



UDK: 336.711(494)

DOI: 10.2478/jcbtp-2019-0013

Journal of Central Banking Theory and Practice, 2019, 2, pp. 51-64

Received: 12 April 2018; accepted: 30 June 2018

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The Swiss National Bank's fear of float

Abstract: We theoretically examine under which assumptions the impossible trinity holds. We also focus on the most recent Swiss experience and ask whether the SNB gained monetary independence by switching from a fixed to a floating exchange rate system in January 2015. The theoretical examination shows that the impossible trinity holds under the following assumptions: Equality of domestic and foreign real interest rates, the quantity theory of money holds, and that the relative PPP is fulfilled. The empirical analysis reveals that relative PPP does not hold for the Swiss case and it was necessary for the SNB to adopt its monetary policy in accordance with the ECB's expansionary monetary policy. We show that for a small open economy, such as Switzerland, whether the central bank implements a fixed or a floating exchange rate system does not play a role in its monetary policy independence.

Keywords: Foreign exchange market, Swiss crisis, impossible trinity, monetary policy independence

JEL classification number: E52, E58, E42

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1 Introduction

The main insight of the impossible trinity is that a small open economy cannot have an independent monetary policy, complete capital mobility, and a fixed exchange rate system—at the same time. One might think that by switching from a fixed to a floating exchange rate system, a central bank would gain some degree of independence for its monetary policy.

The literature on exchange rate systems documents a development which is called a *corner solution*. Given a spectrum from pure floating exchange rate systems and super fixed exchange rate systems (like currency boards) it has been found that countries move from the middle to the two extreme positions. However, this result depends on whether *de jure* or *de facto* exchange rate regimes are analysed. A lot of countries claim that they have a (pure) floating exchange rate in place, but, *de facto*, the actual changes in the reserves of the central bank's balance sheet reveal that is a dirty float. This phenomenon is discussed under the label *fear of floating* (Calvo and Reinhart, 2002; Lahiri and Végh, 2001). Under these conditions, central bank interventions in the foreign exchange market might also influence the money supply and interest rates so that monetary policy is not fully independent from fluctuations on the foreign exchange market. One recent twist in the *fear of floating* literature is the finding of an asymmetric intervention behaviour: Appreciations and depreciations of the domestic currency are not treated with an equal response. This is discussed under the label *fear of appreciation* (Levy-Yeyati, Sturzenegger and Gluzmann, 2013).

In this paper we shed light on the case of Switzerland and analyse its most recent experience with its fx-rate system: The Swiss National Bank (SNB) introduced a lower floor of 1.20 SFR/EUR in 2011, but switched back to a floating system in January 2015 (SNB, 2015a).

When considering the impossible trinity, one might think that by switching from a quasi-fixed to a floating exchange rate system, the SNB gained some degree of independence for its monetary policy (Frankel, 1999, p. 7). In contrast to this, the empirical evidence reveals that the SNB intervened more heavily in the fx-market and acquired more reserves under the most recent floating era than in the era when the lower floor was in place. Furthermore, the interest rate policy also points in the direction that Swiss monetary policy is still highly influenced by the monetary policy of the European Central Bank (ECB).

In this paper, we discuss the assumptions under which the main message of the impossible trinity is derived. We also highlight the most recent experience of the SNB, and claim that Swiss monetary policy is still highly influenced by the monetary policy of the ECB. The intervention behaviour of the SNB can be interpreted as another sign for the fear of floating—or to be more precise—the fear of appreciation.

2 Theoretical Examination of the Impossible Trinity

The main message of the impossible trinity is that a small open economy cannot have in place simultaneously

- an independent monetary policy,
- complete capital mobility, and
- a fixed exchange rate system.

In this section, we highlight under which assumptions this message of the impossible trinity holds.

