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THE EXCHANGE RATE COMMITMENT AS ADDITIONAL INSTRUMENT OF MONETARY POLICY IN CZECH REPUBLIC, SWITZERLAND AND ISRAEL²

JEL CLASSIFICATION: E52, E58, F31

ABSTRACT:

Main goals of monetary policy of almost all central banks are to provide monetary and financial stability. As a way to achieve these goals central banks manages money and interest rates so as to accomplish a low, stable and predictable inflation rate, which creates an environment conducive to sustainable economic development and employment growth. In conducting monetary policy central bank can use different instrument, such as reference rate, standing facility, required reserves and interventions in the foreign exchange market. This paper analyzes three cases of central bank which were using exchange rate as additional instrument of monetary policy. In case of Central bank of the Czech Republic exchange rate was used to prevent deflation, in case of the Swiss Central Bank as a way to deal with massive overvaluation of the Swiss franc which was posing an

1 National Bank of Serbia. The views expressed in this paper are those of the author, and do not necessarily represent the official view of the National Bank of Serbia

2 Small part of this research paper is presented in the authors doctoral dissertation on the topic „Monetary policy impact on the choice of currency regime in the dual currency system: the case of Serbia”, which was defended at the Faculty of Economics at the University of Belgrade, at July 11, 2018

acute threat to the Swiss economy and carries the risk of a deflationary development and in case of Bank of Israel as a way to increase its foreign exchange reserves by purchasing foreign currency in the open market. Main finding of the paper is that all analyzed central banks, which were using exchange rate as additional instrument, did not jeopardize price and financial stability as their main monetary policy objective.



KEY WORDS:

**EXCHANGE RATE, INTERVENTIONS, MONETARY POLICY AND ITS INSTRUMENTS,
FOREIGN EXCHANGE RESERVES**

1. INTRODUCTION

In this paper analysis is focused on three central banks which were using exchange rate as additional instrument of monetary policy. Those three cases are Central bank of the Czech Republic, Swiss National Bank and Bank of Israel. All the aforementioned banks were using exchange rate as additional instrument of monetary policy for different reasons. In case of Central bank of the Czech Republic exchange rate was used to prevent deflation, in case of the Swiss Central Bank as a way to deal with massive overvaluation of the Swiss franc which was posing an acute threat to the Swiss economy and carries the risk of a deflationary development and in case of Bank of Israel as a way to increase its foreign exchange reserves by purchasing foreign currency in the open market.

For all aforementioned central banks analysis is based on their monetary policy and its main instrument, then reasons of using exchange rate as additional instrument of monetary policy and finally period after central banks abandon targeting of exchange rates of their national currencies against euro (in case of the Central bank of the Czech Republic and Swiss National Bank) and dollar (in case of the Bank of Israel). Aim of this paper is to present ability of central bank by using unconventional monetary policy, without jeopardizing the main goal of monetary policy, namely achieving and maintaining price and financial stability.

2. THE CZECH NATIONAL BANK

According to the Czech Constitution and the Act on the Czech National Bank (hereinafter referred to as: CNB), the CNB's primary objective is to maintain price stability. In December 1997, the CNB Bank Board decided to change its monetary policy regime and at the start of 1998 it switched to inflation targeting. The inflation target set in terms of headline inflation of 2% with effect from January 2010 until the Czech Republic's entry to the euro area. The CNB will strive to ensure that actual inflation does not differ from the target by more than one percentage point in either direction. In October 2018 annual inflation is 2.2%.

The main instruments of monetary policy at the CNB are open market, automatic facilities, liquidity-providing repo operations, minimum reserves and FX interventions. Monetary policy affects the exchange rate primarily in the following ways: (1) through the chosen exchange rate regime (a scale running from an exchange rate peg through to a free float); (2) through the chosen monetary policy scheme (exchange rate targeting, money targeting or inflation targeting); and (3) through foreign exchange intervention strategy (only relevant in countries that do not apply a currency board arrangement)³.

3 Skořepa and Komárek, (2013), p. 4.

2.1. Exchange rate commitment of the CNB

The CNB Bank Board decided to use the exchange rate as a monetary policy instrument, and therefore to commence foreign exchange interventions, on November 7, 2013. The CNB reacted by using its main monetary policy instruments to the full, lowering interest rates to technical zero (0.05%) in late 2012. The aim of using the exchange rate as an additional monetary policy instrument was to prevent deflation, to ensure that the 2% inflation target was achieved in a sustainable manner and to accelerate the return to a situation where the CNB would again be able to use its standard tool, i.e. interest rates. When exchange rate commitment was introduced, i.e. in November 2013, annual CPI was 1.1% (inflation target is set at the level of 2% +/- 1 p.p.).

