Swiss Monetary Policy under a Flexible Exchange Rate Regime: Monetary Targets in Practice

Michel Peytrignet

Introduction

Since the advent of flexible exchange rates, the Swiss National Bank (SNB) has implemented a monetary policy based largely on monetarist principles. As early as 1975 the Bank developed an intermediate monetary target designed to approach as closely as possible the ultimate goal of Swiss monetary policy—price stability. From the very beginning the SNB has been obliged to take a pragmatic approach, accepting the incontrovertible fact that Switzerland, a small open economy with a sizable financial market, is frequently buffeted by large numbers of external shocks.

I begin this study with a description of the basic theory that the SNB has always relied on in developing its monetary policy concept. I then review the major steps in Swiss monetary policy between 1975 and 1999 in order to examine event-fuelled conceptual changes over time and to indicate how, and to what extent, monetarist principles have been applied in Switzerland. My review emphasizes the positive role played by monetary aggregates in a dynamic thought process dominated by the need for flexibility to handle the various shocks the Swiss economy and the demand

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for money experienced. The paper ends with a summary of the key lessons to be learned from this experience.

1 The Theoretical Principles underlying Swiss Monetary Policy

1.1 Fundamental principles

The SNB has adopted three key principles that can be attributed to monetarism.[1] The first of these is making price stability the ultimate aim of monetary policy. The second is accepting the postulate that inflation is an essentially monetary phenomenon. The third is taking into account the long and variable lags between monetary policy incidents and change in the economy and prices in Switzerland and elsewhere.

The first principle stems from the fact that price stability is recognized as the condition essential to sustained change in an economy moving along its potential growth path.[2] The second principle stems from the quantitative theory of trade, a theory that emphasizes the causative role of currency in a long-term inflationist process when monetary aggregate velocity is stable. Finally, the third principle stems from the fact that extended and variable lags in the impact of monetary policy on future price changes lead to significant uncertainty in understanding monetary policy transmission mechanisms, making it difficult, even impossible, to understand the exact dynamics of these mechanisms within an economy and precluding an active role for monetary policy.

Within the monetarist school the most important implication of these principles has been Milton Friedman's 1960 formal recommendation to the American central bank that it adopt a passive rule of monetary policy in the form of a monetary based growth target of 4 per cent per annum.[3]

Application of this passive rule for monetary policy should not necessarily imply that monetary conditions remain stable throughout a business cycle. Continuous growth of the money supply at a fixed rate of 4 per cent per annum allows interest rates to play their role of automatic stabilizers. When demand for currency is stable, a growing supply of money at a constant rate automatically leads to interest rate corrections that affect

1. Cf. Chrystal (1990).
2. Although the constitution and the SNB Act are vague on the SNB's mission, assigning the SNB the task of guiding a monetary policy that satisfies the general interest of the country as a whole, the SNB has always interpreted its mission as giving priority to price stability. This interpretation enjoys strong popular support, but mixed political support.
3. Friedman (1960).

the economic situation. If real GDP rises, the resultant growth in currency demand triggers a stabilizing rise in interest rates, bringing equilibrium back to the financial markets and, soon after, the economy as a whole. In a recession the downward movement of interest rates also produces equilibrium.

In practice, however, things are not quite that simple, as demand for currency is generally sensitive to interest rate variations. Public holdings of liquid assets are affected by changes in interest rates, often by anticipation. In a free financial market it is normal that participants review their portfolio decisions when a change in interest rates occurs.

Microeconomically, an interest rate hike would cause a rational market participant to sell liquid assets and buy assets that are less liquid but yield a better return. Macroeconomically, this behaviour by market participants causes a drop in the effectiveness of automatic stabilizers: The more sensitive currency demand is to interest rate variations (absolute value and *ceteris paribus*), the smaller the interest rate increase required to establish equilibrium in financial markets following an exogenous increase in transactions volume for a given level of money supply. The inverse is true for a drop in transactions volume. Endogenous changes in interest rates are no longer sufficient to slow or stimulate the economy and re-establish equilibrium in price levels. It follows logically that a more activist monetary policy becomes necessary. The central bank must explicitly vary the money supply countercyclically to strengthen the corrective changes in interest rates. A passive monetary policy is insufficient.

