The Swiss Monetary System Revised: A Comparison Between the Fractional Reserve System and a Hypothetical Sovereign Money System in Switzerland

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Abstract

In 2018, a popular vote is expected to take place in Switzerland on whether to revise its current monetary system, which is known as the Fractional Reserve system, and instead implement a Sovereign Money system. The approval of such a proposition would resemble a genuine experiment, since no other country has currently installed a Sovereign Money system in practice, nor has the latter ever de facto existed in a developed country in the modern era. This paper systematically compares the Fractional Reserve system with a hypothetical Sovereign Money system implemented in Switzerland by analyzing the impact of the bank business and the Swiss National Bank's (SNB) monetary policy on the affected economic actors' balance sheets and on monetary aggregates. The major findings suggest that a Sovereign Money system may not per se stabilize the Swiss banking system, since it would not eliminate the cause of financial turmoil the big Swiss bank UBS found itself in during the 2008-2009 financial crisis. However, payment transactions in Swiss francs may be sustained at any time, thereby reducing the risk of bank runs and minimizing, if not eliminating, the "too-big-to-fail" problem. Further, the SNB's novel ability to have direct control over Swiss franc monetary aggregates could reduce bank profits and improve public sector finances. Besides these hypothetical consequences, many uncertainties remain and require further examination.

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1 Introduction

A Swiss cooperation called *Monetäre Modernisierung* (MoMo) has started to launch an initiative to implement a Sovereign Money system in Switzerland with the intention to transform the Swiss franc into a "crisis-proof" currency (Vollgeld-Initiative 2017). The initiative gained ground with the financial difficulties the big Swiss bank UBS faced during the 2008-2009 financial crisis and the announcement that the Swiss National Bank (SNB) and the Swiss Confederation would offer financial support to the bank[1] in order to prevent a potential collapse of essential economic activities in the country, such as Swiss franc payment transactions (FINMA 2014).

The so called *Swiss Sovereign Money Initiative* was brought to the Swiss Parliament in December 2015 with over 110,000 signatures from citizens. A popular vote is expected to take place in 2018.[2] If the initiative was accepted by the public, it would lead to the first practical implementation of an unprecedented kind of monetary system in a developed country since decades, given such a system has neither de facto existed in the modern economy of Switzerland, nor in any other modern and developed country.[3]

In this paper, it is asked how a Sovereign Money system would deviate from the current monetary system in Switzerland with respect to the business of banks in Switzerland and the SNB's monetary policy, since these two types of institutions are explicitly addressed by the initiative. The approach to this question is to analyze how banks' and the SNB's economic activities empirically and hypothetically impact the affected economic actors' balance sheets and the various Swiss franc monetary aggregates.

The major findings suggest that a Sovereign Money system may not per se stabilize the Swiss banking system, since it would not fix the cause of financial difficulties UBS faced during the 2008-2009 financial crisis. Yet, a Sovereign Money system could sustain payment transactions in Swiss francs during financial turmoil, thereby reducing the risk of bank runs and minimizing, if not eliminating, the need to support systemically relevant financial institutions by the state. A Sovereign Money system is supposed to allow the SNB direct control over all monetary aggregates. This is expected this to reduce banks' profits and improve public finances. Finally, banks under a Sovereign Money system would become genuine financial intermediaries, channeling savings to borrowers. Besides these hypothetical consequences, many uncertainties remain and require further examination.

In order to put the idea of Sovereign Money into context, a look back at economic history is required. Monetary authorities and professions have offered various explanations for the emergence and severity of major financial crises of the modern era—such as the Great Depression of the 1930s and the 2008-2009 financial crisis. From the policy measures that were taken as a response it seems as if the main causes of these crises appeared to be too much debt (Reinhart and Rogoff 2011); the deregulation of the banking system towards the end of the 20th century (Fligstein and Goldstein 2012); insufficient liquidity by the banking system (BIS 2010); too low capital ratios so that banks could not absorb losses (BIS 2010);

[1] See https://www.nzz.ch/auch-die-schweiz-stuetzt-das-finanzsystem-1.1114119. Last visited: 4 March 2017

[2] See http://www.vollgeld-initiative.ch/. Last visited: 4 March 2017.

[3] It is argued that a monetary system similar to the concept of Sovereign Money existed in the US state of Louisiana in the 1840s. For more information, see http://www.batz.ch/2015/12/vollgeld-louisiana-1842/ (last visited: 8 February 2017).

or excessive risk taking and speculative banking activities prior to the crises (Fligstein and Goldstein 2012). Regarding the 2008-2009 financial crisis, it is also argued that financial globalization (in particular, the strong interconnectedness of financial institutions) led to the global contagion to financial sectors abroad (Fligstein and Goldstein 2012), so that, even though the crisis had originated in the US, it vastly spread to the rest of the world and reached other economies—such as Switzerland. Here, neither was the Swiss economy immune against this negative economic shock, which took it into recession too (Danthine 2011).

Meanwhile, another narrative has been suggesting that the root cause for both the outbreak and the severe consequences of the past's major financial crises was something else: namely the very *nature* of the contemporary monetary system, and in particular, the mechanism of the bank business. This narrative has been expressed, among others, by high-ranking economists, such as the former chief economist from the German Bundesbank Thomas Mayer (Mayer 2014), members of the Bank of England (McLeay et al. 2014b) or of the International Monetary Fund (Benes and Kumhof 2012), who have begun to throw serious suspicion against the mechanism of today's monetary system with banks as widely held financial intermediaries, taking deposits from savers and channeling them to borrowers. For instance, Jakab and Kumhof (2015) try and explain in a very explicit way, so as to make sure a straight-forward statement is properly understood, nothing less but the basic mechanism of how banks actually work by titling their article "*Banks are not intermediaries of loanable funds—and why this matters*". Under today's widely identical monetary systems in developed countries, banks do *not* use savings to issue loans to borrowers. To put it simply, banks issue loans simply by—based on a fraction of central bank reserves—creating deposits to borrowers, thereby granting the latter money that has not existed before (McLeay et al. 2014b).

Overall, today's so called *Fractional Reserve* system has increasingly become the focus of more and more economic studies. It is argued that the former appears to inherit systemic flaws from a financial stability perspective, which include the risk and occurrence of bank runs; excessive business-cycle fluctuations; and high private and public debt levels (Yamaguchi and Yamaguchi 2016: 2; Sigurjónsson 2015).

However, it did not end with the criticism of the contemporary monetary system—proposals for monetary reforms have emerged and been expressed. Already at the height of the Great Depression, members of the *Chicago School of Economics* developed a proposal for monetary reform called the *Chicago Plan*, which stipulated that banks must fully back their clients' deposits with central bank reserves. The proposal, also known as *100% reserve banking*, received a large amount of support by then leading economists, such as Irving Fisher (Benes and Kumhof 2012: 1).

Yet, US Congress eventually neglected the proposal. Instead, the deposit insurance system—a guarantee by the state to protect deposits in the case of systemic bank failures—and the Glass-Steagall act—which would separate commercial from investment banks—were established (Krugman 2009). The proposal of 100% reserve banking seemed to have been forgotten (Benes and Kumhof 2012)—until the next financial crisis arrived in 2008.

This was first and foremost when the criticism regarding the mechanism of the Fractional Reserve system and the urge for monetary reform expressed by the Chicago plan were revived. The design of 100% reserve banking was, however, revisited until a slightly

transformed, but not identical,[4] concept evolved: Sovereign Money. Sigurjónsson (2015: 11) notes:

> "In a Sovereign Money system, private banks do not create money [...] All money, whether physical or electronic, is created by the Central Bank."

Advocates expect a Sovereign Money system to go along with similar consequences that were expected by advocates of the Chicago Plan: lowered risk for bank runs, reduced public and private debt levels, and more moderate business cycle fluctuations (Benes and Kumhof 2012: 1, Vollgeld-Initiative 2017).

A wide range of various contributions regarding a Sovereign Money system implemented in Switzerland (such as Mayer 2015, or Vollgeld-Initiative 2017, for example) is already in existence. However, two deficiencies can be identified. First, there is no paper which provides a systematic comparison between the empirical design of the current monetary system and a hypothetical Sovereign Money system set up in Switzerland. And second, the writings fail to discuss the initiative in the context of the major economic challenges Switzerland as an open economy and with an internationally relevant banking sector faces. This contribution seeks to fill these gaps in the literature.

2 The Swiss Banking Sector, Switzerland's Macroeconomic Challenges, and the SNB's Mandate

The purpose of this chapter is to outline the general structure and main characteristics of the Swiss banking sector, Switzerland's macroeconomic challenges due to its open economy and its internationally relevant currency, and the SNB's major objectives. The following information is crucial in order to be able to put the subsequent analysis into context. For now, it is assumed that the content of this chapter is exogenous—that is, given—and not a result or a reflection of the current Fractional Reserve system. For this assumption to be realistic, this chapter's content is discussed only superficially.

2.1 The Swiss Banking Sector

According to Swiss law, banks are defined as financial institutions, which, on the one hand, offer to take deposits from clients and, on the other, refinance themselves in order to, on their own account, be able to finance persons or businesses.[5] A bank's account is reflected in its balance sheet, which provides information about how much a bank owns (assets) and how much a bank owes (liabilities) to other actors in the economy. Figure 1 reflects the highly concentrated Swiss banking sector in 2015: assets held by the big Swiss banks accounted for the vast majority of assets held by all banks in Switzerland.

The big banks include UBS and Credit Suisse, which are stock companies. They operate in Switzerland and abroad, thereby generally offering all kinds of banking services—especially what is known as investment banking. That investment banks are big banks is no coincidence: "As a rule, investment banking services are structured globally [...] Fairly large

[4] In a 100% reserve banking system, private banks can still create money (Huber 2013).

[5] See https://www.admin.ch/opc/de/classified-compilation/20131795/index.html. Last visited: 14 February 2017.

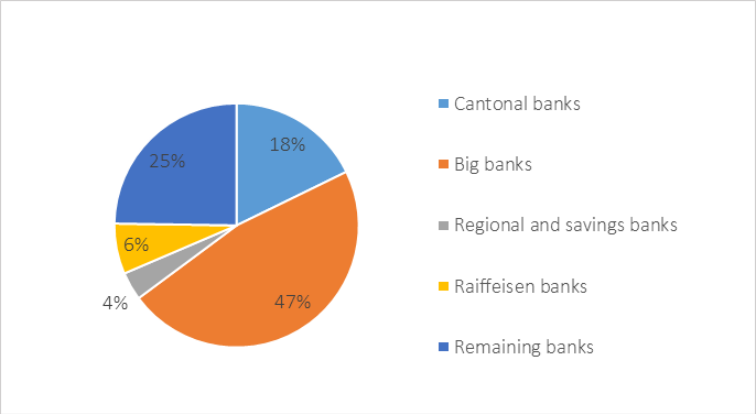

Figure 1: A bank group's total assets as a share of total assets held by all banks in Switzerland, 2015
Source of data: SNB. *Note*: own calculations. Assets in all currencies are considered.

corporation size is typical for businesses engaging in investment banking" (SwissBanking 2006).

Cantonal banks are owned by the respective Cantons of Switzerland; regional and savings banks operate on an even more limited regional level in the economy; and finally, Raiffeisen banks are associations. In contrast to the big banks, these three banking groups generally pursue the "traditional" bank business: issuing loans to households (mortgages) and taking deposits from savers (SwissBanking 2015). The remaining banks are, for instance, branches of foreign banks. These banks are ignored in this analysis due to lack of data.[6]

Of all outstanding assets in 2015, mortgage loans accounted for the main asset category, except in terms of big banks (see figure 2). By issuing a loan to a household, the bank holds an asset, claiming to receive the lent funds (including interests) back at a later point in time.

As can be seen from figure 2, the big Swiss banks rather focus on other bank services, such as providing loans to corporations (which is part of "amounts due from customers"; Finma 2015a) or engaging in trading financial instruments, such as securities (which is part of the category "amounts due from securities financing transactions"; Finma 2015a). In terms of assets, the big banks are also more interconnected with other banks: the total amount of outstanding assets due from other banks as a share of total assets is much higher as opposed to the share of Switzerland's smaller banks (such as regional and savings banks). This underlines the relevance of the big banks in lending funds to other banks.

Briefly examining banks' liabilities in 2015, deposits from clients accounted for the majority of banks' total liabilities independent of their size, whereas the share of the big banks was slightly lower than that of the other bank categories (see figure 3). Holding a client's deposits represents a liability for the bank, since the latter promises to return funds (including interests) to the lender at a later point in time.

Figure 4 illustrates that in 2015, the big banks held more than 50% of their assets in foreign currency, mainly in US dollars. At the same time, regional and savings banks held

[6]Balance sheet information of the category "remaining banks" is included in the category "banks in Switzerland". Nevertheless, it is assumed here that these banks' activities do not substantially affect the balance-sheet pattern of the category "banks in Switzerland".

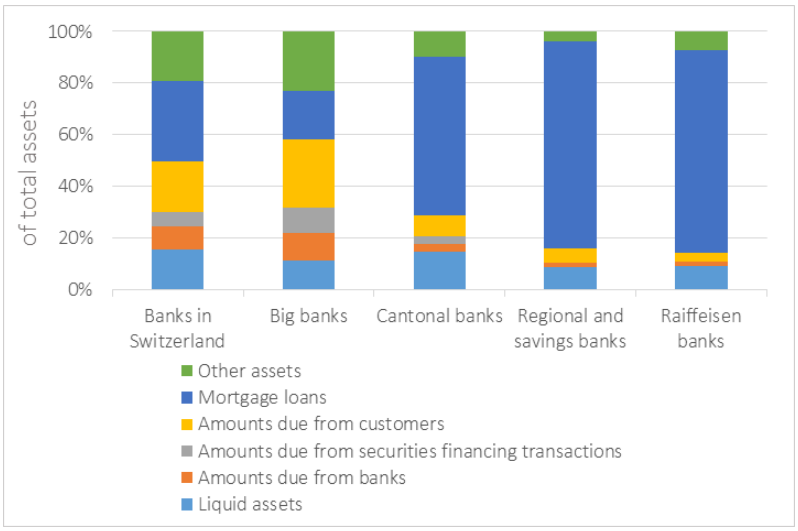

Figure 2: Total asset composition by banking group, 2015
Source of data: SNB. *Note*: own calculations. Assets in all currencies are considered.

almost 100% of their assets in Swiss francs. In this paper, it is assumed that the same holds for the respective bank categories' liabilities, and that the same pattern of currency composition of regional and savings banks also applies to Cantonal banks and Raiffeisen banks.

Figure 5 shows that in 2015, banks in Switzerland held domestic assets primarily in Swiss francs, and foreign assets primarily in foreign currency. The figure suggests that most loans issued by banks in Switzerland are denominated in Swiss francs and most loans issued by branches of banks in Switzerland operating abroad are denominated in foreign currency. Based on figure 4 and figure 5, it is concluded that the big banks conduct around half of the bank business abroad.

As an accounting rule, the amount of banks' assets must equal banks' liabilities. If what a bank owns exceeds what a bank owes, the bank holds capital. The latter is, as a consequence of this accounting principle, included in the category "liabilities" (Farag et al. 2013).[7]

Finally, banks in Switzerland also provide services that are not reflected in their balance sheets, since these transactions are not undertaken in the banks' own account, but on behalf of third parties. Thereby, banks provide services in terms of fiduciary transactions (whereby banks manage fiduciary funds held by pension funds, which are due when employees retire), securities managing (such as if investors seek to buy interest-bearing assets in order to increase their wealth), and the management of derivatives (such as purchasing exchange rate derivatives on behalf of firms which would like to hedge their cross-border trading activities in the case of exchange rate movements) (SNB 2015).

By mainly selling services to either domestic or foreign consumers, the Swiss banking sector accounted for around 6% of GDP in 2015 and is therefore considered a non-negligible

[7]In order to raise capital, a bank can either retain the earnings it generates (by generating an extension of the gap between what the bank owes and what it owns) or the bank can issue more shares to investors (Farag et al. 2013: 302).

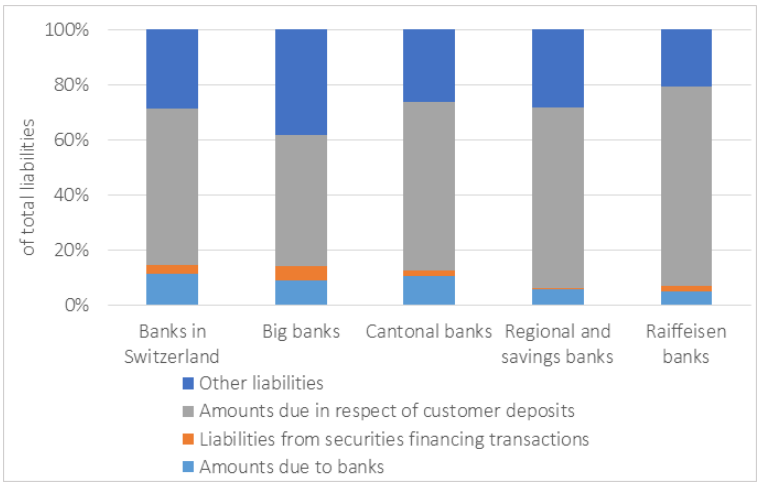

Figure 3: Total liabilities composition by banking group, 2015
Source of data: SNB. *Note*: own calculations. Assets in all currencies are considered.

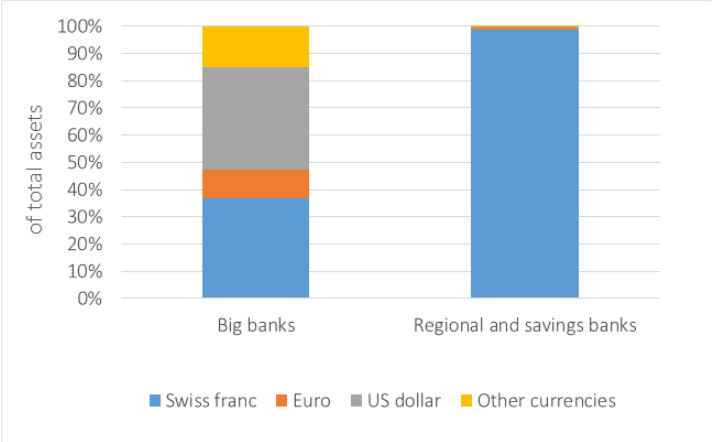

Figure 4: Currency composition of big banks' vs. regional and savings banks' assets, 2015
Source of data: SNB. *Note*: own calculations.

aspect of the Swiss economy (SwissBanking 2015).

2.2 Switzerland as a Small Open Economy and the Swiss Franc as a "Safe Haven" Currency

Mainly when engaging in the off-balance sheet business as just mentioned, banks in Switzerland manage domestic and global investors' demand for interest-bearing investments, including investments denominated in Swiss franc, such as Swiss government bonds. Swiss franc assets have been a popular investment asset to hold, especially in times of global financial turmoil (for instance, during the financial crisis in 2008-2009 and the Eurozone crisis shortly after the onset of the financial crisis, SNB 2016). Alternative, possibly higher-yielding assets were perceived to inherit more risk, which led investors to "flight to safety" in acquiring Swiss franc assets. The Swiss currency—which is required in order to buy

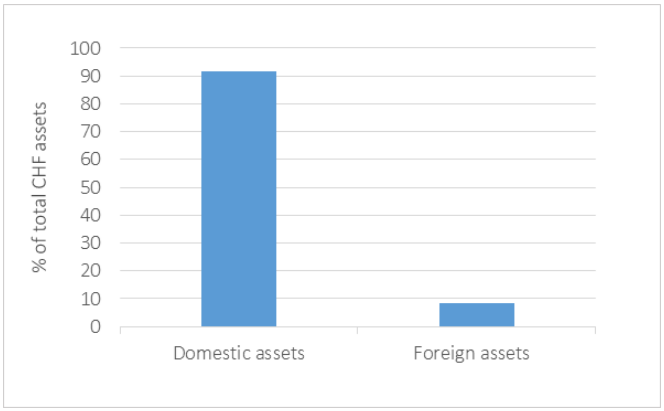

Figure 5: Domestic vs. foreign CHF assets as shares of total CHF assets, 2015
Source of data: SNB. *Note*: own calculations.

Swiss franc investments—is therefore also called a safe haven currency (Jordan 2015a). In an environment of flexible exchange rates which allows a flexible adjustment of the relative price of a currency, an increased demand for the Swiss franc ceteris paribus leads the latter to appreciate against other currencies, such as the euro (see figure 6).

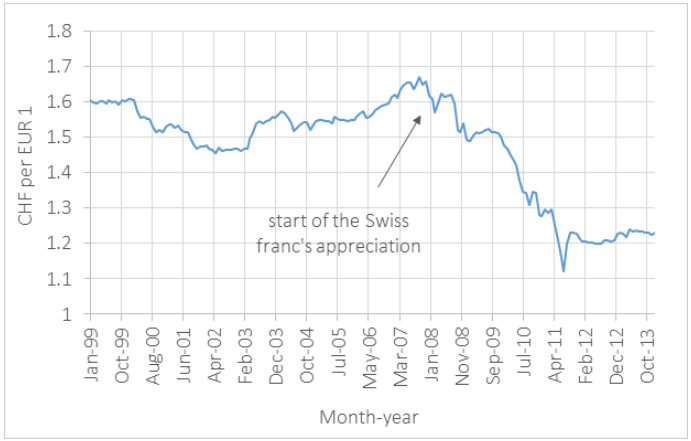

Figure 6: The exchange rate (CHF per EUR 1) and the Swiss franc's appreciation in times of global financial turmoil
Source of data: SNB. *Note*: the Swiss franc started to substantially appreciate at the onset of the 2008-2009 financial crisis.