► **TABLE 1. CNB FOREIGN EXCHANGE TRANSACTIONS**

Period	traded spot transactions		traded forward transactions		unsettled transactions		client transactions	
	expressed in millions		expressed in millions		expressed in millions		expressed in millions	
	USD	EUR	USD	EUR	USD	EUR	USD	EUR
1997 ¹⁾	-1.167,7	-958,5	-110,0	-96,1	-797,5	-703,7	0,0	0,0
1998.	1.972,5	1.801,9	0,0	0,0	400,7	366,6	0,0	0,0
1999.	1.535,1	1.446,0	0,0	0,0	91,9	89,4	0,0	0,0
2000.	146,0	132,3	0,0	0,0	273,4	283,2	0,0	0,0
2001.	444,1	506,5	0,0	0,0	0,0	0,0	34,6	45,7
2002.	2.109,7	2.267,5	0,0	0,0	68,7	70,0	4.219,1	4.271,9
2003.	0,0	0,0	0,0	0,0	0,0	0,0	-277,6	-244,2
2004.	-540,4	-439,0	0,0	0,0	-59,8	-49,0	-347,1	-279,0
2005.	-564,8	-461,0	0,0	0,0	-49,1	-40,0	1.024,2	851,0
2006.	-260,3	-208,0	0,0	0,0	-15,3	-12,0	856,7	726,3
2007.	-1.060,6	-770,0	0,0	0,0	-90,6	-66,0	888,7	651,0
2008.	-1.100,9	-747,0	0,0	0,0	-106,0	-72,0	414,1	274,1
2009.	-1.321,5	-942,0	0,0	0,0	-129,0	-92,0	1.444,2	1.020,2
2010.	-1.325,1	-1.004,0	0,0	0,0	-120,8	-92,0	2.492,1	1.894,2
2011.	-1.412,2	-1.008,0	0,0	0,0	-129,2	-92,0	1.703,4	1.229,1
2012.	-1.087,7	-844,0	0,0	0,0	-103,1	-80,0	1.157,4	852,5
2013.	10.206,9	7.499,0	0,0	0,0	0,0	0,0	2.472,6	1.853,1
2014.	0,0	0,0	0,0	0,0	0,0	0,0	3.325,4	2.500,7
2015.	9.989,1	8.998,0	0,0	0,0	212,4	193,0	4.940,2	4.443,1
2016.	18.424,9	16.851,0	0,0	0,0	1.668,4	1.554,0	4.452,3	4.024,4
2017.	45.500,1	42.530,0	0,0	0,0	4.365,6	4.082,0	694,7	585,5
2018 ²⁾	0,0	0,0	0,0	0,0	0,0	0,0	-146.227,9	-124.946,1

Note: 1) Data are available from May 1997 and 2) Data as of September 2018.

Source: Czech National Bank

The use of foreign exchange interventions as an appropriate tool for countering deflation risks had been recommended by an IMF mission in 2013⁴. If the CNB had not eased monetary policy further, the previously relatively stable exchange rate trend might have been interrupted and the koruna might have started appreciating sharply⁵. The decision to use the exchange rate of the koruna as a monetary policy instrument was preceded

4 IMF and OECD statements about interventions. Document has been downloaded from the following web address: https://www.cnb.cz/en/about_cnb/international_relations/imf_wb/mmf_k_intervencim.html

5 The exchange rate as a monetary policy instrument. Document has been downloaded from the following web address: http://www.cnb.cz/en/about_cnb/publications/download/fact_sheet_mp_exchange_rate_en.pdf.pdf

by a series of internal discussions. Those discussions started at the general level back in 2009 and became increasingly specific between 2012 and autumn 2013⁶.

The CNB in period of FX commitment was using intervention on spot foreign exchange market. Data from intervention are available on monthly level since May 1997 and are published with two months lag (*Table 1*). After FX commitment was abandon, in April 2017, the CNB did not intervene on spot FX market. When the commitment was introduced, the CNB made it clear that its balance sheet consequences were seen as being of strictly secondary importance relative to the monetary policy objectives. The central bank has also repeatedly emphasized that its exchange rate losses have no direct fiscal implications in terms of requiring a transfer from the government budget, as the central bank will be able to repay the losses out of its future profits, i.e. it remains solvent in the long run⁷.

2.2. The CNB ends exchange rate commitment

At its extraordinary monetary policy meeting held on April 6, 2017, the CNB Bank Board decided to end the CNB's exchange rate commitment and that decision takes effect immediately. The discontinuation of the use of the exchange rate as an additional monetary policy instrument means that the koruna exchange rate will move according to supply and demand on the foreign exchange market. As a result, it may fluctuate in either direction in the short term. The CNB stands ready to use its instruments to mitigate potential excessive exchange rate fluctuations if needed. The two-week repo rate was maintained at 0.05%, the discount rate at 0.05% and the Lombard rate at 0.25 %.

Application of exchange rate commitment was not a new CNB monetary policy objective, but rather a temporary instrument used after the room for further interest rate cuts had been exhausted. Price stability – expressed as 2% inflation – remained the CNB's statutory objective. This means the CNB uses inflation targeting. Any strong or sustained anti-inflationary shocks might renew the risk of a sizeable and long-running undershooting of the inflation target or even the threat of deflation in the future. In the case of the exchange rate depreciation shock, the domestic policy authority has to increase interest rates as domestic inflation and output growth increase in response to the sudden demand from abroad⁸. The CNB kept the euros it bought in its international reserves and continued to invest them in high-quality, safe instruments. It will not sell the returns on those reserves for the foreseeable future (*Graph 1*).

After abandoning exchange rate commitment the CNB did not jeopardized price and financial stability and according to the latest available data annual consumer price inflation in October 2018 is 2.2%. The CNB current forecast, announced on 1st November 2018, had shown that in Q4 2019 annual consumer price inflation is forecast at the level of 2.2% and in Q1 2020 at the level of 2.1%⁹.

