



# BOSNIA AND HERZEGOVINA

## TECHNICAL ASSISTANCE REPORT—IMPLEMENTATION OF A NEW RESERVE REQUIREMENT FRAMEWORK

October 2019

This Technical Assistance Report on Bosnia and Herzegovina was prepared by a staff team of the International Monetary Fund. It is based on the information available at the time it was completed on September 2019.

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Price: \$18.00 per printed copy

**International Monetary Fund**  
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# **INTERNATIONAL MONETARY FUND**

Monetary and Capital Markets Department



## **BOSNIA AND HERZEGOVINA**

### **IMPLEMENTATION OF A NEW RESERVE REQUIREMENT FRAMEWORK**

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**September 2019**

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**GLOSSARY**

BAM	Convertible mark
BiH	Bosnia and Herzegovina
BNB	Bulgarian National Bank
CBBH	Central Bank of Bosnia and Herzegovina
CESEE	Central Eastern and South Eastern Europe
CRR	Capital Requirement Regulation
ECB	European Central Bank
EONIA	Euro Overnight Index Average
EUR	Euro
FX	Foreign Exchange
HQLA	High-Quality Liquid Assets
IFRS	International Financial Reporting Standard
IMF	International Monetary Fund
LCR	Liquidity Cover Ratio
LOLR	Lender of Last Resort
MCM	Monetary and Capital Markets Department
OMO	Open Market Operations
TA	Technical Assistance
RGTS	Real-Time Gross Settlement
UIP	Uncovered Interest Rate Parity

## PREFACE

In response to a request from the Central Bank of Bosnia and Herzegovina (CBBH), a technical assistance (TA) mission visited Sarajevo, Bosnia and Herzegovina (BiH) during January 16–25, 2019. Mission members included Guido Della Valle and Nikolaus Solonar (both short-term external experts). Romain Veyrune coordinated the mission remotely.

The mission met with Governor Senad Softić; Ms. Lakić, Ms. Bajrović, and Ms. Raspudić, Deputy Governors; Ms. Čolaković, Chief Economist; Mr. Edis Kovačević, Head of the Accounting and Finance Department; Mr. Dejan Kovačević, Head of the Monitoring and Analysis Department; Mr. Pantić, Head of the Risk Management Department; Mr. Rade Jovanović, Head of the Legal Affairs Department; Ms. Vesna Papić, Head of the Financial Stability Department; Mr. Sijerčić, Head of Cash Management Department; Ms. Zavođa, Head of the Front Office Section; Ms. Tubin Vejzagić, Head of the Back Office Section; and other senior staff of the CBBH. The mission also met with the Mr. Nukić, Assistant Director for Bank Supervision at the Banking Agency of the Federation of Bosnia and Herzegovina, and other senior staff of the agency. The mission held meetings with Unicredit Bank, Raiffeisen Bank, and Sparkasse; they met Mr. Škreb from the USAID/Finra project; and held a teleconference with Mr. Mladen Kovačević, Deputy Director of the Banking Agency of the Republika Srpska, and other senior staff of the agency.

The mission wishes to express its gratitude to the authorities and staff of the CBBH, especially for facilitating the mission’s work, for the constructive discussions, as well as for their hospitality and cooperation throughout the team’s stay in Sarajevo.

The mission also wishes to express its gratitude to Francisco Parodi, the IMF Resident Representative in BiH, and to the staff of the IMF Office—Adrian Musić, Sanela Teskeredžić, and Nedžad Fazlagić—for the outstanding collaboration and support provided prior to and throughout the mission.

This report builds on the aide-mémoire that was presented and discussed with the CBBH authorities at the end of the mission.

## EXECUTIVE SUMMARY

**Since 2014, the CBBH has been exposed to a negative spread on the reinvestment of the reserve requirements.** Until 2014, the CBBH remunerated reserve requirements on the basis of the returns achieved on their reinvestment in the euro area money market. In 2014, when the European Central Bank (ECB) cut the deposit facility rate below zero, the CBBH decided not to follow the ECB in the remuneration of reserve requirements and to floor such remuneration to zero. Subsequently, in 2016, the CBBH decided to remunerate excess reserves at 50 percent of the ECB deposit facility rate and to continue remunerating reserve requirements at 0 percent. This exposes the CBBH to a negative spread of about 0.25 percent and 0.45 percent between the reinvestment yield and the remuneration of excess reserves and reserve requirements, respectively.

**The negative spread in a context of structural lower returns on foreign exchange reserves and sizable capital inflows has led to a gradual and steady erosion of the currency board coverage ratio.** The local legal tender, the convertible mark (BAM), is fixed to the euro in the context of a currency board. The coverage ratio, although stabilized in the past few months, remains dangerously close to the 105 percent threshold, which is considered the minimum to preserve a comfortable buffer above the hard 100 percent lower limit. This calls for measures aimed at enhancing CBBH financial efficiency. In this context, the CBBH requested Technical Assistance (TA) to review its reserve requirement framework.

**First, the mission recommends aligning the remuneration of reserve requirements on foreign exchange (FX) liabilities to the CBBH's opportunity cost.** Because this would represent a neutral remuneration rate with respect to banks' foreign currency intermediation costs, it would halt the potential for arbitrage and the consequent adverse impact on the currency board coverage ratio.

**Second, the mission recommends prescribing the fulfillment in foreign currency of the reserve requirements for foreign currency liabilities.** This is not a prerequisite to alter the remuneration scheme but would contribute to encouraging domestic currency intermediation and facilitating banks' liquidity management if reserves are held in the same currency in which the reserve base is denominated. It would also make it conceptually and operationally easier to differentiate the reserve requirement policy variables per currency while contributing to the overall stability and resilience of the financial sector.

**Third, the mission recommends altering the remuneration scheme of domestic reserve requirements.** In particular, to be neutral from an intermediation perspective, the reserve requirement remuneration should be aligned to the market-neutral uncovered interest rate parity (UIP) rate, whereas the remuneration of excess reserves may take place significantly below the market-neutral rate but at or above the foreign currency remuneration rate. In this context, the excess reserve remuneration rate could play the role of the main policy lever to

manage capital flows. Differentiated remuneration for domestic versus foreign currency allows the CBBH to better defend the currency board arrangement compared to the current practice of treating domestic and FX reserves in the same manner.

**The mission has assessed and estimated the possible effects of the proposed framework on capital flows, profitability, the currency board coverage ratio, interest rates, and cash in circulation.** As a large portion of foreign deposits in BiH banks supports regulatory requirements, the withdrawal of these deposits would likely be limited and gradual. The new remuneration scheme would help to safeguard the CBBH's financial sustainability and improve the coverage ratio, which could be further boosted by any reduction of foreign deposits. It is estimated that the adoption of the new framework would not cost the banking system more than BAM 4.3 million, relative to 2018 profits of about BAM 300 million. It could, however, improve its resilience over time.

**There are no operational or legal impediments to the implementation of the framework.** The mission recommendations can be implemented within the current legal framework, and an effective solution can be found to the different settlement, accounting, reserve management, and payment system issues that the implementation of the new framework would entail.

**The mission recommends a stepwise phase-in of the new framework with sufficient preparation lead time.** It can start from the change in the remuneration of FX reserves immediately and can be concluded by the change in the domestic reserves' remuneration.

**Careful and powerful communication of the new framework is critical for its effective and smooth implementation.** The CBBH should engage in a proactive communication effort with the financial community on the rationale of the updated framework, its features, and the end goal at the conclusion of the transition phase. In its public communication, the CBBH should underscore the framework's cost neutrality in which it will simply pass on the costs it incurs to the banking system with the ultimate objective of strengthening the currency board as well as better harmonizing with the practices of peer central banks in the region. Finally, the enhanced resilience of the financial system by supporting the use of BAM and the effectiveness of the CBBH monetary policy framework are important further considerations for the financial community.

**The CBBH may benefit from additional TA in the implementation of the updated framework.** First, the CBBH may benefit from IMF comments on the draft regulation with which the new framework could be defined and could be completed remotely. Second, the CBBH may benefit from TA on the operationalization of the reserve requirement accounts in foreign currency and the refinement of the reserve management activities. Each could take the form of a TA mission. Finally, the CBBH may benefit from a constructive dialogue with the Area Department or TA to set the new rates of remuneration of domestic reserve requirement and excess reserves.



**Table 1. Key Recommendations and Action Plan for Implementation**

<b>Recommended Actions</b>	<b>Timing<sup>1</sup></b>
<b>The reserve requirement framework</b>	
Align the remuneration of reserve requirements deriving from banks' foreign currency liabilities to the CBBH opportunity cost	Immediate
Prescribe the fulfillment of reserve requirements for foreign currency liabilities in foreign currency	ST
Differentiate the remuneration of the required reserves and excess reserves in domestic currency, with the former set at the market-neutral, UIP-consistent estimated rate and the latter below that to create a sizable interest rate corridor	MT
Introduce a differentiated requirement ratio based on the residual maturity of the liabilities	MT
Introduce minimum daily required reserves, lengthen the maintenance period, and modify the sanctioning regime (when the central bank law will be changed)	LT
Implement the various changes in the following sequence: change the remuneration of reserve requirements for FX deposits; prescribe the fulfillment of reserve requirements for foreign currency liabilities in foreign currency; and alter the remuneration scheme for domestic reserve requirements	MT
<b>Operationalization of the reserve requirement framework</b>	
Coordinate the implementation of the new reserve framework with the banking agencies in the two entities	Immediate
Reconsider, in coordination with the banking agencies, the 100 percent risk weights on euro exposure toward BiH sovereign risk under the new local capital requirement regulation	ST
Establish a reserve requirement account in foreign currency	ST
Develop the reconciliation procedures between the overall account balances and the subaccount per bank to be kept and monitored internally	ST
Refine the banks' reporting templates and the frequency thereof to calculate the reserve requirements per currency	Immediate
Define a detailed stepwise implementation plan with the sequencing of the various actions to be taken and the allocation of responsibilities to the different units for each deliverable	Immediate
Hold a consultation with the banking system to present the updated reserve requirement framework, its rationale, its features, and the implementation timeline	ST
<b>Additional recommendations</b>	
Introduce a cost-recovery fee on foreign exchange conversion transactions performed by the CBBH with commercial banks	ST
<sup>1</sup> Time frame refers to the expected time for completion of recommendations, with Immediate referring to three months, short term (ST) referring to six months, medium term (MT) referring to six months two years, and long-term (LT) referring to more than two years.	

## I. INTRODUCTION

1. **The CBBH operates a currency board.** Appendix I provides a description of the salient features of the currency board arrangement in Bosnia and Herzegovina. The two most important are: (1) the coverage of monetary liabilities with net FX reserves (this is a binding legal constraint); and (2) the fact within the constraints of the currency board, the reserve requirement is de facto the only monetary policy tool under the control of the CBBH.
2. **Since 2014, the CBBH has been exposed to a negative spread on the reinvestment of its reserve holdings.** Until 2014, the CBBH remunerated reserve requirements on the basis of the returns achieved on its reinvestments in the euro area money market. In 2014, when the ECB cut the deposit facility rate below zero, the CBBH decided not to follow the ECB in the remuneration of reserve requirements and to floor such remuneration to zero for financial stability reasons. Subsequently, in 2016, the CBBH decided to remunerate excess reserves at 50 percent of the ECB deposit facility rate and to continue remunerating reserve requirements at 0 percent. This exposes the CBBH to a negative spread of about 0.25 percent and 0.45 percent between the reinvestment yield and the remuneration of excess reserves and reserve requirements, respectively.
3. **The negative spread in a context of structural lower returns on foreign exchange reserves and sizable capital inflows has led to a gradual and steady erosion of the currency board coverage ratio.** The coverage ratio, although stabilized in the past few months, remains close to the 105 percent threshold, which the CBBH considers an important, nonbinding threshold to preserve a comfortable buffer above the hard 100 percent lower limit. This calls for measures aimed at enhancing the CBBH financial efficiency.
4. **Against this background, the governor of the CBBH requested the IMF's Monetary and Capital Markets Department (MCM) TA to update its reserve requirement framework.** The purpose is to enhance and strengthen the stability of the currency board and of the overall financial sector. The CBBH requested the TA to focus on (1) the operational implications of a new framework discussed with the IMF and developed with a view to removing the arbitrage opportunities and increasing the financial and operational efficiency of the CBBH reserve requirement framework; (2) the implementation modalities of the new proposed framework; and, (3) the CBBH's communication to the public.
5. **This report is organized as follows.** Section II presents the current reserve requirement framework in BiH, its role in the prudential liquidity regulations, and its shortcomings. Section III introduces a new reserve requirement framework in line with the concepts outlined in Appendix II. Section IV discusses the operational implications of the new framework, including the desirable regulatory amendments and the settlement issues concerning the accounts in which reserves should be held. Section V considers the implementation of the new framework, including communication and further TA needs.

## II. THE CURRENT SETTING AND SHORTCOMINGS

### A. The Reserve Requirement Framework of the CBBH

6. **The central bank law defines several parameters of reserve requirement framework.** The law specifies the reserve base, the method of reserve fulfillment, the length of the reserve maintenance period, and the sanctioning regime in case of banks' noncompliance with the requirement obligation. The law also prescribes full averaging of reserve requirements over a 10 calendar-day period. The law provides for regulations to be issued by the central bank regarding the reserve requirement ratio and remuneration.
7. **The reserve base encompasses all deposits and borrowing, regardless of the currency.** The reserve base is split fairly evenly between local currency and foreign currency, with BAM 13 billion in local currency and BAM 10.1 billion denominated in foreign currency (predominantly euro). The share of the reserve base denominated in BAM has increased steadily from 37 percent in 2008 to 56 percent in 2018.
8. **The reserve requirement ratio is currently set at 10 percent of the reserve base without distinction of currency or maturity.** The ratio of reserve requirements is set by the Governing Board of the CBBH. While the current ratio is uniform across currencies and maturities, in the past, the reserve ratio distinguished between liabilities with a maturity below one year and liabilities with a maturity over one year. From 2008 to 2016, the latter were subject to a lower ratio with a view to encouraging long-term bank funding. However, it was based on contractual rather than residual maturity and provided scope for circumvention via early termination clauses applied to long-term deposits. Regarding the currency, although the ratio has never differentiated between currencies, the central bank law would allow the ratio to be differentiated per currency if needed.
9. **All reserves are held in local currency at the CBBH.** Banks maintain their reserves exclusively through reserve accounts at the CBBH denominated in BAM. The reserve accounts are also connected to the CBBH Real-Time Gross Settlement (RTGS) payment system.
10. **The remuneration for required reserves is 0 percent, while excess reserves are remunerated at -0.2 percent.** Prior to 2014, the rate on required and excess reserves was set relative to the euro area overnight index average rate (EONIA), reflecting the CBBH's return on the investment of FX reserves and administrative costs. In 2014, with the introduction of negative deposit facility rates in the euro area, the CBBH set the remuneration of all reserves to 0 percent to isolate the BiH market from negative rates and the risk of adverse financial stability consequences. The current remuneration was put in place in July 2016 after the ECB lowered the deposit facility to -0.40 percent in March 2016.

## B. Shortcomings of the Current Framework

11. **Remunerating reserves above the return of short-term euro area assets exposes the CBBH to a negative spread, eroding its profitability and endangering the currency board coverage ratio.** Excess reserves, since they need to be available on demand and can be highly volatile, should be invested in short-term, high-quality assets. Hence, the CBBH is exposed to a negative spread of about 35 basis points between the remuneration of excess reserves and the yield of short-term, highly creditworthy euro assets in which these reserves could be invested. In addition, in theory, due to the full averaging provision, banks may also use part of their required reserves to cope with liquidity shocks. However, it is likely that the large excess reserves are sufficient to cope with this risk. Therefore, the CBBH treats required reserves as more stable funding that could be invested in longer dated assets. If this were not the case, the remuneration policy cost for the CBBH would be even greater.