An appreciation of the Swiss franc tends to pose a challenge for the Swiss economy and price stability for the following reason: given that exports and imports make up around 50% and 40% (respectively) of GDP (Jordan 2015a: 4), Switzerland is perceived an open economy and its economic performance is to a large extent dependent on a thriving export sector.[8] All else equal, a rapid appreciation of the Swiss franc makes domestic goods relatively more expensive and foreign goods relatively cheaper. As a consequence, economic theory predicts

[8]GDP can be decomposed into consumption (C), investment (I), government spending (G), and net exports (NX, which is exports minus imports) which suggests that, all else equal, a decrease in exports lowers GDP.

exports to decrease, since the latter become more expensive to foreigners. Figure 7 presents an event of a strong Swiss franc appreciation (CHF per EUR 1 goes down),[9] accompanied by a decrease in exports to the Eurozone, and downward pressures on the price level.[10]

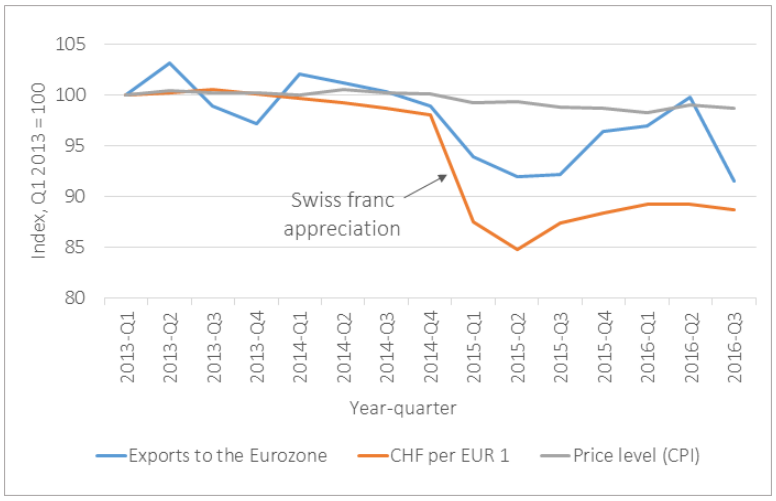

Figure 7: Swiss Exports to the Eurozone, the exchange rate (CHF per EUR 1), and the price level (CPI) *Source of data*: SNB. *Note*: index based on own calculations.

On the other hand, the price of imported goods is an important determinant of Swiss price developments, too (Jordan 2015a: 4), since the Consumer Price Index (CPI)—the SNB's measurement of the price level in Switzerland—takes import prices into account. An appreciation of the Swiss franc is—in theory—associated with imported deflation (a fall in the general price level) due to decreasing import prices, although lower import prices do not necessarily have to be associated with exchange rate movements, but can appear given a certain exchange rate level. In this context, Jordan (2015a: 3) notes that "most of the negative inflation Switzerland has experienced in recent years has been linked to lower prices for imported goods."

Openness of the financial system and the real economy supports the strong performance of both the Swiss banking sector and the export sector, allowing both aspects of the economy to have access to a broader market, and thereby, to sell more products. On the other hand, openness can, as just argued, be associated with challenging price stability in times of financial turmoil, or with the Swiss economy being exposed to imported deflation also in more stable times.

2.3 The SNB's Mandate

To deal with the just described challenges is a major task for the SNB. The institution was established to fulfill two interrelated tasks: on the one hand, to ensure price stability, so that

[9]Here, the Swiss franc appreciated due to the SNB's monetary policy (when the so called *1.20 lower bound* was abandoned). This figure nevertheless illustrates that changes in the exchange rate can be accompanied by effects on the real economy.

[10]Economic theory says if GDP decreases, the unemployment rate tends to rise. This reduces the "bargaining power" of employees, allowing firms to pay them a lower wage. Lower wages allow firms to sell their products cheaper, leading to downward pressures on prices in general (see Blanchard 2017).

the Swiss franc retains its purchasing power; and on the other, to promote financial stability, which involves the counteraction of negative economic shocks on the Swiss financial system (SNB 2015: 5), since the latter can have an indirect effect on price stability. The SNB's mandate is fixed and set up in the Swiss Constitution. Yet, in pursuing the latter, the SNB is "independent in the fulfillment of its mandate" (SNB 2016: 6): given its legal boundaries, the SNB can choose by itself what tools it perceives most appropriate and supportive to ensure price and financial stability. The SNB's preferred approach to monetary policy is also known as the SNB's "monetary policy framework", which the institution can adjust at any time (Jordan et al. 2009).

3 Fractional Reserve Vs. Sovereign Money System: Banks in Switzerland

This chapter is devoted to the comparison between the current Fractional Reserve and a hypothetical Sovereign Money system with regard to banks in Switzerland. This paper's discussion of the concept of Sovereign Money is primarily based on the contributions by Huber (2013) and Sigurjónsson (2015), but also on the material provided by the website of the initiators of the Swiss Sovereign Money initiative.[11] In the appendix, a discussion on the practical implementation of the Sovereign Money system in Switzerland is provided.

3.1 Fractional Reserve System: How Banks in Switzerland Manage Deposits in Swiss Francs

Under the currently installed Fractional Reserve system, bank deposits held in Swiss francs can be decomposed into three types: demand deposits,[12] savings deposits, and time deposits, suggesting that economic actors can choose among holding Swiss francs on any of these three different types of bank accounts (SNB 2016a). Deposits denominated in foreign currency can similarly be distinguished in terms of these three categories (Huber 2013). For the sake of analysis, the focus is laid on Swiss franc deposits held at domestic bank offices and their branches abroad (SNB 2016a).

Rational economic actors have an incentive to place their funds with a bank if the cost of holding money at the bank is less than the cost of hoarding money outside of the bank, such as in a safe at home (Humphrey 2015). In this sense, the interest rate[13] banks pay on the various deposits serves as an incentive for individuals to open an account. A bank typically offers higher interest rates on deposits which are less liquid and inherit more risk (Farag et al. 2013: 2014).

[11] In this sense, the discussion in this paper can deviate from the detailed requirements and exact accounting principles stipulated by the Swiss Sovereign Money initiative.

[12] The SNB defines what is here called "demand deposits" as the sum of bank clients' "deposits in transaction accounts" and "sight deposits" (SNB 2016).

[13] When talking about the interest rate, the nominal interest rate is referred to. The latter is to be distinguished from the real interest rate, which is calculated by subtracting the inflation rate from the nominal interest rate. The real interest rate would be the decisive rate based on which economic actors make decisions (see Blanchard 2017). However, the interest rate is referred to as if it did not make any difference whether nominal or real interest rates are considered.

Demand Deposit Accounts

Economic actors are able to place Swiss francs on demand deposit accounts from which they are able to immediately withdraw money (in the form of cash, which is banknotes or coins) or in order to electronically transfer the funds to another economic actor's bank account. Thus, these funds are on demand. When a client deposits cash (such as banknotes) at the bank, the asset and liability side of the bank's balance sheet expand by the face value of cash that is deposited with the bank (see figure 8). Cash becomes property of the bank and appears in the asset category "liquid assets" (recall figure 2, FINMA 2015a). Regarding the bank's liabilities, the client's demand deposits are increased. "The deposit signifies the bank's liability to the customer", since "a demand deposit represents a bank's commitment to pay the deposit amount in cash, or to electronically transfer it to another beneficiary, when the owner so demands" (Sigurjónsson 2015: 9). The bank's client, in turn, holds demand deposits instead of cash. In this example, the client holds exclusively capital as liabilities, meaning that the former is not indebted.

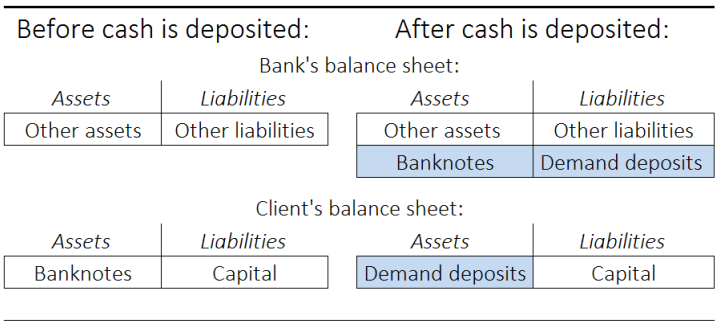

Figure 8: Client places cash at his or her demand deposit account under the Fractional Reserve system *Source*: own illustrations based on the illustrations by Mayer (2016: 5). *Note*: "other liabilities" can include capital.

When cash is placed on a demand deposit account, it is withdrawn from the economy, with the result that currency in circulation decreases. Following equation 1, the monetary aggregate *M1*, which the SNB (2016a) defines as currency in circulation (which decreases) plus demand deposits (which increases), stays the same (Mayer 2016).[14]

$$currency\ in\ circulation + demand\ deposits = M1 \tag{1}$$

Equivalently, when the client withdraws cash from his or her demand deposit account, the bank's balance sheet decreases by the face value of cash that is withdrawn: the bank owns fewer liquid assets and owes fewer demand deposits. Hereby, the money supply *M1* remains the same as well: there is more currency in circulation, whereas there are fewer demand deposits.

When the bank receives cash, it can exchange cash for electronic SNB money (see figure 9; Jordan 2015).

[14] In order to practically assess the impact on the monetary aggregate, *M1* is measured as demand deposits plus currency in circulation minus banks' cash holdings (SNB 2016a). In this sense, given an amount of currency in circulation, if demand deposits increase, and also banks' cash holdings increase, *M1* stays the same as a result.

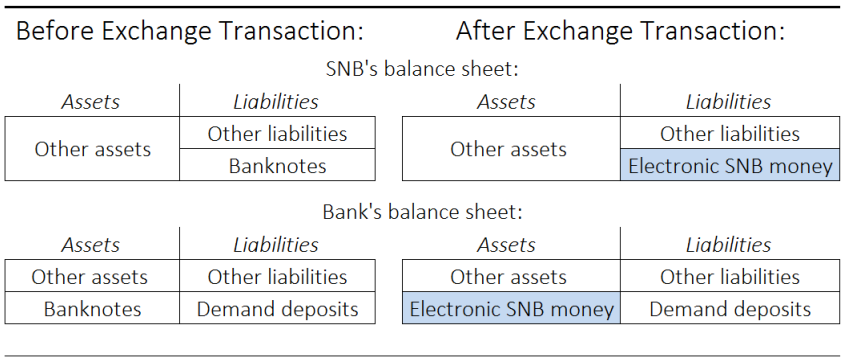

Figure 9: Bank exchanges cash for electronic SNB money under the Fractional Reserve system *Source*: own illustrations. *Note*: for simplification, this illustration does not take other amounts of banknotes or electronic SNB money already issued by the SNB into account.

In this paper, the unambiguous term "electronic SNB money" instead of what is mostly called "sight deposits held by banks at the SNB" or simply "reserves" is used. Since banks in Switzerland hold almost all Swiss franc liquid assets in the form of electronic SNB money (see figure 46 in the appendix), it is assumed here that banks instantaneously exchange cash for electronic SNB money when cash is placed at banks.

This exchange leaves the size of both the bank's and the SNB's balance sheet unaffected. Regarding the bank's balance sheet, there is an accounting exchange on the asset side of its balance sheet. Regarding the SNB's balance sheet, there is an accounting exchange on the liability side of its balance sheet: the SNB must now provide the bank with electronic SNB money. Equivalently, when the client aims to withdraw cash, the bank exchanges electronic SNB money for cash. A discussion on the relevance of electronic SNB money is provided later.

Funds part of the monetary aggregate *M1* serve as a means of payment. Figure 10 illustrates that over time, demand deposits have become an even more dominant means of payment: in the 1980s, cash represented around 23% of *M1*, and in 2016, cash represented less than 15% of *M1*.

This general phenomenon can be traced back to technological innovation, which has increasingly enabled clients to pay for goods and services directly with funds from their demand deposits via electronic payment transactions (Rich 2000).

Savings Deposit Accounts

Money can also serve as a store of value. Economic actors can transfer funds from their demand deposit account to a savings account (the former can also directly place cash on savings accounts). In technical terms, the transfer represents a passive exchange on the liability side of the bank's balance sheet (see figure 11), suggesting that demand deposits become savings deposits.[15] Like demand deposits, banks hold clients' savings deposits

[15] In the SNB's banking statistics, there is no information about how many funds individual banking groups owe in terms of their clients' various types of deposits, but simply the aggregate "liabilities in respect of customer deposits". Nevertheless, this paper makes the distinction in order to illustrate that both funds are different in nature.

Figure 10: Currency in circulation as a share of *M1* over time
Source of data: SNB. *Note*: own calculations.

as liabilities that must be paid back (that is, provided as demand deposits which can be physically withdrawn or transferred), including interest payments. A large amount of savings deposits can be withdrawn only after a certain period of time. A limited amount can be instantly withdrawn (Huber 2013).

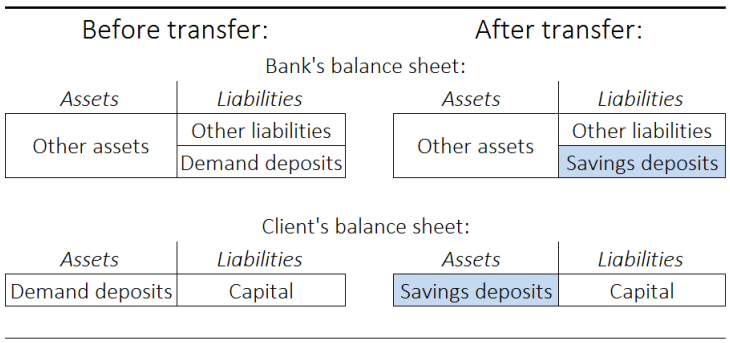

Figure 11: Transfer of funds from a demand deposit account to a savings deposit account under the Fractional Reserve system
Source: own illustrations based on Huber (2013).

Exactly the same would happen with regard to the bank's balance sheet if a holder of demand deposits decided to transfer these funds electronically to another client, and if that client put the money on his or her savings account with the *same* bank. More generally, electronic transfers of funds between clients of the *same* bank do not affect the size of the bank's balance sheet, only the composition of its liabilities (Huber 2013).

When funds from a demand deposit account are transferred to a savings account, the monetary aggregate *M1* decreases because demand deposits decrease. At the same time, funds are shifted to the monetary aggregate *M2*, which consists of *M1* plus funds on savings accounts (SNB 2016). The overall effect is that *M2* remains stable.

$$M1 + savings\ deposits = M2 \tag{2}$$

In his economic textbook, Blanchard (2017: 76) argues that banks "receive funds from people and use these funds to [...] make loans to other people and firms". However, Huber (2013) argues that this statement does not reflect what happens in reality: the bank does *not* lend funds held on savings accounts. According to Huber (2013: 24), savings deposits are closed down means of payments. Similarly, Sigurjónsson (2015: 18) notes:

> "When households choose to save more money in bank accounts, those deposits come simply at the expense of deposits that would have otherwise gone to companies in payment for goods and services."

Time Deposit Accounts

Banks also offer so called time deposit accounts to their customers. Thereby, banks propose that their clients invest a certain minimum amount of money to acquire various types of financial assets. For example, a client could acquire what is known as Certificates of Deposit (CDs), commercial papers (CP), or money market papers (Huber 2013: 39).

The time depositor does not have access to time deposits for a period lasting for between some months and several years, implying that time deposits are both short-term to medium-term investments (Huber 2013). Gilkeson et al. (1999: 104) note that it is possible for clients to conduct an early withdrawal of their time deposits prior to stated maturity, but this goes along with "an early withdrawal penalty typically equal to some percentage of face value."

Funds on time deposit accounts are part of the monetary aggregate *M3* (SNB 2016a). If an individual acquires a CD, or any other asset that would increase the amount of funds held on a time deposit account, the former always pays with funds from the monetary aggregate *M1* (that is, either with cash or with demand deposits; Huber 2013: 38). The balance-sheet effect of when a client acquires time deposits with funds from his or her demand deposit account almost looks the same compared to the balance-sheet effect presented in figure 11 (simply exchange "time deposits" for "savings deposits"). Thereby, money flows directly from *M1* to *M3*. *M1* decreases, and so does *M2*; in contrast, *M3* stays the same (Huber 2013: 38).

$$M2 + time\ deposits = M3 \tag{3}$$

Like savings deposits, neither are funds held on time deposit accounts actively used by the bank—the bank neither lends nor sells these funds (Huber 2013). After time deposits have matured, the investor can either renew the investment (that is, reinvest the funds in time deposits) or get back liquid funds on his or her demand deposit account (including interests), which the client can spend in the real economy (Huber 2013).

Figure 12 presents the evolution of demand deposits, savings deposits and time deposits in Swiss francs over time.[16]

The figure shows that demand and savings deposits have grown over the years—especially after the 2008-2009 financial crisis—and that time deposits have experienced a boom prior to and a rapid fall after the crisis, but otherwise remained relatively stable. Time deposits serve—similarly to savings deposits—as a store of value, but the former are different in nature: in case of a default of the issuer of a CD, for instance, the bank takes the funds

[16]The reason for why monetary aggregates compromise solely deposits in Swiss francs is that, "under a system of flexible exchange rates, foreign currencies were not a close substitute for the Swiss franc and exchange rate fluctuations resulted in undesirable fluctuations in the monetary aggregates" (SNB 2007: 10).

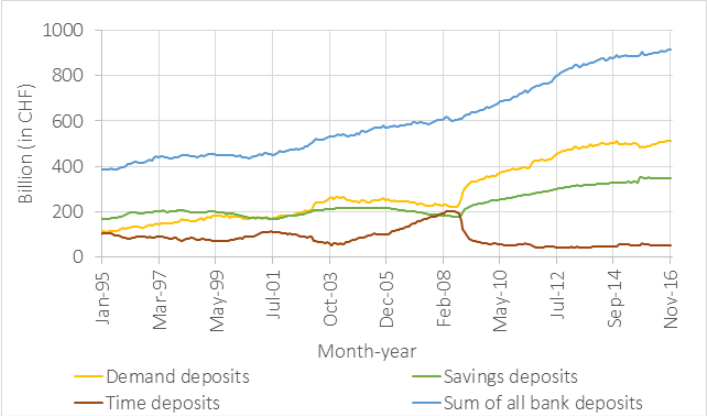

Figure 12: Evolution of the size of various CHF bank deposits
Source of data: SNB

provided by time depositors as capital to absorb losses.[17] This implies that time deposits can bear substantial risk (Gilkeson et al. 1999). This may explain why, during the crisis, economic actors appeared to have withdrawn substantial amounts of funds from their time deposit accounts—reflected by a decrease in time deposits in early 2009. All else equal, some of the funds were either liquidated into demand deposits, which led to an increase in demand deposits, or put into a savings account, which led to an increase in savings deposits. Gilkeson et al. (1999: 117) find that "most if not all early [time deposit] withdrawals are motivated by the depositors' liquidity needs", suggesting that the demand for liquid assets (such as demand deposits) substantially rose as the 2008-2009 financial crisis unfolded.

Since "banks neither need deposits nor in fact can use them to create credit" (Huber 2014: 5), it might seem unclear why banks do offer these deposits at all, given that banks must pay interests on them. An explanation is provided in the following sections.

Asset Management

Before banks' management of clients' deposits under the Sovereign Money system is discussed, a major practice undertaken by the big banks in Switzerland must be looked at: the talk is of asset management, a financial service "delivered to private, corporate or institutional clients who own a certain volume of assets or wealth" (SwissBanking 2006: 15). OFR (2013: 1) writes:

> "Asset managers act primarily as agents: managing assets on behalf of clients [...] Losses are borne by—and gains accrue to—clients rather than asset management firms. In contrast, commercial banks [...] typically act as principals: accepting deposits with a liability of redemption at par and on demand, or assuming specified liabilities with respect to policy holders" (OFR 2013: 1).

This statement explains why assets under management, such as securities portfolios, generally do not appear on bank balance sheets (OFR 2013: 27, SwissBanking 2006: 16).

[17] See https://www.ubs.com/ch/en/swissbank/private/pay-and-save/accounts/time-deposit.html. Last visited: 4 March 2017.

When client A tells its bank to buy a security, the former's demand deposit decreases. Instead of demand deposits, client A now holds a security. In turn, client B holds demand deposits instead of a security (see figure 13). The bank actively channels demand deposit and the security between client A and client B. Regarding the transaction illustrated in figure 13, both bank clients hold their demand deposit account at the same bank.

Before security purchase:		After security purchase:	
Bank's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Other assets	Other liabilities	Other assets	Other liabilities
	Demand deposits to client A		Demand deposits to client B
Client A's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Demand deposits	Capital	Security	Capital
Client B's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Security	Capital	Demand deposits	Capital

Figure 13: Bank client A buys a security from client B
Source: own illustrations based on OFR (2013).

Not only do banks provide the service of asset management; this service is also conducted by other institutions, such as insurance companies or non-bank asset managers (SwissBanking 2006). And yet, the latter institutions are likely to be interrelated with a bank in Switzerland: non-bank asset managers manage assets "on behalf of their clients who in turn have deposited these assets with a bank" (SwissBanking 2006).

3.2 Sovereign Money system: How Banks in Switzerland Would Manage Deposits in Swiss Francs

When economic actors bring Swiss francs in the form of cash to a bank under the Sovereign Money system, they can choose whether to hold them either on a payment transaction account (transaction account hereafter), or instead on a financial investment account (investment account hereafter; Sigurjónsson 2015). Demand, savings, and time deposits in Swiss francs as discussed no longer exist anymore. It is assumed that they continue to exist in terms of foreign currency deposit accounts offered by banks in Switzerland. It is further assumed that banks would still be able to offer asset management in the same manner as described before. Therefore, a discussion on asset management under the Sovereign Money system will not be provided here.