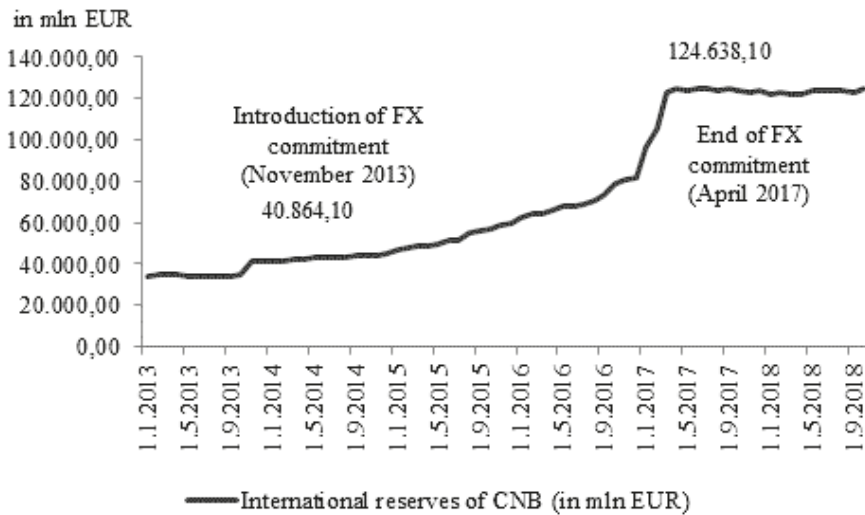
6 Franta et al., (2014), p. 4 and Alichì et al., (2015), p. 15-16.

7 Franta, Holub and Saxa, (2018), p. 4.

8 Audzei and Brázdík, (2012), p. 20.

9 Current and archive of forecasts and presentations for meetings with analysts for the CNB. Document has been downloaded from the following web address: http://www.cnb.cz/en/monetary_policy/forecast/previous_forecasts/index.html

▶ GRAPH 1. CNB INTERNATIONAL RESERVES



Note: Data as of October 31, 2018.

Source: Czech National Bank

Brůha and Tonner (2017, 2017a) assess the effect of the introduction of the exchange rate floor on the Czech economy. Two empirical methods (simulations with structural macroeconomic models to obtain the trajectories of the main macroeconomic variables under the counterfactual of no floor and the synthetic control method) had shown that the floor prevented inflation from turning negative and the effects on the real economy were most likely positive. Authors concluded that the introduction of the floor was a correct and successful policy action of the CNB.

3. THE SWISS NATIONAL BANK

The constitutional basis of the Swiss currency and the activity of the Swiss National Bank (hereinafter referred to as: SNB) are contained in article 99 of the Federal Constitution¹⁰. The central bank mandate consists in the obligation of the National Bank to pursue a monetary policy serving the interests of the country as a whole.

The SNB's monetary policy strategy consists of three elements: a definition of price stability, a medium-term inflation forecast and, at the operational level, a target range for a reference interest rate, the three-month Libor. The main monetary policy instruments of

¹⁰ Article 99 of the Federal Constitution, downloaded from the following web address: https://www.snb.ch/en/mmr/reference/Bundesverfassung_Art_99/source/Art_99_Geld_und_Waehrung_en.pdf

the SNB are¹¹: open market operation, standing facilities and additional monetary policy instruments.

3.1. Exchange rate commitment of the SNB

Before official introduction of exchange rate commitment the SNB stated on August 3, 2011 that the Swiss franc was massively overvalued at that time. The SNB in statement stated that it will not tolerate a continual tightening of monetary conditions and is therefore taking measures against the strong Swiss franc by narrowing the target range for the three-month Libor from 0.00–0.75% to 0.00–0.25%. When interest rates are constrained by the zero lower bound (ZLB), the volatility of real and a nominal variable increases because the central bank is not able to respond to adverse shocks using its traditional instrument¹².

At the same time, it was very significantly increase the supply of liquidity to the Swiss franc money market over the next few days¹³. The SNB intends to expand banks' sight deposits at from currently around CHF 30 billion to CHF 80 billion. Consequently, with immediate effect, the SNB was no longer renew repos and SNB Bills that fall due and was repurchased outstanding SNB Bills, until the desired level of sight deposits has been reached¹⁴.

Swiss National Bank sets minimum exchange rate at CHF 1.20 per euro on September 6, 2011 (*Graph 2*). Chairman of the SNB Governing Board Thomas Jordan at BIS Annual Conference, which was held at Lucerne, June 21, 2013, said that by introducing the minimum exchange rate, the SNB countered an inappropriate tightening in monetary conditions for Switzerland. That tightening was the result of a dramatic appreciation of the Swiss franc, which was caused by international developments which unsettled financial markets, transforming the Swiss franc into a safe haven.

With immediate effect, the SNB was no longer tolerating a EURCHF exchange rate below the minimum rate of EURCHF 1.20. The SNB was enforce this minimum rate with the utmost determination and was prepared to buy foreign currency in unlimited quantities. And if the economic outlook and deflationary risks so require, the SNB was prepared to take further measures¹⁵.