12. **Compensating the reserve remuneration cost with extra credit and interest rate risks taken in other parts of its foreign exchange reserve portfolio may be a risky and self-defeating strategy.** It induces greater volatility in the coverage ratio and may lead to a coverage ratio drop in case of market upheaval and turbulences when a comfortable coverage ratio is needed the most.

13. **The current market conditions do not change the fundamental assumption about the CBBH opportunity cost.** The CBBH opportunity cost continues being represented by the return of short-term euro area assets. In a negative interest rate environment, the CBBH may decide to take extra interest, credit, and liquidity risks in search of higher yields. Such strategy may pay off as long as the risk on mode prevails. But the extra yield should not be passed on to the banks. The CBBH bears the risk and should reap any extra yield.

14. **The current remuneration scheme may have cost the CBBH approximately BAM 7.7 million in 2018.** Excess reserves, accounting for BAM 2.8 billion, generated BAM 5.1 million through the 0.2 percent negative interest rate charge. Assuming the corresponding amount of foreign reserves was invested in very short-term assets (such as overnight deposits) at -0.50 percent, this would have cost BAM 12.8 million, for a loss of BAM 7.7 million. Required reserves, which can be considered more stable in the long term, could be invested in longer duration assets to generate a positive return for the CBBH not to be passed on to banks.

15. **Remunerating reserves above euro area interest rates might attract speculative, short-term capital flows.** These flows may further erode the coverage ratio, as explained in Box 1 of Appendix I.

16. **Remunerating reserves above their opportunity cost reduces banks' intermediation spread at a cost for the central bank.** The opportunity cost of reserves, from a central bank's perspective, is the yield of short-term euro area assets in which reserves can be invested by the central bank. When reserve requirements are remunerated at a rate

higher than the yield of short-term assets, the central bank incurs a cost that results, *ceteris paribus*, in a lower intermediation spread for banks. While there might be specific circumstances in which in the pursuit of monetary and financial stability objectives should be at a cost, such cost cannot be justified beyond the short-term as it may ultimately endanger the key pillar of the CBBH monetary policy framework: the coverage ratio of the currency board. Moreover, from a banks' perspective, without central bank reserves, banks would still need to hold high-quality liquid assets (HQLA) for precautionary and regulatory purposes while incurring even greater costs. Hence, *a fortiori*, a remuneration rate higher than the yield of short-term euro area assets in which reserves can be invested can hardly be justified.

17. **The remuneration of banks' reserves at a rate different from their opportunity cost is distortive from a financial intermediation perspective.** If reserve requirements are remunerated, the "neutral" rate at which to remunerate them is the opportunity cost. If reserves are remunerated substantially below market rates, this acts as a distortionary tax on financial intermediation that banks pass on to borrowers through higher interest rates or to savers and depositors in general through lower deposit rates. If they are remunerated above, it is a cost borne by the official sector, which may allow the banking system to perform its function at more attractive terms than justified by economic and financial conditions.

18. **Prescribing the fulfillment in BAM of the reserve requirements for foreign currency liabilities encourages foreign currency intermediation at the expense of domestic intermediation.** In a system in which reserve requirements on currency liabilities are fulfilled in local currency, all else being equal, the amount of foreign currency loans can be equal to foreign currency deposits. At the same time, domestic currency deposits will be used to fulfill reserve requirements for both currencies, limiting available funds for domestic currency credit growth. Furthermore, the greater provision of loans in foreign currency, via the money multiplier unencumbered by reserve requirements, fuels a greater supply of deposits in foreign currency, thereby ultimately promoting financial system euroization. This is, in fact, one of the reasons many central banks with sizable banking system liabilities in foreign currency require the fulfillment in foreign currency of a significant proportion of the respective reserve requirements. This is illustrated in Box 1.

19. **The money multiplier effect in BiH is mitigated by indexed loans in local currency.** In BiH, many loans are provided in local currency with a currency clause linking loans principal and interest payments to the BAM-EUR exchange rate.

20. **Finally, without additional monetary policy instruments, the current reserve requirement framework can be considered a relatively blunt tool, which cannot be calibrated to target specific macroeconomic variables.** In absence of alternative instruments, the central bank may wish to maximize the flexibility and effectiveness of the tool. This would be the case if, in principle, reserve requirement ratios and remuneration were differentiated per currency, and remuneration of required reserves was differentiated from the remuneration of excess reserves. In such a context, the central bank could better

calibrate the parameters of the framework in the pursuit of its objectives while minimizing the impact on its financial sustainability and on the banks' intermediation function. In particular, the CBBH would be able to influence the cost and attractiveness of holding BAM relative to foreign currency within the corridor determined by UIP and transactions costs. This might be relevant in a scenario in which the CBBH had to defend the currency board.

**Box 1. Currency of Denomination of Reserve Requirements on Foreign Currency Liabilities: Some Examples from the Western Balkans**

In Serbia, required reserve ratios are 5 percent and 0 percent on domestic currency liabilities, with maturity up to two years and longer, respectively, and 20 percent and 13 percent on the corresponding FX liabilities. However, for FX liabilities, 38 percent of the required reserves on liabilities with maturity up to two years, and 30 percent of required reserves on liabilities with maturity over two years have to be maintained in dinar. Therefore, on foreign currency liabilities, 62 percent of the amount of required reserves calculated by applying the ratio to foreign currency sources, with maturity up to two years, and 70 percent of the amount of required reserves calculated by applying the ratio to foreign currency sources, with maturity over two years, need to be held in foreign currency.

The National Bank of Serbia (NBS) initially prescribed the fulfillment in local currency of the reserve requirements on foreign currency liabilities to boost banks' demand for local currency funding sources and drain excess liquidity. Over time, the share of foreign currency reserves to be maintained in local currency has been declining.

In Albania, until the beginning of 2018, the reserve requirement ratio was 10 percent for both domestic currency and foreign currency liabilities, with reserve requirements on foreign currency liabilities to be maintained in euro. At that time, the foreign currency liability ratio was raised to 12.5 percent (with a marginal reserve requirement of 20 percent applied to foreign currency liabilities exceeding 50 percent of the total reserve base) while the ratio on domestic liabilities was lowered to 7.5 and 5 percent for liabilities with a maturity up to 12 months and from 12 months to two years, respectively. Reserve requirements on U.S. dollars liabilities are fulfilled in U.S. dollars since the currency represents a non-negligible share of the total liabilities of the banking system; reserve requirements on euro and all other foreign currency liabilities are fulfilled in euro.

However, for 12 months, the Bank of Albania prescribed the fulfillment of the reserve requirements on foreign currency liabilities in foreign currency up to 10 percent of the of the foreign currency reserve base and in local currency for the remainder. The rationale was to prevent and postpone the effect on the banking system domestic liquidity conditions (that is, a reduction in the banking system liquidity deficit), which would have had an adverse effect on the Bank's profitability.

The Croatian National Bank applies a uniform 12 percent reserve requirement ratio on both domestic and foreign currency liabilities. However, 75 percent of the reserve requirements on foreign currency liabilities need to be maintained in kuna and 25 percent in foreign currency.

### C. Interaction with Regulatory Requirements

**21. Reserve requirements do not count as HQLA under local liquidity regulations.**

This boosts the demand for excess reserves as liquidity buffers under the liquidity cover ratio (LCR) and additional domestic liquidity regulations.

**22. Excess reserves represent a substantial part of banks' liquidity buffers.** Under the LCR, excess reserves are recognized as HQLA under local liquidity regulations. The small size of the local government bond market (about BAM 2.5 billion) leaves excess reserves as the only sizable domestic currency level 1 HQLA. However, from a practical point of view, excess reserves are the only effective liquid assets as, in light of the poor

secondary market liquidity for government securities, such securities can be hardly relied upon in case of a significant liquidity shock. Additional liquidity regulations on maturity mismatches also prescribe additional liquidity buffers for liabilities maturing within 30 days. These are usually held in excess reserves.

23. **The aggregate liquidity coverage ratio exceeds 300 percent.** The banking system in the federation recently started reporting the LCR in preparation for compliance under national regulation. Based on preliminary information, banks have substantial liquidity buffers. Most banks in the federation hold above 200 percent while only three are below 200 percent. In Republika Srpska, reporting of the LCR has not yet started. The latest impact assessments indicate that all banks would have a ratio above 100 percent.

24. **FX term liabilities are used to comply with a maturity mismatch regulation.** According to this regulation, banks need to have 85 percent of liabilities maturing within 30 days covered by assets maturing within 30 days. Banks struggle to attract term funding in BAM and, therefore, hold on to FX term funding, largely from their foreign parent. This explains the persistent recourse to funding from nonresidents. It also explains a bias toward intermediation in foreign currency for which long-term loans can be better covered by long-term funding in the same currency.

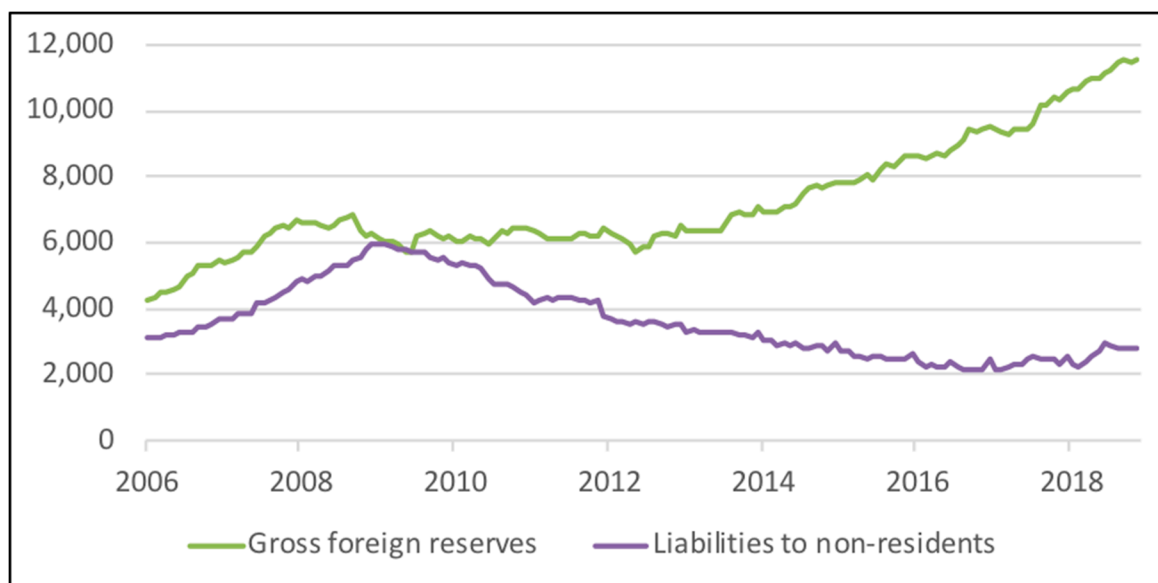
25. **While attracting deposits from non-residents for regulatory purposes, some banks also need to place a significant amount of funds with nonresidents due to large exposure limits.** Reserves with the central bank are considered equivalent to exposure to a non-sovereign borrower, and these are capped to 25 percent of the banks' regulatory capital according to group risk policy and EU regulation. Balances in excess of the 25 percent threshold are placed with the parent bank or invested in euro-denominated assets.

26. **Banks adjust their net FX open position through indexation of assets and liabilities to euro.** In order to comply with the limit on net FX open position (30 percent of regulatory capital for euro-denominated assets/liabilities), banks have introduced currency clauses into loan and deposit contracts. Initially, this was focused on the asset side, the strong growth of which was funded in foreign currency from the banks' parent. More recently, deposits have been issued with such indexation clauses to replace maturing FX funding.

27. **Overall, banks' funding from non-residents is strongly driven by the need to attract term funding in the absence of sufficient term funding in domestic currency.** The resulting sizable excess reserves are a byproduct of the regulatory environment. Banks have a limited ability to reduce these liabilities through repayment or conversion to domestic currency liabilities in the short term. FX deposits from nonresidents driven by the interest rate differential between the CBBH reserve remuneration rate and the euro area rates do not

seem to represent a sizable source of the observed persistence of deposits from nonresidents,<sup>1</sup> as evidenced in Figure 1. However, it cannot be overlooked that they have also contributed.

Figure 1. Developments in Gross Foreign Reserves and Bank Liabilities to Nonresidents



Sources: IMF and Central Bank of Bosnia and Herzegovina.

### III. AN UPDATED RESERVE REQUIREMENT FRAMEWORK

#### A. The Principles of the Updated Framework

28. **The mission suggests designing the updated the CBBH reserve requirement around the following key principles.** These principles derive from the conceptual framework of the reserve requirement in a currency board presented in Appendix II.

29. **First, reserve requirements in foreign currency should be remunerated at a rate not higher than the respective opportunity cost.** A longer-lasting, higher remuneration would represent a difficult-to-justify cost to the central bank and could fuel destabilizing, short-term, arbitrage-seeking capital flows. Furthermore, the cost deriving from the higher remuneration could jeopardize the central bank profitability, thereby impairing the currency board coverage.

<sup>1</sup> Deposits from nonresidents in BiH, like almost everywhere in Central Eastern and South Eastern Europe (CESEE), had been on a steadily declining trend since the global financial crisis. As euro area banks deleveraged, strong credit growth in CESEE countries abated and foreign banks switched gradually to a model of self-funded local subsidiaries.



30. **Second, reserve requirements should be fulfilled in principle in the same currency in which the reserve base is denominated.** This should apply for all significant currencies accounting for a minimum percentage of the total banking system liabilities. There appears no reason to encourage a systematic currency mismatch in the assets and liability composition, to fuel loan euroization, and to complicate the compliance with the liquidity regulations by enforcing reserves in a currency different from the one in which the reserve base is denominated when a given currency accounts for a sizable part of the total liabilities of the banking system. In fact, in a currency board, while the domestic and the anchor currencies are de facto equivalent, they are not equivalent from a regulatory and risk perspective.

31. **Third, the reserve requirement framework should not encourage foreign currency intermediation at the expense of local currency intermediation.** On the contrary, the framework may be used to promote local currency intermediation and financial stability. This principle has two consequences:

- The remuneration of domestic currency reserve requirements should not be lower than the remuneration of reserve requirements in foreign currency. A lower remuneration would represent a hard-to-justify support by the central bank of intermediation in foreign currency at the expense of intermediation in domestic currency. However, as outlined in the conceptual framework presented in Appendix II, there are several reasons why reserve requirement remuneration in domestic currency should be higher to reflect the country-specific, market-neutral, UIP-consistent interest rate.
- The reserve requirement ratios on foreign currency liabilities may differ from the ratio on domestic liabilities. The latter, however, should not be higher than the former so as not to encourage asset and liability euroization.

32. **Fourth, in a context of structural excess liquidity, the remuneration of excess reserves in domestic currency becomes a key policy variable.** It influences domestic deposit remuneration rates and capital flows. In particular, it should be lifted in case of potentially destabilizing capital outflows toward the market-neutral, UIP-consistent interest rate, while it can be lowered when there are significant excess liquidity and comfortable capital inflows.

33. **Fifth, in a currency board, reserve requirements become the key policy instrument.** The central bank lacks any alternative instruments. It may, therefore, be desirable to preserve the flexibility of the instrument to maximize its effectiveness. This entails the readiness to use the different parameters of the instruments, namely: the ratio, the denomination currency, and the remuneration rate. It also entails to possibly differentiate these parameters for different classes of liabilities, denominated in different currencies or maturities, in the pursuit of relevant policy objectives.