Transaction Accounts

Funds held on transaction accounts will exclusively serve as a means of payment (Huber 2013). A client who aims to place cash (such as banknotes) at a bank and demands instant access to the funds chooses this type of account. A transaction account resembles a demand deposit account under the Fractional Reserve system with the following difference: when

a client puts cash on a transaction account, these funds do not appear on the bank's balance sheet, but *off*-balance (below the double line, see figure 14). This implies that the bank neither owns nor owes the funds: the bank's balance sheet remains unaffected. The bank's off-balance sheet, however, increases by the face value of the funds placed on the transaction account. The client now still holds legal tender, only in electronic instead of physical form: "the funds in Transaction Accounts will be electronic [...] money created by the Central Bank" (Sigurjónsson 2015: 14). For the first time, clients can hold electronic SNB money, whereas under the Fractional Reserve system, non-bank clients do not have access to electronic SNB money.

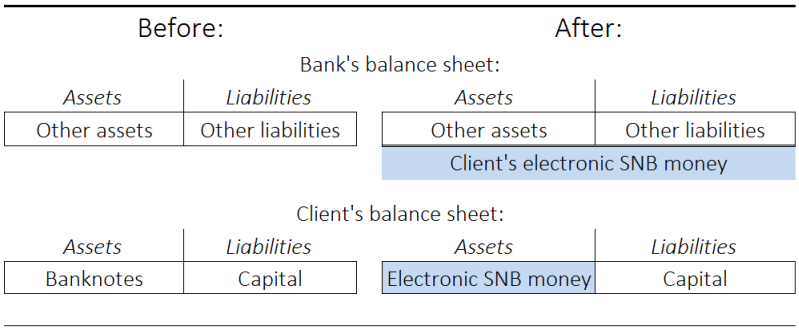

Figure 14: Client places cash on his or her transaction account under the Sovereign Money system
Source: own illustrations.

Under the Sovereign Money system, a new monetary aggregate is introduced: M, consisting of currency in circulation and electronic SNB money.[18] Following equation 4, M stays the same after cash is placed on a transaction account—currency in circulation decreases and electronic SNB money increases.

$$currency\ in\ circulation + electronic\ SNB\ money = M \tag{4}$$

Swiss francs held on transaction accounts are treated equivalently to cash: they are exclusively provided by the SNB, suggesting that economic actors can always and regardless of the size or sustainability of the bank's balance sheet withdraw funds by either withdrawing cash from the account or by transferring electronic SNB money to another transaction account which is held either at the same or another bank.

Also here, it is assumed that banks instantly exchange cash for electronic SNB money at the SNB. In terms of the transaction presented in figure 15, the SNB would now have to provide electronic SNB money instead of cash. Hereby, this paper assumes that the SNB reports the amendments in its *off*-balance sheet. This novel accounting principle is explained in the fourth chapter, when the SNB is discussed.

When a client withdraws funds from his or her transaction account, the reverse of what is illustrated in figure 14 and figure 15 occurs: the bank must exchange electronic SNB money for cash on behalf of the client. As a result, the individual holds cash and no electronic SNB money on his or her transaction account anymore, leaving the size of the new monetary aggregate M unaffected.

[18]See Huber (2013). A specification of this new monetary aggregate is provided in chapter 4.

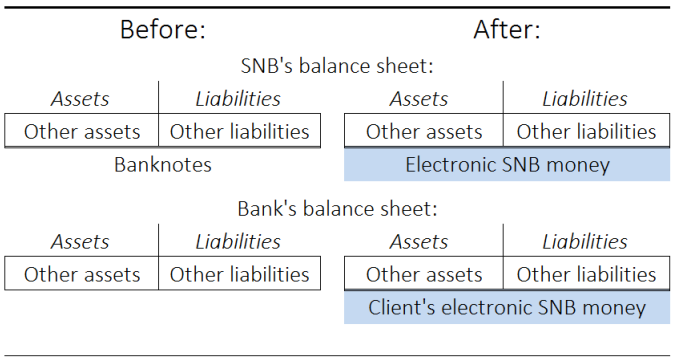

Figure 15: Bank exchanges client's cash for electronic SNB money under the Sovereign Money system *Source*: own illustrations. *Note*: for simplification, this illustration does not take other amounts of banknotes or electronic SNB money already issued by the SNB into account.

Since deposits held on transaction accounts become a perfect substitute for cash, these accounts "are risk free [...] and interest-free as they are not available to the bank to invest" (Sigurjónsson 2015: 11).

Investment Accounts

Funds on investment accounts serve as a store of value. Clients can transfer electronic SNB money on transaction accounts to (or place cash on) investment accounts. Sigurjónsson (2015: 12) notes:

> "Funds in an Investment Account are [...] not available to the owner before the due date, or after a notice period has passed [...] Banks can offer Investment Accounts with different risk profiles, maturity and interest rates catering to different types of savers."

When a client places funds on an investment account, they become part of the bank's balance sheet (see figure 16): the latter expands by the face value placed on the investment account. Now the bank holds electronic SNB money on the asset side and a liability to pay back the client's funds (including interests) in the form of electronic SNB money (which the client can withdraw in the form of cash, for instance). The client's transaction account is empty—instead, he or she holds a claim on electronic SNB money. This transaction does not affect the SNB's (off-)balance sheet.

Investment accounts resemble savings and time deposit accounts under the Fractional Reserve system, since funds placed on them become part of the bank's balance sheet. Here, however, banks are able to actively use funds held on investment accounts to lend them to other economic actors demanding a loan. In this sense, clients placing their funds on investment accounts become genuine financial investors and banks become genuine financial intermediaries (Huber 2013, Sigurjónsson 2015). According to equation 4, the monetary aggregate M is not affected by the transaction presented in figure 16: the investor holds less electronic SNB money, and instead, the latter can be reinvested and put back into circulation by the bank.

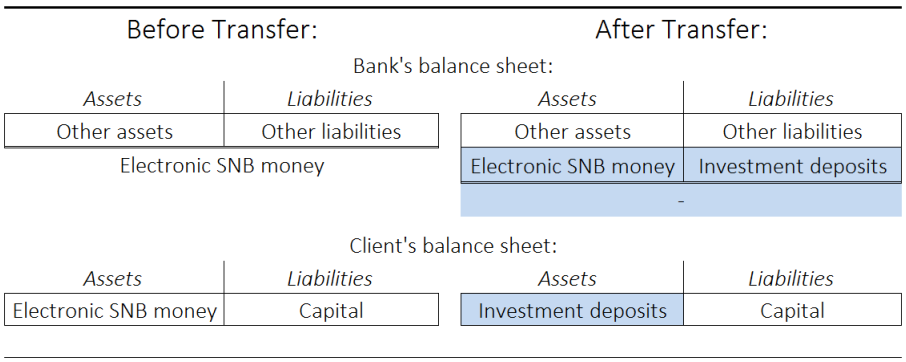

Figure 16: Transfer of funds from a transaction account to an investment account under the Sovereign Money system
Source: own illustrations.

What types of investment options banks may offer for investment depositors under a Sovereign Money system cannot be predicted. Nevertheless, two investment options banks could offer under a Sovereign Money system are discussed here.

First, banks could offer an investment option, which is, in principle, similar to the Fractional Reserve system's time deposit account option: those investments for which banks offer the highest interest rates may bear the highest risk. Like time deposits, banks under a Sovereign Money system may take investment deposits as capital so that, in case of default of the party invested in, the investor (who placed his or her funds on an investment account in the first place) would face a loss. Thereby, risk-friendly investors under a Sovereign Money system may be compared to investors which are asset management clients under the Fractional Reserve system (see figure 13), with the difference that the investment depositors would not directly hold an investment asset, but be lenders of SNB money holding a claim on the latter.

The second option for banks may be to offer an investment option that resembles the Fractional Reserve system's savings deposit account option: banks may offer a lower interest rate on these kinds of investment deposits, but in turn, banks could offer to guarantee a certain amount of funds in case of the a bankruptcy of the party invested in (similar to the *esisuisse* deposit guarantee scheme).

For simplification, it is assumed here that the total amount of funds held on transaction accounts under a Sovereign Money system equals the total amount of demand deposits under the Fractional Reserve system, and that funds held on investment accounts equal the amount of the sum of savings and time deposits (see figure 17).

As presented in the figure, it is further assumed that, in times of great uncertainty and high-risk perceptions, bank clients would be willing to liquidate their funds on investment accounts and shift them on transaction accounts. Hypothetical implications are discussed later.

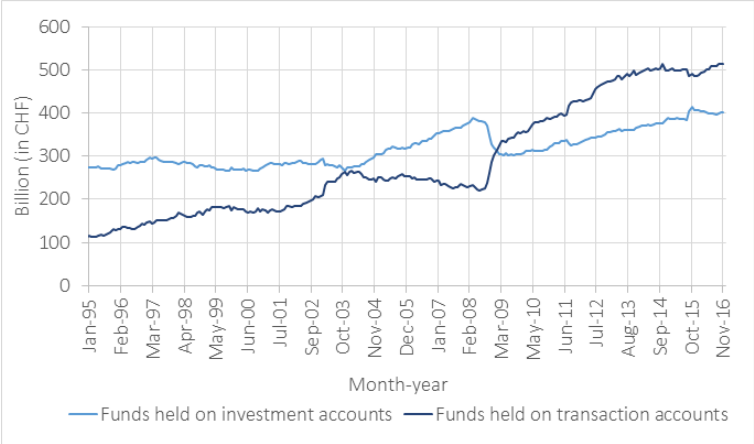

Figure 17: Funds hypothetically held on the Sovereign Money system's two new types of bank accounts *Source*: own illustrations. *Note*: it is assumed that all funds held on investment accounts equal the sum of the Fractional Reserve system's total savings and time deposits. It is also assumed that all funds held on transaction accounts to be equal to the Fractional Reserve system's total demand deposits.

3.3 Fractional Reserve System: How Banks in Switzerland Manage Loans in Swiss Francs

Economic textbooks, such as that by Blanchard and Johnson (2015), introduce the so called *intermediation of loanable funds model of banking* (Jakab and Kumhof 2015: 2) for explaining how banks make loans to borrowers under the current Fractional Reserve system. The model suggests that a bank uses the depositor's funds as "reserves". Then, the bank takes some of these "reserves" and keeps them due to regulatory requirements, whereas it lends the rest to a borrower. Given that now, the depositor as well as the borrower hold funds on their bank accounts, the money supply has increased by the amount of the extended loan to the borrower.

However, "money creation in practice differs from some popular misconceptions—banks do not act simply as intermediaries, lending out deposits that savers place with them" (Mc Leay et al. 2014: 1). In the modern economy, when a bank issues a loan, it simply expands its balance sheet: its assets and liabilities increase by the amount of the loan's face value (see figure 18). "New funds are produced only with new bank loans, [...] through book entries made by keystrokes on the banker's keyboard at the time of disbursement" (Jakab and Kumhof 2016: 2). On the asset side, the bank now holds a claim to get the lent funds including interests repaid from the borrower. The liability side of the bank's balance sheet now reflects the bank's new requirement to provide the borrower with demand deposits.

The SNB's balance sheet is not affected by this transaction. Quite differently, the client's and the bank's balance sheets have been extended. According to equation 1, creating demand deposits increases the money supply *M1*, whereby the amount of cash stays the same.

Any created deposit "never leaves the banking system as a whole unless [it] is repaid" (Kumhof and Jakab 2016: 2). Once a loan is paid back, both the asset side and the liability side of the bank's balance sheet simultaneously shorten by the face value of the loan, the reverse of what is illustrated in figure 18 (what remains is the borrower's interest payment

Before loan is issued:		After loan is issued:	
Banks' balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Other assets	Other liabilities	Other assets	Other liabilities
		Loan	Demand deposits
Borrower's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
-	-	Demand deposits	Loan

Figure 18: Bank issues a loan under the Fractional Reserve system
Source: own illustrations.

to the bank). Equivalently, the borrower's balance sheet decreases when the loan is paid back (Huber 2013).

A possible way to combat unlimited money creation by banks is therefore the practice of borrowers repaying their loans:

> "The households and companies who receive the money created by new lending may take actions that affect the stock of money—they could quickly "destroy" money by using it to repay their existing debt, for instance" (McLeay et al. 2014b: 14).

Besides money creation by issuing loans, banks can also create money by purchasing securities (such as government bonds), equity, or physical goods (such as real estate). In this case, the bank pays for the desired assets with newly created money, too (Jakab and Kumhof 2016). If the bank buys a security, the bank's balance sheet expands: on the asset side, the bank owns a security, and on the liability side, the bank owes demand deposits to the security seller (see figure 19).[19]

The same principle applies when a bank buys real estate (exchange "security" for "real estate"). According to equation 1, *M1* increases also in this example, since the bank increases the amount of demand deposits. However, when a bank sells securities to *another bank*, the monetary aggregates do not change: a bank can buy securities with its electronic SNB money, whereas the other bank selling the securities obtains electronic SNB money. This purchase merely changes the *composition* of both banks' balance sheets (Rule 2015).

As opposed to the previous example (figure 18), in this case, the security seller does not become indebted: there is no loan that needs to be repaid to the bank. The bank has, to put it simply, granted itself a loan, or in other words, money.

Figure 20 illustrates that the growth rate of Swiss franc assets held by banks in Switzerland is positively correlated with the growth rate of investment (the correlation coefficient accounts for about 0.5). When economic actors take out loans to increase investment, Swiss franc assets also increase, since banks expand their balance sheets when issuing a loan. At

[19]See the German Bundesbank's discussion of banks creating money by creating loans: https://www.bundesbank.de/Redaktion/DE/FAQ_Listen/faq_zum_thema_geldschoepfung.html?docId=175750#175750. Last visited: 5 January 2017.

Before security is purchased:		After security is purchased:	
Bank's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Other assets	Other liabilities	Other assets	Other liabilities
		Security	Demand deposits
Security seller's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Security	Capital	Demand deposits	Capital

Figure 19: Bank buys a security from a non-bank client under the Fractional Reserve system
Source: own illustrations.

the same time, when individuals borrow less or repay their loans, investment may remain stable or even shrink, and so do banks' assets. Huber (2014: 6) concludes:

> "In a modern money system, investment is basically no longer dependent on savings. Banks can fund real and financial investment (and consumption) without prior savings, and they actually do so when making loans or primarily buying sovereign bonds or real estate."

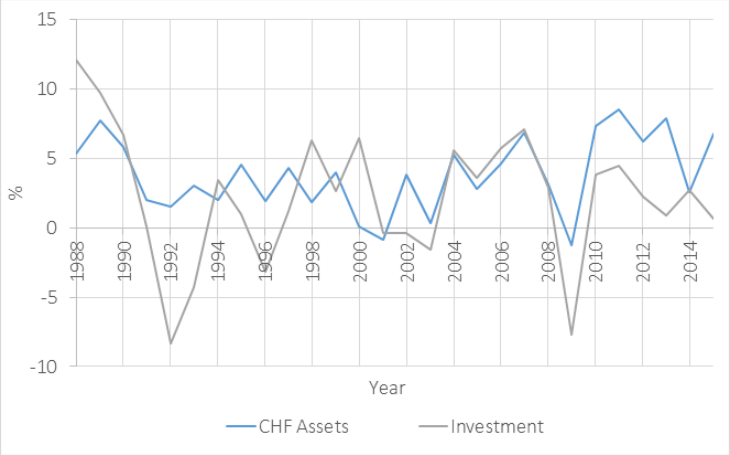

Figure 20: Annual CHF assets and investment growth over time
Source of data: SNB

Creating Swiss franc demand deposits by issuing loans or by buying other assets, such as securities, applies to all banks with a banking license in Switzerland (that is, all banks introduced in chapter 2),[20] and it is assumed here that this mechanism does *not* apply to foreign banks operating abroad which issue Swiss franc denominated loans: in their study, Brown et al. (2009) show how banks in the Eurozone and beyond issuing Swiss

[20]In 2013, PostFinance, a Swiss financial institution, received a limited banking license and hence was not allowed to independently issue mortgages or loans to firms. For more details, see https://www.nzz.ch/weiterhin-nur-eine-halbe-bank-1.17877875. Last visited: 8 March 2017.

franc denominated loans must hold Swiss francs first before they can issue a Swiss franc denominated loan. It is therefore assumed that transactions with foreign banks abroad or clients of foreign banks abroad do *not* affect the size of *M1* (see Altermatt and Baeriswyl 2015: 35).

The Role of the Reserve Requirement in Managing Loans

In discussing how banks manage deposits under the Fractional Reserve system, no bank client was indebted in the mentioned examples. Regarding the bank's balance sheet, all funds placed with the bank were by 100% backed by electronic SNB money (that is, by liquid assets). In discussing how banks manage loans to borrowers, bank clients becoming indebted were introduced. All else equal, the more loans a bank issues by creating demand deposits, the lower is the share of liquid assets (that is, electronic SNB money) the bank holds, and the higher the share of *illiquid* assets (that is, loans) the bank holds. If then, all depositors wanted to withdraw cash all of a sudden, the bank may not be able to provide cash for all depositors.

This may be an explanation for why the so called *minimum reserve requirement* is set in place. Thereby, exclusively *Swiss* banks are subject to this regulation.[21] Generally speaking, Swiss banks need to hold 2.5% of their deposits[22] as electronic SNB money (see SNB 2016: 14). Figure 21 shows that prior to the outbreak of the 2008-2009 financial crisis, banks in Switzerland indeed backed only about 2.5% of their deposits by electronic SNB money, suggesting that the rest (that is, 97.5%) was backed by illiquid assets, such as loans. With the onset of the crisis, the amount of electronic SNB money as a share of banks' deposits has grown, increasing the Swiss banking system's ability to instantly provide its demand depositors with cash. The big banks show the highest share of liquid assets in 2015. This high share partly reflects regulatory requirements (FINMA 2014).

Figure 21 does not necessarily suggest banks increasingly acquired electronic SNB money by attracting clients placing cash with the bank: by conducting monetary policy, the SNB can affect the amount of banks' electronic SNB money (this is further discussed in chapter 4).

The minimum reserve requirement itself does, however, not prevent banks from being able to create demand deposits by issuing loans. In other words, under the Fractional Reserve system, banks do not need to hold electronic SNB money prior to issuing loans:

> "Each individual bank is able to provide credit and to issue money out of nothing, without having to have received new reserves [that is, central bank money] first [...], or without having to have received new deposits or capital first" (Werner 2015: 117).

Similarly, the Swiss law states that banks are required to hold the specified amount of electronic SNB money only on average during a specific period of time (NBA 2012). To put it simply, when banks in Switzerand issue a loan, they only afterwards look for how

[21] Foreign banks operating in Switzerland are freed from this regulation (Jordan et al. 2009: 352).

[22] This is a simplification. In fact, "the minimum reserve requirement is 2.5% of relevant short-term liabilities, which are calculated as the sum of short-term liabilities in Swiss francs (up to 90 days) plus 20% of liabilities towards customers in the form of savings and investments" (SNB 2016: 14).

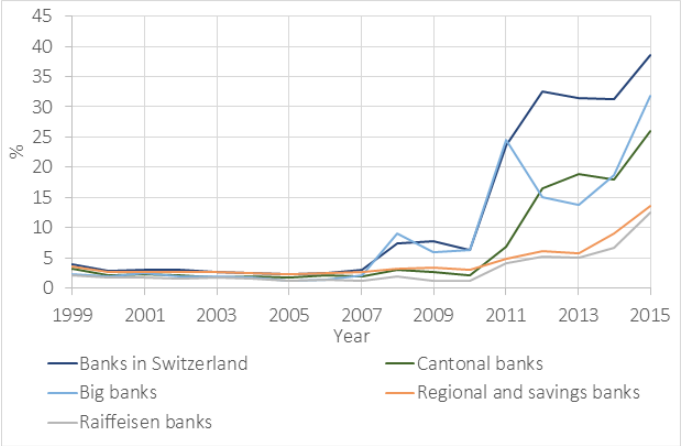

Figure 21: Liquid assets as a share of deposits from customers over time
Source of data: SNB. *Note*: own calculations. It is assumed that the total outstanding amount of liquid assets equals the total outstanding amount of electronic SNB money.

they can fulfill the minimum reserve requirement, a practice which is also called *refinancing* (Jakab and Kumhof 2015: 4).

The first purpose of the reserve requirement may be for banks to be "better" able to, at any time, exchange electronic SNB money for cash when demand depositors so demand. The second purpose is explained later.

3.4 Sovereign Money System: How Banks in Switzerland Would Manage Loans in Swiss Francs

As opposed to the Fractional Reserve system, Swiss francs must not be created "ex nihilo" by banks when issuing a loan under the Sovereign Money system. Banks can only issue a loan if they borrowed the face value of the loan in the first place (Huber 2013). This principle would resemble the assumption that, under the Fractional Reserve system, foreign banks outside of Switzerland issuing loans denominated in Swiss francs must fully finance this loan ex ante (again, see Brown et al. 2009).

In technical terms, banks must hold electronic SNB money in the form of funds eligible to lend on the asset side of their balance sheets. In issuing a loan to the borrower, an accounting exchange on the asset side of the bank's balance sheet occurs (see figure 22): electronic SNB money becomes a claim on the loan. At the same time, the bank's off-balance sheet expands, reflecting that the borrower now holds electronic SNB money in the amount of the loan on his or her transaction account. The borrower becomes indebted until the loan (including interests) is repaid to the bank.