Under these conditions a central bank has only two options. Either it adopts a discretionary monetary policy, in which case it distances itself from the essentials of monetarism, or it adopts a contingent monetary policy rule that explicitly takes the shocks affecting the economy into account.

1.2 Roles defined for monetary aggregates

In a monetarist-based monetary policy regime, a monetary aggregate can play a number of roles. First, it can be a nominal anchor. As the quantitative theory of trade clearly indicates, inflation is an essentially monetary phenomenon. Currency is a natural nominal anchor, a role that is particularly important in the medium term as, while it is well established that excessive sustained monetary growth produces excessive price increases, no one is likely to contend that every movement in prices has a monetary explanation.

Second, a monetary aggregate can be a tool as an intermediate target in the monetary policy decision-making process. A reference value is determined by the monetary authorities concerning the level or growth of the aggregate consistent with price stability in the medium term. In principle, changes in the aggregate in relation to this reference value trigger an automatic correction by the central bank. The correction cannot be instantaneous, although financial market participants, if they are rational in their anticipations, can count on the central bank taking action promptly. In practice, however, the monetary aggregate often plays only the role of indicator; the central bank observes the movements of the aggregate, but is not obliged to routinely react to deviations from the reference value. The deviations act as an alert requiring fresh analysis of the situation by the central bank prior to deciding on its reaction.

When the aggregate can play the role of intermediate target, the central bank should be able to "ignore" the ultimate aim of price stability, perhaps even fail to explicitly define the concept. To define the value of the intermediate target, only an explicit definition of the economy's *nominal* potential for growth is required of the central bank. An implicit definition of price stability enters the definition of the monetary target only when the economy's potential for growth in real terms is explicitly known.

Third, in a monetarist-based monetary policy system, a monetary aggregate is a communication tool. The performance of a monetary aggregate in relation to its reference value gives the central bank a reference framework that can be used to explain the bank's policy to the public, especially the media. This explicit framework enhances monetary policy transparency and can also be used to signal changes in monetary policy direction. When the monetary aggregate plays the role of intermediate target as defined above, it can also be used by the public to evaluate central bank performance. This possibility is far less significant when the aggregate is considered an indicator only.

1.3 Intermediate target or indicator?

To be used as a monetary policy intermediate target, a monetary aggregate should meet the following four criteria as closely as possible.

1. It should be as insensitive as possible to changes in interest rates. The more sensitive an aggregate, the more the central bank is forced to either set variable objectives or tolerate persistent deviation from a constant target. Furthermore, the monetary policy signals sent by an aggregate

sensitive to interest rate variations may be ambiguous.[4] In Switzerland the monetary base is the aggregate least sensitive to variations in interest rates, followed by M3, M2, and M1, the most sensitive.[5]

2. Demand (at least long-term demand) should be sufficiently stable. This condition is necessary so that the signals the aggregate issues can be deciphered and the reference value compatible with price stability estimated. In Switzerland the stability of monetary aggregates has been the subject of a number of studies, the most recent of which are Peytrignet (1996) and Peytrignet and Stahel (1998).[6]
3. The link between money creation and future price stability must be statistically determined and relatively stable. The link between Swiss monetary aggregates and future price increases is discussed briefly in Appendix A1.
4. Finally, the aggregate should be controllable by the central bank. This condition is more easily met by narrow aggregates. By definition the monetary base is the only aggregate completely and at all times controllable by the central bank. In practice such control can produce interest rate volatility that can quickly become unacceptable to the bank. Broad monetary aggregates are more difficult to control directly.

If only the first three conditions are satisfactorily met, the monetary aggregate can no longer fully act as intermediate target. The most it can do is act as an indicator in monetary policy decision-making.