## B. An Updated Reserve Requirement Framework

34. **The following changes are, therefore, proposed for the CBBH reserve requirement framework.** The changes are aimed at aligning the framework with the principles set out in the previous subsection.

35. **First, the remuneration of reserve requirements deriving from banks' foreign currency liabilities should be aligned with their opportunity cost.** There are no compelling monetary policy or financial stability reasons why the CBBH should systematically bear the cost deriving from a reserve requirement remuneration higher than the risk-adjusted yield on the reinvestment of these reserves. This principle is valid when rates are positive, but also when remuneration rates are negative. Avoiding any cost is also necessary to prevent the negative spread and the risk of potentially destabilizing arbitrage-seeking, short-term capital flows. It would also make it simpler for the CBBH to alter the reserve requirement ratio, as the case might be, as the higher ratio would have no adverse financial sustainability implications. In a currency board system, the sustainability of the central bank's financial arrangements has a special dimension because it is a prerequisite for the sustainability of the currency board. While, in the long term, there can be no tradeoff between the pursuit of monetary policy objectives and central bank financial sustainability in any monetary policy arrangement,<sup>2</sup> this principle acquires an even stronger relevance in currency board. The principle can be operationalized in several ways:

- The CBBH may set the remuneration at the ECB deposit facility rate minus a small, fixed spread reflecting the CBBH handling, operational, and administrative costs as well as credit risk. The resulting remuneration rate, at the current juncture, could be -0.45 percent or -0.50 percent.<sup>3</sup> The banks would know the remuneration rate ex ante. The link to the ECB policy rate would be explicit.<sup>4</sup> The CBBH would benefit from any investment return

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<sup>2</sup> In alternative monetary policy arrangements, lack of sustainability means de facto monetary financing, which impairs the pursuit of price stability.

<sup>3</sup> These figures are based on the current ECB deposit facility rate of -0.40 percent and the current market rates. The ECB deposit facility rate is -0.40 percent. However, CBBH, like any other central bank, does not have access to the ECB deposit facility rate, so it can only invest in the euro area money and securities market. Short-term secured euro area money-market rates and short-term yields of highly creditworthy government securities are less than -0.40 percent. The repo fund rates are, at the time of the mission, 0.45 percent. Therefore, -0.45 percent would remunerate reserves at the same market rate banks could achieve in the market, taking into account that the repo rates trade below the deposit facility rate. -0.50 percent could be justified if CBBH wanted to remunerate slightly below market rates to recover its overhead costs. CBBH might apparently minimize the cost by investing in longer dated securities or securities with lower credit rating but the extra yield is a result of extra credit and interest rate risks borne by CBBH, of which it should also reap the benefits.

<sup>4</sup> This could be done by explicitly linking the reserve requirements remuneration to the ECB deposit facility and any change thereof to be applied as of the start of the maintenance period following the ECB rate change.

in excess of the remuneration rate and would bear the cost of any return below the pre-agreed remuneration rate;

- The CBBH may pass on, ex post, to the banks the return on the reinvestment of the reserve requirements in high quality, liquid assets while retaining the extra return deriving from riskier assets. This was the arrangement in place until 2014 when, due to exceptional conditions, it was temporarily halted. Therefore, both the CBBH and the banking system should be well acquainted with it both conceptually and operationally.

36. **The two remuneration arrangements are substantially equivalent.** The explicit link to the ECB policy rate, the circumstance that reserve requirement remuneration is known ex ante to the banks, and that the CBBH reaps the benefits and bears the costs of its investment activities are considered to be benefits of the first remuneration variant. Box 2 provides an example of a central bank that effectively introduced negative remuneration on foreign currency reserve requirements.

#### **Box 2. Negative Remuneration of Reserve Requirements: An Example from the Western Balkans**

The Bank of Albania (BoA) had in 2016 a 10 percent reserve requirement ratio applied on foreign currency liabilities to be fulfilled in foreign currency—U.S. dollars for dollar liabilities and euro for liabilities denominated in euro and other foreign currencies.

While excess reserves were at that time already remunerated at negative rates, euro reserve requirements were remunerated at zero. The cost borne by the central bank was not passed on to the banks for fear of destabilizing disintermediation effects if negative rates had been introduced, and banks had charged negative rates to retail depositors at a time in which euro deposit rates were already at an all-time low.

As the negative interest rate environment persisted in the euro area money market, the BoA decided in September 2016 to charge the ECB deposit facility rate—a rate equal to its estimated opportunity cost—on the banks required reserves in euro and apply a spread of -15 basis points on excess reserves resulting in an all-in rate of -0.55 percent on excess reserves in euro.

The change from 0 percent to -0.40 percent remuneration on euro reserve requirements took place after consultation with the banking system in which the rationale of the measure was explained, i.e., the central bank limited capability to absorb indefinitely the cost and the need to reflect in the euro reserve requirement remuneration the central bank opportunity cost. The change took place in one single step and was effective two months after the initial consultation with the banks.

The change did not have negative market impact. In the two or three months following the change, weighted average deposit remuneration rates declined almost proportionately by 2 or 3 basis points (considering a 40 basis points charge on a 10 percent reserve base, a proportional reduction would have entailed a decline of 4 basis points) from around 0.11 percent to 0.08 percent. Euro deposit growth continued, albeit at a somewhat slower pace, while domestic currency deposits briefly picked up, but both effects were short-lived.

In 2018, the BoA increased the reserve ratio on foreign currency liabilities to 12.5 percent and 20 percent on the share of foreign currency liabilities exceeding 50 percent of total liabilities subject to reserve requirements. Such change would have been hardly possible if the central bank had been exposed to a significant negative carry on foreign currency denominated reserves.

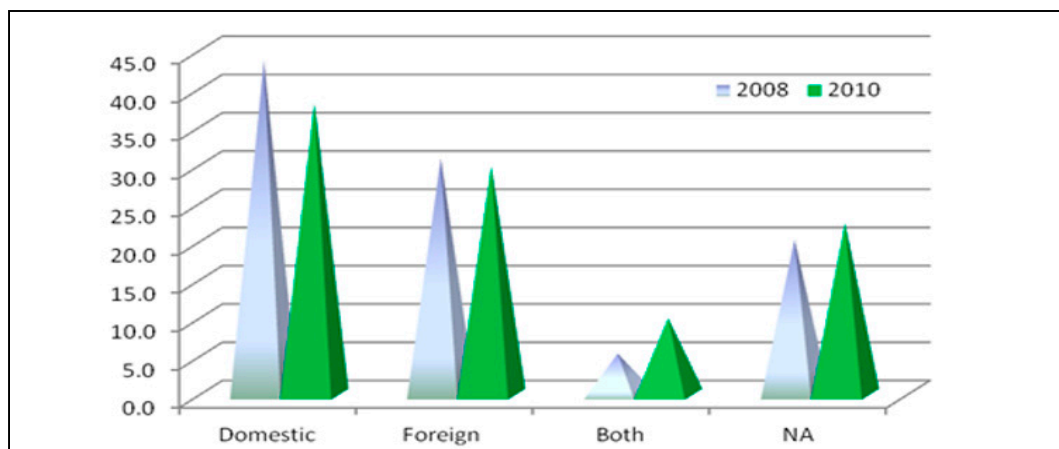
37. **The CBBH might also apply the CBBH opportunity cost to a share of the excess reserves.** Based on the ratio between foreign currency deposits and total deposits, the CBBH may consider a share of excess reserves in BAM as derived from foreign currency deposits and remunerate them at the CBBH opportunity cost. Although feasible, this alternative is not recommended. Banks should be free to choose in which currency they want to allocate their excess reserves. Once banks have reserve requirements' accounts in foreign currency, if they will hold excess reserves on those accounts, it is right that they will be charged the lower remuneration rate, but it is unlikely that they will hold their sizable excess reserves due to the lower remuneration rate.

38. **This alternative would not generate sustainable gains and would seem motivated exclusively by short-term profit considerations.** If pursued, however, the ratio should be calibrated on the bank-specific ratio between foreign currency deposits and total deposits to penalize to a greater extent banks holding a larger share of foreign currency liabilities.

39. **Second, the CBBH should demand that reserve requirements for foreign currency liabilities shall be fulfilled in foreign currency.** The CBBH may prescribe that reserve requirements for any liability (including importantly indexed liabilities denominated in BAM) denominated in foreign currency shall be fulfilled in euro, based on the CBBH cross-currency exchange rate between the foreign currency and euro at a predefined point in time except for significant currencies. Reserve requirements for significant currencies other than euro should be fulfilled in the respective currency. In line with the LCR definition of significant currency, the CBBH can consider significant any currency accounting for more than 5 percent of the total liabilities of the banking system.

40. **Box 1 provides an example of three central banks in the region in which reserve requirements on foreign currency liabilities are fulfilled in foreign currency.** Based on IMF statistics, in about 30 percent of cases (in 2010), reserve requirements on foreign currency liabilities are payable in foreign currency. The percentage increases, however, when the share of foreign currency liabilities is sizable and there is a history of exchange rate instability. This is shown in Figure 2.

Figure 2. Currency of Denomination of Reserve Requirements on Foreign Currency Liabilities 1/



Source: IMF survey of central banks.

1/ In Gray, S., 2011, "Central Bank Balances and Reserve Requirements," International Monetary Fund, Working Paper 11/36.

41. **In the context of the conceptual framework and principles presented in this paper, the fulfillment in foreign currency of the reserve requirements for foreign currency liabilities would serve the following purposes.**

- First, it would reduce the current incentives toward loan euroization. This was described in Section II.B.
- Second, it would make it easier operationally and conceptually to differentiate the reserve requirement parameters per currency. However, as described in Box 2, the reserve requirements parameters such as the ratio and the remuneration rate may be differentiated per currency regardless of any fulfillment in foreign currency of the reserve requirements for foreign currency liabilities. Furthermore, the fulfillment in foreign currency of the reserve requirements for foreign currency liabilities may also be partial, for a portion only of the total reserve requirements for foreign currency liabilities.
- Third, it would encourage a substitution over time of term funding in foreign currency from nonresidents with term funding in BAM from residents. In fact, the latter would become relatively more convenient than the former. Over time, such substitution would increase the resilience of the financial system and reduce regulatory-driven capital inflows and excess reserves.
- Fourth, it would make it easier to enforce the LCR per significant currency. If banks cannot hold reserves in foreign currency, in absence of other domestic HQLA, complying with the LCR per currency becomes difficult.

42. **The third change to the reserve requirement framework that the CBBH should consider is to alter the remuneration policy of domestic currency reserves.** In the initial phases, the CBBH may leave the domestic reserve remuneration unchanged at the current level. Over time, the CBBH should consider a system in which the remuneration of domestic reserve requirements is aligned to the estimated, market-neutral, UIP-consistent interest rate, and the remuneration of excess reserves in domestic currency takes place substantially below that.

43. **A remuneration of domestic reserve requirements at a rate lower than the market-neutral, UIP-consistent interest rate represents a tax on banks' intermediation.** In fact, the market-neutral, UIP-consistent interest rate represents, at least conceptually, the opportunity cost of reserves in domestic currency. A lower rate of remuneration, although it could be perfectly conceivable from a financial stability perspective, widens the intermediation spread and alters the banks' financial incentives against domestic intermediation.

44. **Within this framework, the remuneration of excess reserves would become the key policy variable to manage capital flows.** The remuneration could be lowered to a level not lower than the rate on foreign currency reserves in case of large excess liquidity and short-term, destabilizing capital inflows, whereas it could be increased above the market-neutral rate in case of capital outflows to stabilize the CBBH net foreign exchange reserves.

45. **A sizable difference between the reserve requirements remuneration rate and the rate on excess reserves would also have two advantages.** First, it would stimulate interbank money market activity, as banks with excess reserves would be encouraged to lend them out to banks short of reserves<sup>5</sup>. Second, the remuneration of domestic reserve requirements at a rate close to their opportunity cost, represented by the market-neutral interest rate, would be neutral from a domestic intermediation perspective so that changes in the ratio could be used to manage liquidity conditions without any tightening or loosening monetary impact.

46. **Tables 2 and 3 are illustrations of the possible reserve remuneration rates and reserve requirement ratios under the new framework.** The rates and the ratios are purely illustrative and reflect the current constellation of euro area interest rates. They show prior initial estimations of the UIP-consistent neutral rate conducted by the country team. The calibration of the domestic reserve requirement and excess reserve remuneration rates would require more analysis before the actual decision is taken. The lower ratio on long-term domestic liabilities could be introduced immediately, increasing excess reserves, or,

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<sup>5</sup> Currently, all banks have sizable excess reserves, so an interest rate corridor per se would not be sufficient to stimulate the interbank market unless excess reserves shrank or became more unevenly distributed.

preferably, at the time reserve requirement ratios were to be lifted. In that case, the ratios could be lifted selectively for all categories of liabilities except long-term domestic liabilities.

**Table 2. Reserves' Remuneration**

	Reserve Requirements	Excess Reserves
Local Currency	+0.20%	-0.30%
Foreign Currency	-0.45%	-0.45%

**Table 3. Reserve Requirement Ratio**

	Short-Term	Long-Term
Local Currency	10%	5%
Foreign Currency	10%	10%

### C. Additional Refinements to the Reserve Requirement Framework

47. **The mission also considered additional refinements to the reserve requirement frameworks.** They are hereby summarized.

- **First, the CBBH could reintroduce a differentiated requirement ratio based on the residual maturity of the liabilities.** Until 2016, the CBBH differentiated the reserve ratio on the basis of the contractual maturity of banking liabilities. A lower ratio applied on longer-term liabilities. This was harmonized to 10 percent in 2016. However, local currency funding remains predominantly short term. The steep yield curve presumably reflects high-term premia related to the reported greater reluctance from clients to place longer-term deposits in local currency. This bias encourages banks to issue long-term loans in euro, for which it is easier to raise longer-term funding at affordable rates to comply with the maturity mismatch regulation. A lower ratio on domestic liabilities would offset the client bias, facilitate raising longer-term funding in local currency, and encourage loans in local currency. The ratio should be based, however, on residual maturity.
- **Second, the CBBH should consider the introduction of minimum daily reserve requirements.** The daily minimum should apply particularly on foreign currency reserve requirements to facilitate their reinvestment, taking into consideration that banks do not need averaging on 10 percent of their liabilities in foreign currency. This change would, however, require a change in the central bank law to be within the scope of this mission, which that focused on possible refinements within the context of the current law.
- **Should the law be amended, the CBBH should also consider lengthening the maintenance periods beyond the current 10 calendar-day period and amending the**

**noncompliance sanctioning regime.** It is understood that both these changes have already been discussed but are dependent on the amendment to the Law.

#### **D. Introduction of a Foreign Currency Conversion Fee**

48. **The CBBH also requested TA on the possible introduction of a foreign currency conversion fee.** The mission is of the view that a small conversion fee to recover the costs related to the foreign currency conversion services offered to the banks is reasonable. It would be consistent with the pursuit of financial efficiency and the cost recovery principle with which services to the banking system should be offered. In the context of the updated reserve requirement framework, a small cost recovery fee would minimize the extent to which banks could arbitrage reserve requirements in different currencies to take advantage of the higher remuneration on domestic liabilities.

49. **The CBBH could consider a flat per-transaction fee.** The flat fee would be consistent with the cost recovery principle, as the CBBH's own processing costs do not depend on the FX transaction size. Its value could be easily calculated as the headcount and the information technology cost of the platform for FX transaction processing divided by the number of transactions per year. It should be seen as the most obvious option if a fee is introduced.