As opposed to the Fractional Reserve system, when a bank issues a loan under the Sovereign Money system, the money aggregate M is not affected. When an investor places funds on his or her investment account, or, equivalently, when a bank lends electronic SNB money (which the bank has withdrawn from the economy—that is, from the investor), the same funds will be re-injected in the economy when an economic actor borrows money from the bank. Simply speaking, already existing savings "create" loans (Huber 2013). Overall, Sigurjónsson (2015: 86) notes that

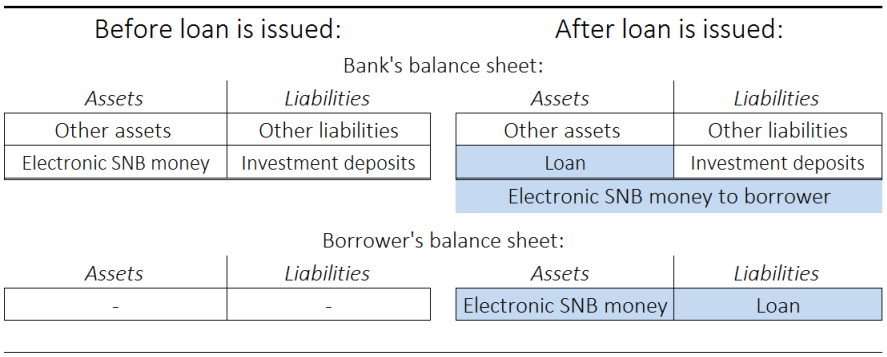

Figure 22: Bank issues a loan to a borrower under the Sovereign Money system
Source: own illustrations.

> "the money supply will be stable regardless of the lending activities of banks [...] Bank lending will not expand the money supply and repayments of bank loans will not reduce the money supply."

Under a Sovereign Money system, savings from investment accounts and loans could be related according to the so called *golden rule of banking*, which applies if a borrower borrows a particular amount of money for a particular time period from one or more lenders who in total invest the same amount of money for the same amount of time. In short, long-term loans would be financed with long-term deposits (Huber 2013). However, if one assumes that investors have preferences for shorter-term investments, then, a principle called *maturity transformation* would rather apply, whereby "the bank matches the demand of long-term borrowers with supply of several successive short-term investors" (Sigurjónsson 2015: 77).

Based on the assumption that holders of the Fractional Reserve system's savings and time deposits place their funds on financial investment accounts, figure 23 presents the amount of funds eligible to lend vs. the outstanding amount of various types of loans issued by banks in Switzerland over time.

The basic message is that, assuming that holdings of the Fractional Reserve system's savings and time deposits became the only funds eligible to lend, banks in Switzerland could *not* cover the outstanding amount of various types of loans banks have issued to non-banks, neither in 2015 nor during the last two decades: the Swiss banking system would require at least 100% of investment deposits to cover the face value of banks' various outstanding loans from a source other than holders of investment accounts. Prior to the onset of the 2008-2009 financial crisis, the required share was substantially lower than the currently required share. Presently, banks would have to borrow an amount of around 100% of funds held on investment accounts from other sources just to fund domestic mortgage loans.

Since the Swiss banking system holds a large amount of electronic SNB money, the former could theoretically use these funds as additional assets in order to issue loans, thereby only requiring an additional amount of around CHF 100 billion to cover the value of outstanding domestic mortgage loans.

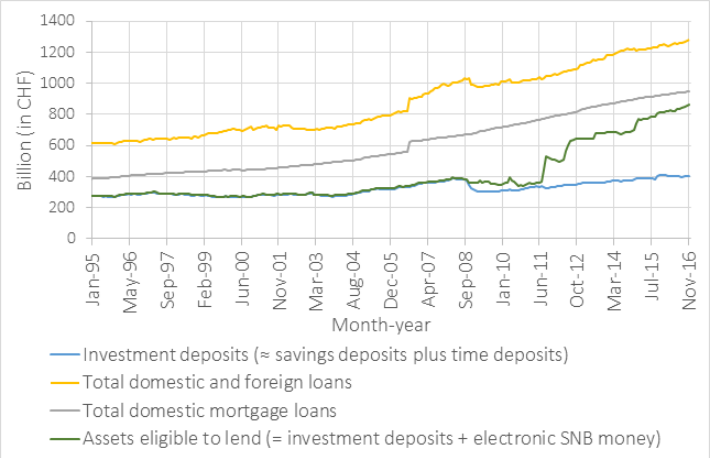

Figure 23: Potential loan supply by the banking system vs. potential loan demand by economic actors *Source of data*: SNB. *Note*: all types of loans refer to Swiss franc denominated loans

3.5 Fractional Reserve System: The Swiss Interbank Market

Besides issuing loans or taking deposits to and from economic actors, today's banks in Switzerland also offer interbank payment services for the settlement of electronic payment transactions (in various currencies and across various countries. Again, for the sake of analysis, payment transactions in Swiss francs are considered here). If—as mentioned in the discussion of how banks manage deposits under the Fractional Reserve system—economic actors electronically transfer funds from their demand deposit account to that of other economic actors running their account with the *same* bank, the bank will undertake a passive exchange on the liability side of its balance sheet. The size of the latter would, however, stay the same.

It works differently if the transfer of funds occurs between economic actors running their demand deposit accounts at *different* banks. In an environment with a large amount of various banking institutions, it is very likely that bank clients undertaking a transaction run a bank account at two different banks (McLeay et al. 2014). In Switzerland, the interbank payment system is organized by Swiss Interbank Clearing AG (SIC; SwissBanking 2006).

Suppose client A takes out a loan from bank A to buy a house (see figure 24). Prior to the transaction, the house owner (client B) owns a house and holds its demand deposit account at bank B (whereby client B holds zero demand deposits). When client A buys the house, demand deposits are electronically transferred from client A's demand deposit account at bank A to the house seller's demand deposit account at bank B. At the same time, bank A must "settle" with bank B by transferring electronic SNB money to bank B. As a result, bank A holds less electronic SNB money and fewer demand deposits than before.[23] Bank B receives electronic SNB money (new assets) and owes demand deposits

[23]The example is a simplification. In reality, the following rather applies: Suppose CHF 100 are "transferred" from bank A to bank B. On the same day, a client from bank B "transfers" CHF 50 to bank A. At the end of the day, bank A must effectively transfer electronic SNB money and deposits only amounting to CHF 50 to bank B (Huber 2013: 30). The measurement of how many funds must be transferred on a net basis is called "clearing" and the effective transfer of these funds is called "settlement". See https://www.six-interbank-clearing.com/en/shared/questions-answers/glossary/glossary-payment-terms.html. Last visited:

(new liabilities) to client B.

Before transfer of demand deposits:		After transfer of demand deposits:	
Bank A's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Other assets	Other liabilities	Other assets	Other liabilities
Electronic SNB money	Capital	Loan	Capital
Loan	Demand deposits	-	-
Bank B's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Other assets	Other liabilities	Other assets	Other liabilities
		Electronic SNB money	Demand deposits
House buyer's (client A's) balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Demand deposits	Loan	House	Loan
House seller's (client B's) balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
House	Capital	Demand deposits	Capital

Figure 24: Demand deposits are transferred to another bank under the Fractional Reserve system
Source: own illustrations based on McLeay et al. (2013).

In this example, bank A runs risk of facing a liquidity shortage and might therefore not be able to provide further payment transactions (that is, either enabling clients to withdraw cash or enabling clients to electronically transfer funds to other banks' clients), given that some of its other liabilities could include demand deposits. This can be the case even if the bank holds enough capital.

This figure suggests that, other than refinancing itself via obtaining electronic SNB money from clients placing cash with the bank (so that the bank can exchange cash for electronic SNB money), the bank can also refinance itself via obtaining electronic SNB money from clients that transfer demand deposits from another bank to the bank in question.

Besides these options, the bank can also borrow electronic SNB money either from other banks in the *secured* money market (by providing collateral, such as securities) or in the *unsecured* money market (by not providing collateral), or directly from the SNB (by providing collateral).

Banks issuing Swiss franc loans abroad typically do not have access to a SNB sight deposit account and thereby cannot borrow electronic SNB money from the SNB directly, and they therefore refinance themselves by borrowing electronic SNB money from their so called *correspondent banks* in Switzerland (see Rule 2015).

Overall, the bank refinancing itself would pay the cost of borrowing in the form of interest payments to the lender of electronic SNB money (directly to another bank or to the SNB, or indirectly to the new depositor).

According to Huber (2013), banks could buy securities by extending their balance sheets (see again figure 19), and would then be able to swap these securities for receiving electronic

18 February 2017.

SNB money, implying that banks can, all else equal, demand electronic SNB money from the SNB as long as the SNB is ready to buy securities from banks. In other words: even if banks had to fully back their deposits by electronic SNB money, they would still be able to create money by issuing loans, since they are able to refinance themselves ex post.

Figure 25 shows that prior to the financial crisis of 2008-2009, borrowing electronic SNB money in the unsecured interbank market (at the Libor, which is an off-shore interest rate banks abroad charge for lending Swiss francs, Jordan et al. 2009: 351) went along with the highest costs, so banks would have an incentive to refinance themselves by receiving deposits by clients (which was the cheapest option, since banks had to pay the lowest interest rates). After the onset of the 2008-2009 financial crisis, however, it has become cheaper for banks to refinance themselves via the unsecured money market. This is another development that can be traced back to the SNB's monetary policy (which will be discussed in chapter 4).

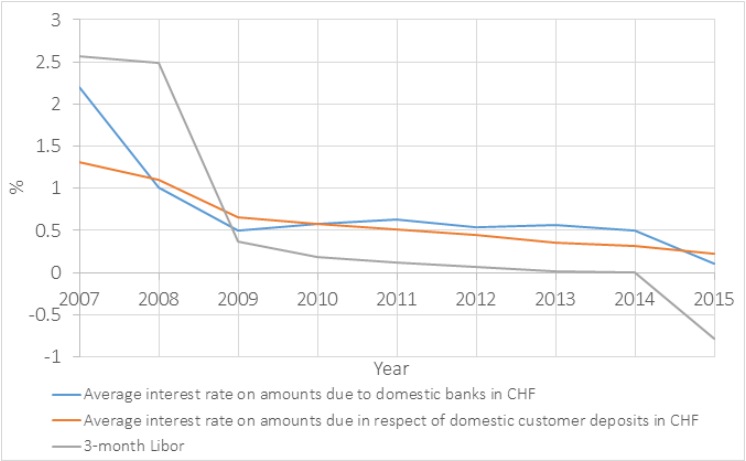

Figure 25: Deposit vs. money market rates over time
Source of data: SNB. *Note*: It is assuemd that the rate on "amounts due to domestic banks" reflects the secured money market rate.

3.6 Sovereign Money System: The Swiss Interbank Market

Besides holding electronic SNB money as assets from investors, if an individual bank under the Sovereign Money system did still not hold enough electronic SNB money to match them with the demand for loans, this bank would be able to borrow electronic SNB money from the following sources: from other banks (with excess amounts of electronic SNB money when they cannot find borrowers) in the unsecured interbank market (whereby no collateral is provided) at the Libor, in the secured interbank market (whereby collateral is provided and banks would swap electronic SNB money for securities), or directly from the SNB.

Furthermore, banks could issue debt certificates, such as bonds or bills that would represent an additional source of funding for banks in Switzerland (Huber 2013).

Recall figure 23, which presents the total outstanding amount of investment deposits and loans regarding the whole Swiss banking system. It implies that under a hypothetical Sovereign Money system, the Swiss banking system would, all else equal, mainly have to borrow additional electronic SNB money directly from the SNB.

Like it is presented in figure 16, when a bank receives electronic SNB money from a source other than an investor, its assets and liabilities would equivalently increase by the value borrowed.

The flow of electronic SNB money among banks and between banks and the SNB serves a different purpose as opposed to under the Fractional Reserve system. Under the Sovereign Money system, banks borrow electronic SNB money to directly finance borrowers, and not anymore to merely *refinance* themselves. A bank with excess electronic SNB money has—like a bank under the Fractional Reserve system—an incentive to lend these funds to a bank with a shortage of electronic SNB money, since holding electronic SNB money as an asset does not generate interest income (at the same time, however, the bank would have to pay interests to the lender of these funds). If banks abroad would like to (fully) refinance their Swiss franc denominated loans, it is assumed here that, like under the Fractional Reserve system, they would similarly borrow electronic SNB money to lend from their correspondent banks and back their issued Swiss franc denominated loan by this amount of borrowed assets, thereby not affecting the Sovereign Money system's monetary aggregate M.

Besides borrowing funds to finance loans, banks are supposed to further provide electronic payment transactions regarding clients transferring funds held on transaction accounts at different banks.

Suppose an indebted client A who runs a transaction account at bank A would like to transfer money to client B who runs a transaction account at bank B. Under a Sovereign Money system, banks would not settle deposits and electronic SNB money at the end of the day, but could directly organize a transfer of funds from one transaction account to another bank via the Swiss interbank payment platform Swiss Interbank Clearing AG (see figure 26). The banks' balance sheets are not affected by the interbank transfer, only their off-blance sheets: client A withdraws electronic SNB money from his or her transaction account, and these funds are transferred to client B's transaction account. There is no bank liquidity risk involved regarding this transaction as opposed to under the Fractional Reserve system.

3.7 Fractional Reserve System: Bank Interest Rates and How Banks in Switzerland Make Profits

DeYoung and Rice (2004: 34; quotation marks added by the author) note:

> "The interest margin banks earn by "intermediating" between depositors and borrowers continues to be the primary source of profits for most banking activities."

Banks receive a higher interest rate on their issued loans (or other assets, such as securities) than the rate banks pay on their clients' deposits (or other liabilities) (Farag et al. 2013: 202). Banks use the difference (or interest rate spread) between the return on their assets and liabilities to cover their operating costs.[24]

[24] In this analysis, a competitive Swiss banking system is assumed, in which generally no profits are generated. It is further assumed that all profits the Swiss banking system still generates stems from other sources than from the interest rate spread.

Before transaction:		After transaction:	
Bank A's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Other assets	Other liabilities	Other assets	Other liabilities
Loan	Investment deposits	Loan	Investment deposits
Client A's electronic SNB money			
Bank B's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Other assets	Other liabilities	Other assets	Other liabilities
		Client B's electronic SNB money	
House buyer's (client A's) balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Electronic SNB money	Loan	House	Loan
House seller's (client B's) balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
House	Capital	Electronic SNB money	Capital

Figure 26: Electronic SNB money is transferred to another bank under the Sovereign Money system
Source: own illustrations based on the illustration by Mayer (2016: 18).

Figure 27 presents the average interest rate banks in Switzerland receive on issued loans to customers and households, and the average interest rate banks pay on customer deposits. The former interest rates have been almost identical over the last 8 years. The average interest rate banks have paid on their clients' deposits was on average 2 percentage points lower, suggesting an average interest rate spread of around 2 percentage points.

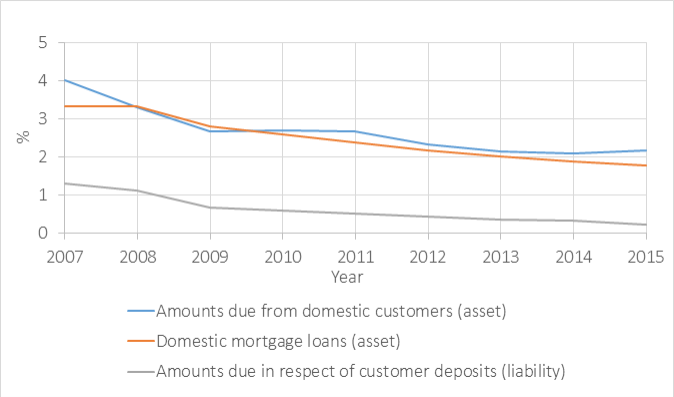

Figure 27: The interest rate spread for banks in Switzerland
Source of data: SNB. *Note*: for simplification, assume these rates to be the only rates that banks have to consider in terms of what they earn or have to pay.

McLeay et al. (2014) argue that in order to issue additional loans, a bank needs to lower the interest rate on the additional loan, since the demand for loans from borrowers increases as the price of borrowing, that is, the interest rate on a loan, decreases. Then, in order to retain the interest rate spread for covering banks' expenses and profits, the bank

must also lower the deposit rate.[25]

In an environment of already low deposit rates, banks are limited in terms of lowering deposit rates even further: it might reduce incentives for clients to bring cash to the bank, since the opportunity costs of bringing money to the bank decrease. In such an environment, combined with the fact that the SNB started to charge banks holding electronic SNB money ("negative interest rates"), banks have, to give an example, increased interest rates on long-term mortgage in order to retain the interest rate spread (Bech and Malkhozov 2016).

There is yet another way for banks to generate profits: generating interest rate seigniorage (Huber 2013). Given that banks create deposits by issuing loans, this suggests that banks do not need to pay interests on *all* their deposits, but only on a *fraction*: namely on those which are backed by *liquid* assets (such as when a client brought cash to a bank and puts it at his or her savings account). Instead of paying, banks *receive* interests on their illiquid assets, namely on those deposits which are backed by loans. In other words: it would be less profitable for banks if they had to fully finance all their issued loans by customer deposits. CBS (2017: 23) notes that in Switzerland,

> "[average] commercial bank seigniorage [across 2007 and 2015] amounted to CHF 3.9 billion per year—0.6% of average GDP across the period and a cumulative total of CHF 34.8 billion."

The authors assess the opportunity costs the Swiss banking system would face if it had to fully finance its operations ex ante—such as Swiss businesses, for instance, have to do (CBS 2017).

To put it simply, generating interest rate seigniorage is only possible if banks hold only a fraction of their assets as electronic SNB money. The more electronic SNB money the banking system holds, the lower the interest rate seigniorage. CBS (2017) concludes that in 2015 and 2016, interest rates seigniorage for the Swiss banking system was in fact negative (recall figure 33, which shows that the banking system currently backs a larger share of deposits by electronic SNB money).

In order to avoid costs, banks prefer it if clients hold their funds in accounts other than demand deposit accounts—by owing demand deposits, a bank must always anticipate that clients withdraw these funds at any point in time and so the bank would have to hold enough electronic SNB money "on demand". If clients held deposits at savings accounts, the bank would not have to anticipate instant withdrawals and would not need to hold costly electronic SNB money, but could instead profitably lend those to other banks facing a possible shortage of electronic SNB money. In order to attract such longer-term deposits, banks offer higher interests on, for instance, savings accounts (see figure 28).

Besides generating profits arising from interest rate spreads and through interest rate seigniorage, "banks also earn substantial amounts of noninterest income by charging their customers fees in exchange for a variety of financial services" (DeYoung and Rice 2004: 34). Banks receive fees for providing services such as asset management, or the securitization of various assets, such as mortgages, which Switzerland's big banks, such as UBS, were conducting prior to the outbreak of the financial crisis (SFBC 2008: 4). In this context, FINMA (2009: 9) notes:

[25] It is assumed that under a competitive Swiss banking system, if one bank decreased the rate on loans in order to attract borrowers, it may face difficulties retaining the interest rate spread. So the bank would also have to lower the deposit rate.

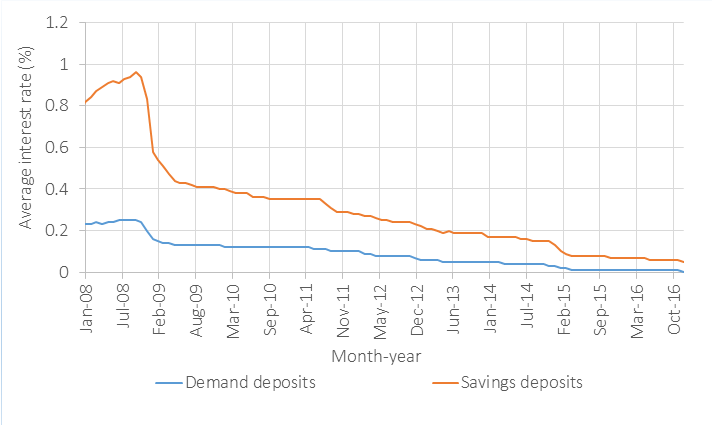

Figure 28: Interest rates on different types of bank accounts
Source of data: SNB.

> "[A] new originate-to-distribute business model of many international investment banks was designed to convert loans they originally granted themselves or purchased from other banks and financial institutions into marketable securities via the securitisation process and sell them to other investors [...] The associated risk allocation was deemed to be more efficient than that of the traditional business model."

In the case of UBS prior to the outbreak of the 2008-2009 financial crisis, the securitization and subsequent selling of structured products partly served as a proprietary trading strategy (SFBC 2008: 4). In conducting proprietary trading, banks trade assets on their own account and not on behalf of clients, and keep the profit arising from these transactions for themselves (Balluck 2015).

The balance-sheet effect of proprietary trading activities may be compared to figure 19, when a bank under the Fractional Reserve system acquires securities with money created by itself. By expanding its balance sheet, a bank could buy a number of US debt securities (by creating demand deposits to, for instance, financial institutions that sold these securities), transform them into a package, and sell the package for a higher price, thereby making a profit (SFBC 2008). Prior to the crisis, UBS, for instance, increasingly acquired US debt securities called Asset Backed Securities (ABSs) and Collateralized Debt Obligations (CDOs) which were backed by subprime mortgages (SFBC 2008: 3). At the same time, UBS and other large investment banks were able to issue bonds with low risk premiums (that is, the banks could refinance themselves at low costs) (FINMA 2009: 14).

These profitable trading activities could explain why, as reflected in figure 29, especially big banks' profits increased dramatically prior to the outbreak of the financial crisis.

The rising profits generated by the big banks coincided with the expansion of the same bank category's balance sheet (see figure 30). At the same time, total assets of the other bank categories (except for "banks in Switzerland", which may reflect the big banks' balance sheet) remained roughly stable.

