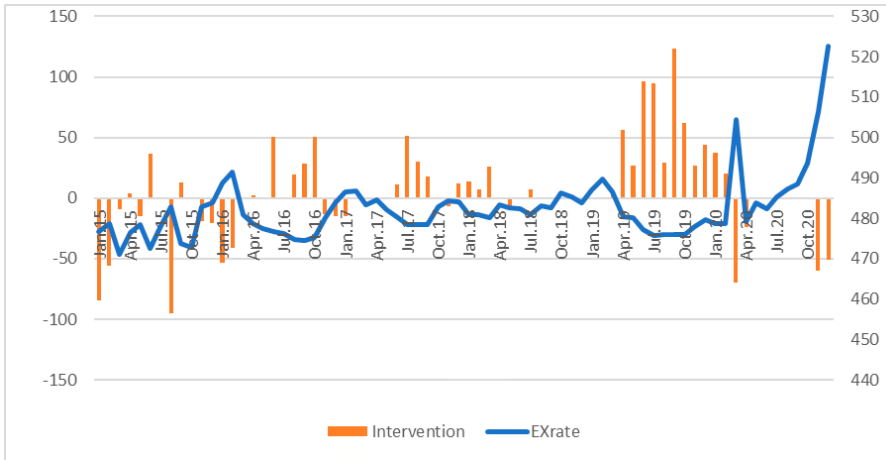
ganized on the principle of repo agreements, attracting foreign currency at a fixed exchange rate, with the condition of future return and payment of fixed interest.

The study of the volumes of swaps shows that they are not performed regularly. For example, in 2019, swaps did not take place at all, and in 2020-2021, the CBA attracted foreign currency and reduced market liquidity. In terms of cash interventions, in 2018 and in 2019, the CBA bought net USD 44

million and USD 565 million, respectively, while in 2020, it sold USD 36.1 million.

In any case, it is obvious that the interventions carried out by the CBA have an impact on foreign exchange rates.

Figure 4 Foreign exchange interventions of the CBA and the USD/AMD exchange rate 2015-2020



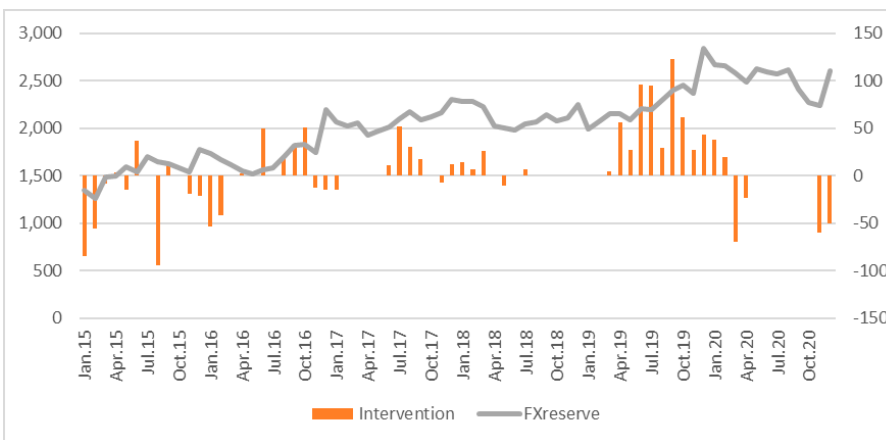
Source: Composed by the author (data source: Money Market - <http://moneymarket.am> and the Central Bank of Armenia - www.cba.am)

The Central Bank of Armenia carried out interventions in the foreign exchange market, the volumes and impact of which on the US dollar exchange rate are also presented in the IMF Country Report No. 21/273.

The interventions implemented by the Central Bank may affect other economic indicators, which may have negative effects. In order to avoid such negative

effects, central banks implement sterilization, which requires additional efforts and actions. As a result of foreign exchange interventions, central banks use foreign currency reserves. The interventions carried out by the CBA affect foreign exchange reserves of the country, because reserves increase or decrease sharply during the interventions.