Free capital movement will lead to an equalization of real interest rates in the domestic and foreign economy ($R = R^*$). The real interest rate is the difference between the nominal interest rate (i) and the inflation rate (\hat{p}). Hence it follows that

$$(1) \quad i - \hat{p} = i^* - \hat{p}^* \quad \text{as well as} \quad i = i^* + \hat{p} - \hat{p}^*$$

The second assumption of the impossible trinity is that the quantity theory of money holds. Hence, the inflation rate is equal to the growth rate of the money supply – adjusted for the growth rate of the real GDP and long term trends in the velocity of money. Assuming that the last two factors are equal to zero leads to a situation where the growth rate of the money supply determines the level of inflation in the domestic and foreign economy:

$$(2) \quad \hat{p} = \hat{m} \quad \text{and} \quad \hat{p}^* = \hat{m}^*$$

The third assumption is that real Purchasing Power Parity (PPP) holds, so that the real exchange rate is constant. The change in the nominal exchange rate (\hat{e}) is therefore equal to the inflation differential:

$$(3) \quad \hat{e} = \hat{p} - \hat{p}^*$$

In case these assumptions are fulfilled, it is obvious that a small open economy with complete capital mobility and a fixed exchange rate system has no degree of freedom with respect to its monetary policy: In case the foreign economy has implemented its monetary policy (\hat{m}^*), the foreign inflation rate (\hat{p}^*) is given. Since the nominal exchange rate is not allowed to fluctuate ($\hat{e} = 0$), it follows from equation (3) that the domestic inflation rate has to match the foreign inflation rate ($\hat{p} = \hat{p}^*$). Since inflation rates have to be equal, it follows from equation (2) that money growth rates in the domestic and foreign economy have to be equal ($\hat{m} = \hat{m}^*$), too. From equation (1) it also follows that $i = i^*$. As a consequence, it

becomes clear that there is no space for an independent monetary policy of the domestic central bank: The domestic central bank just has to mimic the monetary policy decisions of the foreign central bank.

It is different in a floating exchange rate system: The nominal exchange rate is allowed to change ($\hat{e} \neq 0$) so that according to equation (3), the inflation rates do not have to be the same. When the foreign economy has opted for (\hat{m}^*), so that (\hat{p}^*) is realized, the domestic economy can still independently opt for (\hat{m}) in order to determine \hat{p} . By determining \hat{p} , the domestic economy also determines \hat{e} . A numerical example illustrates the different relationships: If the foreign economy opts for an inflation rate of 2 % and the domestic central bank opts for an inflation rate of 5 %, the exchange rate has to increase by 3 % each year – a nominal depreciation of the domestic currency. It is important to stress that this steady increase of the nominal exchange rate has no effect on the real exchange rate. The real exchange rate is constant and does not affect the real economy at all.

This example highlights that the central bank might gain some degree of independence for its monetary policy when it switches from a fixed to a floating exchange rate system. These insights of the impossible trinity are, of course, derived under the assumptions made above. Especially, since it is assumed that relative PPP holds, the real exchange rate is assumed to be constant.

It is very important to understand that relative PPP does not seem to hold in the real world – at least in the short run! As a consequence, even in a floating exchange rate system, the monetary policy of the domestic central bank might not be independent of the monetary policy of the foreign central bank. If an expansionary monetary policy of the foreign central bank ($\hat{m}^{*\uparrow}$) also leads agents in the foreign exchange market to also expect a loose monetary policy in the future $E(\hat{m}^{*\uparrow})$, this could lead to a sharp appreciation of the domestic currency. In the case that prices of goods are sticky, the change in the nominal exchange rate will also influence the real exchange rate and thereby the real economy: The domestic inflation rate might be affected via the depreciation-inflation- or appreciation-deflation-spiral *and* a real appreciation also affects negatively the export sector of the domestic economy, which could also lead to a recession.