Based on figure 31, this paper concludes that big banks have not increased their balance sheets through issuing loans (to themselves) in Swiss francs, since a massive amount of loan

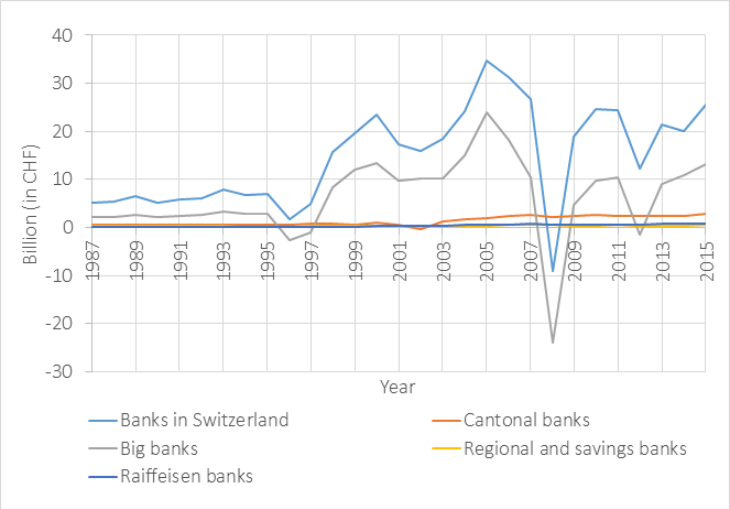

Figure 29: Evolution of bank profits over time
Source of data: SNB.

issuance would be reflected in an increase in Swiss franc assets during the same time period. It is further assumed here that the big banks were able to increase their USD balance sheet by creating money through issuing loans; and they were able to do so because they run branches in the US—thereby having received a banking license in the US.[26] As discussed earlier, it is assumed that as soon as a foreign bank receives a banking license in the country in question, the bank can create money in that country's currency when issuing loans or when buying securities or other assets.

Meanwhile, there was "inherent risks related to the balance sheet growth" (SFBC 2008: 2): as figure 29 and figure 30 show, both assets and profits decreased dramatically with the outbreak of the 2008-2009 financial crisis.

3.8 Sovereign Money System: Bank Interest Rates and How Banks in Switzerland Would Make Profits

Under a Sovereign Money system, the major source of banks' income is to generate an interest rate spread between the interest rate earned on loans and the rate paid on funds that banks borrow to finance economic actors taking out a loan. Compared to the Fractional Reserve system, banks will have to finance the full face value of a loan before issuing the latter (since banks literally channel investment deposits to borrowers). When the client repays the loan (including interests), the bank channels the loans' face value back to the investor, including a fraction of interest payments made by the borrower. The bank keeps the remaining interest payments, which represent the interest rate spread.

Under a Sovereign Money system, income from generating interest rate seigniorage arising from the management of CHF loans and deposits, which the Swiss banking system is able to generate under the Fractional Reserve system, would cease to exist. Without Swiss franc interest seigniorage, profits of the banking system may be generally lower than those

[26]See http://www.finews.ch/news/banken/18215-ubs-forex-libor-doj-klagen-credit-suisse-zukunft-waiver. Last visited: 8 March 2017.

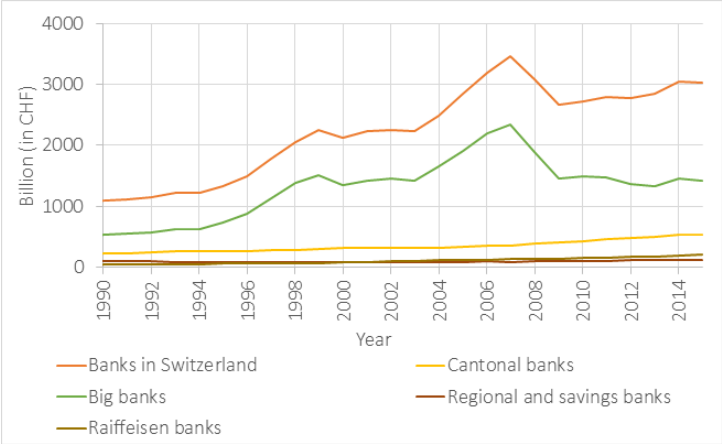

Figure 30: Evolution of bank assets over time
Source of data: SNB.

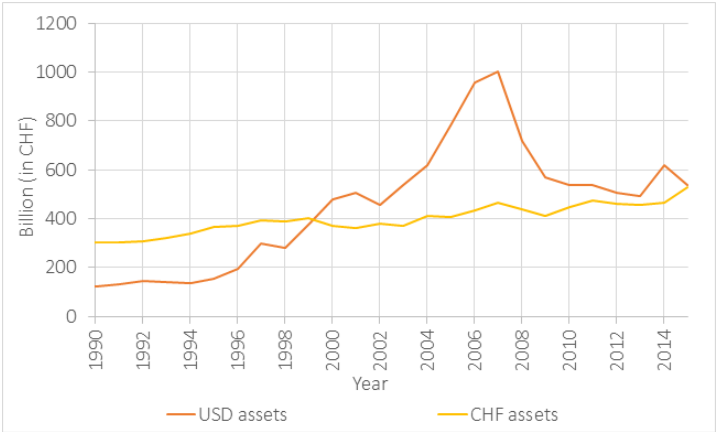

Figure 31: The big banks' CHF assets vs. USD assets over time
Source of data: SNB.

under the Fractional Reserve system. In other words: banks' interest rate seigniorage gains would represent one aspect of opportunity costs the Swiss banking system may face under a Sovereign Money system.

Since banks in Switzerland would have to fully finance their activities ex ante, banks may loose their competitive advantage over other private businesses operating in Switzerland: "banks will lose the ability to create money and gradually lose the income related to money creation." Sigurjónsson (2015: 86).

All else equal, if the interest rate on a financial investment account was 0%, a rational client would choose to hold funds on a transaction account, since the latter is not risk-bearing. In order to attract clients, a bank in Switzerland will therefore have to offer an interest rate of higher than 0% so that the client may have an incentive to lend money to the bank. In order to retain a competitive interest rate spread which this paper assumes to be approximately 2 percentage points (see figure 27), the bank would have to demand an interest rate of at least 2% on loans—a similar rate compared to that under the Fractional

Reserve system in 2015. Given an interest rate of about 0.3% on savings deposits in 2015 (see figure 28, which shows interest rates for different types of bank accounts under the Fractional Reserve system), banks would have to offer a higher interest rate to attract additional clients to place their funds with the bank. Should interest rates on loans increase to an extent so that they would deter economic actors to take out a loan, the SNB may step in (which is discussed in chapter 4).

And yet, under a Sovereign Money system, banks' operating costs may increase: on the one hand, providing payment transactions (electronic payment transfer and enabling clients to withdraw cash) imply management costs for banks, as they do not generate any benefit for banks. On the other hand, matching savings with loans (that is, the practice of maturity transformation) may pose greater coordination challenges and therefore be accompanied by higher costs for banks as opposed to simply pressing a keystroke when a loan is issued under the Fractional Reserve system. Banks may cover their additional costs by widening the interest rate spread regarding investment deposits and loans, or by imposing fees.[27] If banks did not cover their additional costs, the result may be that profits for the Swiss banking system would be further dragged down. However, these considerations remain speculative and would have to be further analyzed.

The nature of a Sovereign Money system may eliminate banks' ability to conduct proprietary trading with self-created Swiss francs: banks could not buy securities with self-created Swiss francs and trade them on the bank's own account. However, banks may still conduct speculative transactions: banks could trade equities or securities with borrowed funds and on behalf of their risk-friendly investors, thereby keeping a share of the profit that resulted from this trade. An open question of whether such speculative trades will increase or decrease under a Sovereign Money system remains.

Assuming that the nature of the monetary system outside of Switzerland remains the same, so will Swiss banks operating abroad similarly able to conduct their foreign business as before. Therefore, the big international banks in Switzerland may face no competitive disadvantage compared to banks abroad: in terms of their foreign business, the former banks could be expected to be able to compete on the same level with other banks abroad as before.

3.9 Fractional Reserve System: Financial Stress Test—A Negative Shock on the Swiss Banking System

Jakab and Kumhof (2015: 12) provide an explanation for why banks' assets may have so rapidly and sustainably increased up until the time the 2008-2009 crisis unfolded:

> "In the case of the credit supply shock, the reason is that the additional money creation stimulates additional economic activity, by facilitating additional transactions, which in turn means that households want to keep some of the additional money to support additional spending, rather than to repay existing loans."

[27] Huber (2013) estimates that in Germany, 7 to 10 euro per month may cover the costs banks face for managing transaction accounts. This implies that from the client's perspective, these accounts may go along with negative interest rates. However, this aspect is ignored, since this analysis has not considered fees regarding the Fractional Reserve system's deposit accounts either.

As a result of the bursting housing bubble in the US, which made house prices decrease, and, in turn, made many US subprime borrowers default, ABS, CDOs and other related financial products backed by US subprime mortages massively decreased in value (Krugman 2009). As a consequence, "UBS recorded total write-downs and credit losses of around USD 53 billion in connection with the financial crisis between 2007 and mid-2009" FINMA (2009: 15).[28]

For simplification, treat a write-down and a situation in which a borrower defaults identically. When the borrower defaults, the bank's balance sheet is reduced by the face value of the risky loan (since the bank cannot expect it to be paid back, see figure 32). At the same time, the bank must absorb this loss by an equivalent reduction of its capital. If this is all capital the bank held, and if another borrower defaulted, the bank would not have any capital left to absorb losses. At the time its liabilities (minus capital) exceed its assets, the bank becomes balance-sheet insolvent (Farag et al. 2013).

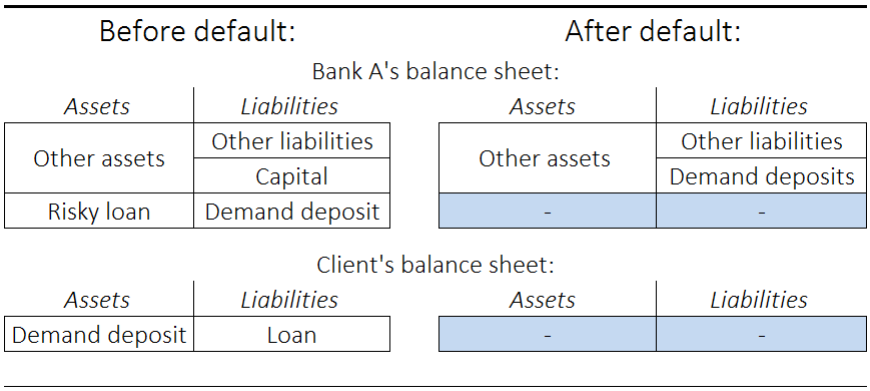

Figure 32: Borrower defaults under the Fractional Reserve system
Source: own illustrations based on Farag et al. (2014). *Note*: suppose the client bought a house from a client of the same bank (so that the demand deposit is still a liability of the bank). At the same time, after the client aquired the house, the house price dropped to zero, so that the client does not hold any assets anymore. At the same time, the client's liabilities are eraced.

The lack of capital can bring a bank into liquidity difficulties: "doubts surrounding a bank's capital adequacy, for example, can cause creditors to withdraw their deposits" (Farag et al. 2013: 204). As a possible result, the bank could find itself "cash-flow insolvent", given it has not enough electronic SNB money to enable systemically important banking services, such as payment transactions in Swiss francs (Farag et al. 2013: 204). The bank may have difficulties in borrowing electronic SNB money, since no other bank might be willing to lend its electronic SNB money to this bank (or might only lend while demanding a high interest rate). If the development was left unchanged, it could result in a "domino effect" in Switzerland: a bank not being able to pay oustanding liabilities to other fiancial institutions could have brought the latter into financial difficulties, too. Sigurjónsson (2015: 9) puts it as follows:

[28]The other big bank in Switzerland, Credit Suisse, pursued a similar business model compared to UBS, but held a lower volume of securitized US residential mortgages and was able to take earlier measures to lessen the extent of exposure to the US subprime market (for instance, by selling the assets in question) (FIMNA 2009: 14).

> "A bank's stock of cash and Central Bank reserves (both assets of the bank) is small compared to total deposits (the bank's liability). A rumor that a bank may be in difficulty can therefore cause customers to withdraw their deposits in panic (a bank run). A bank run forces the bank to sell assets quickly to fund payouts to depositors. Such a sudden increase in the supply of assets can lead to a fall in market prices, putting other banks into trouble, and the whole banking system may follow."

Prior to the onset of the financial crisis, the Swiss deposit insurance *esisuisse*—an association of bankers—promised to pay CHF 30,000 on each bank account in case of a bank failure, or a maximum amount of CHF 4 billion (esisuisse 2015).

The big banks together owed around CHF 224 billion as Swiss franc deposits to clients at domestic institutions in 2007.[29] Given two big banks at the time, and assuming each bank held approximately half of this amount, then if a bank run had occurred, the deposit insurance may not have prevented a possible collapse of payment transactions in the economy—even if some of the big banks' deposits were held at savings or time deposit accounts. In short, UBS was perceived as "too big to fail" (FINMA 2014).

In 2008, the Swiss Federal Council announced that it, together with the SNB, would step in and support UBS with a "rescue package" in order to sustain financial stability. The SNB installed *StabFund*, which operated as a so called *special purpose vehicle*. It allowed UBS to put its still illiquid assets into this fund and would enable the big bank to, at a later point in time, sell these funds for a higher price. In 2013, StabFund stopped its operation when the once illiquid assets were sold off. Since the price of these funds increased until this point in time, UBS could pay back the lent funds (including interests), which it had borrowed from the Confederation, and overall, the Confederation and the SNB even made a profit from supporting the big bank.[30]

In the end, the economy of Switzerland was first and foremost "merely" hit by a decrease of foreign demand for Swiss goods and services, reflected in a temporary decrease in net exports during the 2008-2009 financial crisis (see figure 47 in the appendix).

3.10 Sovereign Money System: Financial Stress Test—A Negative Shock on the Swiss Banking System

Since the Fractional Reserve system remains set in place abroad, a Sovereign Money system implemented in Switzerland may not eliminate the root cause of financial difficulties the big Swiss bank UBS faced during the 2008-2009 financial crisis: banks in Switzerland with a banking license abroad would still be able to conduct foreign currency business in the same way they do under the Fractional Reserve system.

And yet, a Sovereign Money system may eliminate the root cause of financial instability the overall economy of Switzerland was threatened by during the crisis, when the sustainability of Swiss franc payment transactions seemed to be at risk:

[29] See https://data.snb.ch/en/topics/banken#!/cube/babilpoua?fromDate=2006&toDate=2009&dimSel=D0%28VKE%29,INLANDAUSLAND%28I%29,WAEHRUNG%28CHF%29,BANKENGRUPPE%28G15%29. Last visited: 6 March 2017.

[30] https://www.nzz.ch/nzzas/nzz-am-sonntag/ubs-rettung-zahlt-sich-aus-1.18127589. Last visited: 6 March 2017.

> "Deposits in Transaction Accounts are protected in [case of] a bank failure as they are kept at the Central Bank,[31] on behalf of the customers, and are separate from the failing bank's own assets. A deposit guarantee scheme is therefore not necessary for Transaction Accounts" (Sigurjónsson 2015: 12).

Under a Sovereign Money system, bank runs on transaction accounts would allow clients to—regardless of the size or sustainability of the balance sheets of the Swiss banking system—withdraw cash or transfer electronic SNB money at any time, thereby not jeopardizing Swiss franc payment transactions.

In this sense, the "too-big-to-fail" problem may be minimized, with the result that the "too-big-to-fail" regulations may considered to be relaxed, since one major purpose of these regulations was to promote Swiss franc payment transactions in case of a banking crisis (FINMA 2014):

> "As the failure of a bank would no longer threaten the payments system there [...] may be an opportunity to reduce or simplify banking regulation, allowing banks to reduce overhead costs" (Sigurjónsson 2015: 87).[32]

A Sovereign Money system may stabilize payment transactions in Swiss francs, but it may not prevent banks from facing a credit crunch: the new practice of maturity transformation when banks channel savings to borrowers may include risk, as a bank

> "that is unable to find new investors to replace the investors that choose to end their investment [...] may run into liquidity problems" (Sigurjónsson 2015: 77).

A Sovereign Money system may not eliminate this risk. Yet, like in terms of time deposits under the Fractional Reserve system, the Swiss banking system may impose early withdrawal penalties to deter investors from desperately transferring funds from investment accounts to transaction accounts in times of great financial uncertainty.

However, what happens if banks' assets, namely claims on loans, cannot be paid back as borrowers default? Since it is assumed in this paper that holders of risky funds at investment accounts bear the full risk associated with a loan, they might face write-downs or lose their investment funds (such as time depositors under the Fractional Reserve system or investors holding securities). In terms of less risky assets, banks in Switzerland may still provide the deposit insurance esisuisse for limited amounts of funds held on investment acocunts. Hereby, a discussion of whether the funds provided by esisuisse would be sufficient in case of systemic bank failures is foregone.

Bankruptcies of banks in Switzerland could fail to provide necessary functions in the economy, such as loan issuance to businesses and households. And in a situation of high risk perceptions, investors shifting their funds to their transaction accounts could induce an even greater shortage of assets eligible to lend for the Swiss banking system. Facing a possible credit crunch, this is when the SNB would have to step in to counteract this negative economic shock.

[31] Sigurjónsson (2015) assumes that transaction accounts are held at the central bank. Vollgeld-Initiative (2017) stipulates that they are held at individual banks. For the sake of analysis, however, it does not make a difference, since the legal form of these funds is the same—funds held on transaction accounts remain central bank money.

[32] Ronner (2015) at UBS claims that the financial regulations set up by the international community and Switzerland cost the bank around CHF 1 billion in 2015.

4 Fractional Reserve Vs. Sovereign Money System: The SNB

In this chapter, the SNB is addressed. It deals with the question of what empirically and hypothetically happens to the business of the SNB and related economic actors under the respective monetary system.

4.1 Fractional Reserve System: The General Mechanism of the SNB's Monetary Policy

According to the Swiss Constitution, the Confederation has the exclusive right to issue cash (that is, banknotes and coins). Yet, the Confederation has forwarded the task to issue banknotes to the SNB. The issuance of coins is still a matter of the Confederation.[33] In addition, the Confederation has forwarded the task to *distribute* banknotes and coins to the SNB. Besides this, the SNB also issues electronic SNB money (SNB 2016b).

In sum, the SNB is responsible for the issuance of SNB money (the SNB calls the latter "monetary base", SNB 2016a), which is composed of banknotes and electronic SNB money:

$$banknotes + electronic\ SNB\ money = SNB\ money \tag{5}$$

The SNB (2016b) notes that Swiss legal tender is composed of SNB money plus coins. Since coins account for a very small share of cash,[34] the simplification is made that legal tender is approximately equal to SNB money. Demand, savings, or time deposits are therefore no legal tender, but merely a *claim* on legal tender (Huber 2013).

Recall the fact that when non-indebted economic actors place cash (such as banknotes) with a bank under the Fractional Reserve system, this increases their demand deposits. Yet, banknotes as well as electronic SNB money are brought into circulation via the SNB through loans to the banking system. This means that non-bank economic actors can only access cash by borrowing from banks (Huber 2013). Non-indebted economic actors therefore must have gotten cash or demand deposits from other economic actors who borrowed money in the first place. This would imply that income distribution could be a reason why some economic actors are more indebted and some less. Finally, this would ultimately suggest that under the Fractional Reserve system, payment transactions in Swiss francs can only occur if there is at least one indebted actor in the economy (see Huber 2013).

Figure 33 presents the outstanding amount of demand deposits, all bank deposits, and SNB money. The figure shows that prior to the outbreak of the 2008-2009 financial crisis, the outstanding amount of SNB money was only a small fraction of total outstanding Swiss franc demand deposits. Since the onset of the crisis, the SNB increased the amount of SNB money dramatically, currently reaching about the same level as the total outstanding amount of demand deposits.

The SNB's current monetary policy framework was adopted in 1999, after the SNB abandoned the practice of steering the amount of SNB money (Rich 2000). The SNB

[33] Regarding the SNB's right to issue banknotes, see https://www.snb.ch/en/iabout/cash/id/qas_noten_1. Last visited: 26 February 2017.

[34] In 2015, coins in circulation as a share of currency in circulation was less than 5% on average. See https://data.snb.ch/en/topics/snb#!/cube/snbnomu. Last visited. 26 February 2017.

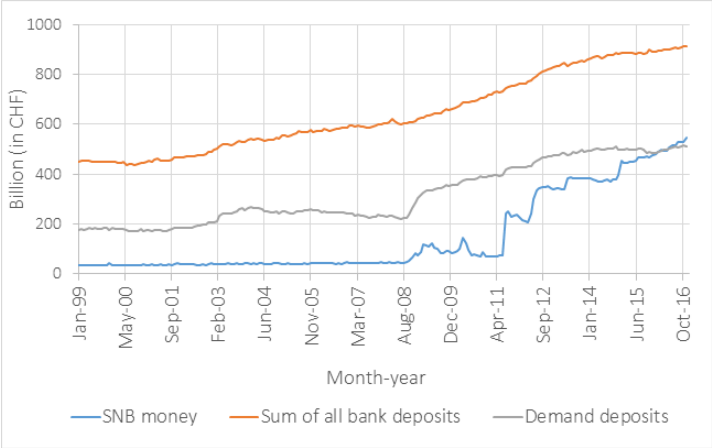

Figure 33: Bank deposits vs. SNB money
Source of data: SNB.

abandoned the old monetary policy framework because of the fact that the demand for SNB money (e.g., cash) could vary sharply in the short run so that setting a target for the monetary base in the first place might have not allowed to meet the demand at a certain point in time. Also, the reasoning behind targeting SNB money seemed incomprehensible (Rich 2000): why should the SNB influence a monetary aggregate whose first component is either not available to the public (electronic SNB money), and whose second component has become a relatively unimportant means of payment (cash)?