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4. As inflation is essentially a monetary phenomenon, it is logical to believe that an acceleration in monetary growth is potentially a danger to future price increases. When a monetary aggregate is extremely sensitive to interest rate variations, in some circumstances that fact may be questioned without faulting the theory. Suppose a central bank was obliged to introduce a restrictive monetary policy to fight an undesirable price increase. The result is temporarily high interest rates and below-normal monetary growth. Following such action the economy begins to slow down, a precursor to and cause of the desired drop in inflation. The subsequent drop in interest rates to re-establish normal monetary conditions accelerates monetary growth, which may temporarily exceed the value deemed normal without risking another increase in prices.
5. Monetary base is defined as total bank notes outstanding with the public and the banks plus banking system reserves with the SNB. M1 is total notes and coins in circulation with the non-banking public plus demand deposits and transactions accounts. Since 1995, M2 adds to M1 savings deposits, M3 term deposits.
6. The principal results of these studies demonstrate that monetary-base demand is intermittently stable and that demand for M2 and M3 has been stable since the early eighties.

1.4 The Swiss monetary policy concept

Since the advent of flexible exchange rates, the SNB has relied on the theoretical principles summarized in the preceding paragraphs in defining its monetary policy concept. For over 20 years, in an effort to maintain price stability it has applied a concept based on an intermediate target defined in terms of a monetary aggregate.

Since the 1930s, especially since the advent of flexible exchange rates, the ultimate aim of Swiss monetary policy has always been to maintain price stability.[7] This priority even inspired Bernanke et al. (1999) to write that the SNB, along with the Bundesbank, were precursors of central bank management of direct inflation targeting.[8] Whenever there has been conflict between price stability and meeting monetary targets, price stability has often taken precedence over monetary targets. Rich (1999) debated this position.[9] Further on, we will see that whenever there is a rise in the external value of Swiss currency sufficient to seriously threaten economic conditions in our country, the fight against such an increase has taken priority over meeting a monetary target. According to current views, this pragmatic attitude to monetary targets can be interpreted as inspired by a concern to avoid having the deflationary forces produced by enormous surges of the franc negatively affect the Swiss economy. At that time the fight against the negative impact on economic conditions of a rising franc was a priority. The price to be paid for neutralizing these shocks was accepting temporary inflation.

Although SNB official papers often mention the role of intermediate target played by the monetary aggregates in its monetary policy concept, in practice the aggregates have most often played a role of indicator, a key indicator certainly, rather than a role of intermediate target. We will see presently that the concept has changed considerably over time. It has been redeveloped, revised, and re-invented three times, as circumstances demanded.

This description of Swiss monetary policy since the beginning of the seventies makes it easier to describe the effective role of monetary aggregates, an important role not only in communicating Swiss monetary policy, as Mishkin (1999, 588) recently stated, but also in the decision-making process.[10]

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7. Cf., for example, Swiss National Bank ([1982], 22, 97, and following).
8. Bernanke et al. (1999), cf. in particular Chapter 4, “German and Swiss Monetary Targeting: Precursors to Inflation Targeting.”
9. Rich (1999).
10. Mishkin (1999).

2 Swiss Monetary Policy, A Historical Review beginning in 1971

The final years of the fixed exchange rate system under the Bretton Woods Agreement were difficult for Switzerland, as they were for most other countries.[11] With the uncertainty of financial markets, the Swiss franc was seen as a safe haven. In spite of two successive re-evaluations (9 May and 18 December 1971) and the tightening of numerous restrictions on importing capital, maintaining a fixed rate for the franc obliged the SNB to intervene massively on the money market. The money supply increased by 59.6 per cent (annualized rate) in February 1972, M1 by 27.9 per cent in March of the same year, producing a spike in inflation. After a considerable lag, inflation reached 11.9 per cent in December 1973. To halt this disaster the SNB and the federal government jointly decided to allow the franc to float beginning on 23 January 1973 and to introduce an independent monetary policy with a view to re-establishing price stability.