Figure 5 CBA interventions and FX reserves 2015-2020 (million USD)



Source: Composed by the author (data source: Money Market - <http://moneymarket.am> and the Central Bank of Armenia - www.cba.am)

The level of foreign exchange reserves and its change can have a positive or negative impact on the credit rating of the country, which in turn affects the cost of financing from external sources (government or private) and the ability to withstand external shocks to the economy. At the same time, maintaining foreign exchange reserves requires costs (including alternative costs) associated with investing in low-yield assets.

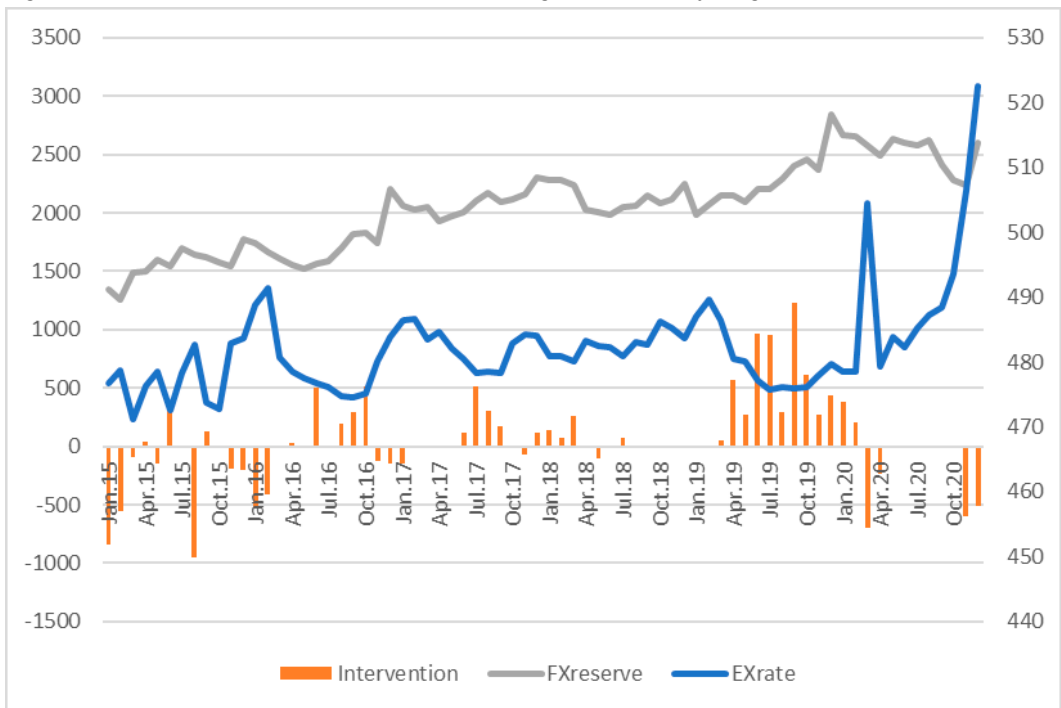
Central banks have disagreements about the tools of intervention and their publicity, which stems from the purpose of the interventions. This is explained by the effect of central bank interventions on the exchange rate and the effect of publicity on the expectations of market participants, and thus on the present and future exchange rate (Nedeljko-

vic & Saborowski, 2019). From the above, it can be concluded that the ability to influence the expectations of market participants is an important factor in the process of influencing exchange rate fluctuations.

As mentioned by Patel & Cavallino (2019), the main medium-term goal of central bank intervention is to mitigate exchange rate fluctuations, influence exchange rate levels, ensure market liquidity, and limit the impact on international investment.

CBA interventions can be compared with the level of foreign exchange reserves of the RA, in order to get an idea about the impact of CBA interventions on the foreign exchange market and on the level of the country's foreign exchange reserves.