The SNB's monetary framework since 1999 is characterized by three elements: first, the definition of price stability—the SNB defines price stability as an annual CPI inflation rate (inflation rate hereafter) of between 0% and 2% in the medium to long term (Bäuerle and Kaufmann 2012).[35] Second, the SNB sets a target range for its reference interest rate, namely the three-month Libor in CHF (Libor hereafter). And third, the SNB provides an inflation forecast which is published by the SNB and informs economic actors about the expected evolution of the price level over the next three years if the Libor remained constant over the projected time period (Jordan and Kugler 2004).

Conventional Monetary Policy

The supply of cash is determined by banks' demand for cash. Banks' demand for cash is itself determined by the demand for cash by clients, who withdraw cash from ATMs, for instance: the SNB "issues banknotes and coins commensurate with demand for payment purposes" (SNB 2016) and therefore satisfies the demand for cash, as opposed to providing a fixed supply in the first place (Jordan 2015: 2). Banknotes are printed on behalf of the SNB and coins are printed on behalf of the Confederation (SNB 2016). The SNB buys banknotes from the printing press and credits the printing press' bank account with an amount of money that covers the costs of printing banknotes. Then, the SNB lends the newly printed banknotes to banks when the latter so demand (as discussed, it is assumed that banks exchange cash for electronic SNB money and vice versa).

[35]The SNB allows inflation to temporarily deviate from the measure.

In contrast to cash, the SNB actively steers the amount of electronic SNB money the banking system holds, and this is how the SNB takes influence: in order to refinance itself, bank A could borrow electronic SNB money from the SNB or from another bank B. If the borrowing rate which the SNB offers is lower than the rate bank B offers, bank A as a rational economic actor will borrow electronic SNB money from the SNB instead of borrowing from bank B. Hereby, the SNB lends electronic SNB money to the bank if the bank provides securities as collateral. In case the bank as a borrower cannot pay back the lent amount, the SNB keeps the security.

The interest rate on a security is negatively related to its price. Therefore, if the SNB wants to induce a bank to borrow electronic SNB money at a lower rate, the SNB can offer to buy the bank's securities at a higher price than other market participants. During the term of the repo transaction, the bank holds electronic SNB money instead of securities, which represents an accounting exchange on the asset side of the bank's balance sheet (see figure 34; CBS 2017: 10). The SNB, in contrast, expands its balance sheet: now it holds securities and owes electronic SNB money to the bank. Since the SNB holds an investment asset, "the bank pays interest (repo interest rate) to the SNB for the term of the repo agreement" (SNB 2016: 16). The SNB and the bank agree to reverse the transaction at a later point in time.

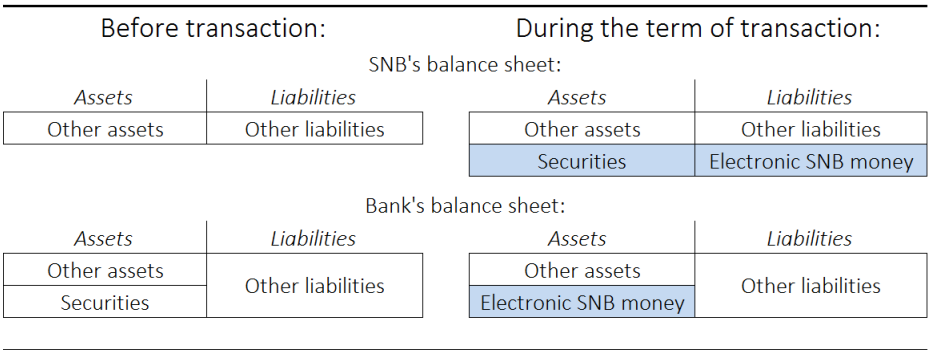

Figure 34: The SNB conducts repo transactions under the Fractional Reserve system
Source: own illustrations.

If bank B, to continue the example, would like to lend its electronic SNB money to other banks, but bank A is only willing to borrow from the SNB, bank B would have to lower the lending rate in order to attract banks as borrowers. The result is that the interbank rate, the Libor, also falls (see figure 35) and follows the repo rate. Assume that the repo rate is reflected by the Swiss Average Rate Over Night (SARON).

The SNB's ultimate goal regarding repo transactions is to indirectly steer the interest rate in the money market, the Libor. It is the rate a number of banks in London charge each other for borrowing and lending Swiss francs in the unsecured money market (recall the fact that in the unsecured money market, loans are not backed by securities that serve as collateral). This is why the SNB aims to target the Libor: it is the lending rate that reflects perceived risk by the banking system (Jordan 2009). Because in "normal times", lending money without collateral is more risky, and therefore, the Libor is typically slightly higher than the repo rate. As shown in figure 35, the Libor has reached its lower level at

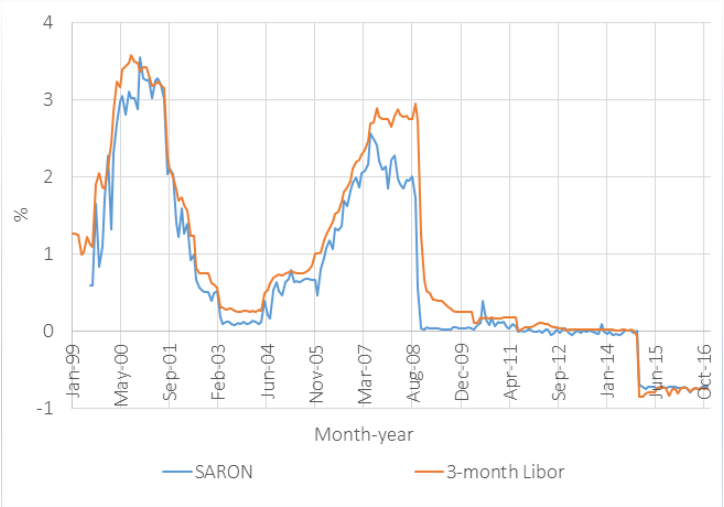

Figure 35: SARON and the three-month Libor for CHF
Source of data: SNB.

near 0% in 2009 and is currently negative. The implications of a change in the Libor are discussed when talking about the *transmission mechanism* of the SNB's policies.

By lending electronic SNB money to the banking system, the SNB generates interest rate seigniorage (Huber 2013). Hereby, the same principle applies compared to when banks in Switzerland issue loans: when banks return electronic SNB money to the SNB, the latter's balance sheet shortens (the SNB neither holds securities nor owes electronic SNB money anymore). Yet, the interest rate gain from holding the securities remains. Since banks have been holding an increased amount of electronic SNB money lately, the SNB's interest seigniorage gains arising from holding an increased amount of securities have increased (CBS 2016).

When issuing coins, the SNB buys coins from the Confederation and credits the Confederation's bank account (which the Confederation holds at the SNB) the *full value of denomination*. When examining the revenues aspect of the Swiss Federal budget, there is a rubric called "increase of coins in circulation"—in 2015, revenues from issuing coins accounted for CHF 68 million (EFV 2016: 5). After subtracting costs of producing coins, what is left is what Huber (2013: 19) calls the *original seigniorage* and it becomes part of the Confederation's income. Assuming zero costs, the original seigniorage accounted for less than 1% of the Confederation's revenues in 2015.[36]

Except for this initial step, every next step regarding the distribution of coins works the same compared to banknotes: the SNB lends coins to banks and thereby brings them into circulation. However, the SNB does not mention coins in its balance sheet, since coins do not legally stem from the SNB.

[36]In 2015, the Confederation's revenues amounted to about CHF 70,000 million.

Unconventional Monetary Policy

Besides conducting repo transactions in order to increase liquidity in the banking system, the SNB can also intervene in the foreign exchange (FX) market to affect the value of the Swiss franc, thereby combating an undesired appreciation of the Swiss franc, for instance.

In a FX transaction, the SNB can buy foreign currency, such as euros, from clients of domestic or foreign banks. If the SNB buys euros from a client of a *domestic* bank which runs a sight deposit account with the SNB, the latter credits the bank's SNB sight deposit account with the corresponding Swiss franc value. In other words: the bank holds more electronic SNB money which the SNB needs to provide, and the SNB holds more FX reserves (see figure 36). The bank now owes CHF demand deposits to its client, with the effect that the monetary aggregate *M1* increases (see Altermatt and Baeriswyl 2015).

Before transaction		After transaction	
SNB's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Other assets	Other liabilities	Other assets	Other liabilities
		EUR assets	Electronic SNB money
Bank's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
Other assets	Other liabilities	Other assets	Other liabilities
		Electronic SNB money	CHF demand deposits
Client's balance sheet:			
Assets	*Liabilities*	*Assets*	*Liabilities*
EUR demand deposits	Capital	CHF demand deposits	Capital

Figure 36: The SNB conducts FX transactions under the Fractional Reserve system
Source: own illustrations based on Altermatt and Baeriswyl (2015: 35).

When the SNB buys foreign currency from a client of a *foreign* bank which does not have a SNB sight deposit account, the SNB credits the amount of electronic SNB money to the foreign bank's correspondent bank in Switzerland, so that the correspondent bank owes electronic SNB money to the foreign bank. The economic actor receiving Swiss francs will be the client of that foreign bank (see Altermatt and Baeriswyl 2015: 2). This transaction, however, would not affect *M1*, since CHF demand deposits provided by foreign banks abroad are not part of Swiss franc monetary aggregates (see SNB 2016, and Altermatt and Baeriswyl 2015).

By injecting electronic SNB money into the banking system, the SNB increases the amount of Swiss francs and equivalently reduces the amount of euro in the money market. The SNB can reverse these transactions.

In August 2011, the SNB introduced a so called *1.20 lower bound*. This monetary policy was about fixing the price of the Swiss franc against another currency, such as the euro. Whenever the Swiss franc appreciated below CHF 1.20 per EUR 1, the SNB would intervene in the FX market.

As presented in figure 37, FX interventions over the last years have gone along with an increase in the size of both banks' and the SNB's balance sheets. The SNB's balance sheet rose to almost 100% of nominal Swiss GDP in 2015, reflecting an increase in FX

investments. Also, electronic SNB money accounted for a higher share of total assets of banks in Switzerland.

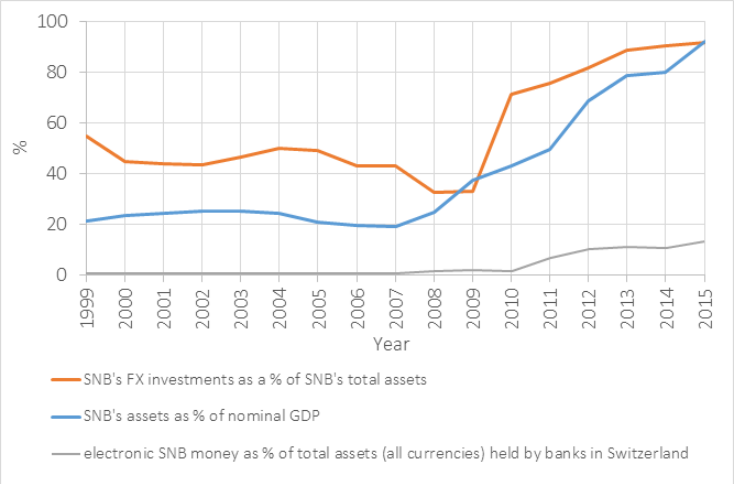

Figure 37: The SNB's FX interventions
Source of data: SNB. *Note*: own calculations.

By again regarding figure 21, the amount of electronic SNB money increased more than one-by-one with the increase in CHF demand deposits (unlike what is suggested in figure 36, which implies that electronic SNB money increases one-by-one with the increase in CHF demand deposits). The SNB may therefore have increasingly bought foreign currency from foreign clients of foreign banks.

By conducting repo and FX transactions, the SNB influences the banking system's cost of holding liquidity—that is, the cost of holding electronic SNB money.

The ability to influence this cost has weakened in recent years because interest rates on securities (which banks pay in turn for borrowing electronic SNB money from the SNB or from banks in the secured money market) have been on a continuously decreasing path, so that the cost of holding electronic SNB money has decreased.

As a result, the SNB imposed a new tool in January 2015—a negative interest rate on banks' sight deposits (on which banks hold electronic SNB money) held with the SNB that exceeded a certain threshold; until then, sight deposit accounts were non-interest-bearing (SNB 2016b: 18). It is assumed here that prior to January 2015, banks did have to pay interests to the SNB on borrowed electronic SNB money, but that the account *per se* did not go along with costs.

With the policy of negative interest rates, the SNB would still be able to influence and increase the cost of holding electronic SNB money—in fact, banks were induced to hold *less* electronic SNB money, since they had to pay in case the amount of electronic SNB money exceeded a certain level.

Since banks cannot lend electronic SNB money to non-financial economic actors outside of the banking sector, an individual bank can only reduce the amount of its electronic SNB money by buying other assets (such as securities) from another bank with a sight deposit account at the SNB or from a foreign bank with a correspondent bank. Thereby, the bank would transfer electronic SNB money to the other bank that sells the alternative asset.

Overall, Christensen and Krogstrup (2014: 13) note that the overall amount of electronic SNB money the whole Swiss banking system holds will be stable as long as the SNB does not increase or reduce the amount of electronic SNB money via its repo or FX transactions. Therefore, institutions whose sight deposits exceeded the exemption threshold have transferred money from their SNB accounts to banks which had not exhausted their threshold, with the result that turnover on the Swiss franc repo market increased (Maechler 2015).

The Standing Facilities

Besides the just mentioned open market operations— whereby the SNB is actively involved and takes action—the so called standing facilities are a tool with which the SNB merely changes market conditions (SNB 2016).[37]

The standing facilities are composed two aspects. The first aspect is the intraday facility, which provides the banking system with interest-free liquidity (electronic SNB money) that must be paid back at the end of the day.

The second aspect is the liquidity-shortage financing facility, whereby banks can borrow electronic SNB money that they are not able to obtain quickly enough in the interbank market or if minimum reserve requirements cannot be ensured at the end of the reporting period. If this scenario occurs, banks can borrow electronic SNB money from the SNB at a special rate higher than the Libor or the repo rate.[38] This higher rate may have the purpose to deter banks from actively refinancing themselves at the SNB (without the SNB's intervention), and to induce them to refinance themselves via other sources (such as borrowing from other banks, for instance). If banks used the liquidity-shortage financing facility tool too often and continuously demanded electronic SNB money from the SNB, the latter would have to constantly increase its balance sheet—which it might not be willing to do, since it may impact the Libor and have unintended consequences.

4.2 Sovereign Money System: The General Mechanism of the SNB's Monetary Policy

The Swiss Sovereign Money initiative stipulates that the Confederation obtain the monopoly over the issuance of Swiss francs in the form of banknotes, coins, and book money (book money is equivalent to funds held on transaction accounts).[39]

This paper makes the assumption that the SNB will obtain the task to issue all three mentioned forms of Swiss francs. Thereby, the SNB not only remains the lender of last resort (such as under the Fractional Reserve system, under which the SNB would provide banks with electronic SNB money for refinancing purposes), but in fact becomes what Huber (2014) calls the issuer of first instance—and thereby, the Swiss franc becomes what the initiators call *Sovereign Money*, since Swiss francs in any of the three forms stem from a state institution.

[37] Here, it could be argued that imposing negative interest rates on banks' sight deposit account with the SNB rather resembles an amendment of market conditions. At least, the SNB is not actively involved concerning the policy of negative interest rates.

[38] See http://www.snb.ch/en/iabout/monpol/id/monpol_instr. Last visited: 8 March 2017.

[39] http://www.vollgeld-initiative.ch/initiativtext/. Last visited: 11 February 2017

Huber (2013) proposes the introduction of a new monetary aggregate called *M*. *M* is composed of the Fractional Reserve system's monetary aggregates *M1*, banks' cash holdings in Swiss francs,[40] and electronic SNB money (Huber 2013: 169):

$$M = M1 + electronic\ SNB\ money^{41} \tag{6}$$

Since under the Sovereign Money system, any form of Swiss francs is to be exclusively issued by the SNB, the following equation may hold:

$$M = SNB\ money, \tag{7}$$

where

$$SNB\ money = banknotes + coins + electronic\ SNB\ money. \tag{8}$$

According to equations 6, 7, and 8, the hypothetical monetary aggregate *M* accounted for over CHF 1,000 billion in July 2016 (see figure 38), reflecting the strong increase in electronic SNB money held by the Swiss banking system. The figure shows that in "normal times" (that is, before the 2008-2009 financial crisis), *M* would approximately equal *M1*. In other words, *M* would represent the outstanding amount of Swiss francs used as means of payments in the Swiss economy. The figure also shows that in "normal times", nominal GDP develops relatively proportionally to *M1*, or *M*.

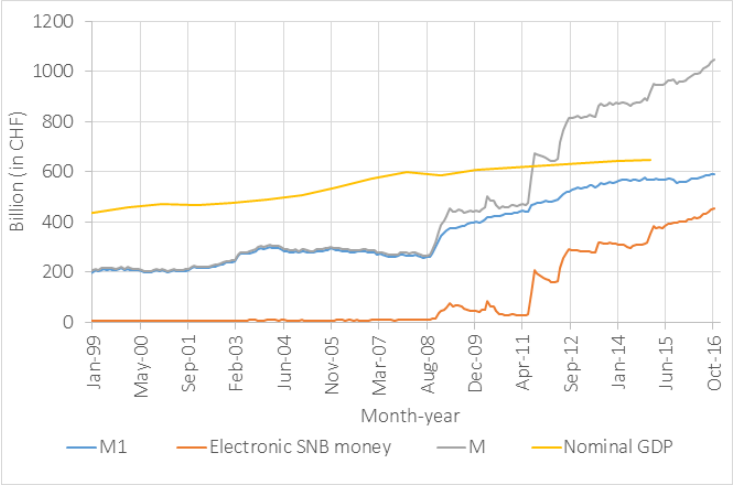

Figure 38: The monetary aggregate *M* and its Fractional Reserve system's components, and Swiss nominal GDP
Source of data: SNB. *Note*: own calculations. The growth rate of nominal GDP for the last 10 years was 2.7% p.a. .

Meanwhile, funds held on investment accounts will merely be *claims* on SNB money, but not SNB money itself. Therefore, they are not included in *M* (Huber 2013: 109).

[40]Banks' cash holdings are part of banks' liquid assets. Since banks' liquid assets are approximately equal to the total amount of electronic SNB money issued by the SNB, it is assumed that banks' cash holdings are 0.

[41]Huber (2013) uses the monetary aggregate *M1* as a simplified approximation for reflecting the money supply *M*. This paper assumes this is because in "normal" times (that is, prior to the 2008-2009 financial crisis), banks hold only little electronic SNB money (see figure 46 in the appendix).

The Swiss Sovereign Money initiative does not prohibit the SNB from using any of the monetary policy tools under the Fractional Reserve system (Vollgeld-Initiative 2017). And yet, the initiative explicitly requires that the SNB steer the money supply and sets up certain requirements for how the SNB brings money into circulation.[42] For the sake of analysis, this paper assumes that the SNB amends the second pillar of its monetary policy framework, so that its three pillars become: defining price stability (between 0% and 2% CPI inflation in the medium to long run), steering the money supply M, and creating an inflation forecast. It is assumed the SNB leaves its inflation forecasting model based on the Libor set in place.

The second pillar—steering the money supply M—would replace the pillar "setting a target range for the Libor" under the Fractional Reserve system. The SNB may consider this type of amendment because under the Sovereign Money system, the institution obtains full control over Swiss franc monetary aggregates (as opposed to merely be able to influence the amount of banks' electronic SNB money and banknotes as under the Fractional Reserve system).

The initiative stipulates that the SNB can bring money via two channels into circulation: debt-free via the Confederation, or via loans to the banking system.[43] The first task becomes relevant when considering monetary policy in normal times (that is, when the economy is not hit by internal or external economic shocks); the second whenever the SNB must respond to sudden internal or external shocks.

Conventional Monetary Policy 1.0: Managing the "Long-Run" Money Supply

The Swiss Sovereign Money initiative stipulates that Swiss francs can be issued *guilt-free*[44]. Hereby, the SNB would *not* lend Swiss francs by buying securities from banks or by purchasing foreign currency such as under the Fractional Reserve system. Instead, issuing debt-free SNB money is equivalent to issuing non-interest-bearing loans that do not mature (Huber 2013).

Note that issuing guilt-free SNB money would not be an entirely new task for the SNB: providing the economy with guilt-free SNB money is based on the Fractional Reserve system's mechanism for how *coins* are issued (as was already discussed). Under the Sovereign Money system, this mechanism is simply *extended* to banknotes and electronic SNB money.

In a Sovereign Money system, "the Central Bank will increase the money supply in proportion with the overall growth of the economy and to meet inflation targets" (Sigurjónsson 2015: 12). In this sense, the relevant equation for the SNB to meet this requirement is equation 9, which assumes that the growth rate of the money supply (g_M) must compensate for the growth rate of the real economy (g_Y) plus inflation (π).

$$g_M = g_Y + \pi. \tag{9}$$

According to figure 38, the hypothetical money stock M accounted for around CHF 1,000 billion in 2015. Yet, this paper assumes that the "necessary" money stock accounts for only around CHF 300 billion (an explanation is provided in the appendix when discussing the

[42] http://www.vollgeld-initiative.ch/initiativtext/. Last visited: 11 February 2017.
[43] http://www.vollgeld-initiative.ch/initiativtext/. Last visited: 11 February 2017.
[44] http://www.vollgeld-initiative.ch/initiativtext/. Last visited: 11 February 2017.

implementation of the Sovereign Money system). Thereby, based on this assumed initial money stock of CHF 300 billion, an expected annual real GDP growth rate of around 2% (this is approximately equal to the average annual growth rate of Swiss real GDP for the last 10 years),[45] and an "inflation target range" of 0% to 2%, the SNB would have to increase the money supply M by CHF 6 to 12 billion the next year (and the years thereafter if all else remained equal).