11 Guidelines of the Swiss National Bank on monetary policy instruments of 25 March 2004 (as at 1 January 2015). Document has been downloaded from the following web address: https://www.snb.ch/en/mmr/reference/snb_legal_geldpol_instr2015/source/snb_legal_geldpol_instr2015.en.pdf

12 Baurle and Kaufmann, (2014), p. 4.

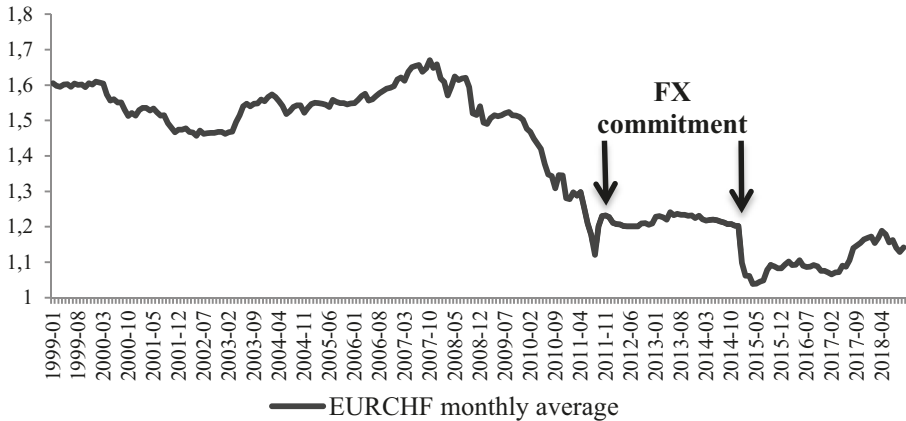
13 More information about liquidity on forex market can be found in paper Mancini L., Ranaldo A. and Wrampelmeyer J. (2010), "Liquidity in the Foreign Exchange Market: Measurement, Commonality, and Risk Premiums", SNB Working Paper 2010-3, Swiss National Bank, 2010.

14 Swiss National Bank takes measures against strong Swiss franc. Document has been downloaded from the following web address: https://www.snb.ch/en/mmr/reference/pre_20110803/source/pre_20110803.en.pdf

15 Swiss National Bank sets minimum exchange rate at CHF 1.20 per euro. Document has been downloaded from the following web address: https://www.snb.ch/en/mmr/reference/pre_20110906/source/pre_20110906.en.pdf

According to the data from Annual report for 2011¹⁶ during that year the rate of inflation varied between 1.0% and -0.7%. After the SNB imposed a minimum exchange rate of CHF 1.20 to the euro on September 6, the euro fluctuated between CHF 1.20 and CHF 1.24 up to the end of the year.

▶ **GRAPH 2. EURCHF DEVELOPMENT IN PERIOD JANUARY 1999-OCTOBER 2018**



Source: Swiss National Bank

When it comes to the intervention on foreign exchange market the SNB reveals those information only in annual report (*Table 2*) without stated on which market intervention was done (spot, forward, option). Also, the SNB does not announce the dynamics of the implemented foreign exchange interventions, but in the annual reports reveals only the total figure of Swiss francs bought during the year. Based on the monetary approach to exchange rates Lenz and Savioz (2009, p.10) start from the premise that monetary policy has an influence on the exchange rate. Annual dataset cover 1973-2011 period result point to relative government spending and relative terms of trade as the main drivers of the Swiss franc RER in the long run¹⁷.

When the interest rate can no longer be used or is insufficient to influence inflation expectations and achieve price stability, FX interventions become a viable option¹⁸. One question that can be posed is what further the SNB could do, besides FX interventions. According to Badescu (2016, p. 34) one of the measures could have been restricting the free flows of capital, but such a measure would have entailed risks for Swiss banks and would not have been accepted by the rest of the developed countries.

16 Swiss National Bank 104th Annual Report 2011. Document has been downloaded from the following web address: https://www.snb.ch/en/mmr/reference/annrep_2011_komplett/source/annrep_2011_komplett.en.pdf

17 Mancini Griffoli et al., (2014), p. 29.

18 Lizal and Schwarz, (2013), p. 136.

▶ TABLE 2. FX INTERVENTION OF THE SNB

Year	Amount bought in CHF billion	Announcement in the SNB annual report
2011.	-	On 6 September the SNB set a minimum exchange rate at CHF 1.20 per euro. These measures were taken in response to the acute threat to the Swiss economy and the risk of deflationary developments originating from the massive overvaluation of the Swiss franc.
2012.	188.00	In 2012, in order to enforce the minimum exchange rate, the SNB conducted extensive foreign exchange transactions and purchased foreign currency to a value of CHF 188 billion. Foreign exchange transactions are conducted with a wide range of domestic and foreign counterparties. The SNB accepts well over 100 banks from around the world as counterparties. With this network of contacts, it covers the relevant interbank foreign exchange market.
2013.	-	The SNB continued to direct its monetary policy instruments towards enforcing the minimum exchange rate. The Swiss franc traded above CHF 1.20 for the entire year, largely as a result of the easing of tensions on financial markets. Consequently, unlike in 2012, the SNB was not required to enforce the minimum exchange rate through foreign currency purchases.
2014.	25.80	In 2014, the SNB continued to gear its monetary policy instruments to enforcing the minimum exchange rate of CHF 1.20 per euro. The end of the year saw the exchange rate against the euro near the minimum rate, prompting the SNB to purchase foreign currencies in its defence, which it had not done in the previous year. Purchases made towards the end of the year amounted to a total of CHF 25.8 billion.
2015.	86.10	In 2015, the SNB purchased a total of CHF 86.1 billion in foreign currency to enforce the minimum exchange rate and influence exchange rate developments. The vast majority of these foreign currency purchases were made in January.
2016.	67.10	In 2016, the SNB purchased a total of CHF 67.1 billion in foreign currency. Aside from these foreign currency purchases, the SNB did not conduct any monetary policy-related open market operations. These interventions occurred mainly at times of heightened uncertainty, when the Swiss franc was particularly sought after as a safe investment. As in preceding years, it did not generally comment on individual interventions, except for foreign currency purchases made in June 2016, when the UK's decision to leave the EU gave rise to uncertainty.
2017.	48.20	In 2017, the SNB's foreign exchange market interventions totalled CHF 48.2 billion. They occurred mainly during periods of uncertainty, when the Swiss franc was particularly sought-after as a safe investment.