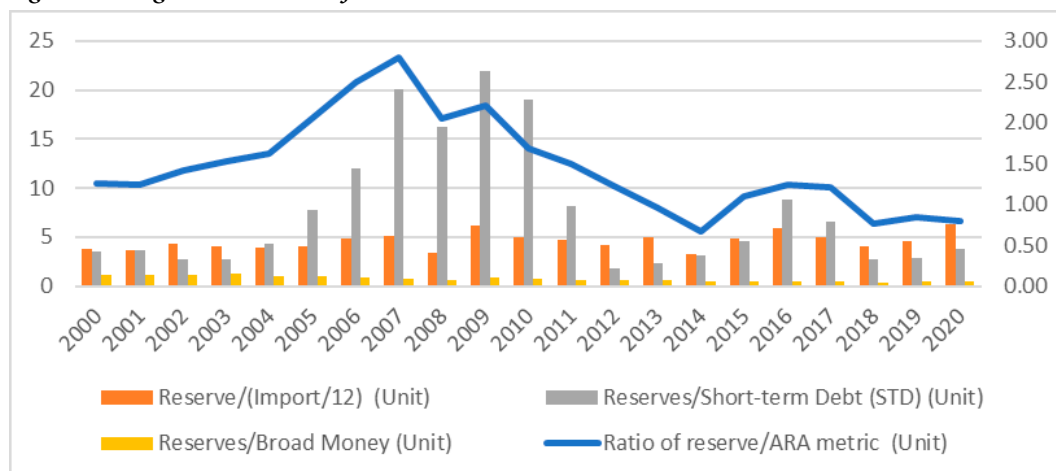
Figure 6 CBA Interventions, the USD/AMD exchange rate and RA foreign reserves 2015-2020



Source: Composed by the author (data source: Money Market - <http://moneymarket.am> and the Central Bank of Armenia - www.cba.am)

The IMF published four indicators to assess foreign exchange reserves of the countries. One of the most important indicators published by the IMF is the reserve adequacy ratio (ARA metric), which assess-

es a wide range of risks associated with the capital outflows reflection in the balance of payment (Arslan & Cantú, 2019).

Figure 7 Foreign reserve ratios of the RA 2000-2020

Source: Composed by the author (data source: the International Monetary Fund - <https://www.imf.org>)

It can be seen from the graph that the ARA metric of the RA reserves (assessment of reserve adequacy) is about 0.8, which is significantly lower than the level of the benchmark (1-1.5). It is obvious from the diagram presented above that the CBA should be careful when using reserves, or it would be more expedient not to use foreign exchange reserves for interventions.

Financial derivatives can be alternative tools during foreign currency market intervention. The development of the derivatives market can give an opportunity to intervene without using foreign exchange reserves. The use of derivatives by the CBA can have a positive impact on both the mitigation of exchange rate fluctuations and market liquidity. The CBA can influence foreign exchange rate fluctuations,

without significantly changing the reserve level. In order to mitigate exchange rate fluctuations, it is more appropriate to carry out currency interventions publicly, as the central bank will also have the opportunity to influence the expectations of market participants. A variety of intervention tools can be used for market interventions (sterilized or non-sterilized) in accordance with monetary policy of the CBA, which may affect the situation on the financial market or, conversely, have no effect at all.

Table 1 compares the possible impact of tools (cash and derivatives) used by central banks for currency interventions in the exchange rate, market liquidity, foreign exchange reserves, and the necessity to make other interventions to sterilize the negative impact of foreign currency market intervention.

Table 1 Currency intervention tools and their impact

Tool	Application	Impact			
		Smoothing currency rate fluctuations	Providing liquidity in the foreign exchange market	Saving foreign exchange reserves	Excluding the need for sterilization
Currency foreign exchange deals	CB buys or sells foreign currency	Yes	Yes	No	No
Combination of foreign exchange spot transactions with forwards	CB buys/sells on the foreign exchange spot market and sells/buys on the forward market	Yes	Yes, temporarily	Yes, temporarily	No
Currency swap	CB exchanges currency under the condition of future exchange	Yes	Yes, temporarily	Yes, temporarily	No
Forward contract for difference (CFD)	CB buys/sells currency forward, the final settlement of which is made in local currency.	Yes, as it effects the expectations and supply or demand	Yes, as it effects expectations and supply or demand.	Yes, currency is not paid	Yes, as the differences are not as big as the entire contract

Source: Compiled by the author

As already mentioned above, in order to regulate foreign exchange rate fluctuations, the CBA mainly uses cash intervention and sometimes foreign exchange swaps. Swaps are used in the RA by the repo principle, i.e., buy or sell on spot market and sell or buy in the future with the payment of a certain interest.