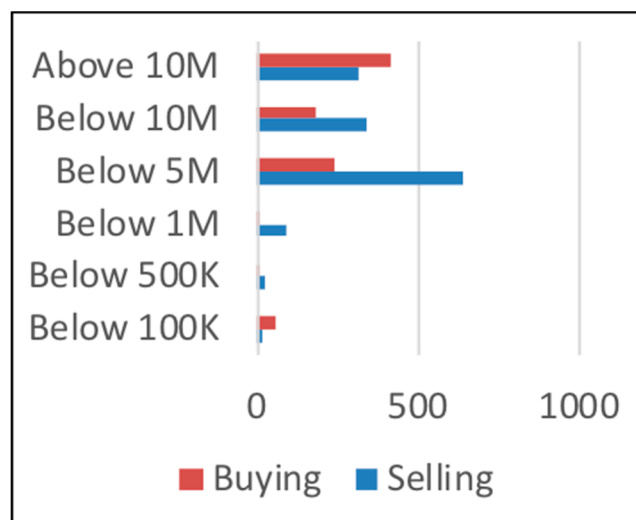
50. **A value-based fee is not recommended.** In fact, it would be equivalent to the introduction of a buying and selling spread, which would be more difficult to justify in the context of a currency board.

51. **A possible refinement of the flat fee is a fee schedule based on transaction size.** Under a fee schedule, there would be a discrete number of fees applied to transactions in different size buckets. This could address the regressive nature of a flat fee, which would weigh disproportionately on smaller transactions. While a flat fee may rightly penalize banks conducting an inefficient number of small transactions rather than using their FX reserve account and the averaging option, it would also penalize smaller banks. If the fee schedule were chosen, the number of size buckets should be kept to a minimum.

52. **In 2018, the bulk of transactions were greater than BAM 1 million in size.** There were 2,314 transactions conducted, an average of 9 per day, and 2,122 of those transactions were greater than BAM 1 million. There were 654 instances where the same bank was both buying and selling BAM on the same day. This is illustrated by Figure 3.



Figure 3. Size Distribution of CBBH FX Transactions in 2018



Sources: Central Bank of Bosnia and Herzegovina and authors' calculations.

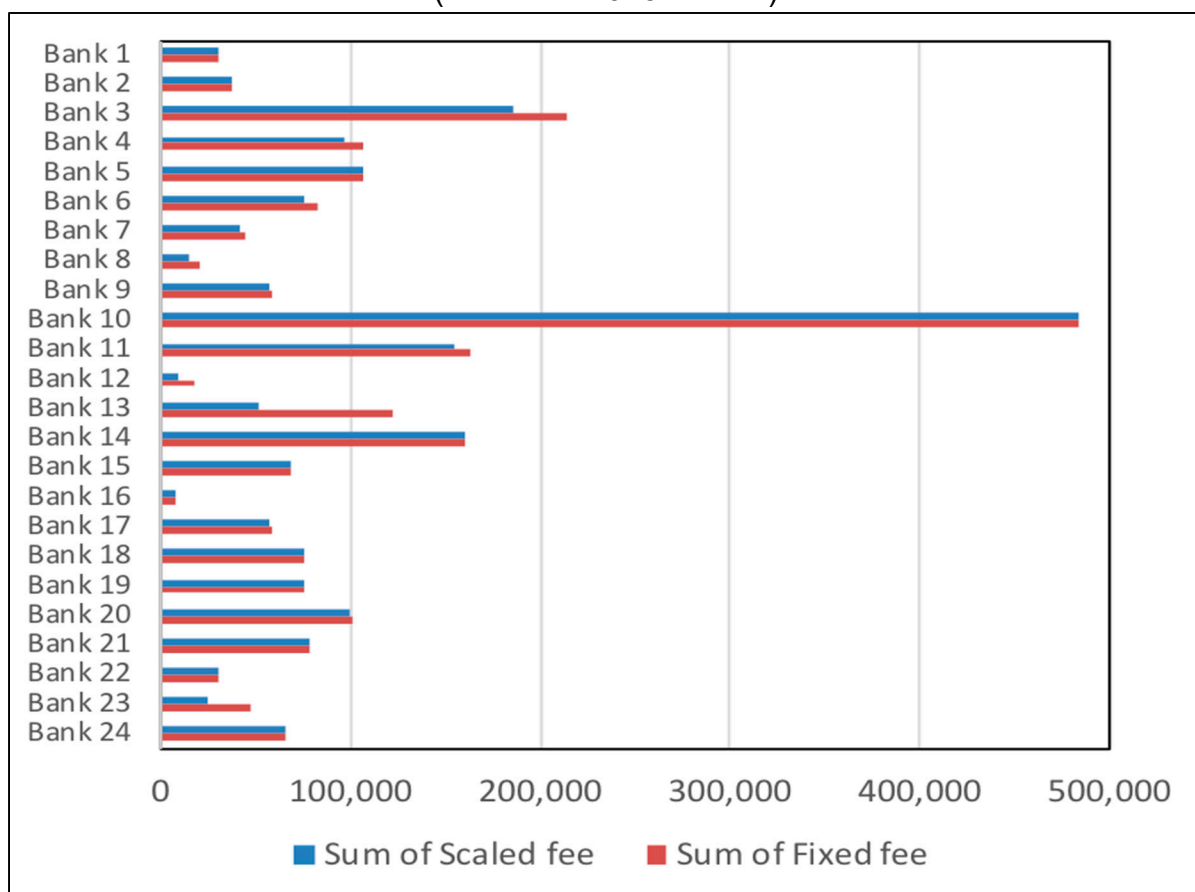
53. **A flat transaction fee of BAM 1,000 would have generated BAM 2.2 million in 2018.** Based on transaction data in 2018 (and assuming not more than one buying and selling transaction per day per bank), the average transaction cost would be 0.01 percent of the transaction amount yet would reach 0.14 percent for one specific bank conducting many transactions for small amounts.

54. **Within a fee schedule, a reduced fee of BAM 100 for transactions smaller than BAM 1 million would reduce the burden for small banks.** The transaction fee of BAM 1,000 could be maintained for larger transactions. This would reduce the maximum cost per bank to 0.06 percent of its transacted amount without affecting the overall fee-generated revenues or average transaction costs.

55. **Considering the proposal to update the reserve requirement framework, the availability of a FX reserve account with averaging would allow banks to reduce their costs further.** Banks could economize their FX transactions with the CBBH by drawing down or over-fulfilling their FX reserve requirements and transact with the CBBH toward the end of a reserve period to equalize deviations from their reserve requirements.

56. **Banks might also use the framework to allocate at the end of the maintenance period all their excess reserves to BAM if excess reserves in foreign currency were penalized from a remuneration perspective.** The small FX conversion fee would rightly penalize this arbitrage, reduce its scope, or make it more expensive. The effects per bank of the two transaction fee arrangements are displayed in Figure 4.

Figure 4. Simulated Transaction Fees per Bank in BAM  
(Based on 2018 Trades)



Sources: Central Bank of Bosnia and Herzegovina and authors' calculations.

### E. Estimated Impact of the Updated Reserve Requirement Framework

57. **The updated reserve requirement framework might have an impact on CBBH profitability, on capital flows, on the currency board coverage ratio, and on banks' interest rate margin as well as on deposits and loans interest rates.** The potential impact on these variables is analyzed in the next subsections.

#### Capital Flows

58. **Capital flows are estimated based on the following assumptions.** Resident deposits are sticky with limited elasticity to marginal changes in the deposit remuneration rates. Deposits from nonresident are theoretically driven by three factors: (1) funding strong domestic lending growth beyond the growth rate of domestic deposits. This was a factor during the past decade, but it is unlikely to have any impact nowadays; (2) arbitrage-seeking flows to arbitrage the remuneration differential between CBBH excess reserves and the ECB deposit facility. This is also unlikely to have any major impact, as regulatory costs of cross

border flows are likely to offset any potential gain. Based on anecdotal evidence collected by the mission, such a factor is unlikely to play any major role; and (3) regulatory reasons.

59. **Longer-term foreign currency deposits have substantial regulatory value for banks.** They are needed to comply with the maturity mismatch regulation. They are thus unlikely to diminish unless they can be substituted by term BAM deposits. This process is unlikely to take place quickly; it can only take place over the medium term and only to a limited extent given the low elasticity of BAM term-deposits for little changes in the interest rate differential. However, should this substitution take place, the resilience of the banking system would be enhanced, nonresident deposits would decline, and excess reserves would be reduced. Such a substitution process could be encouraged if complemented by a lower requirement ratio on long-term BAM liabilities.

60. **Short-term deposits from nonresident banks in foreign currency (mainly intergroup) may diminish to the extent that they don't fulfill regulatory needs.** The amount of short-term liabilities with maturities up to one year to nonresident financial institutions in foreign currency is about BAM 850 million. They may include deposits with a maturity between 30 days and one year, which have a lower but not insignificant regulatory value, as well as some arbitrage-seeking flows. A decline of these deposits may be seen as beneficial, as they have limited value in supporting credit growth while these outflows would numerically improve the currency board coverage ratio.

61. **If all deposits from nonresidents in foreign currency that are not needed to satisfy regulatory requirements were repaid, total deposits from nonresidents would decline by BAM 930 million.** This estimate is based on a bank-by-bank assessment of deposits from nonresidents and the maturity structure of their assets. It is important to note that this is an upper, extreme estimate, which assumes that all nonresident deposits not needed for regulatory reasons would be repaid, and banks complied only with the minimum regulatory ratios without any buffer above the minimum. Furthermore, any reduction would be gradual over time in light of the maturity profile of the deposits.

62. **The change in the remuneration scheme is unlikely to have any significant impact on placements with nonresidents either.** Placements with nonresidents are mainly driven by regulatory reasons, although a non-negligible part could be explained by portfolio flows in search of higher return via investment in Central Eastern and South Eastern Europe (CESEE) government securities. Second, the proposed remuneration scheme would not make short-term, high-quality euro area assets more attractive than the CBBH excess reserves to engender any sizable excess reserve reallocation. This would also be the case if excess reserve remuneration on domestic reserves were lowered to -0.30 percent. Third, portfolio outflows may be compensated by inflows if banks repatriated current placements to fulfill their new reserve requirements in foreign currency.

63. **Capital outflows are therefore estimated to range between 0 and BAM 850 million.** BAM 930 million represents a theoretical upper limit in an adverse scenario in which all deposits from nonresidents not needed for strict regulatory compliance were redeemed. Outflows are, however, much more likely to be in the lower end of the BAM 0 to BAM 850 million range.

64. **Experience from 2016 corroborates the mission assessment that there would be no significant drop in the CBBH international reserves or FX liabilities.** The experience from 2016 is illustrated in Figure 1. FX liabilities declined slightly after the transition from zero remuneration to -0.20 percent, in line with the prevailing trend, but have picked up since.

65. **The mission's assumption of limited capital flows is further corroborated by international experience.** Bulgaria's experience when it lowered the reserve remuneration to -0.60 percent is illustrated in Appendix III. It should, however, be pointed out that such experience is extreme, as it brought the reserve remuneration below the level of short-term euro area assets yields, thereby inducing capital outflows. Albania's experience when the remuneration of reserve requirements in euro was lowered to -0.40 percent is presented in Box 2. Such experience is much more comparable to the proposed remuneration scheme and the same change in the remuneration policy in 2016 in BiH.

### **CBBH Profitability**

66. **The financial result of the CBBH would have improved from BAM 8.8 million to BAM 13.2 million with the proposed change in the remuneration of reserve requirements on foreign currency liabilities.** The improvement is based on the lower remuneration paid on the FX reserve requirement, diminished by the outflows described earlier. The estimate does not include one-off software change costs or staff costs.

67. **If the CBBH, in the first phase, also applied the lower remuneration of FX reserve requirement to a share of excess reserves; this could generate extra BAM 2.63 million per annum.** This would be the case if the lower remuneration were applied to the current excess reserves based on the share between foreign currency deposits and total deposits. However, the gain would likely be short-lived, as banks will not hold sizable excess in foreign currency once they have a reserve requirement account in foreign currency and can choose in which currency excess reserves can be held.

68. **If the CBBH also changed the remuneration of domestic reserve requirements, this would impact their profitability only marginally.** The net results would improve by BAM 200,000, as the higher remuneration on required reserves would be offset by the lower remuneration on excess reserves. Such an estimate is based on the assumption of a BAM required reserve remuneration rate of 0.20 percent and an excess reserve remuneration rate of -0.30 percent, as presented for illustrative purposes in the Tables 2 and 3.

## Currency Board Coverage Ratio

69. **Based on 2018 data, the coverage ratio would improve by 4 basis points under the scenario of no capital flows and by 54 basis points under the extreme capital flow scenario.** Under the no capital flow scenario, monetary liabilities and the CBBH foreign exchange reserves would remain unchanged, and the lower remuneration of reserve requirements would improve the CBBH yearly financial results. Under such a scenario, the coverage ratio would increase from 105.81 percent to 105.85 percent. Under the extreme scenario, monetary liabilities would decline by BAM 930 million, and the coverage ratio would increase to 106.39 percent.

## Banks' Net Interest Rate Margin and Deposit Remuneration Rates

70. **The effects on the bank interest margin depend on how the extra reserve requirement cost is passed on.** In principle, banks pass on the cost to depositors in terms of lower deposit remuneration rates. If this were the case, euro deposit remuneration rates would decline by 0.045 percent (or 10 percent reserve requirements times 0.45 percent remuneration differential). However, while based on the current remuneration rates, banks have scope to pass on part of the cost to term deposits, and the scope is limited for euro sight deposits already remunerated close to zero. If banks cannot recover the small extra cost indirectly, via higher account fees and cannot recover the cost via a widening of the intermediation spread and higher lending rates, they will absorb the cost via their net interest margins.

71. **As a consequence, the change in remuneration of FX reserve requirements is expected to have a negligible impact on banks' net interest margins.** The upper ceiling of the cost of the banking system would be BAM 4.3 million if the whole cost were absorbed via the net interest rate margin. This represents slightly more than 1 percent of the total banking system profit. However, banks would try to recover the cost primarily via their intermediation margin in foreign currency, which could widen up to 4.5 basis points and via indirect costs and noninterest income.

## Effects on Currency in Circulation

72. **Effects on domestic currency in circulation could take place via two channels.** Depositors could decide to convert their bank holdings into physical cash if deposit remuneration rates were no longer attractive enough. Banks could decide to convert their excess reserves into physical cash to avoid the negative charge.

73. **Cash hoarding from depositors will not take place.** This conclusion is underpinned by several reasons. First, banks are wary based on commercial consideration to pass on any cost to customers who may engender any deposit flight, so the cost is likely to be passed indirectly via higher fees and only if the fees will not endanger clients' retention. Second, customers have alternatives to lower short-term deposit remuneration rates, such as investing

in longer dated deposits. Third, the overall effect on euro deposit remuneration rates should not exceed 4.5 basis points, a change too small to engender any asset reallocation. Fourth, BAM deposit remuneration rates should not change, at least in the first phase, and should not change by more than 1 basis point in the second phase if the excess reserve remuneration rate will be changed as suggested.