Source: Swiss National Bank, Annual Report – various issues

3.2. The SNB ends exchange rate commitment

At January 15, 2015 the SNB stated that it is discontinuing the minimum exchange rate of CHF 1.20 per euro and main tool for monetary policy implementation was again a short-term interest rate. At the same time, central bank lowered the interest rate on sight deposit account balances that exceed a given exemption threshold by 0.5 percentage points, to -0.75% . It is moving the target range for the three-month Libor further into negative territory, to between -1.25% and -0.25% , from the current range of between -0.75% and 0.25% . The announcements of rate cuts into deeper negative territory likely moved market perceptions of where the lower bound on interest rates is located, as well as simultaneously lowering the policy rate. Moreover, the simultaneous discontinua-

tion of the minimum exchange rate policy resulted in strong upheaval in global financial markets¹⁹.

The SNB's decision to discontinue the floor took financial markets by storm. The EURCHF rate fell from 1.2 to 0.88 in the first hours of trading after the announcement and closed at 0.99 for the day (17:00 Zurich local time). The Swiss franc had appreciated by 11% against the euro by the end of January. The daily rate stood slightly above EURCHF 1.2 before the policy decision but averaged EURCHF 1.057 for the post minimum exchange rate period until June 30, 2015²⁰.

Chairman of the Governing Board of the SNB Thomas Jordan in his speech at the SAFE Policy Center at February 23, 2016 said that at the beginning of 2015, it became clear that the minimum exchange rate of CHF 1.20 per euro was no longer sustainable from a monetary policy perspective, and would require ever larger foreign currency purchases to enforce it.

The SNB in statement said that the minimum exchange rate was introduced during a period of exceptional overvaluation of the Swiss franc and an extremely high level of uncertainty on the financial markets²¹.

4. THE BANK OF ISRAEL

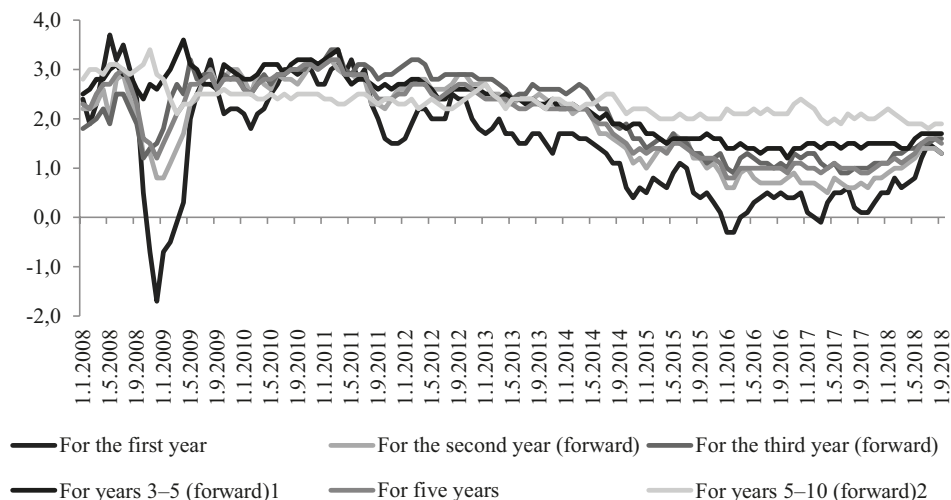
The Bank of Israel's (hereinafter referred to as: BOI) main function is to protect the value of the local currency, namely to maintain price stability. Israel's government, in consultation with the Governor of the Bank, sets a price stability target - an annual rate of increase in the Consumer Price Index (CPI). The current target is between 1 percent and 3 percent a year, and the Bank is obliged to strive to achieve that goal (in October 2018 CPI stand at the level of 1.2% YoY). To achieve its objectives the Bank of Israel has a number of policy instruments in its arsenal, the main one being the short-term interest rate (current at the level of 0.25%), which is set by a Monetary Committee headed by the Governor. According to the Monetary Policy Report for first half of 2018 annual inflation is expected to remain within the target range during the second half of 2018, and to total 1.2 percent at the end of the year. Inflation in 2019 is expected to be 1.5 percent (*Graph 3*).