There are two approaches for how the SNB may record the information of the nominal value of SNB money issued in a certain time period (suppose 1 year for simplification). The face value of the newly created money could either enter the SNB's balance sheet (with the effect that the SNB's balance sheet would expand by the amount of SNB money issued), or it could be noted *outside* of the SNB's balance sheet (that is, off-balance sheet) (Huber 2013, Mayer 2016). For the sake of analysis, suppose the SNB records money that is issued guilt-free *outside* of its balance sheet.[46]

For creating electronic SNB money, the SNB would credit the face value of the newly issued electronic SNB money on the Confederation's bank account (which the latter holds at the SNB, see figure 39). For the first time, banks' balance sheets would *not* be affected by the SNB's monetary policy actions.

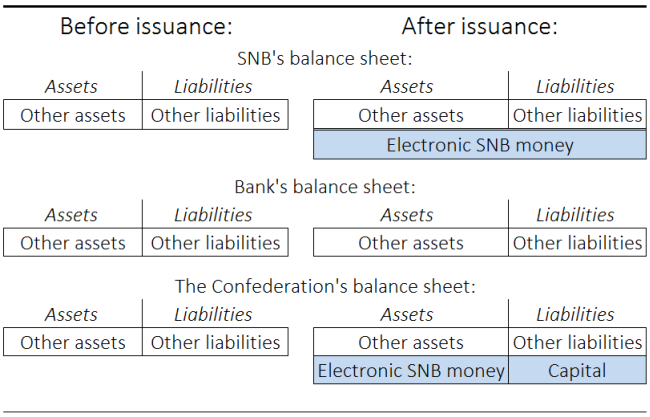

Figure 39: The SNB issues guilt-free money under the Sovereign Money system
Source: own illustrations based on Mayer (2016). *Note*: the provision of Sovereign Money resembles a transfer of an interest-free loan that does not mature and therefore does not have to be paid back. This is why "capital" is added to the liability side of the Confederation's balance sheet. It could also say "not maturing loan" instead of "capital".

The Confederation would receive the full original seigniorage, that is, the purchasing power of electronic SNB money injected by the SNB (ΔM) minus the cost of producing these funds ($C_{\Delta M}$).

[45] https://data.snb.ch/en/topics/uvo#!/cube/gdprpq?fromDate=2000-Q1&toDate=2016-Q3&dimSel=D0%28VVK%29,D1%28BBIP%29. Last visited: 7 March 2017.

[46] If the SNB decided to pursue the first strategy and to expand its balance sheet when it increases the long-run money supply, the asset and liability side of the SNB's balance sheet would increase. On the asset side, we would see which party this newly created money goes to (namely the Confederation) and on the liability side we would see the amount issued. However, the terms "assets" and "liabilities" would be misleading, since they do not represents assets neither liabilities (Vollgeld-Initiative 2017).

These CHF 6 to 12 billion to be brought in circulation may not exclusively exist of electronic SNB money; they will be a combination of electronic SNB money (the majority), banknotes (a minority), and coins (a smaller minority), whereby the printing of banknotes and minting of coins is associated with costs (SNB 2015). Assuming costs of zero, the Confederation could earn an original seigniorage of CHF 6 to 12 billion every year if all else remained equal. Under the Fractional Reserve system, the original seigniorage is only generated regarding coins, whereas under a Sovereign Money system, the original seigniorage would apply to the creation of electronic SNB money, banknotes, and coins if issued guilt-free via the Confederation.

This original seigniorage, namely $\Delta M - C_{\Delta M}$, adds to the Confederation's annual budget (ΔS_Public), expressed by taxes (T) minus government purchases (G). Based on Jackson (2013: 42), the Confederation's budget under a Sovereign Money system is re-written as follows:

$$T - G + (\Delta M - C_{\Delta M}) = \Delta S_Public \tag{10}$$

If, for some reason, the SNB perceived a necessity to decrease the money supply M permanently, the SNB could theoretically withdraw money from the economy by absorbing funds paid as taxes that the Confederation would have received otherwise, or by simply not paying out the full original seigniorage as just discussed (Sigurjónsson 2015).

Advocates of the Sovereign Money proposal suggest that the issuance of guilt-free central bank money may become the major channel of monetary policy in normal times (Huber 2013).

The issuance of guilt-free SNB money might remind of a monetary policy called *Quantitative Easing* (such as recently conducted by the ECB), when the central bank buys government bonds with the goal to decrease the yield on the latter.[47] However, the first distinction is that, under a Sovereign Money system, the issuance of guilt-free SNB money would not be accompanied by increasing public debt levels (since the state would not have to pay the issued amount back). Second, Quantitative Easing is a measure some central banks have adopted in order to combat temporary negative economic shocks, thereby representing an *unconventional* monetary policy measure. Regarding the issuance of debt-free SNB money, it would be a monetary policy tool in *normal* times, thereby representing a conventional monetary policy measure. If the SNB decided to exclusively issue guilt-free SNB money via the Swiss Confederation, and if this amount of money reached economic actors within the economy (via government spending, for instance), this paper concludes that Swiss franc payment transactions may be promoted without non-bank economic actors necessarily being indebted—as is the case under the Fractional Reserve system.

Conventional Monetary Policy 2.0: Managing the "Short-Run" Money Supply

Under a Sovereign Money system, the Swiss banking system as a whole may hold a shortage of electronic SNB money and may therefore not be able to meet borrowers' demand for loans. A temporary shortage of loans could lead to a credit crunch, with the consequence of dampening investment and thereby economic activity in the Swiss economy. In this situation, the SNB would have to provide banks in Switzerland with electronic SNB

[47] https://www.nzz.ch/wirtschaft/zweifel-an-der-wirksamkeit-der-europaeischen-geldpolitik-1.18474079. Last visited: 8 March 2017.

money in the form of loans. Managing the "short-run" money supply might even become a *conventional* monetary policy tool, since funds on investment accounts plus the additional amount of electronic SNB money banks hold seem to be insufficient to meet the demand for outstanding loans (recall figure 23).

By providing the Swiss banking system with electronic SNB money banks can use to lend, the SNB would have to expand its balance sheet by the amount of loans issued. On the asset side of its balance sheet, the SNB would hold a security (assuming that the SNB conducts repo transactions), and on the liability side, it would owe electronic SNB money to the bank (like conventional repo transactions under the Fractional Reserve system as illustrated in figure 34). The bank's balance sheet would also look the same as in figure 34, with the different implication that the bank would use the electronic SNB money to directly lend it to a borrower. Like under the Fractional Reserve system, the interest rate on loans issued by the SNB (that is, the repo rate in case of a loan backed by collateral) would depend on how much the institution would want to stimulate borrowing by economic actors.

If the SNB decided to exclusively issue all SNB money via *loans* to the banking system (instead of issuing guilt-free SNB money via the Confederation), public finances may *still* improve: the SNB would be able to generate a larger amount of interest rate seigniorage as opposed to under the Fractional Reserve system, since banks would have to fully finance themselves via electronic SNB money ex ante. In this particular situation, the Swiss banking system's profits generated through interest rate seigniorage under the Fractional Reserve system may—under a Sovereign Money system—be *shifted* to the SNB.

Unconventional Monetary Policy

Like in terms of the discussion of the Fractional Reserve system, this paper assumes that the SNB may intervene in the FX market so as to combat an appreciation of the Swiss franc: for instance, by buying euros and selling Swiss francs in the FX market. Hereby, the bank's balance sheet would be unaffected by the SNB's FX intervention (see figure 40) if the SNB purchased foreign currency from a client of a domestic bank. The latter would

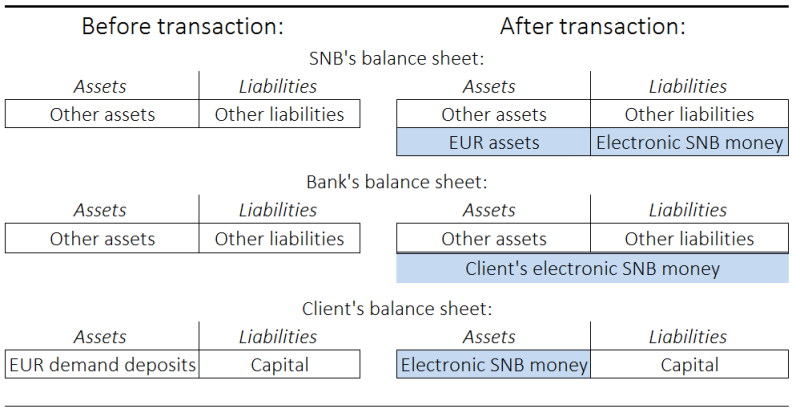

Figure 40: The SNB conducts FX transactions under the Sovereign Money system
Source: own illustrations based on Mayer (2016). *Note*: for simplification, it is assumed that the bank did not owe EUR demand deposits to the client in the first place.

have to increase the client's transaction account by the counter-value of the EUR deposit the client held before, implying an increase in M (since there is more electronic SNB money in circulation). If, however, the SNB bought foreign currency from a bank with no sight deposit account at the SNB (such as a bank abroad), the SNB may credit the sight deposit account of the foreign bank's correspondent bank with electronic SNB money. The correspondent bank's balance sheet would increase: it would own electronic SNB money as assets and, at the same time, owe these funds to the foreign bank. This may also increase M (since the correspondent bank holds more electronic SNB money), but this paper assumes that, similarly to under the Fractional Reserve system, this would not be accompanied by an increased amount of Swiss francs in circulation in the Swiss economy (that is, the correspondent bank cannot use the electronic SNB money, but owes it to a bank abroad).

As suggested by the SNB's operations under the current Fractional Reserve system, it is assumed that the SNB would conduct most FX transactions by buying foreign currency from foreign clients of banks abroad, thereby not increasing the amount of electronic SNB money held in transaction accounts to such an extent as illustrated in figure 40.

The New Standing Facility: Setting Minimum Maturity Rates for Investment Deposits

Under the Sovereign Money system, the SNB obtains a new monetary policy tool: setting the minimum maturity rates for funds held on investment accounts (Vollgeld-Initiative 2017, Huber 2013). This tool may be compared to the standing facilities under the Fractional Reserve system, whereby the SNB merely changes market conditions without actively being involved in terms of increasing or decreasing the banking system's level of electronic SNB money by intention.

Under a Sovereign Money system, electronic SNB money held by the Swiss banking system in order to promote Swiss franc payment transactions is placed outside of banks' balance sheets, namely in transaction accounts. This is why this paper makes the assumption that the standing facilities could cease to exist: there is no need anymore for banks to refinance themselves for the sake of promoting Swiss franc payment transactions.

Instead, the SNB would be enabled to stipulate what must be the minimum amount of maturity for investors to hold funds on investment accounts. The first purpose of adjusting the minimum maturity rate is that the SNB could decrease the amount of Swiss francs held in transaction accounts plus currency in circulation. Simply speaking, if the SNB decided to suddenly increase the minimum maturity rate on investment deposits, investors would not be able to access their lent funds as quickly, whereas borrowers might have repaid their maturing loans earlier at the prescribed date, leaving idle the already repaid amount at banks. Banks would have to hold these funds until the extended maturity date regarding investment deposits. Even though the monetary aggregate M would stay the same, money would temporarily be withdrawn from circulation that cannot be spent in the economy, similar to what already happens with savings and time deposits under the Fractional Reserve system (see Huber 2013: 151).

4.3 Fractional Reserve System: The Transmission Mechanism of the SNB's Monetary Policy

Transmission to Bank Interest Rates

By conducting repo transactions with banks, the SNB influences the cost of electronic SNB money banks hold (see Huber 2014). If the price of borrowing electronic SNB money falls (that is, if the SNB lowers the repo rate so that the Libor falls, for instance), it costs less for banks to refinance themselves. Given this, banks can more easily afford to also lower the rate on loans (such as the rate on mortgages) to keep the same interest rate spread as before.

Figure 41 presents the relatively proportional decrease in both the Libor and the mortgage rate in recent years. All else equal, if the price of borrowing decreases, economic theory predicts rational individuals to borrow more—investment would increase and so nominal GDP. Given the present environment of very low interest rates (currently, the Libor is at a negative rate), economic actors *have* in fact taken out more mortgages. This has led to "imbalances on the mortgage and real estate markets" (SNB 2016: 6), reflected by a relatively strong increase in housing prices (see figure 41), but a generally stable or even decreasing overall price level (recall the fact that the CPI has slightly decreased since 2013).

In order to counteract such "imbalances", the SNB has introduced a so called *counter-cyclical capital buffer*, which requires banks to hold additional capital when issuing mortgages (SNB 2016). This might have helped combat the strong price increase, reflected by a flattening of the price index for residential space since early 2015.

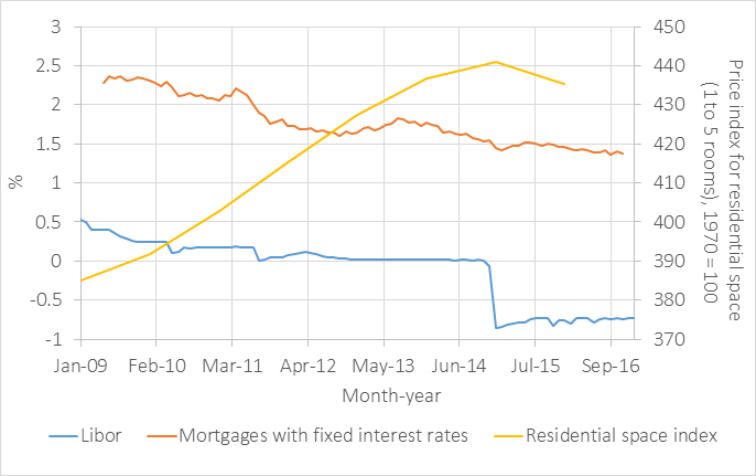

Figure 41: The real estate and mortgage market
Source of data: SNB.

Transmission to Long-Term Interest Rates

Figure 42 shows that the yield on Swiss Confederation bonds behaves similarly and is relatively strongly linked to the SARON (which is assumed to be the repo rate), especially to the yield on shorter-term Confederation bonds (the correlation coefficient between the 1-year Swiss government bond and the SARON is around 0.97 and the correlation coefficient

between the 5-year Swiss government bond and the SARON is around 0.87). In fact, the link between Swiss franc government bonds and the repo rate is so strong because banks or the SNB hold such bonds as collateral regarding their repo transactions with one another (Rule 2015). To put it simply, when conducting repo transactions, electronic SNB money is lent in exchange for a security, such as a CHF government bond, and the cost of borrowing money is equal to the yield of the government bond, or the repo rate—but generally, yields on Swiss government bonds may slightly deviate from the repo rate because these securities are also traded by private global investors.

Observing a correlation between two variables alone does not allow any assessment of the direction of causality. It is also argued that overall, long-term bonds have generally followed a downward trend over the last decades. This may be a consequence of increased financial globalization and the increasing demand for risk-free investment assets, not necessarily reflecting central bank monetary policy per se (see Bean et al 2015).

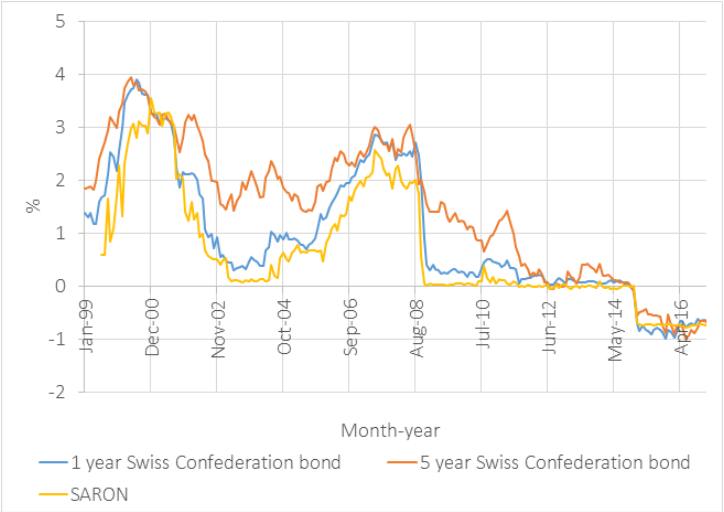

Figure 42: SARON and bond yields
Source of data: SNB.

However, as Christensen and Krogstrup (2014) note, also when the SNB engaged in temporary foreign exchange interventions and bought substantial amounts of FX in short consecutive time periods in 2011, the yields on long-term Swiss Confederation bonds did respond: "the yield drop was particularly strong in connection with the final announcement of the most substantial increase in reserves" (Christensen and Krogstrup 2014: 8). The authors argue that this drop was due to an increased amount of electronic SNB money held by banks in Switzerland, which led to a decline in term premiums on Confederation bonds, with the overall effect that the relative price of these securities decreased (Christensen and Krogstrup 2014: 37). Banks could have increasingly traded these assets, or banks may have started to charge a higher price on these bonds due to lower risk expectations, given the SNB's reassuring action to be determined to intervene in the FX market to counteract a Swiss franc appreciation. Similarly, negative interest rates reduced the yield on Confederation bonds (Bech and Malkhozov 2016), and this reduction may be traced to banks' increased trading activities on financial assets, such as trading securities (Maechler

2015).

Transmission to Alternative Assets

Whether economic actors acquire alternative investment assets—other than seemingly safe government bonds, for instance—mainly depends on two aspects: expectations about the evolution of the domestic and global economy, and on the yield on safe investments. FINMA (2015: 8) states that US debt securities such as CDOs or ABSs became attractive as "conventional" and risk-free investment assets—such as government bonds—offered lower and lower yields (if the yield on low-risk securities is low, banks might switch to other assets, such as stocks or more risky bonds, or, in the case of UBS, to US financial products, such as ABS or CDOs. This situation was, however, also characterized by optimism about the global economy and therefore, financial institutions were ready to take on more risk (FINMA 2009).

Transmission to the Exchange Rate

As can be seen in figure 43, the 1.20 lower bound imposed from September 2011 to January 2015 helped to stabilized the value of the Swiss franc. This may lead to the conclusion that FX interventions would per se have an effect on the CHF per EUR 1 exchange rate, thereby supporting the export industry (since a rapid appreciation leading to higher export prices could be prevented).

Figure 43: The CHF per EUR 1 exchange rate and the "1.20 lower bound"
Source of data: SNB.

And yet, the transmission mechanism of monetary policy to the exchange rate is rather ambiguous: the SNB has been intervening in the FX market before introducing the 1.20 lower bound, and Bernholz (2015) argues that these temporary FX interventions did not have the same effect as the SNB's expressed commitment to maintain the 1.20 lower bound, implying how exchange rates develop is to a large extent driven by market participants' expectations: "[the announcement of the 1.20 lower bound] stabilized expectations so that nobody wanted to risk losses by betting against the SNB" (Bernholz 2015: 404).

4.4 Sovereign Money System: The Transmission Mechanism of the SNB's Monetary Policy

The Transmission Mechanism of Issuing Guilt-Free SNB Money

There are four possibilities regarding the question of how SNB money received via the original seigniorage could be spent by the Swiss Confederation (Vollgeld-Initiative 2017, Huber 2013). In this sense, monetary policy becomes fiscal policy. For the sake of analysis, this paper assumes that the Confederation does not consider distributing the original seigniorage among the Cantons.

As a first option, the Confederation could use the additional revenues to increase government spending (G). Given that the annual expected original seigniorage of CHF 6 to 12 billion would amount to 8.6% to 17.1% of the Confederation's annual expenses in 2015, one may be tempted to expect an additional stimulus of around 0.9-1.8% of nominal GDP in 2015,[48] which may, all else equal, spur economic growth, and eventually be accompanied by a multiplier effect.[49] Yet, Zurbrügg (2012: 10) notes:

> "The impact of a government economic stimulus programme in a small open economy such as Switzerland is slight. The high proportion of imports means that much of the government spending dissipates abroad."

This paper therefore concludes that it is unclear whether the additional revenue generated through the original seigniorage would serve much as a fiscal stimulus.

Second, the Confederation could lower taxes (T). Thereby, "the part of the extra money that taxpayers choose to spend or invest will tend to increase economic growth" (Sigurjónsson 2015: 79).

This approach could be challenging from a political economics perspective: if, for example, the SNB decided to, in one year, not create Sovereign Money in the same amount, the Confederation might find itself in a situation of a lack of funds to maintain a balanced budget. In order for the latter to be realized, the Confederation would have to raise taxes in the next year, something that could encounter resistance of the Swiss taxpayers.

As a third option, the Confederation may distribute the original seigniorage among the Swiss citizens.[50] In technical terms, "individuals may use the dividend to spend more, to save it or to pay debts" (Sigurjónsson 2015: 80). In practical terms, this option may be equally challenging from a political economics perspective—for instance, long-term residential foreigners might feel discriminated against by not receiving a share of the seigniorage by the state to Swiss citizens.