**74. Banks' cash hoarding is unlikely and, even if it took place, it would be manageable.** It is true that central banks have limits to the extent to which they can charge negative rates on bank reserves without engendering a large-scale conversion into cash if excess reserve charges exceeded cash storage and insurance costs. It is also true that such costs may be lower in developing economies relative to the cost in advanced economies, where negative rates on reserves were pushed further down, as cash storage costs may be lower in developing economies. However, the effects of the proposed change are expected to be tempered by the following considerations:

- The proposed framework will not affect BAM reserve holding costs in the first phase, and it will affect it in the second phase only marginally. Therefore, in the first phase banks cannot avoid the charge by converting FX reserve holdings into BAM cash, and in the second phase a change of 10 basis points is too small to engender any large-scale conversion;
- There are diseconomies of scale to cash hoarding. According to several anecdotal feedbacks, cash hoarding costs increase more than proportionally as cash holdings increase. New storage units may need to be built. Insurance companies may not be ready to insure large holdings, or they can increase their premium. For contingency reasons, holdings need to be allocated to several storage units and the security features of each storage unit enhanced;<sup>6</sup>
- Regulators may disincentivize cash hoarding and increase its cost. They can, for instance, withdraw large denomination banknotes typically used for cash hoarding or can penalize banks for increases in banknotes' demand beyond the trend prior to the change. The regulators can also penalize the treatment of physical cash from a regulatory perspective.

**75. International experience and the CBBH experience in the past support this assessment.** Negative rates in the region and beyond were lowered below the level suggested

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<sup>6</sup> See for instance, Moser, T., *Monetary Policy below the Zero-Lower Bound*, in Della Valle G., E. Themeli, and R. Veyrune, 2018, *Negative Euro Area Interest Rates and Spillovers on Western Balkan Central Bank Policies and Instruments*, publication of the proceedings of the conference co-organized by the IMF in 2017: "In particular, we figured out that insurance costs for paper currency are not easily scalable, because insurance companies put limits on how much cash they are ready to insure per unit, be it a safe or a vehicle. You cannot take a truck or a vault and fill it to the top with banknotes and get full insurance. The insurance company will only insure a certain amount per truck or vault. As a consequence, the costs for storage and insurance are higher than usually assumed. In addition, it is logistically and administratively cumbersome to store and handle large amounts of cash, as you have to deal with anti-money laundering regulation, and so on."

in this report without engendering any large-scale conversion. This is the case in Switzerland, at -0.75 percent, but also in Bulgaria, more recently at -0.60 percent. As regards BiH, an increase in the currency in circulation could be observed in 2016, following the lowering of the remuneration on excess reserves, but in November 2018 the 12-month growth rate of 9.6 percent is consistent with the average annual growth rate of 9.4 percent preceding the change in 2016. At that time, remuneration rates on reserve requirements for both domestic and foreign currency liabilities remained unchanged.

#### IV. THE NEW FRAMEWORK: OPERATIONAL IMPLICATIONS

**76. The operational implications of the new framework are analyzed from the legal, regulatory, settlement, compliance, payment system, reserve management, and accounting perspectives.** Possible stepwise implementation modalities are also discussed.

##### A. Regulatory Implications

**77. The new framework does not require legal changes.** It may be established within the context of the current central bank law via the CBBH regulation. The current law allows the CBBH to differentiate among the currency in which the reserve requirements need to be fulfilled, the remuneration rate, and, if needed, the requirement ratio as a function of the currency in which the reserve base is denominated.

**78. The introduction of required reserves in foreign currency will lead banks to adjust the currency composition of their assets or liabilities.** To remain within net FX open position limits, banks will either have to increase their FX-denominated deposits—or in BAM with a currency clause—or reduce FX-denominated assets.

**79. Banks could also repatriate foreign placements.** Banks have about BAM 2.2 billion in foreign currency deposits with nonresidents. Banks would have the option of transferring these deposits to fulfill FX reserve requirements without impacting on their regulatory ratios.

**80. The effects on the LCR depend on the assets that banks will use to comply with the reserve requirements in foreign currency.** It would, however, give banks more options to comply with the LCR per significant currency as prescribed by the new liquidity regulation and will give the CBBH via the remuneration level more options to steer capital flows via the arbitrage between excess reserve remuneration rates and FX asset yields.

**81. It is recommended to reconsider the 100 percent risk weights on euro exposure to BiH sovereign risk under the new local capital requirement regulation (CRR).** According to the new local CRR, risk weights on sovereign exposure in foreign currency will be gradually lifted to 100 percent. Under such regulation, after the transitory regime, once risk weights are lifted to 100 percent and reserve requirements on foreign currency liabilities are entirely fulfilled in foreign currency, the impact on banks' capital will be about

BAM 120 million, approximately 3.7 percent of total regulatory capital. The mission recommends reconsidering the scope of the application to euro exposure, at least with the central bank. If there were different risk weights applied to banks' deposits in BAM and euro with the central bank, this in fact would contradict the rationale of the currency board and the rationale of regulation that, in such an arrangement, should correct pricing distortion across currencies and not introduce them.

## **B. Settlement Implications**

**82. The fulfillment in foreign currency of the reserve requirements for foreign currency liabilities requires banks to transfer foreign currency to a CBBH foreign currency account and requires the funds to be made available to the banks upon their demand within the limit of their balance.**<sup>7</sup> Two options have been considered.

**83. Under the first option, all reserve requirements are maintained in one single CBBH account over which the CBBH has exclusive operating authority.** The account may be held with a commercial bank or with a central bank. Banks would need to transfer their funds there, and the CBBH would need to be ready to transfer the funds back to the correspondent account of the commercial banks. To minimize CBBH operational burden, there could be a stipulation according to which the CBBH may execute a maximum of one transfer a day per bank from the CBBH account to the bank correspondent account by a predefined deadline. Transfer instructions received after the deadline could be executed only on a best effort basis. Funds available from the account after the deadline for the execution of payments could be invested by the CBBH according to the different modalities discussed in following subsections.

**84. Under the first option, the CBBH would need to internally track the funds per bank and reconcile them with the total balance held on the CBBH account.** This could take place via the transfer instructions from the banks on which the CBBH would need to be copied.

**85. The first option would have resource implications for the CBBH.** Extra resources would be needed for payment processing and account reconciliation. Information technology systems might need to be enhanced to facilitate the reconciliation process and the maintenance of operational subaccounts per bank internally.

**86. Under the second option, the CBBH would open a reserve requirement subaccount per bank owned by the CBBH over which commercial banks would have operating authority to execute outward payments.** Under this option, the CBBH would

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<sup>7</sup> This reflects the current full averaging approach and the absence of any daily minimum reserve requirement. Therefore, on any given day, a bank can fully use all its available reserves as long as they comply on average during the 10-day period with the requirement.



not need to allocate resources for payment processing and account reconciliation. Banks' daily reserve balances would simply be the end-of-day closing balance of each subaccount. Banks themselves would execute payments and could execute as many payments per day as needed. Account maintenance fees and transaction costs could be automatically charged on each subaccount, thereby transferring them onto the banks.

87. **Although conceptually appealing, as less resource intensive, this second option has several drawbacks.** First, it would make it more difficult to reinvest the available overnight account balances, scattered across several subaccounts. Second, it would require the negotiation of a more complex account management relationship with the correspondent bank. This might delay the implementation process. Third, it is likely could be possible only with a commercial bank and not with a central bank.

88. **The CBBH may, therefore, start with option one and consider over time the switch to option two.** Option one, in fact, would allow a rapid implementation. In light of the experience gained and a better assessment of the resource implications and the perceived benefits of option two, a switch to option two may be assessed at a later point in time.

### C. Compliance Implications

89. **The CBBH would need to refine the bank reporting templates and the reporting frequency to calculate the reserve requirements per currency.** This implies that banks report liabilities per currency to calculate reserve requirements in domestic currency and foreign currency, respectively. It also requires the use of cross rates between euro and the foreign currency at a predefined point in time (e.g., cross rates at the end of the period for which requirements are calculated) to calculate euro reserve requirements on foreign currencies other than euro.

### D. Payment System Implications

90. **The opening of reserve requirement account(s) in foreign currency and the fulfillment in foreign currency of reserve requirements on foreign currency liabilities do not force the CBBH to offer payment and clearing services in euro.** Several central banks have reserve requirements in euro but do not offer any domestic clearing services in euro. The provision of such services should always be the result of a CBBH policy decision taking into account an assessment of pros, cons, and costs.

91. **The opening of reserve requirement account(s) in foreign currency may, however, facilitate the processing and reduce the costs of domestic payments in foreign currency if the CBBH ever decided to enable them.** This seems to be the case especially if the CBBH operationalized settlement option two with a subaccount per bank. Under this option, a domestic payment in euro could take place as a transfer entry from a CBBH subaccount operated by one bank to another subaccount operated by another bank.

## **E. Foreign Exchange Reserve Management Implications**

92. **The implementation of the updated reserve requirement framework would also have implications on the modalities with which foreign exchange reserves are managed.** These implications would depend on the settlement options adopted and how they are operationalized as well.

93. **Under the updated framework, part of the FX reserves corresponding to reserve requirements could be invested on a term basis, whereas the remainder and excess reserves could be invested overnight.** The most volatile part of the FX reserves corresponding to (1) excess reserves; (2) the maximum amount of reserves averaged during the maintenance period estimated at a high confidence level; and (3) the maximum possible change of the reserve requirements from one maintenance period to another should be invested overnight, as it needs to be available at all times to meet banks' demands.

94. **Overnight investment could take place according to different modalities.** The CBBH could invest the funds itself after the cutoff time for bank payments; it could agree with the correspondent bank to an automatic investment facility in which available funds are invested overnight in a reverse repo backed by high-quality collateral. Both the Eurosystem and commercial banks offer these automatic investment facilities. The CBBH would need to investigate their precise modalities. A third option would be to leave the funds on the correspondent account overnight. The choice from among the three options should take place on the basis of return, risk, and operation burden considerations.

95. **In case the CBBH decided to have a reserve requirement account with a commercial bank, it should decide whether to agree to a daily sweeping procedure to transfer the balances from the commercial bank account to a central bank account.** The balances would be automatically transferred back the following morning. The sweeping process would be aimed at minimizing the overnight, uncollateralized credit risk with a commercial bank. It would be prudent to implement it if it were decided not to reinvest the available funds overnight but leave them on the account.

96. **If the CBBH decided to implement the settlement option with multiple subaccounts, one per bank, the reinvestment process would be complicated.** First, it would become more difficult to enforce a payment cut-off time after which balances are available to be reinvested since banks have direct operating authority. The investment process could be delayed until it became unpractical. Second, the balances on the different subaccounts would probably need to be consolidated first before any reinvestment could take place, either directly from the CBBH or via an automatic investment facility. Last but not least, the daily sweeping procedure could also be complicated. It is unlikely that it could take place between multiple subaccounts and one single Eurosystem account or vice versa. So, it is more probable that the different subaccount balances would need to be consolidated before the sweeping process. On the following morning, when the funds were returned, they would

need to be apportioned again among the different subaccounts. It is difficult to anticipate at this stage whether the whole procedure will be accommodated by the different external parties involved.

## **F. Accounting Implications**

97. **The implementation of the proposed reserve requirement framework should not pose major accounting challenges.** Changes required can be easily implemented and do not represent an implementation hurdle. The fulfillment in euro of reserve requirements for foreign currency liabilities will replace a domestic monetary liability on the CBBH balance sheet with a foreign currency monetary liability. Depending on the chosen solution, a process should be in place to ensure that the foreign exchange reserve requirement account balance(s) are in line with the respective general ledger balances.

## **V. IMPLEMENTING THE NEW FRAMEWORK.**

### **A. A Phased-In Approach**

98. **The updated reserve requirement framework requires a careful phase-in with an appropriate sequencing of steps involving several departments at the CBBH.** The mission recommends the following sequencing:

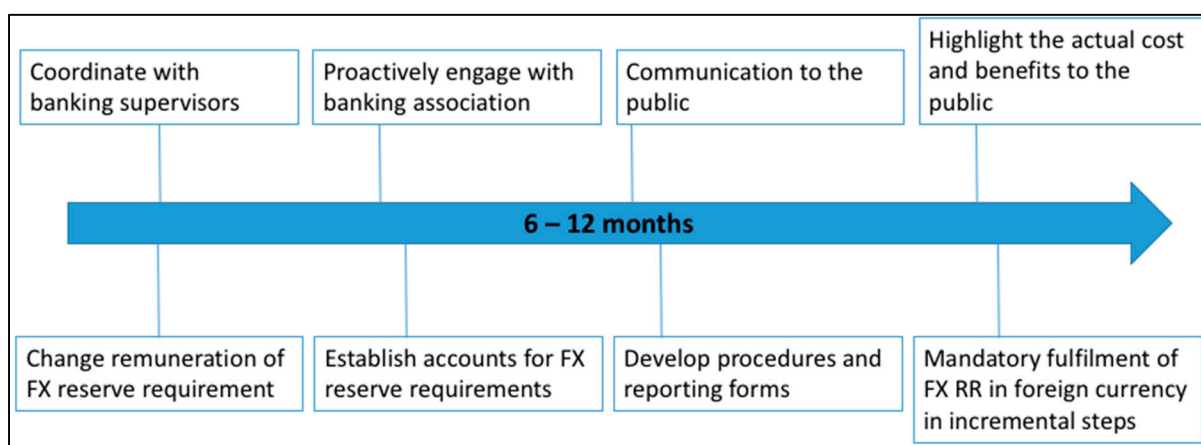
- i. **Engage with the banking supervisor in each entity early in the process.** Although the CBBH maintains ownership of the framework, it is important to secure at an early stage the cooperation of the banking supervisors to share the reform agenda and the objectives pursued. Cooperation may also be useful to conduct any impact assessment as well as in the implementation and enforcement process;
- ii. **Involve the banking system through proactive engagement and communication.** The CBBH is the ultimate decision maker; however, the new framework could be better accepted and understood if its rationale, its features, and its implementation modalities were communicated early on, giving banks an opportunity to voice their concerns. Central banks' consultations usually take the form of a consultation paper or of a workshop organized with the banks. A workshop with a short presentation can be better in BiH. Banks can have an opportunity to express doubts and concerns about risks, but this should not prevent the central bank from moving forward;
- iii. **Change the remuneration scheme of reserve requirements for foreign currency liabilities.** This can be done immediately and does not require the introduction of reserve requirement accounts in foreign currency. Excess reserves will still be allocated to domestic currency and remunerated at the current levels;
- iv. **Should the CBBH wish to alter the reserve requirement ratios, this might take place after the change in the remuneration scheme to minimize adverse financial**

**impacts.** At this juncture, and with a view to promoting local currency term funding, the CBBH may also wish to consider whether to exclude long-term funding in domestic currency from the higher ratio;

- v. **Establish banks' reserve accounts in foreign currency.** This may take longer. Initially, banks may place on the reserve accounts in foreign currency any foreign currency excess reserves that they may wish to hold for regulatory or precautionary purposes. The mission anticipates that voluntary excess reserves in foreign currency will be small if the remuneration will be aligned to the euro money market rates or slightly below that. In fact, most of the recent placements in foreign currency with nonresidents have been driven by banks having exhausted their large exposure limits with the central bank;
- vi. **Develop and refine the procedures, reporting forms, and timelines to effectively handle the accounts.** This entails in particular the development and procedures for payment processing, account reconciliation, and reserve requirement calculation based on a modified reporting form with a split per currency of the liabilities to calculate reserve requirements in domestic currency and foreign currency, respectively;
- vii. **Introduce mandatory reserve requirements in foreign currency for foreign currency liabilities.** This needs to be done in a stepwise approach since, although euro and BAM are substantially equivalent from a monetary policy perspective, they are not equivalent from a regulatory and currency mismatch perspective. Banks can only fund euro assets with BAM liabilities, and vice versa, to a limited extent. Therefore, the increase in euro assets deriving from the denomination in euro of the reserve requirements for FX liabilities would create a currency mismatch in the banks' balance sheets, which might be difficult to hedge in the short term. Banks may need time to redenominate part of their deposits by adding a currency clause. While the precise steps can be further discussed, the mission considers a six-month transition period feasible if banks are given sufficient lead time to prepare. In this case, the fulfillment in foreign currency of reserve requirements for FX deposits may take place in three steps: initially, only a quarter of the reserve requirements for FX deposits will be fulfilled in foreign currency; after three months, this can be increased to half; and after a period of an additional three months; this can be lifted to 100 percent; and
- viii. **Change the remuneration scheme of reserve requirements into domestic currency.** While in the initial stages the remuneration of reserve requirements in domestic currency can be left unchanged, the CBBH can consider in a second stage the differentiation of the remuneration of required and excess reserves in domestic currency, with the former brought to a level closer to the market neutral rate and the latter used as policy variable to manage capital flows.