19 Grisse and Schumacher, (2017), p. 9.

20 Bonadio, Fischer and Sauré, (2018), p. 7.

21 Swiss National Bank discontinues minimum exchange rate and lowers interest rate to -0.75%. Document has been downloaded from the following web address: https://www.snb.ch/en/mmr/reference/pre_20150115/source/pre_20150115.en.pdf

▶ **GRAPH 3. THE BOI EXPECTED RATE OF INFLATION (PERIODIC AVERAGE, IN %)**



Note: 1) Forward expectations for full years, from the end of the third year to the end of the fifth year and 2) Forward expectations for full years, from the end of the fifth year to the end of the tenth year.

Source: Bank of Israel

4.1. Exchange rate commitment of the BOI

On March 3, 2008 the BOI announced plan to increase foreign exchange reserves by 10 billion dollars over the next two years by purchasing approximately 25 million dollars per day in the open market, effective from Monday, March 24, 2008. From July 10, 2008 the BOI increase the average daily rate of foreign currency purchases to 100 million dollars and announce that aim is to increase the level of foreign exchange reserves to 35-40 billion dollars. At November 30, 2008 the BOI announce that since the Bank had been implementing a program to increase the level of the foreign exchange reserves, the Bank has purchased about 10 billion dollars and that it continued to purchase about 100 million dollars per business day with aim to increase the level of foreign exchange reserves to level between 40 billion dollars and 44 billion dollars.

In statement²² the BOI announced that current market conditions, in time when introduced plan to increase foreign exchange reserves, allowed it to increase its reserves in a prudent manner, consistent with the Bank's interest rate policy while reinforcing the stability and resilience of the financial system and the economy. In Investment of the Foreign Exchange Reserves Annual report for 2008²³ the BOI stated that foreign exchange

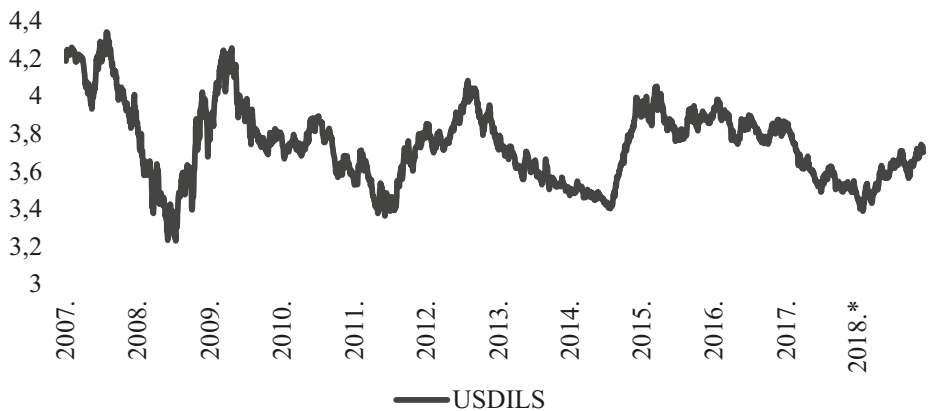
22 Statement is named The Bank of Israel announces plan to increase foreign exchange reserves by 10 billion dollars over the next two years by purchasing approximately 25 million dollars per day in the market, beginning 24/3/08. Document has been downloaded from the following web address: <http://www.boi.org.il/en/NewsAndPublications/PressReleases/Pages/080321f.aspx>

23 Investment of the Foreign Exchange Reserves Annual report 2008. Document has been downloaded from the following web address: <http://www.boi.org.il/deptdata/mth/doch08/doch08e.pdf>

reserves grew that year in dollar terms by 14 billion dollars, from 28.5 billion dollars at the end of 2007, to 42.5 billion dollars at the end of 2008. In 2008 purchases totaled 12.1 billion dollars.

At February 15, 2009 the BOI stated that it will continue to purchase on average 100 million dollars per day, as part of its program to increase the level of the foreign exchange reserves, but also added that it will buy government bonds of different types and maturities through Open Market Operations to a daily average of 200 million Israeli Shekel (ILS). The shekel depreciated dramatically against the dollar during the interventions (from ILS 3.2 to ILS 4.2, i.e. by around 30%). Immediately after the exit from the interventions in August 2009 it started to appreciate strongly, eventually almost returning to its original level (ILS 3.4 in July 2011) (*Graph 4*).

▶ **GRAPH 4. USDILS DEVELOPMENT IN PERIOD JANUARY 2007-NOVEMBER 2018 (DAILY DATA)**



Note: As of November, 30 2018.

Source: Bank of Israel

According to Caspi, Friedman and Ribon (2018, p. 6) FX intervention of the BOI has: (a) high “success rate” on impact. In over 90% of intervention cases, the exchange rate moved in the desirable direction (i.e., that of depreciation, as all the interventions we analyze are purchases). (b) An intervention shock persists for about 40 to 60 trading days (between 2 and 3 calendar months) before it attenuates or becomes statistically insignificant. This result means that the exchange rate returns during the 40 to 60 days are still affected by the initial intervention shock on day 1.

4.2. The BOI ends exchange rate commitment

Following the adoption of this new operating policy in the foreign exchange market, the Bank of Israel announced that it will from August 4th, 2009 discontinued its program of daily purchases of 100 million dollars in the foreign exchange market which began in March 2008. The dollars which the BOI purchased became part of the Bank’s foreign ex-

change reserves (*Table 3*). The BOI also announced that it bought dollars against shekels, but simultaneously converts a fixed percentage of those dollars into other reserve currencies according to the currency composition that is set for the holdings of foreign exchange reserves. In new operating policy in the foreign exchange market the BOI stated that under underlying economic conditions meaning weigh a number of factors in determining its policy in the foreign exchange markets²⁴. These include: the level of economic activity in general and the export situation in particular, the level of inflation, financial stability and the functioning of the foreign exchange markets.