As a consequence, even in a floating exchange rate system, a sharp real appreciation can make it necessary to

- also adjust the domestic monetary policy – the domestic central bank might also opt for a more expansionary monetary policy by lowering interest rates or increasing the money supply,

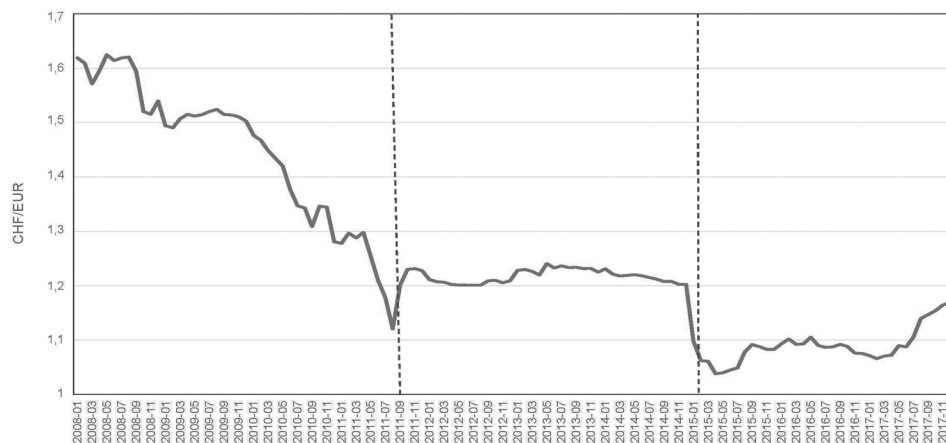
- intervene in the foreign exchange market to counter the appreciation – the domestic central bank has to build up its foreign reserves: In case these interventions are not sterilized, they will also lead to an increase of the domestic monetary base via the reserve component.

3 Empirical Examination of the Swiss Case

3.1 Development of fx-reserves

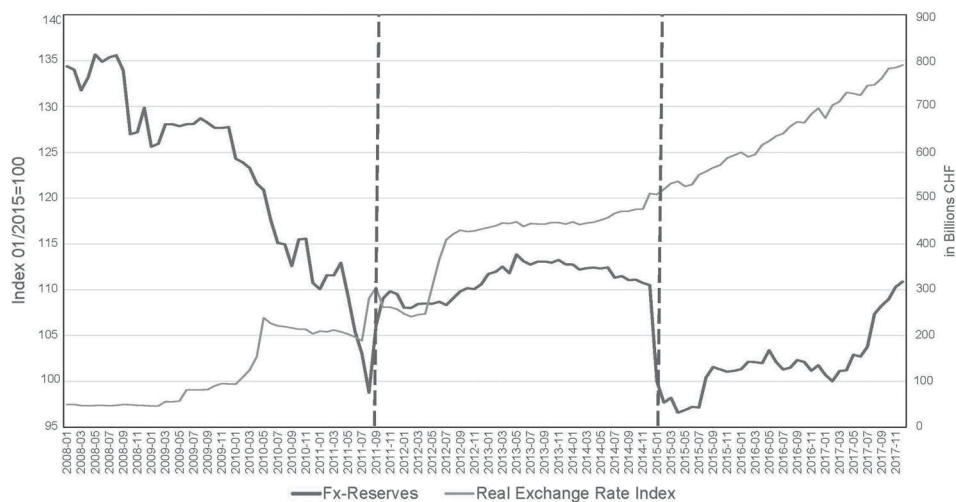
Since the outbreak of the financial crisis in 2008, the Swiss franc has always been under appreciation pressure. Figure 1 highlights the development of the exchange rate vis-a-vis the Euro: From 01/2008 to 09/2011 the nominal exchange rate decreased sharply by about 30% (1.60 CHF/EUR to 1.12 CHF/EUR).