Swaps are widely used tools in financial markets that are still evolving, which is why they appear in new forms. But at the same time, swaps are quite complex instruments unlike other derivative financial instruments and require a lot of experience and knowledge, especially if we consider that swaps are a combination of several forward contracts (according to another approach, a swap is a combination of two bonds, one of which is long and the other is short). This is the main reason why non-financial companies are not interested in this tool. As we can see from the table, the use of swaps solves the problem of exchange rate fluctuations, liquidity and reserves, but temporarily, because at the end of the swap period the party has to trade in the cash market to fulfill the obligations under the swap agreement. Swap agreements concluded by the Central Bank of the Republic of Armenia have a period of 1-2 months, which implies that the situational ten-

sion in the foreign exchange market is postponed for the period defined by the swap agreement. If the tension in the currency market is not eased by the end of the swap, the Central Bank of Armenia can only offer one more swap and so on. In any case, the regulation of the situation in the market is set and still remains on the country's foreign exchange reserves. As an alternative, forward contracts can solve the problem of reducing currency risks in the same way, because as mentioned above, a swap is a set of several forwards. In addition, the table shows that the combination of spots and forwards and the use of swaps have the same effect on the selected indicators. A cash transaction solves the problem of reducing exchange rate fluctuations and market liquidity at the moment, and the presence of a forwards ensures the replenishment of reserves on an accrual basis, and forwards also regulate the demands of market participants, which are based on expectations.

As we can see from the given table, the CBA can get the same result both by using swaps and by combining cash and forwards. But what is the difference between using these two tools and what perspectives do forward contracts provide? Swaps are concluded and traded exclusively in the inter-

bank market, and in the case of a combination of cash and forward transactions, a forward contract concluded on the interbank market can be resold to the bank's customers, as a forward contract is more accessible and understandable to non-financial participants. The emergence and development of such a market will ensure that businesses enter into transactions in the forward market to hedge their future cash flows. At the same time, a new financial instrument will appear in the financial market, which can become a separate subject of buying and selling and which can activate the financial market, attracting new participants from the non-financial sector, who expect future foreign exchange inflows and want to fix the exchange rate.

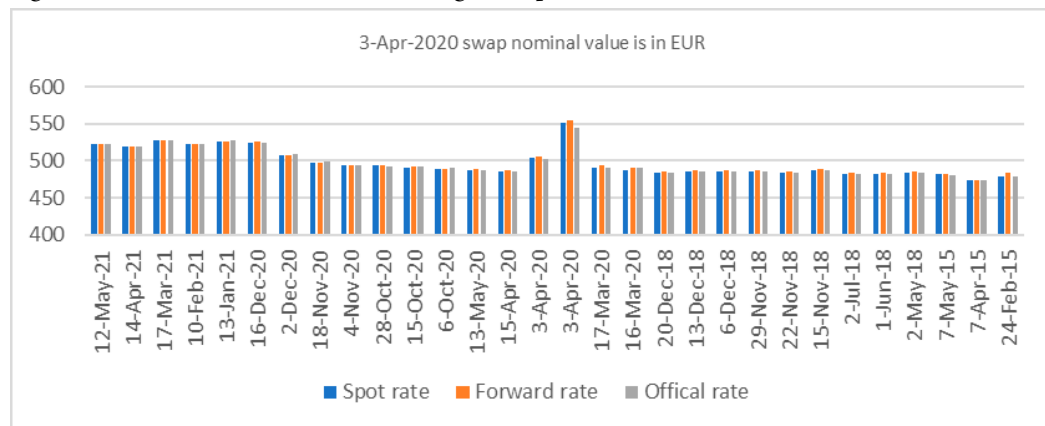
Another option are forward contracts for difference. Forward contracts based on difference create new opportunities. In this case, the final settlement will be made in cash AMD, foreign exchange reserves will not change at all as a result of those interventions and there is no need to sterilize the consequences of the intervention. Forwards can be concluded for the period of three or six months, but also for any other period, which will smooth out time inconsistencies in foreign exchange flows. Forwards are simpler than swaps, and they are more visible to businesses. Of course, the CBA does not have direct transactions with non-financial organizations; in this case, commercial banks can be intermediaries between non-financial organizations and the CBA. As can be seen from the table below, the swap tool does not affect foreign exchange reserves only temporarily, since it assumes return of foreign currency injected into the forward market, which may create a new demand for foreign cur-

rency, which can be alleviated only by selling or buying foreign currency from reserves or by creating new swaps. At the same time, by quoting the prices of forward contracts, the CBA will encourage leading banks to carry out appropriate quotations and involve non-financial organizations in the derivatives market. By including non-financial organizations in this market, it will be ensured that over time the foreign exchange inflows of the economy are adjusted through market mechanisms without the participation of the CBA.