99. **The timeframe for implementation requires a fine balance.** The pursuit of many steps requires sufficient lead time. Regulation needs to be drafted, stakeholders need to be engaged, FX account arrangements need to be set up, and the shift toward the fulfillment in foreign currency of reserve requirements for foreign currency liabilities needs to take place in a stepwise manner. Therefore, the whole timeframe needs to strike a proper balance between expeditious implementation to address the underlying economic needs and to maintain momentum, and a careful implementation to ensure all steps are properly and effectively undertaken. Figure 5 provides a visual description of the proposed sequencing of actions and of the overall timeframe within which the whole new framework can be implemented.

Figure 5: Sequencing of the New Framework



Source: Authors.

## B. Communicating the New Reserve Requirement Framework

100. **Engaging various stakeholders is important to ensure an appropriate reaction to policy changes.** The effectiveness of new policy is greatly enhanced if a broad range of economic actors are addressed through various communication channels. Involving banks and the banking association early will allow banks to better understand the rationale and the implementation modalities and give them time to plan for changes to their balance sheets.

101. **The CBBH should proactively reach out to the different stakeholders.** The aim is to involve various public and private stakeholders early in the process and provide an opportunity for the CBBH to communicate its motivation. This helps to illustrate the consistency of this proposal with the financial sustainability of the currency board given interest rate developments in the euro area and the common objective of strengthening the stability and resilience of the financial system via greater incentives to the use of BAM.

102. **The CBBH is encouraged to communicate on the new framework through speeches, interviews, and the CBBH website.** The active communication by the CBBH with the public and private sectors will help to diffuse the inevitable criticism of the new

framework and control its narrative. The framework's impact on the profitability of the central bank and the improvement in the coverage ratio will be important to articulate to the general public. Importantly, the central bank should not bear the cost of negative euro area interest rates for a prolonged period of time. Such cost, in fact, may ultimately undermine the key pillar of monetary and financial stability in BiH: the currency board. Finally, it should be stressed that the new framework enhances the resilience of the currency board allowing a differential remuneration of BAM reserves vs. FX reserves, thus influencing capital flows.

**103. Illustrating the direct costs of the new framework is important to avoid providing banks with an excuse to raise fees.** This will alleviate the risk of banks using the framework change to their advantage to increase fees to their customers.

### **C. Additional Technical Assistance**

**104. The CBBH may benefit from additional TA in the implementation of the updated framework.** Although in line with the practices of most central banks with a sizable reserve base in foreign currency, the implementation of the new framework may present several technical challenges for which the CBBH may benefit from a constructive dialogue with the IMF that may take the form of additional TA. Several areas in which this TA could materialize are anticipated.

**105. First, the CBBH may benefit from IMF comments on the draft regulation with which the new framework could be defined.** This may take the form of a desktop review of the regulation.

**106. Second, the CBBH may benefit from TA on the operationalization of the reserve requirement accounts in foreign currency and the refinement of the reserve management activities.** Each could take the form of a TA mission. The former could take place to review the operational arrangements for the setup and functioning of the reserve requirements accounts in foreign currency. This may take place toward the end of 2019:H1. The TA mission on reserve management should take place later on, once the reserve requirements for foreign currency liabilities is fulfilled in foreign currency. This might take place toward the end of 2019. Reserve management could also be assessed in a more comprehensive manner, taking into account the recent currency board coverage challenges, the approaching turning point in the euro area interest rate environment, and the establishment of this new asset and liability tranche in total CBBH reserves.

**107. Finally, the CBBH may benefit from a constructive dialogue with the Area Department or TA to set the new BAM reserve requirement and excess reserves remuneration rates.**

## APPENDIX I. SALIENT FEATURES OF THE CURRENCY BOARD IN BOSNIA AND HERZEGOVINA

1. **The Central Bank of Bosnia and Herzegovina was established in 1997.** The CBBH was founded in accordance with the Law on the Central Bank of Bosnia and Herzegovina, which was adopted by the Parliamentary Assembly of Bosnia and Herzegovina on June 20, 1997, according to the General Framework Peace Agreement in Bosnia and Herzegovina. The Bank started its operations on August 11, 1997.

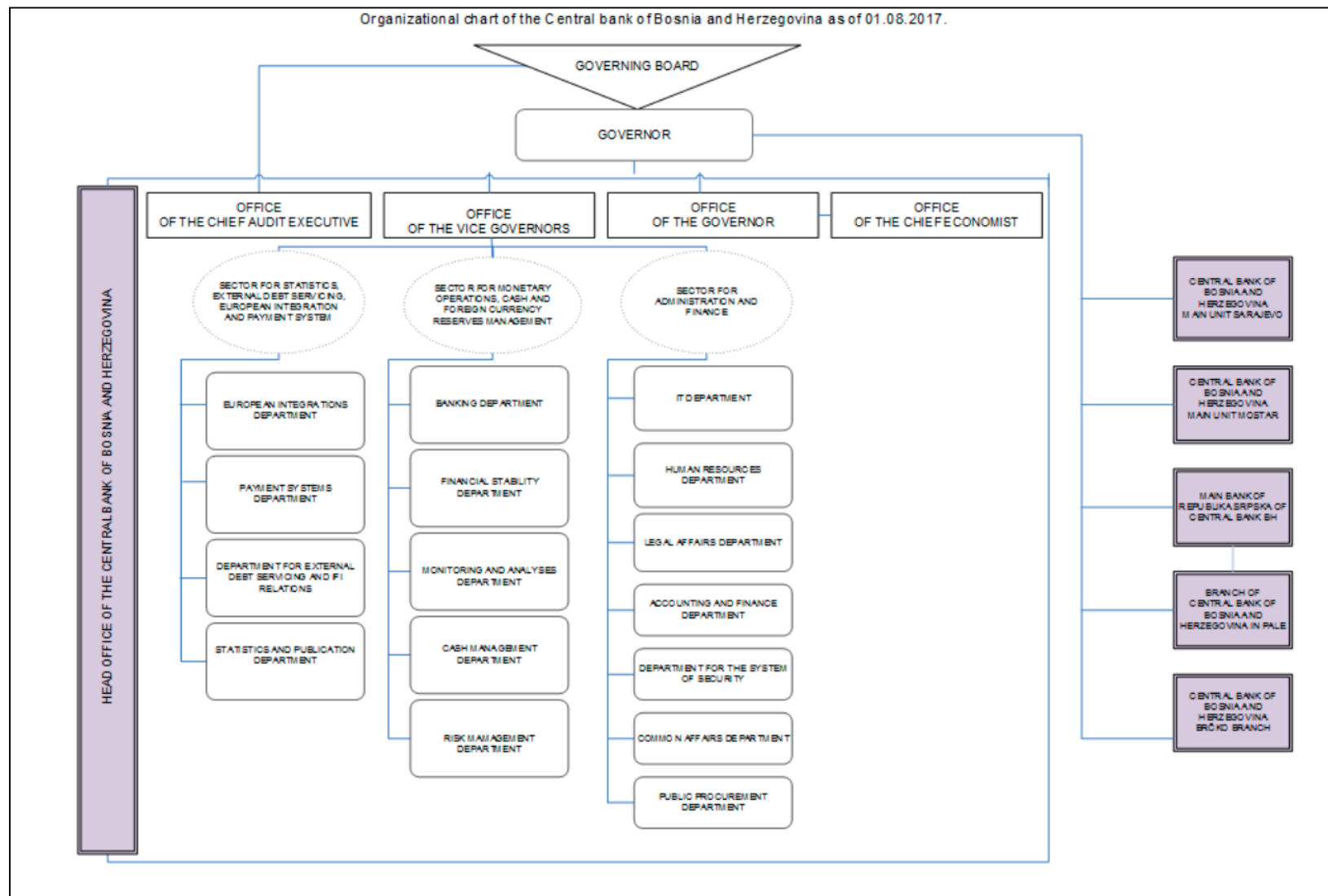
The main objectives and tasks of the CBBH are:

- to define, adopt, and control the implementation of monetary policy of BiH through the issuance of local currency (convertible mark) with full coverage in free, convertible FX assets;
- to keep and manage the official FX reserves of the bank in a safe and profitable manner;
- to implement monetary policy in accordance with the Law on the Central Bank of Bosnia and Herzegovina;
- to establish and maintain adequate payment and settlement systems;
- to coordinate the activities of the banking agencies, which are in charge of issuing banking licenses and supervising banks;
- to accept deposits from the state and public institutions of BiH and deposits from commercial banks;
- to issue provisions and guidelines for the performance of the bank's operations, in accordance with the Law on the Central Bank of BiH;
- to take part in the operations of international organizations working on strengthening the financial and economic stability of the country; and
- to represent BiH in international organizations regarding monetary policy issues.

2. **The highest body of the CBBH is the Governing Board.** The Governing Board is in charge of defining monetary policy and the control of its implementation, and the organization and the strategy of the bank in accordance with the Law on the Central Bank of Bosnia and Herzegovina.

3. **The Management of the CBBH consists of the governor and vice-governors, appointed by the governor with the approval of the Governing Board.** The Management operationally manages the bank's activities. According to the Law on the Central Bank of Bosnia and Herzegovina, the governor, with the approval of the Governing Board, appoints the Chief Audit Executive and three deputies. Appendix I, Figure 1 provides the CBBH organizational chart.

Appendix I. Figure 1. The CBBH Organizational Chart





4. **The CBBH has a head office, three units, and two branches.** The CBBH operates through its head office; three main units located in Sarajevo, Mostar, and Banja Luka; and two branches, one in Brcko District and the other in Pale, the latter of which operates under the authorization of the Main Bank of Republika Srpska of the Central Bank of Bosnia and Herzegovina in Banja Luka.

### **Currency Board and Monetary Policy Instruments**

5. **In a currency board, the monetary authority commits to exchange liabilities denominated in domestic currency against the anchor currency, and vice versa, at a predefined par value and commits to back up the value of its monetary liabilities with a value of net foreign assets at least equivalent to that of its monetary liabilities.**

6. **As in other fixed exchange rate arrangements without capital controls, the monetary authority (1) should aim at conducting policies to maintain a stable level of foreign reserves at the central bank; and (2) imports the monetary policy of the anchor country with domestic rates aligned with the interest rates of the anchor currency via the arbitrage enabled by the fixed exchange rate arrangement, the free capital flows, and the limited transaction costs.** The smoothness of the capital flow-based liquidity management depends on the seamlessness of capital flows between the anchor and the anchored economy.<sup>1</sup>

7. **Currency boards are the archetypes of fixed exchange rates without capital controls.** Unlike in other variants of fixed exchange rate arrangements, the monetary authority has no refinancing instrument at its disposal to manage domestic liquidity both in normal and stressed times and cannot fulfill any lender of last resort (LOLR) function. Furthermore, currency boards tend to be well integrated with the anchor economy (otherwise the arrangement would not be viable) and should experience greater capital mobility (less frictions) between the anchor and anchored economy. De facto, the only, or the most, important instrument at the disposal of the monetary authority is the reserve requirement it controls, inter alia, the base, the ratio, the remuneration, and the currency in which reserve requirements need to be fulfilled.

8. **The CBBH's main objective is maintaining the monetary stability of BiH.** This is achieved through the definition, adoption, and control of the implementation of monetary policy of BiH via the issuance of the local currency, BAM, with full coverage in freely convertible FX assets. It is also achieved by the management of the foreign reserve assets of BiH and the coordination of the activities of the banking agencies, in charge of issuing banking licenses and supervising banks.

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<sup>1</sup> Mariam El Hamiani Khatat and Romain Veyrune, 2019, Liquidity Management under Fixed Exchange Rate with Open Capital Account, IMF working No. 19/58.

9. **The CBBH has a limited set of monetary policy instruments at its disposal.** In light of the rules concerning the functioning of the currency board, the CBBH can only issue local currency in exchange for foreign reserve assets. Therefore, the CBBH has limited or no instruments at its disposal to manage domestic liquidity both in normal and stressed time. It has no control over the money supply, it cannot conduct liquidity providing operations, which would increase the level of its monetary liabilities above the level of its net FX reserves, and it cannot practically fulfill any LOLR function. Article 37 of the CBBH Law explicitly forbids the CBBH from entering into any kind of money market operation.

10. **The reserve requirement is the most important monetary policy instrument for the CBBH.** The CBBH controls, inter alia, the ratio, the remuneration, and the currency in which reserve requirements need to be fulfilled. Appendix I, Box 1 summarizes the main legal provisions concerning reserve requirements in BiH.

#### **Appendix I. Box 1. Legal Framework of the Reserve Requirement Framework in BiH**

The overarching principles and rules concerning reserve requirements in BiH are stipulated in Article 36 of the Law on the CBBH. Within the framework defined in the law, the CBBH, by way of the Regulation of the Central Bank's Governing Board, will define the minimum amount of reserves to be held and the remuneration thereof.

Reserve requirements are calculated on deposits and borrowed funds, regardless of the currency in which the funds are denominated. Required reserves are implemented equally for all banks. Required reserves shall be maintained by way of deposits with the central bank, through its head office and main units, and shall be calculated as average daily reserves over 10-day periods.

The compensation paid by the central bank to banks on the amount of their reserves shall be determined by the Governing Board regulation.

Regulations by which required reserves are modified shall specify the date by which banks shall comply with the new reserves.

If a bank fails to fulfill its required reserves for two consecutive periods, the central bank will cease to process withdrawal transactions for the bank and will inform the appropriate banking authorities so that the appropriate measures are taken to correct the shortfall within the same period, that is, 10 days. If the failure to fulfill the reserve requirement continues for another period, that is, 10 days, the central bank will inform the appropriate banking authorities so that they can initiate appropriate procedures against the bank.

The central bank determines and collects from any bank that fails to maintain the required reserves at the minimum level prescribed a penalty in the amount of five per mil per day on the shortfall in such bank's required reserves until the shortfall is corrected.

The legal framework, therefore allows:

- i. reserve requirements to be differentiated according to the currency in which the reserve base is denominated;
- ii. reserve requirements to be differentiated according to the maturity (contractual or residual) of the liabilities;
- iii. The CBBH to prescribe the currency in which the reserve requirements need to be held as a function of the currency in which the reserve base is denominated; and
- iv. reserve requirements' and excess reserves' remuneration to be differentiated per currency in which either reserve requirements are denominated or according to the currency in which the reserve base is denominated.