Finally, the Confederation could also decide to save the funds or draw down debt. During the implementation procedure, the initiators of the Swiss Sovereign Money initiative expect the SNB to issue around CHF 300 billion of guilt-free SNB money (see appendix for a discussion; Vollgeld-Initiative 2017). The Confederation and Cantons could use these funds

[48] Revenues of the Swiss Confederation in 2015 accounted for around CHF 70 billion (see https://data.snb.ch/en/topics/uvo#!/cube/pubfin?fromDate=2008&toDate=2017&dimSel=D0%28B%29,D1%28E%29. Last visited: 9 March 2017. Swiss nominal GDP in 2015 was around CHF 650 billion (see figure 38).

[49] To put it simply, the multiplier effect describes a situation in which an economic stimulus (such as an increase in G) increases economic growth, and that this additional amount of economic growth stimulates further economic growth (see Blanchard 2017).

[50] See http://www.vollgeld-initiative.ch/initiativtext/. Last visited: 9 March 2017.

in order to draw down their outstanding debt of almost CHF 200 billion in total, with the possible implication that the public sector of the Swiss economy would largely become free of debt.

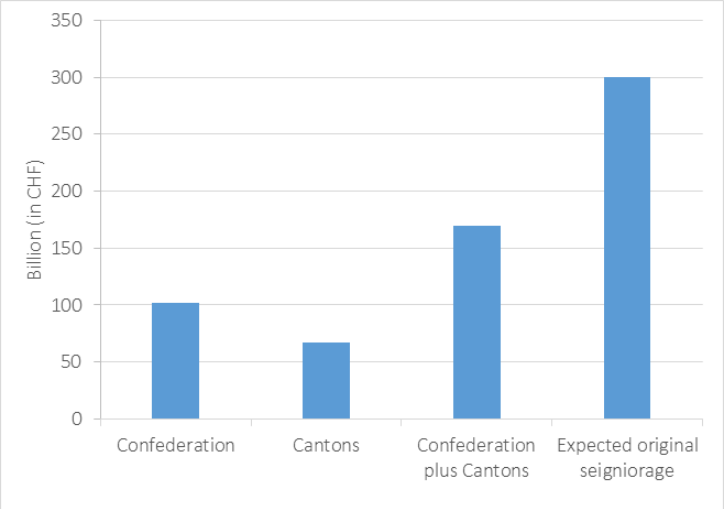

Figure 44: Outstanding debt by levels of government vs. expected original seigniorage through implementation of the Sovereign Money system
Source of data: SNB. *Note*: data refer to the year 2015. "Expected original seigniorage" is taken from Vollgeld-Initiative (2017.

Jackson (2013: 18) notes that how money is spent by the government (that is, either by increasing spending or lowering taxes, for instance) can have different effects on economic growth and the evolution of the price level. It is therefore assumed that the SNB would—in case of aiming to increase the monetary aggregate M while aiming to maintain price stability—necessarily have to know *in advance* how the Confederation considers to spend the original seigniorage. As a result, increased coordination between monetary and fiscal policy may be required.

This could raise the question of whether the increased ties with the Confederation may, in a way, impede the SNB in fulfilling its mandate. One answer may be provided by Zurbrügg (2012: 6), who emphasizes a "rules-based" policy approach and claims:

> "The lack of clarity in past rules had led to monetary policy being more exposed to political pressure [...] There is consensus that a rules-based monetary policy is more successful in price stability".

Like under the Fractional Reserve system, a Sovereign Money system associated with the goal to sustain price stability requires the strong and clear commitment of the SNB to its defined monetary policy framework. This may allow the SNB to fulfill its mandate, regardless of the strength of ties with the Confederation.

In addition, it is unclear whether the *question* of how to spend the original seigniorage by the Confederation may itself pose a challenge for *political* stability, since the Confederation would have to determine what projects to spend the original seigniorage on (e.g, on security or on health care). Depending on the nature of the project, this may encounter resistance from political opponents.

Transmission to Bank Interest Rates

In case of a possible credit crunch under the Sovereign Money system (that is, if banks held too little electronic SNB money to lend), the SNB could step in and inject electronic SNB money into the Swiss banking system by offering to lend electronic SNB money to banks in Switzerland for a lower rate than the rate at which banks take investment deposits from investors. Since all else equal, the price of borrowing electronic SNB money would decrease, banks may lower the rates on loans they issue to retain a competitive interest rate spread. Reduced costs for new loans could induce households and firms to borrow more, thereby increasing investment and economic activity.

By curbing lending to the banking system (that is, by simply not providing additional electronic SNB money or by issuing securities), the SNB could—as opposed to the Fractional Reserve system—*directly* counteract imbalances on the real estate and mortgage market which may, all else equal, minimize the need to maintain the currently installed regulatory counter-cyclical capital buffer regarding the issuance of mortgages.

Transmission to Long-Term Interest Rates, Alternative Assets, and the Exchange Rate

The transmission of monetary policy to long-term interest rates, alternative assets, and the exchange rate under the Sovereign Money system remain generally unclear, and therefore, only some considerations are discussed.

Under the assumption that the Confederation used the original seigniorage generated from the implementation of the Sovereign Money system to draw down its entire debt, the now *non-existence* of Swiss Confederation bonds could pose new challenges for institutional investors such as Swiss pension funds and other economic actors looking for a safe investment opportunity in times of global financial turmoil. In an environment of already negative yields on bonds, institutional investors and other economic actors might see themselves forced to switch to riskier assets located abroad.

Also, regarding repo transactions with the SNB, it might raise the question of which type of collateral assets banks would use in order to receive electronic SNB money from the SNB or other banks to lend.

A possible alternative for investment assets in times of financial turmoil and, at the same time, in an environment of negative interest rates (on safe investment opportunities), may be to place funds on transaction accounts: they are risk-free but might bear slightly negative interest rates (in case they go along with fees), as currently Confederation bonds do. Treating both transaction accounts and Swiss Confederation bonds as a "safe haven", the Swiss franc may similarly appreciate in an uncertain environment, since economic actors may seek to place funds on transaction accounts with their acquired Swiss francs. If this was the case, and investors flight to transaction accounts in Switzerland, the SNB may then have even *more* limited abilities to counteract a Swiss franc appreciation if the SNB was not able to push down rates on transaction accounts.

Alternatively, the SNB may consider to impose regulations to deter global investors from opening up a transaction account, such as by imposing fees. Whether this would be in the SNB's interest is unclear.

Advocates of the Sovereign Money initiative mention that bonds issued by banks of

the Swiss banking system may instead become an alternative attractive investment option, since banks in Switzerland would, under the assumption of holding an insufficient supply of loans, look for additional electronic SNB money for issuing loans (Vollgeld-Initiative 2017).

Whether such bank bonds would indeed become the preferred and safe alternative investment assets is unclear. If they did become the preferred alternative asset in times of financial turmoil, the SNB may want to push down these yields in order to deter global investors to acquire these types of assets and to combat an appreciation of the Swiss franc (similar to what the SNB has been trying to do in terms of Swiss government bonds; Bech and Malkhozov 2016). However, by buying bank bonds, the SNB would, at the same time, provide the Swiss banking system with more electronic SNB money, thereby possibly provoking an unintended surplus of loans to economic actors. Whether these interventions would have an effect on the exchange rate is unclear.

Finally, it can be assumed that, like under the Fractional Reserve system, the SNB may be able to counteract the Swiss franc appreciation first and foremost when there are strong expectations by market participants about the SNB's commitment to in fact intervene in the FX market. In that regard, if investors do not perceive a reasonable channel through which the SNB might be able to counteract such upward pressure on the Swiss franc under the Sovereign Money system, FX interventions can be expected to have limited effects. One thing is clear—under the Sovereign Money system, the SNB would have to communicate comprehensibly which channels may enable the institution to achieve its goal.

5 Conclusion and Implications

This paper systematically compared the current Fractional Reserve system with a hypothetical Sovereign Money system in Switzerland. The focus was laid on the role of banks in Switzerland and the SNB, their impact on the affected economic actors in terms of balance-sheet effects and on the size of the various monetary aggregates. This paper also sought to take the specifics of Switzerland as a small open economy and with an internationally relevant banking sector into account.

In a Sovereign Money system, the SNB is supposed to become the issuer of first instance of Swiss francs, besides continuing to be the lender of last resort for the banking system. This would allow the SNB to obtain full control over Swiss franc monetary aggregates. The major findings of this paper's analysis generally support the claims expressed by the initiators of the Swiss Sovereign Money initiative (Vollgeld-Initiative 2017): a Sovereign Money system could sustain payment transactions in Swiss francs during financial turmoil, thereby minimizing, if not eliminating, the need of the state to financially support systemically relevant financial institutions. Yet, it cannot be expected that a Sovereign Money system could render the Swiss banking system crisis-proof: the alternative monetary system would not fix the cause of the financial difficulties UBS faced during the 2008-2009 financial crisis. This paper further expects a Sovereign Money system to reduce banks' profits and improve public finances—substantially if the SNB chose to issue guilt-free SNB money to the Confederation. Under a Sovereign Money system, banks would become genuine financial intermediaries, channeling savings to borrowers.

Besides these hypothetical consequences of an implementation of the Swiss Sovereign Money initiative, many uncertainties remain. For instance, it is not clear whether the

SNB would be better able to absorb external negative economic shocks and combat an appreciation of the Swiss franc in times of financial turmoil. Neither is it clear whether banks could attract enough investors to supply the demand for loans, or whether the SNB would have to be constantly involved in providing additional loans to the banking system.

Meanwhile, all predictions rest on assumptions. This paper's analysis of a Sovereign Money system implemented in Switzerland remains purely hypothetical and might have not taken certain but crucial aspects into account that would have led to different conclusions. In this context, Thomas Jordan, head of the SNB, notes with regard to the initiative and similar reform proposals:

> "Even well-meaning suggestions for improvement—ones that might in theory appear totally justified—may have grave unintended consequences in the real world" (Jordan 2014).

Regardless of whether the initiative will finally be accepted or not—the analysis of the Sovereign Money proposal should be taken as nothing less but a great opportunity: it might have not only allowed to think about an alternative monetary system, but also, and maybe more importantly, to critically discuss the way today's Fractional Reserve system itself is set up and what hitches it inherits from a financial stability perspective.

A monetary system is the crucial foundation, if not a necessary precondition, for any modern economy. The nature of a monetary system can be traced to seemingly negligible details, such as to the design of and effects on economic actors' balance sheets. The debate about the precise mechanism of (central) banks in the economy, and the effects on the latter

> "[...] did not continue much beyond the 1960s, as the macroeconomic and monetary functions of banks disappeared almost entirely from mainstream economic theory. As a result, many important insights of the past have been forgotten, and need to be relearned today" (Jakab and Kumhof 2015: 13).

Economists must start to increasingly study and teach the precise functioning the contemporary monetary system. An growing range of literature has taken first steps to eliminate major misunderstandings that have been kept alive by, for instance, conventional economic textbooks.

Moreover, comparing both kinds of monetary systems may have helped to think about the way central bankers and politicians are trying to solve contemporary economic challenges: it seems as if policy makers are seeking to restore economic growth with already existing tools that the current monetary system provides (such as conducting expansionary monetary policy by reducing the policy rates) or by introducing "new" tools (such as *Quantitative Easing*, which involves the lending of money to governments or firms, increasing these economic actors' debt, or *negative interest rates*) or just by increasing regulation, such as increasing capital and liquidity requirements to counteract the "too-big-to-fail problem" (FINMA 2014).

All these proposals' authors, however, do not seem to question the nature of the contemporary monetary system. How money and the process of money creation is viewed results in different macroeconomic responses to financial and economic shocks (see Jakab and Kumhof 2016). Alternative approaches to the bank business and monetary policy may help to tackle challenges that cannot be solved with existing means. And these alternative approaches do not have to be limited to the Sovereign Money proposal.

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Appendix

The Implementation of the Sovereign Money System in Switzerland

Advocates of a Sovereign Money system expect banks and the central bank to require a time period of about 2 years in order to prepare their IT-software and train their employees in order to be able to deal with the requirements of the new monetary system (Mayer and Huber 2014).

Afterwards, the actual implementation procedure is supposed to begin. For simplification, this paper assumes that the size of monetary aggregates remain approximately equal at the levels of December 2016. From a given day onwards, the SNB will have the exclusive monopoly over both the creation and destruction of Swiss francs in any form (Vollgeld-Initiative 2017). This means that, in turn, banks in Switzerland are prohibited from creating or destroying Swiss francs in any form.

As shown in figure 12 when discussing how banks manage deposits under the Fractional Reserve system, clients of banks in Switzerland in total held around CHF 915 billion in the form of bank deposits in December 2016. Of this amount, demand deposits accounted for around CHF 513 billion.

The Swiss Sovereign Money initiative stipulates that these demand deposits become legal tender, since these funds will be held on transaction accounts. In other words, original demand deposits for electronic payment transaction purposes must exclusively be issued by the SNB.

If the new rules applied immediately, it would mean that demand deposits created by banks would instantly become legal tender. This situation must, however, be prevented—legal tender must exclusively be issued by the SNB. Therefore, banks must stop owing these demand deposits to their clients and instead must start to owe them to the SNB. This implies an accounting exchange on the liability side of banks' balance sheets. The SNB, in turn, owes the original demand deposits to the original holders of demand depositors. Only this allows the separation between legal tender and bank created demand deposits. The demand depositors now hold legal tender on their transaction accounts with their banks: the banks transform demand deposit accounts into transaction accounts which they register outside of the banks' balance sheets—that is, off-balance sheet.

At the same time, the SNB's balance sheet increases by CHF 513 billion. Regarding the asset side of the SNB's balance sheet, the SNB now holds a claim on the CHF 513 billion owed by the Swiss banking system, and as a liability, the SNB must provide CHF 513 to the original demand depositors. Despite this expansion, this balance sheet restructuring would not change the size of any monetary aggregate. The affected economic actors' balance sheets would simply be transformed.

Finally, regarding the original savings and time deposits, these funds will be converted into investment accounts (see figure 45; Sigurjónsson 2015).

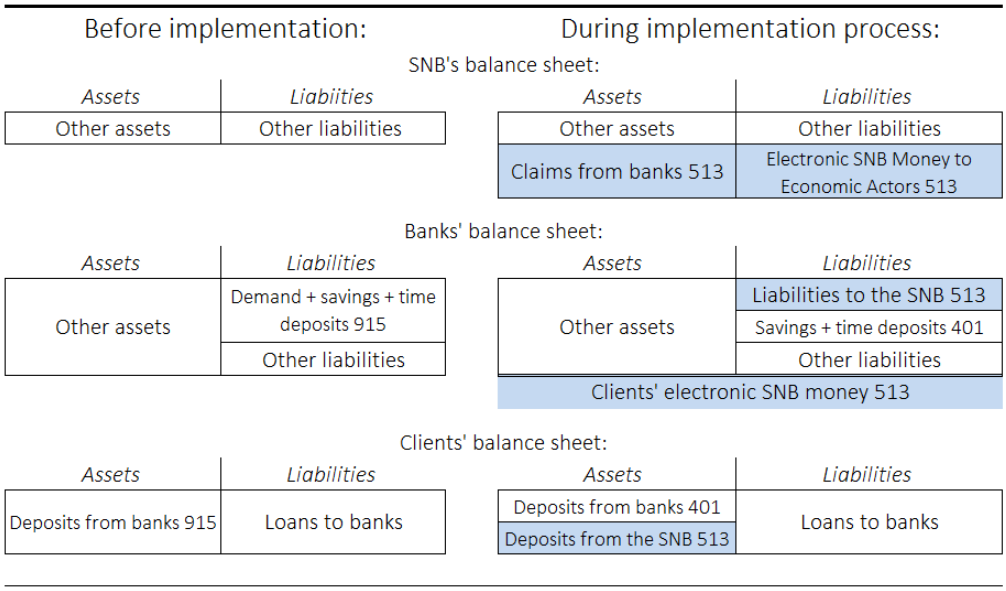

Figure 45: The implementation process of the Sovereign Money system
Source: own illustrations based on Mayer (2016). *Note*: numbers are in CHF billion and are approximations, therefore not perfectly adding up.

As a result of the just described mechanism, the banks will be heavily indebted with the SNB, owing around CHF 513 billion (that is, all original demand deposits) to the latter.

These yet outstanding claims are termed conversion liability (Sigurjónsson 2015: 13) and "the banks would repay them to the (SNB) gradually over a number of years" (Sigurjónsson 2015: 13). For instance, if banks receive funds from borrowers who had originally taken out a loan and now redeem it, the bank's balance sheet is not reduced (such as it would normally be under the Fractional Reserve system). Then the banks can use these funds to redeem part of the outstanding conversion liability amounting to CHF 513. Only when the banks draw down debt to the SNB, the monetary aggregate M actually decreases, because only then, bank money is withdrawn from circulation and destroyed by the SNB, which shortens its balance sheet (since liabilities by the Swiss banking system to the SNB decrease): "As commercial banks repay their Conversion Liability, the bank-created money leaves the money supply" (Sigurjónsson 2015: 13). All else equal, when the conversion liability is paid back, the SNB's balance sheet would decrease to a level before the implementation process began.

The reduction of the money supply due to the debt draw down of banks in Switzerland

would be equivalent to a tightening of monetary policy. Economic theory predicts that a tightening of monetary policy goes along with weakened economic activity. However, reduced economic activity must be prevented—this is why the SNB must step in at this stage. During the time period of debt draw down by banks, the SNB must increase the money supply M in order to keep the money supply stable. "The (SNB) therefore creates new Sovereign Money to compensate for this reduction" (Sigurjónsson 2015: 13).

The initiators of the Swiss Sovereign Money initiative expect this compensation process to take about 10-20 years (Meyer and Huber 2014: 130). This estimate rests on the assumption that holders of demand deposits must in total have borrowed the full amount of demand deposits from the banks as loans, such as mortgages, for instance. Mortgages are long-term loans that require a certain time period until they have matured (see Vollgeld-Initiative 2017).

If the SNB was to replace the total amount of the original demand deposits, the SNB would have to issue CHF 513 billion of guilt-free SNB money. However, the initiators of the Swiss Sovereign Money initiative claim that this amount would be too high and not sustainable from a price stability perspective. Regarding figure 38, the amount of M at the onset of the 2008-2009 financial crisis evolved proportionally to the evolution of Swiss nominal GDP. At the start of the crisis, M started to increase disproportionately. According to equation 6,7 and 8, if the amount of M would indeed be in circulation, it may either generate substantial real economic growth, or inflation. Assuming that the real growth rate is given by around 2%, a higher increase in M would only lead to inflation. This is why the high value of M must be decreased to a level compared to that at the onset of the crisis, that is, at around CHF 300 billion.

It is therefore assumed that the SNB would issue "only" around 300 CHF guilt-free. Therefore, the CHF 300 issued by the SNB would be to partly replace what the banks owed to the SNB, suggesting that around CHF 213 billion (CHF 513 billion minus CHF 300 billion) would in fact be destroyed by the SNB during the implementation process. After 15 years, all outstanding loans from bank clients may be paid back. Sigurjónsson (2015: 13) notes:

> "From day one, banks will not be able to create money, but it may take a number of years for the money they have created to be replaced with sovereign created money. This allows for a smooth transition to the new system and banks will have several years to adapt".

This amount of guilt-free Swiss francs issued by the SNB would be there only *once* due to the nature of the implementation procedure of the Sovereign Money system in Switzerland. It could not be generated a second time (Huber 2013).

Figures

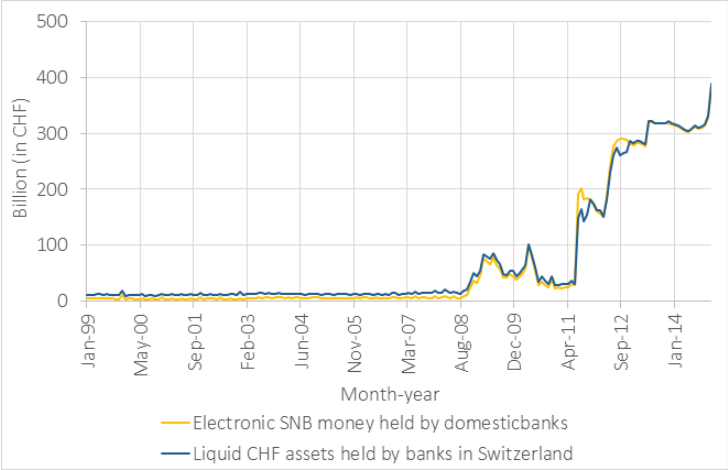

Figure 46: Outstanding electronic SNB money and liquid CHF assets over time
Source of data: SNB. *Note*: it is possible that the amount of electronic SNB money exceeds the amount of liquid assets because certain institutions other than banks can also hold electronic SNB money. This amount, however, is small.

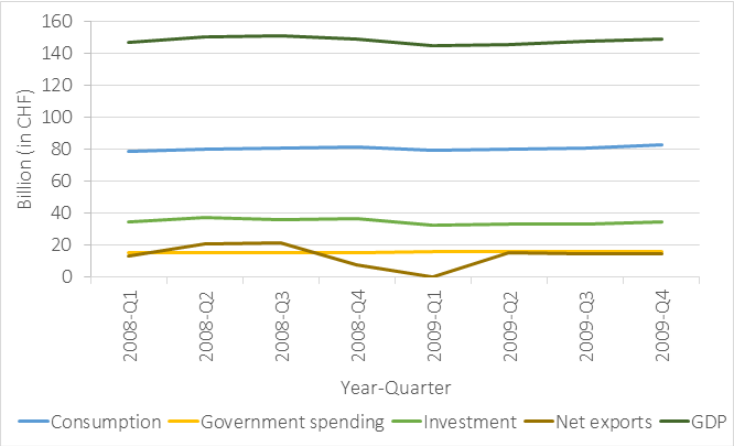

Figure 47: Quarterly Swiss GDP from quarter 1 in 2008 to quarter 4 in 2009
Source of data: SNB.