It is also possible to develop a forward market with cash settlement. These tools also have no impact on foreign exchange reserves and their use allows to mitigate exchange rate fluctuations. This tool can never show the need for sterilization. However, the use of this cash settled forward is more efficient for market participants in the sense that the absence of foreign exchange transfers during the execution of forward contracts allows the parties to the transaction to reduce operating costs associated with the supply of foreign currency. The use of simpler types of derivatives by the CBA will contribute to the development of this market.

The study of swap transactions of the CBA shows that the CBA has and can offer a forward price to the market. When determining the forward exchange rate, the Central Bank may apply the no-arbitrage principle. Based on data of swap contracts implemented by the CBA, forward exchange rates were calculated using the no-arbitrage principle. The forward price of the US dollar calculated on the basis of swap market interventions is presented in the following graph.

Figure 8 Forward rate calculated according to swap 2015-2021



Source: Calculated and compiled by the author

The announcement of such a price would give greater strength to currency interventions, inform market participants about the future market situation and form certain expectations for the future. Most importantly, however, participants would have the opportunity to hedge their financial risks by signing forwards. In addition, in order not to suffer losses due to price fluctuations, some participants may execute a future transaction now, increasing market tension. The separate use of a forward as a financial instrument affects the expectations of market participants, allows them to hedge their risks and reduce their participation in increasing the tension in the foreign exchange market.

5. Conclusion

The development of the financial derivatives instrument market has great importance for the financial markets. Derivatives not only serve as an effective hedging tool for businesses operating in different sectors of the economy, but also provide information about the future market situation and expectations of market participants, increasing the efficiency of the financial market. Scientific studies show that a developed derivatives market allows businesses to agree on their future plans, secure their future supply or acquisition of any assets and eliminate future uncertainties.

The paper examines the interventions carried out by the CBA in the foreign exchange market, revealing their impact on the exchange rate and market liquidity. In addition, the study reveals the impact of foreign exchange interventions on the country's foreign exchange reserves, whose compliance is at a low level (ARA metrics ratio 0.8), while the benchmark level set by the IMF should be 1-1.5, which affects the country's creditworthiness level and the cost of attracting public and private sector loans. This is why the saving of foreign reserves during the implementation of currency interventions is of vital importance for the country's economy. To this end, the following recommendations have been implemented and substantiated:

1. Swap agreements implemented by the CBA can be divided into two parts: spot and forward. Having a separate forward contract will allow market participants to circulate it independently by forming a derivatives market, where they can hedge their finan-

cial risks, form expectations and avoid future uncertainties.

2. The existence of forward contracts and their independent circulation will enable the easing of tension in the foreign exchange market, the influence on the expectations of market participants, as well as the inclusion of future foreign exchange businesses flows in current transactions.
3. The use of forward contracts for difference (CFD) during the implementation of currency interventions will help the CBA to save the country's foreign exchange reserves and exclude drastic changes in the level of foreign reserves, as well as not cause the need for sterilizing the negative consequences of foreign exchange interventions by using other monetary policy tools.

The analysis presented in this article has some limitations. Although graphical analysis of the data provides an insight into the expressive relationship between the variables, it is possible that the changes in the exchange rate and the level of currency reserves are related to other variables, especially the balance of trade and payments, the state of the activity of borrowing money from foreign markets, etc. Due to the lack of data, the studied indicators were considered on a monthly basis in the last 5 years. For greater efficiency, it is necessary to study a longer period based on daily data.

The research results are useful for businesses that may need to avoid foreign exchange risks by using derivatives, and for financial market regulators or policy-makers.

Future research can assess the impact of interventions on the exchange rate and foreign exchange reserves, the impact of the level of reserves on the rating of the country by creating a linear regression model, which will enable the justification of the need to save reserves during the implementation of interventions. In addition, future research could explore the feasibility of using a forward contract for difference or other derivatives to mitigate exchange rate fluctuations without the need to sterilize the consequences of interventions.

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