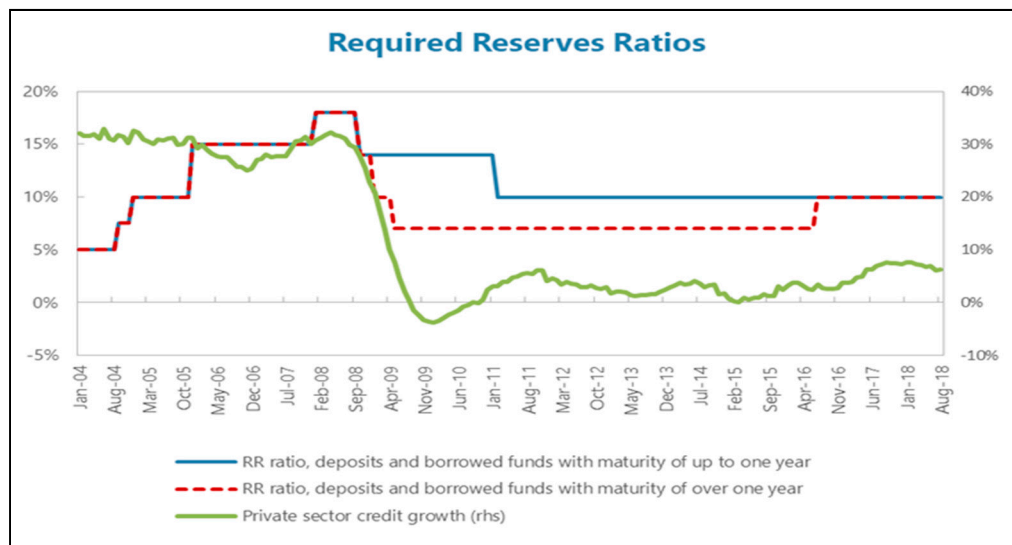
11. **In a currency board, the reserve requirement framework affects the liquidity of the banking system and has important implications for the stability and confidence of the whole financial system.** The reserve requirement framework has two key roles:

(1) prudential: by imposing reserve requirements that force banks to keep a predetermined amount of liquid assets at the central bank, it contributes to the stability of the financial system; and (2) economic policy: by influencing banks' cost of funding, the framework has direct implications on the intermediation spread and, thus, the credit supply.

12. **The CBBH has used the reserve requirement ratio for precautionary and macroprudential purposes.** Over the years, reserve requirements have been used for multiple purposes by the CBBH. While in the absence of liquidity providing operations, standard credit facilities, and LOLR instruments, the CBBH has always maintained for precautionary purposes a significant minimum reserve requirement ratio, the ratio has been altered over time for monetary control purposes, with macroprudential objectives in mind.

13. **The CBBH has extensive and successful experience in adapting and managing its reserve requirement framework.** In the past 15 years, the requirement ratio has been used to influence the economic cycle as well as to build liquidity buffers. During the credit boom (2004–08), the reserve requirement ratio was increased from 5 to 18 percent. In response to the 2008 financial crisis, the CBBH eased the monetary stance by lowering the ratio in multiple steps. In 2016, the ratio was raised with the view of unwinding monetary stimulus. In this context, the remuneration rate of required reserves was aligned with the ECB rate on required reserves (at 0 percent), while the remuneration rate for excess reserves was set to -0.20 percent, that is, at 50 percent of the ECB deposit facility rate. Appendix 1, Figure 2 provides a historical perspective on the reserve requirement ratio in relation to the growth rate of the credit to the private sector.

Appendix I. Figure 2. Required Reserve Ratio and Credit to the Private Sector



Source: Authors.

14. **The CBBH has been facing challenging international conditions.** In the pursuit of the monetary stability enshrined in its mandate, the CBBH has been exposed in the past few years to turbulences and uncertainties coming from the international environment. Extremely unfavorable euro area market conditions, in the form of negative interest rates on deposits and securities, in which the foreign exchange reserves of the CBBH are invested, have exerted pressure on the operations of the CBBH for a longer period of time. Such pressures have contributed to a gradual erosion of the coverage ratio.

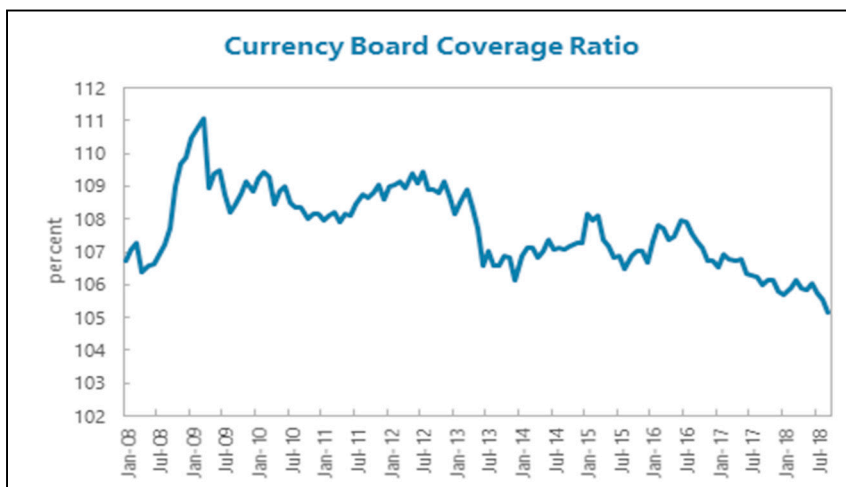
15. **The recent adoption of the International Financial Reporting Standard (IFRS) 9 compounds the problem.** The mandatory implementation of IFRS 9 since January 1, 2018, which has introduced, inter alia, the concept of the mandatory calculation of provisions for expected credit losses on financial assets, represents an additional challenge. IFRS 9 requires the recognition of expected credit losses by a “forward-looking view” principle and its updating at every reporting date to present exposure changes in credit risk of financial assets. As a consequence of volatile international markets conditions and of the changes in the assessment of credit risk, the total financial result of the CBBH has become more volatile.

16. **The currency board coverage ratio has been declining.** As a result of the lower financial return on the foreign reserve investments, as well as a consequence of the increase in the CBBH monetary liabilities and the corresponding increase in the CBBH net foreign reserves, the CBBH currency board coverage ratio—defined as the value of the CBBH net foreign reserves divided by the value of monetary liabilities—has been declining, although it remains comfortably above 100 percent. In the past few months, it has been stabilized above 105—it was 105.7 percent in November 2018—which the CBBH considers an important, nonbinding, informal threshold to preserve a comfortable buffer above the hard 100 percent lower limit.<sup>2</sup> This is evidenced in Appendix I, Figure 3. Appendix I, Box 2 provides an explanation of the factors that may affect the coverage ratio.

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<sup>2</sup> To prevent the coverage ratio from falling below the 100 percent lower limit, it is appropriate to maintain a buffer above 100 percent and to consider contingency plans in a timely manner when the coverage ratio declines toward the 100 percent lower limit. CBBH itself mentioned that it aimed at maintaining the coverage ratio above 105 percent. The mission focused neither on the level of the buffer nor on the contingency plans. It could, however, be advisable to better formalize both. This may be the topic of another TA mission.

Appendix I. Figure 3. Currency Board Coverage Ratio



Source: Authors.

17. **The current remuneration scheme of banks' accounts at the CBBH has contributed to the recent decline in the coverage ratio.** The CBBH is exposed, in fact, to a negative spread between the reserve requirement remuneration and the short-term euro money market, where reserves are reinvested. This negative spread undermined the CBBH's profitability at a time when assets' return was already at an all-time low. The remuneration scheme might have also encouraged speculative capital inflows to arbitrage the difference between the ECB deposit facility rate and the higher remuneration of the CBBH, exposing the central bank to the risk of sudden reversal.

### Appendix I. Box 2. Factors Affecting the Currency Board Coverage Ratio

The coverage ratio is calculated as the ratio between net foreign exchange reserve assets and the CBBH monetary liabilities.

Monetary liabilities are only exchanged for foreign reserve assets and vice versa.

The following main factors affect the coverage ratio:

- The CBBH profit and loss and asset revaluation that affects the value of the net foreign assets, that is, the value by which the net foreign exchange reserves exceeds the monetary liabilities;
- The profit distributed by the CBBH that reduces the value of its net foreign assets or increases one of its liabilities. The CBBH can distribute profit (60 percent of the yearly profit) only when the value of its initial capital plus retained earnings is at least equal to 5 percent of the value of its monetary liabilities;
- Capital inflows and outflows that affect the numerator and the denominator by the same amount. In particular capital inflows by increasing the net foreign exchange reserves and the monetary liabilities by the same amount reduce the coverage ratio; and
- Any change in the CBBH capital underwritten by the BiH government with the provision of foreign reserve assets.

In the past two years, the coverage ratio's decline has reflected a lower return on CBBH assets as a result of negative euro area interest rates, the negative carry between the return on assets, and the banks' reserve remuneration as well as steady capital inflows.

## APPENDIX II. RESERVE REQUIREMENTS IN A CURRENCY BOARD: THE CONCEPTUAL FRAMEWORK<sup>1</sup>

### Sources of Demand for Reserves and Reserve Requirements in a Currency Board

1. **Reserve requirements traditionally fulfill different roles.** The roles traditionally fulfilled by reserve requirements could be found in Based on Gray, S., 2011, “Central Bank Balances and Reserve Requirements,” International Monetary Fund, Working Paper 11/36.
2. **There are different sources of demand for reserves.** First, there is a willful demand for reserves. In the absence of any mandatory reserves, commercial banks would hold reserves at the central bank mainly for precautionary reasons, that is, to minimize the settlement risk, which is the risk of being unable to fulfill an obligation in central bank money due to insufficient reserves. Second, on top of banks’ willful demand for reserves, supervisors often request banks to hold a certain level of reserves at the central bank. The most direct form of regulatory reserve holding is the reserve requirement, but also additional liquidity regulations may force banks to hold reserves. Appendix II, Box 1 explains additional regulatory driven demand. Willful demand and regulatory demand partially overlap, as regulatory reserves may also fulfill part of the voluntary reserve demand, but this strongly depends on the design of the regulatory framework.

#### Appendix II. Box 1. Liquidity Regulation and Reserves’ Demand

Pursuant to the introduction of the Basel III framework and its liquidity regulation, banks may hold reserves for regulatory purposes and compliance with the LCR in certain jurisdiction, with a dearth of high-quality liquid assets.

Although more sophisticated and better calibrated than reserve requirements, the LCR strongly depends on the assumptions regarding the marketability of high-quality liquid assets in a stress scenario. Such marketability may be more dubious in smaller and developing markets in which there is a limited supply of such assets than in the large, mature markets for which the LCR has been initially conceived. Therefore, in less developed market, reserves may be the only type of eligible HQLA, thereby propping up the demand for reserves.

In addition, some jurisdictions do not include required reserve among HQLA for several reasons, including the lack of averaging provision, the length of the maintenance period, prudential purposes, and other liquidity management purposes. If required reserves do not count as HQLA, the demand for excess reserves for LCR compliance may be strong even when required reserve ratios are high.

3. **Besides a demand for local currency reserves, there is also a demand for reserves in foreign currency.** Banks may demand to hold voluntary foreign currency reserves at the central bank either because (1) their lack of access to correspondent banking where they could alternatively hold their FX assets in excess of the minimum required or (2) if they find

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<sup>1</sup> The conceptual framework presented in this appendix represents the mission proposal on the role reserve requirements should play in a currency board and the features they should correspondingly have. It is based on prior work undertaken within the IMF that the mission refined, academic research and countries’ example. It does not represent, however, the official IMF doctrine.

it financially more advantageous to keep their reserves with the central bank. The supervisors may also wish to accommodate banks' requests and even introduce a reserve requirement on foreign currency liabilities if banks' access to the correspondent accounts could be disrupted. A disruption could be caused by a concern about the liquidity of commercial banks' placements abroad, or by a risk that banks underestimate the liquidity risk arising from their liabilities in foreign currency and do not keep enough HQLA denominated in FX. Banks may also choose to keep a certain level of reserve in the composition of the numerator of the LCR, even though alternative HQLA are available in the market.

**4. There are three salient features of currency boards that influence the role of reserve requirements.**

- First, in a currency board, the central bank liquidity provision is constrained by the amount of foreign reserve assets held. Hence, the central bank cannot fulfill a LOLR function either in domestic currency or in foreign currency, or it can fulfill it only to the extent of its free reserves above the level of its monetary liabilities, if the central bank law allowed such a function to be fulfilled. This feature enhances the prudential role of reserve requirements, particularly in the jurisdictions in which additional HQLA are missing, are limited, or are traded in markets for which liquidity and depth can be considered more questionable in an acute, broad-based liquidity stress scenario.
- Second, the central bank lacks monetary policy instruments since its policy stance is strongly tied to the stance of the anchor currency. This feature enhances the incentives to use reserve requirements for monetary control purposes. It entails restricting, via a higher reserve requirement ratio, credit provision when the growth rate of the credit to the private sector is considered unsustainable and, vice versa, stimulating it, via a lower ratio, when credit growth stutters.
- Third, in a currency board, the domestic currency is considered an almost perfect substitute for the anchor foreign currency. The greater fungibility between domestic and the anchor foreign currency minimizes the difference in the role normally attributed to reserve requirements on domestic and foreign currency liabilities. In fact, traditionally, and in many jurisdictions, the role of reserve requirements on foreign currency liabilities is predominantly prudential, whereas the role of domestic currency reserve requirements is more geared toward liquidity management and, in a few cases, monetary control.

**5. Domestic currency is, however, not a perfect equivalent of the anchor currency.**

This is the case from both a regulatory and risk perspective also in BiH. First, from a regulatory and internal risk management perspective, assets in one currency need to be funded in the same currency with liabilities of a similar maturity profile with strict limits on

the open currency position.<sup>2</sup> Second, without questioning the stability of the currency board, banks and depositors have different currency preferences. Banks have a preference for local currency loans to minimize the indirect credit risk to which they would be exposed if the currency board changed. Depositors have a greater preference for foreign currency deposits the longer is the tenor, the larger the amount, and the greater the level of financial literacy to minimize their financial risks in case of unlikely changes in the currency board.

6. **Regulation and the parameters of the reserve requirement framework should therefore be adjusted accordingly.** They can be adjusted to address the financial distortions that may derive from treating equally what is perceived differently and minimize the consequent financial stability risks.

### **Specific Functions of Reserve Requirements in a Currency Board**

7. **In addition, there are specific functions that reserve requirements fulfill in a currency board.**

#### **FX Reserve Stabilizer**

8. **First, reserve requirements act as a foreign currency reserve stabilizer.** They create a need for foreign currency funding. Therefore, the reserve requirements stabilize the central bank's stock of foreign reserves as they create an additional source of banks' demand for reserves. This demand can only be fulfilled at an aggregate level by borrowing foreign currency and converting it at the central bank. Such borrowing can take place domestically, if remittances and current account flows provide a sufficient amount of foreign currency funds, or abroad, in the international money market. This is evidenced in Appendix II, Table 1, in which reserve requirements and any demand of excess reserves increase the amount of FX reserves to be financed internationally and converted at the central bank.

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<sup>2</sup> This is one of the banks' impediments to extending long-term loans in domestic currency in BiH, as long-term local currency funding sources are scarcer and costlier.



**Appendix II. Table 1. Simplified Balance Sheet of a Central Bank in a Fixed Exchange Rate Arrangement without Capital Control—Reserve Requirement**

Assets	Liabilities	
FX Reserves	Currency in Circulation	
	Government Account	
	Reserve requirement	Banks' demand for Reserves
		Room for averaging
More FX reserves	Excess reserves	
More FX reserves		

Source: Authors.