Figure 2 displays the development of the real exchange rate vis-a-vis the Euro (against the left axis) and contains information about the fx-reserves of the SNB in billions of CHF (against the right axis). Since the real exchange rate is based on price indices, it takes the value of 100 at the beginning of 2015. As can be seen, the nominal appreciation which took place during 01/2008–09/2011 also led to a real appreciation. Such a sharp real appreciation in a very short time period cannot be countered by, for example, productivity gains. As a consequence, this development has to have negative consequences for the real economy, especially for the Swiss export sector. After 2009, the Swiss inflation rate – displayed in Figure 4 – was always lower than the target inflation rate of 2%. On 6 September 2011, the SNB informed the public, via a press release, of the introduction of a lower floor at 1.20 CHF/EUR. This level was about 10% higher than the prevailing level one day before. The SNB (2011) came up with the following official reasons: ‘The current massive overvaluation of the Swiss franc poses an acute threat to the Swiss economy and carries the risk of a deflationary development.’

Figure 1: Nominal Exchange Rate

The changes of the exchange rate system are marked by the dashed lines.

Source: Own elaboration with data from SNB (2018).

Figure 2: Real Exchange Rate Index and Fx-Reserves

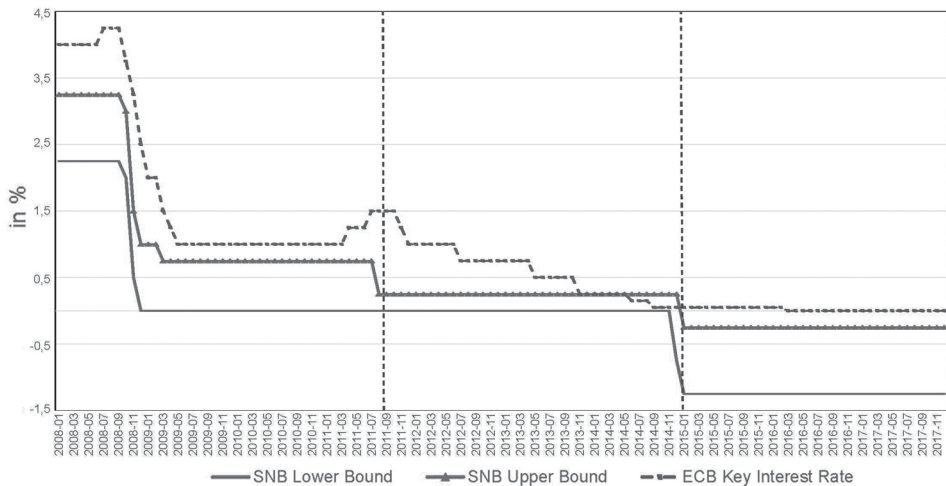
The changes of the exchange rate system are marked by the dashed lines.

Source: Own elaboration with data from SNB (2018) and Eurostat (2018).

During 2012, the nominal exchange rate was trading only slightly above 1.20 CHF/EUR. In May–July 2012, the SNB had to intervene heavily in the foreign exchange market to defend the lower floor. However, after the famous ‘*whatever it takes*’ speech of the ECB President Mario Draghi (on 26 July 2012),¹ the appreciation pressure diminished and the exchange rate fluctuated in a band between 1.20 and 1.24 CHF/EUR. Since the appreciation pressure disappeared, the SNB did not intervene as much as before, and reserves were more or less constant.

The situation in the foreign exchange market changed in 2014: As highlighted by Figure 3, the ECB cut its interest rate for the main refinancing operations several times, while the SNB did not touch its interest rates at all. The interest rate spread between the euro area and Switzerland decreased and became even positive in June 2014. However, a lower interest rate in the euro area compared to Switzerland is completely unsustainable with the prevailing appreciation pressure on the Swiss franc. As a consequence, the appreciation pressure increased tremendously in the fourth quarter of 2014, which led the SNB to intervene heavily in the fx-market again (Figure 2).

Figure 3: Key Interest Rates



The changes of the exchange rate system are marked by the dashed lines.