After reaching the desired level of foreign exchange reserves (in November 2008 the BOI announced that the level of adequate reserves is between 40 and 44 billion dollars), the BOI continued its dollar purchasing program in light of the increased uncertainty of the international economic situation. Israel's foreign exchange reserves at the end of August 2009 stood at 56,401 million dollars, an increase of 4,307 million dollars from their level at the end of July 2009.

► **TABLE 3. THE AVERAGE LEVEL OF RESERVES**

Year	Average level of reserves (\$ million)	Year	Average level of reserves (\$ million)
2000	21,843	2009	51,310
2001	23,495	2010	64,665
2002	23,948	2011	75,744
2003	23,999	2012	75,930
2004	25,908	2013	78,693
2005	27,020	2014	85,973
2006	27,884	2015	87,389
2007	28,994	2016	95,777
2008	32,270	2017	107,567

Source: Bank of Israel

Israel's experience suggests that it is possible to intervene successfully in the foreign exchange market over an extended period of time on a large scale with the goal of mitigating the appreciation of the exchange rate, through the purchase of foreign exchange²⁵.

5. CONCLUSION

This paper presents using exchange rate commitment as additional monetary policy instrument for central banks of Czech Republic, Switzerland and Israel. Those central

24 Q&A on the Foreign Exchange Markets. Document has been downloaded from the following web address: https://www.boi.org.il/deptdata/pikuah/crisis_fa/crisis_mth.pdf

25 Flug and Shpitzer, (2013), p. 203.

banks were implementing foreign exchange intervention for different reasons. In case of Central bank of the Czech Republic exchange rate was used to prevent deflation, in case of the Swiss Central Bank as a way to deal with massive overvaluation of the Swiss franc which was posing an acute threat to the Swiss economy and carries the risk of a deflationary development and in case of Bank of Israel as a way to increase its foreign exchange reserves by purchasing foreign currency in the open market.

All aforementioned central banks were using forex interventions for limited period of time and with different way of communications with general public. The CNB announce its interventions on monthly level with two month leg, while in case of the SNB that information is only available in annual report as collective figure without specify in what market interventions occurred (spot, swap, option). The BOI during implementation of forex interventions announced daily level of foreign currency purchases.

For the Czech Republic, as a small open economy with a long-term excess of liquidity in its banking sector, FX commitment was a more effective instrument for easing the monetary conditions than any other (i.e. negative interest rate, quantitative easing). The SNB aim was to reach a substantial and sustained weakening of the Swiss franc. The current massive overvaluation of the Swiss franc was posed an acute threat to the Swiss economy and carries the risk of a deflationary development. The BOI implemented plan to increase foreign exchange reserves in a prudent manner, consistent with the Bank's interest rate policy while reinforcing the stability and resilience of the financial system and the economy.

During FX commitment and after abandon that commitment in all aforementioned central banks price and financial stability was not jeopardized. That is good evidence that using foreign exchange rate as additional monetary policy instrument can be good solution for different reasons without harm main monetary policy objective, namely a low, stable and predictable inflation rate, which creates an environment conducive to sustainable economic development and employment growth.

REFERENCES

Alichi A., Benes J., Felman J., Feng I., Freedman C., Laxton D., Tanner E., Vavra D. and Wang H. (2015), „Frontiers of Monetary Policymaking: Adding the Exchange Rate as a Tool to Combat Deflationary Risks in the Czech Republic”, IMF Working Paper WP/15/74, Washington D.C.: International Monetary Fund, 2015.

Article 99 of the Federal Constitution. Document has been downloaded from the following web address; https://www.snb.ch/en/mmr/reference/Bundesverfassung_Art_99/source/Art_99_Geld_und_Waehrung_en.pdf

Audzei V. and Brázdk F. (2012), “Monetary Policy and Exchange Rate Dynamics: The Exchange Rate as a Shock Absorber “, CNB Working Paper series 9/2012, Czech National Bank, 2012.

Badescu B. (2016). Foreign Exchange Interventions as an Unconventional Monetary Policy Instrument — An Empirical Review. *Journal of Economics, Business and Management*, Vol. 4, No. 1, January 2016, Pp. 29-35.

Bäurle G. and Kaufmann D. (2014), “Exchange rate and price dynamics in a small open economy – the role of the zero lower bound and monetary policy regimes”, SNB Working Paper 10/2014, Swiss National Bank, 2014.

BIS Annual Conference: Navigating the Great Recession: what role for monetary policy?, Lucerne, 21 June 2013, Speech of Chairman of the SNB Governing Board Thomas J Jordan on the topic „Unconventional policy measures in Switzerland“

Bonadio B., Fischer A. and Sauré F. (2018), “The speed of exchange rate pass-through”, SNB Working Paper 5/2018, Swiss National Bank, 2018.

Brůha J. and Tonner J. (2017), “An Exchange Rate Floor as an Instrument of Monetary Policy: An Ex-post Assessment of the Czech Experience”, CNB Working Paper series 4/2017, Czech National Bank, 2017.