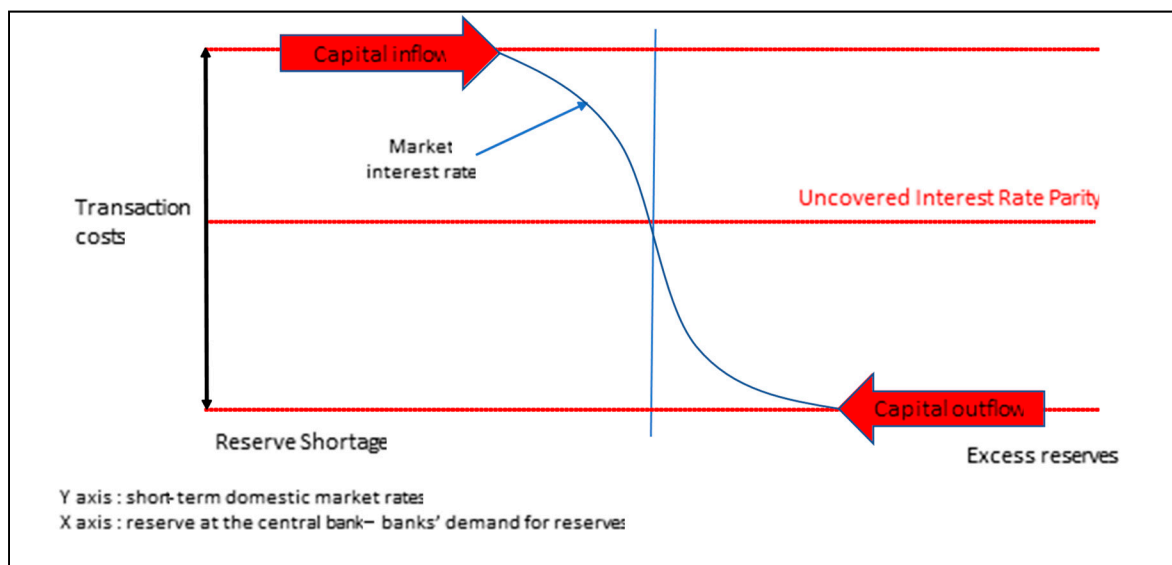
### Transmission of the Anchor Country Interest Rate

9. **Reserve requirements also facilitate the transmission of the anchor currency interest rates to the domestic money market.** At the individual bank level, demand for reserves creates a need for interbank transactions from which short-term domestic interest rates are derived. Financial institutions subject to reserve requirements compare the cost of fulfilling their reserve requirements domestically with the cost of international funding, which may be the cost of additional borrowing or the opportunity cost of repatriating placement in the foreign market. Banks satisfy their demand for reserves in the domestic market, equalizing some counterparty needs with others who have reserves surplus, as long as the cost of domestic borrowing is lower than the cost of funding in foreign currency in the international money market. If demand exceeds supply, once local borrowing costs exceed the cost of foreign currency funding, banks will take recourse to foreign currency funding and will sell the FX proceeds to the central bank to satisfy their need for local currency funding.

10. **This arbitrage ensures that the local money market rates remain in line with the anchor currency interest rate.** It does not result, though, in absolutely equivalent rates even in a currency board in which exchange rate risk is formally nonexistent, because a premium relative to the anchor currency rate is likely to emerge. Further, the difference between the anchor currency and domestic currency interest rates could fluctuate within a corridor without triggering arbitrage-seeking capital flows due to the following factors:

- Country risk.** Investing in a country can be considered intrinsically more or less risky than investing in another country on account of credit, market, liquidity, and political risks. This is reflected in different sovereign ratings and different credit default spreads for sovereign, financial institutions, and corporates in different countries. Hence, interest rates of the domestic currency and of the anchor currency should correspond once adjusted for the different level of risk as assumed under the UIP. Country risk is difficult to gauge but can be considered relatively steady over time, justifying a persistent interest rate spread between the anchor currency and the domestic currency. The country risk leads to a market-neutral, UIP-consistent interest rate of the domestic currency different from the interest rate of the anchored currency.
- Transaction costs.** Interest rate equalizing capital flows take place only when the UIP-consistent domestic interest rates deviate from the anchor country interest rate by more than the transaction costs. For instance, if FX conversion costs amounted to 0.10 percent each way, interest rate differentials should exceed 0.20 percent per annum to compensate for the FX transaction costs of two exchange rate conversions. There are additional transaction costs, including, inter alia, bid/ask spread on borrowing and lending transactions, capital charges on interbank lending transactions, regulatory costs deriving from the impact that interbank transactions may have on the compliance with the LCR, and the Net Stable Funding Ratio (NSFR) under Basle III framework. These transactions costs create a corridor around the market neutral, UIP-consistent domestic currency interest rate within which interest rates can fluctuate without triggering interest rate adjusting capital flows as evidence in Appendix II, Figure 1.

Appendix II. Figure 1. Short-Term Interest Rate and Capital Flows in a Fixed Exchange Rate Arrangement without Capital Controls with Frictions



Source: Authors.

**11. Arbitrage in the presence of frictions and transaction costs create a corridor within which domestic rates can fluctuate vis-à-vis the anchor foreign currency rates.**

At the aggregate level, when the banking system as a whole is confronted with a reserve shortage, it can only borrow from the foreign market once the reserve shortage has pushed domestic interest rates higher to the capital inflow trigger point (the red upper line in Appendix II, Figure 1). Ceteris paribus, when confronted with a reserve surplus, an individual bank will compare the domestic investment opportunities with those in the foreign market net of friction costs. However, when the banking system as a whole is confronted with a reserve surplus, it can only invest it in the foreign market once the reserve surplus has pushed domestic interest rates to the capital outflow trigger point (the red lower line in Appendix II, Figure 1). The rate at which the central bank remunerates excess reserves become critical as it could boost the demand for reserves at the central bank and prevent capital outflows if it is more attractive than the market-neutral, UIP-consistent rate plus the transaction costs.

### **Reserve Requirement Settings in a Currency Board**

**12. The specific roles played by reserve requirements in a currency board influence their settings.** They influence, in particular, the ratio and the averaging, the currency in which they are denominated and the remuneration.

#### **The Ratio and the Averaging**

**13. The local currency reserve requirement ensures that there is permanently a minimum demand for local currency, thereby stabilizing the demand for reserves.** The intertemporal smoothing of liquidity flows allowed by the averaging of the reserve requirement over a long-enough maintenance period (for example, over a month basis such as to encompass a typical payment cycle in most economies related to taxes, salaries, and pensions) would help banks better withstand liquidity shocks, reducing the need for liquidity adjusting capital flows. Liquidity adjusting capital flows are also tempered by the corridor in which domestic interest rates can swing and by the uneven adjustment that takes place outside the corridor due to frictions, credit and regulatory limits, and other impediments.

**14. If banks can fulfill the reserve requirement on average during the maintenance period, averaging should be able to absorb large autonomous factors' shocks.** Given the propensity to large, frequent, and short-lived autonomous liquidity factor shocks in fixed exchange rate arrangements, the room for averaging should be commensurately large to minimize the impact of autonomous factors' fluctuation on short-term rates and to spread the effects on capital flows if the liquidity shock proves to be long-lasting.

#### **Denomination**

**15. There are several reasons to impose foreign currency reserve requirements on foreign currency liabilities when they represent a sizable part of the banking system**

**total liabilities.** These reasons apply despite the high level of fungibility between domestic and anchor currency in a currency board. The reasons include the following:

16. **First, the fulfillment in foreign currency of the reserve requirement on foreign currency liabilities minimizes central bank foreign currency intermediation.** Such intermediation could be, in fact, accentuated if reserves in domestic currency were held, encouraged, and prescribed to cope with foreign currency settlement risk, liquidity risk, and for precautionary purposes.

17. **Second, it facilitates banks' liquidity management and the compliance with liquidity regulation.** If reserve requirements and excess reserves considered are HQLA in the liquidity regulation, the compliance with the LCR, as well as internal banks' limits, can be facilitated if reserves were held in the same currency in which deposits are denominated. In fact, the LCR and other liquidity ratios may apply for each "significant" currency. It also encourages banks to determine the currency in which excess reserve for precautionary purposes should be allocated. By contrast, if required and excess reserves cannot be held in foreign currency, it becomes much more difficult to comply with the LCR per currency.

18. **Third, it helps the monetary authority to differentiate the remuneration policies for domestic and foreign currency denominated required and excess reserves.** Such differentiation prevents a higher than necessary remuneration of foreign currency reserves undermining the pursuit of financial efficiency.

19. **From a currency board perspective, the reserve requirement currency should be neutral.** Prescribing the fulfillment of reserve requirements on foreign currency liabilities in foreign currency does not alter the currency board coverage ratio, as it would replace a domestic monetary liability, that is, the banks' reserve requirements, with a foreign currency monetary liability in the central bank's balance sheet.

20. **From a settlement and payment system perspective, foreign currency reserve requirements may facilitate the central bank's provision of settlement and clearing services in foreign currency, but they do not compel the CBBH to do so.** If depository institutions need to hold reserve accounts at the central bank in foreign currency, the provision of domestic clearing services in foreign currency may be enabled and its costs reduced. This might have positive effects on economic development and the fight against informality as domestic transaction costs for banking payments are lowered, but by no means is a central bank compelled to provide such services once foreign currency accounts are established if, based on other considerations, it does not consider the provision of such services opportune.

## **Remuneration**

21. **The remuneration rates of reserves in domestic currency should be set around the market-neutral, UIP-consistent interest rate.** They can vary within the range defined

by the capital flow trigger points around the UIP-consistent interest rate without triggering capital flows. This provides greater but not unlimited flexibility for the central bank in defining monetary policy consistent remuneration rates. However, once the limits of the band have been reached, higher remuneration rates will engender inflows via covered interest rate arbitrage, whereas lower remuneration rates will eventually engender outflows.

22. **The remuneration rate of excess reserves could be set close to, but above, the capital outflow trigger point of Appendix II, Figure 1.** It should also be set below the required reserve remuneration rate to encourage the interbank market development. Such remuneration rate influences the marginal remuneration rate of deposits (the most important rate from a market perspective). The excess reserve remuneration rate could be altered to affect capital flows via the marginal remuneration of deposits. It can, therefore, be altered in the lower half of the range between the UIP-consistent neutral interest rate and the capital outflow trigger point. Appendix II, Box 2 provides additional argument underpinning this thesis with a counterfactual.

#### **Appendix II. Box 2. Interest on Excess Reserves in Domestic Currency**

If the remuneration of excess reserves were higher than the upper edge of the range around the UIP-consistent neutral interest rate as displayed in Appendix II, Figure 1, this could fuel capital inflows. Banks could hoard reserves beyond their precautionary needs to reap the positive spread between the reserve remuneration and the foreign interest rate. Unwittingly, reserves would no longer be the lowest yielding HQLA in the system. Such remuneration rates would not be consistent with the objective of monetary policy in a fixed exchange rate arrangement, that is, to maintain a stable level of foreign reserves at the central bank, as it would attract an endless flow of capital to benefit from the positive arbitrage between foreign interest rates and reserve remuneration. Therefore, the remuneration of excess reserve should be set so as to stabilize capital flows.

If the remuneration were lower than the lower edge of the range around the UIP-consistent neutral interest rate, banks would hold the minimum necessary for precautionary purposes and would factor the reserve holding costs into their intermediation function resulting, *ceteris paribus*, in a wider spread between lending and borrowing rates to compensate for the reserve holding costs. *Mutatis mutandis*, such lower remuneration rates would not be consistent with the objective of monetary policy in a fixed exchange rate arrangement, that is, to maintain a stable level of foreign reserves at the central bank as the wider intermediation margin and the lower deposit remuneration rates engendered by reserves holding costs may trigger a slow and steady capital outflow.

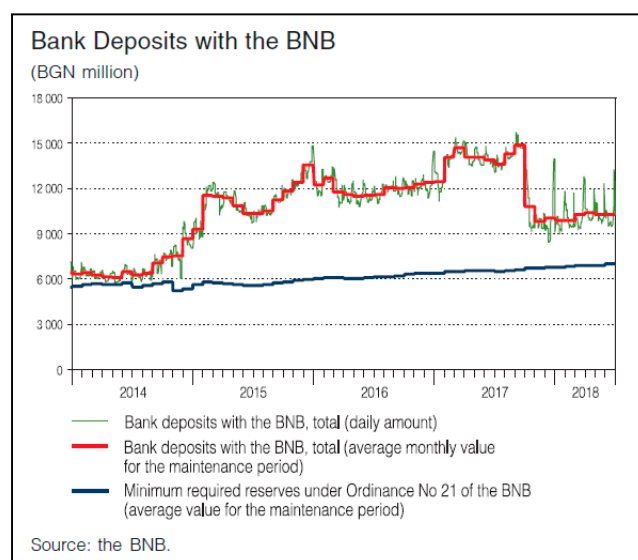
23. **As regards reserve requirements in foreign currency, there is no reason to remunerate them above the opportunity cost of such reserve holdings.** In fact, banks would most likely need to hold them in any case, or, alternatively, hold other short-term HQLA for settlement, regulatory, and precautionary purposes. This would be the case unless the reserve requirement ratio was set at a high rate to exceed bank willful reserve demand or the regulatory framework penalized required reserves (for example, not counted as HQLA, no averaging).

24. **A higher remuneration of foreign currency reserves for a long period of time could hardly be justified from a financial efficiency perspective.** A higher remuneration would entail, in fact, a higher than necessary interest expenditure for the monetary authority, undermining its profitability and impairing over time the currency board coverage.

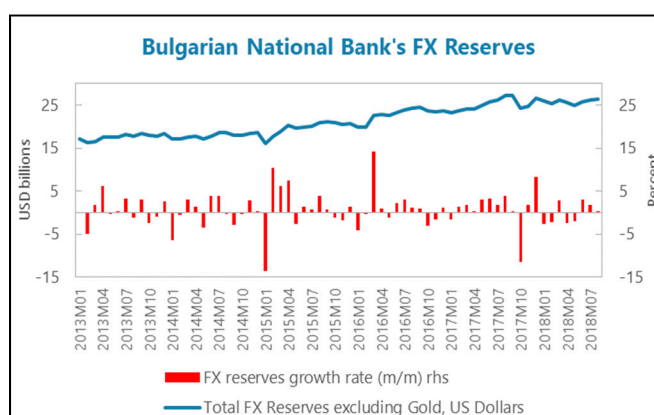
### APPENDIX III. THE BULGARIAN NATIONAL BANK EXPERIENCE WITH RESERVE REQUIREMENT REMUNERATION

1. In the fourth quarter of 2017, the Bulgarian National Bank (BNB) changed the interest methodology for remunerating reserve requirements. The BNB decided to pay the lower of two interest rates: 0 percent or the ECB deposit facility rate less 20 basis points. This cut excess reserve interest rate to -60 basis points. In response, banks' excess reserves decreased by about 25 percent. In parallel, BNB's international reserves fell by more than 11 percent. This is evidenced in Appendix III, Figures 1 and 2.

Appendix III. Figure 1. Bank Deposits with the BNB



Appendix III. Figure 2. BNB FX Reserves



Source: BNB.

Appendix III. Table 1 summarizes the main parameters of the BNB reserve requirement framework.

**Appendix III. Table 1. Bulgarian Reserve Requirement Framework**

	<b>Reserve Base</b>	<b>RR Rate</b>	<b>Remuneration</b>
<b>Bulgaria</b>	Liabilities in domestic and foreign currency, except for funds attracted: <ul style="list-style-type: none"> <li>• By other banks and foreign bank branches with a registered office in Bulgaria;</li> <li>• Through branches of a local bank abroad;</li> <li>• In the form of equity instruments under Article 4, paragraph 1, item 119 of CRR (EU) No. 575/2013 and amending Regulation (EU) N. 648/2012.</li> </ul>	<ul style="list-style-type: none"> <li>• 10% on liabilities to residents;</li> <li>• 5% on liabilities to non-residents;</li> <li>• 0% on liabilities to state and local government budgets.</li> </ul> <p>Excess reserves are the excess of the holdings in reserve accounts by more than 5 percent over the required amount of the minimum required reserves.</p>	<ul style="list-style-type: none"> <li>• 0% or the ECB deposit facility rate less 20 basis points on excess reserves— - lower of two interest values;</li> <li>• Excess reserve interest rate is - 0.60%.</li> </ul>