Source: Own elaboration with data from SNB (2018) and the Deutsche Bundesbank (2018).

¹ The speech was delivered during the Global Investment Conference in London on 26 July 2012. Literally, Mario Draghi said: ‘Within our mandate, the ECB is ready to do whatever it takes to preserve the euro. And believe me, it will be enough.’ (ECB, 2012).

On 15 January 2015, the SNB stopped defending the lower floor and switched back to a floating exchange rate system (SNB, 2015a). Berthold and Stadtmann (2018) highlight two main reasons for this shift:

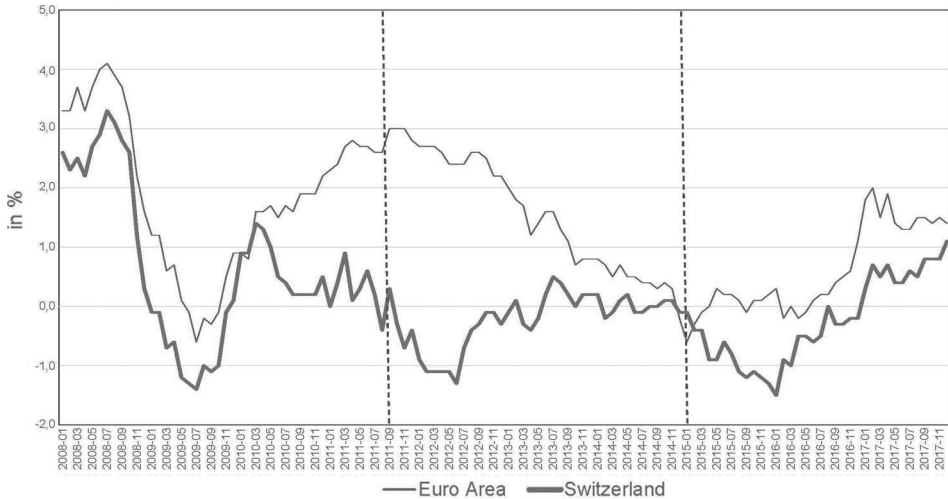
- The accumulation of fx-reserves created an exchange rate exposure in the balance sheet of the SNB.
- Another reason is that the ECB cut its key interest rate to the level of zero and with an appreciation of the CHF, the SNB would have had to lower its own interest rates into the negative range.

When the SNB switched to the floating exchange rate system, the CHF appreciated sharply and traded – at least for a few days – below the level of 1.00 CHF/EUR. This nominal appreciation caused once more a very sharp real appreciation (Figure 2). Despite the fact that the SNB had abolished the peg, it intervened more intensively in the foreign exchange market by acquiring even more reserves during the ‘floating era’ than during the ‘lower floor era’. This is very astonishing, because according to the impossible trinity, one would have believed that the SNB gained some independence for its monetary policy.

However, this is only the case if the assumption of the relative PPP also holds – so that the real exchange rate is constant. This would be the case if the nominal appreciation of the CHF is compensated for by the appropriate inflation differential. As Figure 4 reveals, this was definitely not the case, since even a positive inflation differential can be seen after the abolishment of the peg in January 2015. Therefore, the relative PPP was not fulfilled and the exchange rate also appreciated in real terms.

A real appreciation of the CHF could also affect negatively the export sector of the Swiss economy, which could also lead to a recession. An economic survey of the Swiss corporate sector shows that 70% of the companies reported having been negatively affected by the appreciation of the CHF after the abolishment of the peg (SNB, 2015b). This is also supported by the analysis of Kaufmann and Renkin (2017). They conclude that employment in the manufacturing sector was significantly reduced due to the appreciation of the CHF in 2015.² As a consequence, the Swiss inflation rate also declined via the appreciation-deflation-spiral. As Figure 4 reveals, the inflation rate in the euro area as well as in Switzerland were both far from the target rate of 2%.