Brůha J. and Tonner J. (2017a), “Effects of Monetary Policy”, CNB Economic Research Bulletin Volume 15, Number 2, November 2017, Czech National Bank.

Caspi I., Friedman A. and Ribon S. (2018), “The Immediate Impact and Persistent Effect of FX Purchases on the Exchange Rate”, Research Department, Discussion Paper 2018.04, June 2018, Bank of Israel, 2018.

Current and archive of forecasts and presentations for meetings with analysts at the CNB. Document has been downloaded from the following web address: http://www.cnb.cz/en/monetary_policy/forecast/previous_forecasts/index.html

Flug K. and Shpitzer A. (2013), “Rethinking exchange rate policy in a small open economy: the Israeli experience during the great recession”, BIS Papers No 73, Bank for International Settlement, 2013.

Franta M., Holub T. and Saxa B. (2018), “Balance Sheet Implications of the Czech National Bank’s Exchange Rate Commitment”, CNB Working Paper series 10/2018, Czech National Bank, 2018.

Franta M., Holub T., Král P., Kubicová I., Šmídková K. and Vašíček B. (2014), “The Exchange Rate as an Instrument at Zero Interest Rates: The Case of the Czech Republic”, CNB Research and Policy Notes 3/2014, Czech National Bank, 2014.

Grisse C. and Schumacher S. (2017), “The response of long-term yields to negative interest rates: evidence from Switzerland”, SNB Working Paper 10/2017, Swiss National Bank, 2017.

Guidelines of the Swiss National Bank on monetary policy instruments of 25 March 2004 (as at 1 January 2015). Document has been downloaded from the following web

address: https://www.snb.ch/en/mmr/reference/snb_legal_geldpol_instr2015/source/snb_legal_geldpol_instr2015.en.pdf

IMF and OECD statements about interventions. Document has been downloaded from the following web address: https://www.cnb.cz/en/about_cnb/international_relations/imf_wb/mmf_k_intervencim.html

Investment of the Foreign Exchange Reserves Annual report 2008. Document has been downloaded from the following web address: <http://www.boi.org.il/deptdata/mth/doch08/doch08e.pdf>

Lenz C. and Savioz M. (2009), “Monetary determinants of the Swiss franc”, SNB Working Paper 2009-16, Swiss National Bank, 2009.

Lízal L. and Schwarz J. (2013), “Foreign exchange interventions as an (un)conventional monetary policy tool”, BIS Papers No 73, Bank for International Settlements, 2013.

Mancini Griffoli T., Meyer C., Natal J.M. and Zanetti A. (2014), “Determinants of the Swiss Franc Real Exchange Rate”, SNB Working Paper 8/2014, Swiss National Bank, 2014.

Mancini L., Ranaldo A. and Wrampelmeyer J. (2010), “Liquidity in the Foreign Exchange Market: Measurement, Commonality, and Risk Premiums”, SNB Working Paper 2010-3, Swiss National Bank, 2010.

Monetary Policy Report for first half of 2018, Bank of Israel. Document has been downloaded from the following web address: <http://www.boi.org.il/en/NewsAndPublications/RegularPublications/Pages/MPR201801h.aspx>

Q&A on the Foreign Exchange Markets. Document has been downloaded from the following web address: https://www.boi.org.il/deptdata/pikuah/crisis_faq/crisise_mth.pdf

SAFE Policy Center, Frankfurt am Main, 23 February 2016, Speech of Chairman of the SNB Governing Board Thomas J Jordan on the topic „Monetary policy in the euro area's neighbouring countries“

Skořepa M. and Komárek L. (2013), “Sources of Asymmetric Shocks: The Exchange Rate or Other Culprits?”, CNB Working Paper series 12/2013, Czech National Bank, 2013.

Swiss National Bank 104th Annual Report 2011. Document has been downloaded from the following web address: https://www.snb.ch/en/mmr/reference/annrep_2011_komplett/source/annrep_2011_komplett.en.pdf

Swiss National Bank Annual Report – various issues. Reports can be found at the following web address: https://www.snb.ch/en/i/about/pub/id/pub_annrep

Swiss National Bank discontinues minimum exchange rate and lowers interest rate to -0.75%. Document has been downloaded from the following web address: https://www.snb.ch/en/mmr/reference/pre_20150115/source/pre_20150115.en.pdf

Swiss National Bank sets minimum exchange rate at CHF 1.20 per euro. Document has been downloaded from the following web address: https://www.snb.ch/en/mmr/reference/pre_20110906/source/pre_20110906.en.pdf

Swiss National Bank takes measures against strong Swiss franc. Document has been downloaded from the following web address: https://www.snb.ch/en/mmr/reference/pre_20110803/source/pre_20110803.en.pdf

The Bank of Israel announces plan to increase foreign exchange reserves by 10 billion dollars over the next two years by purchasing approximately 25 million dollars per day in the market, beginning 24/3/08. Document has been downloaded from the following web address: <http://www.boi.org.il/en/NewsAndPublications/PressReleases/Pages/080321f.aspx>

The exchange rate as a monetary policy instrument. Document has been downloaded from the following web address: http://www.cnb.cz/en/about_cnb/publications/download/fact_sheet_mp_exchange_rate_en.pdf.pdf