² One exemption is the recently published study of Mitrović-Mijatović and Ivanović (2017). Even though they conclude that price differentials lead to a change to the real exchange rate, they found no significant influence for the export sector in case of Montenegro.

Figure 4: Inflation Rate in the Euro Area and Switzerland

The changes of the exchange rate system are marked by the dashed lines. Harmonized Index of Consumer Prices (HCIP, 2015=100). Change from the corresponding month of the previous year in percent.

Source: Own elaboration with data from SNB (2018) and Eurostat (2018).

Therefore, the SNB intervened in the fx-market not only because of a *fear of appreciation*, but also because of a *fear of deflation*.

In order to prevent a deflation within the euro area, the ECB opted for a more expansionary monetary policy. In consequence, it was necessary for the SNB to also adjust its domestic monetary policy as well. However, as Figure 4 reveals, the Swiss inflation rate was almost always lower than the inflation rate in the euro area, and even reached a negative level, of about -1.5% , in 2016. Hence the SNB had to be even more expansionary than the ECB because Switzerland was much further away from its inflation target than was the ECB. In order to prove this, the following subsection compares the monetary policies of the SNB and the ECB after the minimum exchange rate was in place.

3.2 Comparison of monetary policies of the ECB and the SNB since 2015

Both central banks implemented low interest rate policies, as shown in Figure 3. In 2016, the ECB lowered its key interest rate to zero. The SNB lowered its key interest rates into the negative area, in order to avoid even more capital imports and thus to prevent a further appreciation of the CHF. First, just one month before the abolishment of the peg, the SNB decreased its lower bound to the negative area. Second, with the implementation of a floating exchange rate system, the SNB also decreased its upper bound into negative territory. After this reduction, the SNB did not change its key interest rates, and kept them negative.

Therefore, the SNB used this instrument more intensively than the ECB. Negative interest rates also have consequences for an economy. For instance, they could reduce the profitability of the commercial banking sector. Furthermore, central banks have little experience with negative interest rates. Gros (2016) argues that a negative interest rate changes central banks' business model because they have to expect a negative seignorage.

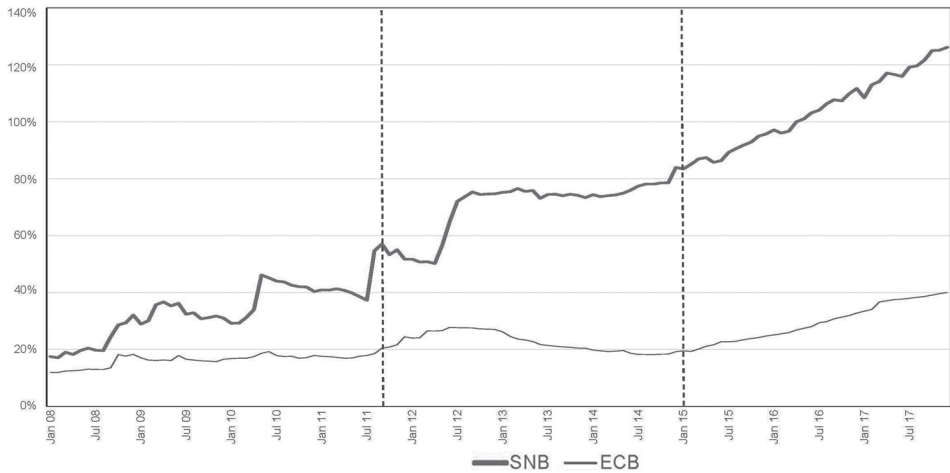
In addition, the ECB introduced a large-scale asset purchase program, the so-called *quantitative easing*. The program's aim was to ease financial conditions, in order to create monetary incentives for the economy to ultimately defend itself against the risk of deflation within the euro area (ECB, 2018). This also raised the expectations of fx-market agents towards future expansionary policy within the euro area. As a consequence, it led to an exogenous shock in the form of larger capital imports into Switzerland, which implied an appreciation pressure on the CHF.³

The ECB mainly purchased sovereign bonds from secondary markets within the euro area. The total purchases of assets amounted to about 2,485 billion euros by July 2018. Even though the Swiss key interest rates were negative, the interest spread was not enough to compensate for such an exogenous shock. This is also supported by the empirical analysis of Hameed and Rose (2017), in which it is shown in particular that the negative Swiss nominal interest rates had only a little impact on the exchange rate (CHF/EUR). Therefore, the SNB also purchased fx-reserves in order to defend against the appreciation pressure on the CHF.

³ The ECB's quantitative easing also led to capital imports into Central and South-Eastern Europe, which have been recently analyzed by Angelovska-Bezhoska, Mitreska, and Bojcheva-Terzijan (2018).

In order to influence the consumer price level, neither the ECB's large scale asset purchase program nor the SNB's fx-reserves purchases were sterilized. This implied a rise in the monetary bases, thus the balance sheets became longer.

Figure 5: Balance Sheet in Relation to the GDP



The changes of the exchange rate system are marked by the dashed lines. The GDP of 2017 was chosen as the basis for the sum of the balance sheet.

Source: Own elaboration with data from SNB (2018) and Eurostat (2018).

Figure 5 compares the total sums of the balance sheets of the ECB and the SNB in relation to the respective GDPs in 2017. It is noticeable that both central banks were more expansionary after 2015. In particular, the SNB increased its balance sheet over the period 01/2015-12/2017 from a level of about 80% to a level of about 130% of the Swiss GDP. A sharp rise of the total sum of the balance sheet by fx-purchases also increases the exchange rate exposure, which can limit a central bank's financial independence (Ivanović, 2014). However, an increasing exchange rate exposure was actually one reason why the SNB switched to a floating exchange rate system in January 2015 (Berthold and Stadtmann, 2018). In contrast, the ECB increased the sum of its balance sheet in relation to its GDP to a level of almost 40%. Hence, the SNB was much more expansionary with its fx-reserve purchases than the ECB with its asset purchases.

Therefore, the SNB not only mimicked the ECB's monetary policy, they were rather more expansionary than the ECB, on the one hand by setting and keeping its key interest rates in the negative territory, and on the other hand, by extending

the total sum of its balance sheet with its fx-reserve purchases. The SNB used its instruments much more intensely than the ECB.

4. Conclusion

According to the impossible trinity, a small open economy cannot have simultaneously an independent monetary policy, complete capital mobility, and a fixed exchange rate system in place. We have analysed the assumptions under which the impossible trinity holds. It holds under the assumptions that:

- free capital movements ensure the equality of domestic and foreign real interest rates,
- the quantity theory of money holds, and
- the relative PPP is fulfilled.

The empirical analysis reveals that the CHF appreciated in nominal as well as in real terms after the abolishment of the peg in January 2015. The real appreciation of the CHF had a negative impact for the Swiss export sector and caused negative consequences for the Swiss economy. It also led to a deflation through the appreciation-deflation-spiral. Although the SNB switched back to a floating exchange rate system, the SNB continued to intervene in the fx-market. These interventions were motivated not only, as initially claimed, by a *fear of appreciation*, but also by a *fear of deflation*.

Hence, the SNB did not gain monetary independence. The main reason is that real PPP does not hold in the short run, so that the real exchange rate was not constant. Therefore, it was necessary for the SNB to adapt its monetary policy in accordance with the ECB's expansionary monetary policy. The empirical analysis reveals that the SNB used its instruments more intensely than the ECB. The SNB set and kept its interest rates in negative territory, and its fx-reserve purchases led to a rise in its balance sheet to a level of about 130% of the Swiss GDP.

Although the SNB, had not introduced the euro in order to be an independent central bank, the present paper shows that nonetheless the SNB is still highly influenced by the monetary policy of the ECB.

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