Three separate time periods may be defined since Swiss monetary policy abandoned fixed exchange rates. During the first (1975–78), the SNB defined annual targets for the M1 monetary aggregate. After a transition period (1978–79), a second period (1980–90) can be identified. Over this 10-year period the SNB set an annual target for the monetary base. Following another transition period, marked by temporary loss of the monetary base as monetary compass at the end of the eighties, in 1991 the SNB introduced multi-year targets based on the seasonally adjusted monetary base. The system is formally in force until the end of 1999. In practice, as a result of new exogenous shocks that affected demand for the monetary base, as early as 1996, Swiss monetary policy took a new direction, with the M3 monetary aggregate playing the role of a second indicator in addition to the monetary base.

2.1 Swiss monetary policy from 1975 to 1978: Annual targets based on M1

In 1975, when inflation was far exceeding tolerable levels, the SNB began to implement a monetarist-based monetary policy. To reduce inflation the SNB opted for a two-stage strategy. In the first stage it determined and announced an intermediate monetary policy target expressed as a yearly growth rate for the M1 monetary aggregate. In the second stage the SNB developed a

11. *Caution*: This is a historic overview of Swiss monetary policy as far as it could be ascertained in 1999. Some information, particularly some data, were perhaps unavailable at the time the monetary policy decisions described were taken.

procedure for controlling M1 and keeping aggregate growth in line with the stated objective.

At the time, M1 was selected by explicit referral to the existence of a stable relationship between money creation measured by M1 and price increases (with a 2- to 3-year lag) and to aggregate controllability. At the time, the SNB was optimistic about its ability to control M1 "without serious problems" (Rich and Béguelin 1985, 82).[12] While recognizing that M1 was not influenced exclusively by the SNB, the Bank could exploit the existing close link between M1 and the monetary base, making it possible to manage M1 through the monetary base management process. As the monetary base is controlled by the central bank, a mandatory and sufficient condition for monetary base influence on M1 value is a stable and foreseeable money multiplier. Specifically, the practice adopted at the time consisted of inferring from the public targets based on M1 an objective based on the domestic money supply at the SNB with the assistance initially of ad hoc methods and later of multiplier forecasts obtained using a purpose-developed small econometric model (cf. Büttler et al. 1979).[13] The targets of both M1 and the monetary base were expressed in the form of mean annual growth rate. The SNB refused to limit itself to a specific growth path for these aggregates during the year. The monetary base fluctuated strongly during the year. These fluctuations were tolerated because they were the result of either seasonal factors or efforts by the SNB to reduce fluctuations in the external value of the franc. Seasonal factors were dominated by changes in "end-of-month loans"; i.e., the increase in liquid assets required by the banks at the end of each month to comply with prescribed minimum reserves.[14] To that was added end-of-quarter demand for non-recurring liquidity by commercial banks (for window-dressing purposes) and occasional demand for funding operations related to managing the Confederation's liquid assets. To avoid interest rate swings the SNB usually met most of these demands for additional liquidity.

To take into account the sensitivity of M1 demand to interest rate variation, the SNB varied the supply of this aggregate by means of a countercyclical policy. When the Swiss economy was having difficulty adjusting to the new flexible exchange regime, to soften high inflation the SNB unhesitatingly set a monetary policy more restrictive than that required to reach the annual M1 growth target. In 1975, inflation stood at 6.7 per cent, risking an under-target M1 growth rate. When the results of the disinflation process began to be apparent, the Bank accepted an above-target 1976 figure

12. Rich and Béguelin (1985).
13. Büttler et al. (1979).
14. Until the end of 1987, under the liquidity-adequacy regulations (Swiss reserve requirements), reserves could be held only at the end of the month.

to re-establish normal monetary conditions. For 1977 the SNB announced a 1-percentage-point reduction in its annual target to maintain the stability of newly restored prices in the coming years. However, this was short-lived. During this 3-year period the intermediate targets defined on the basis of M1 constrained the monetary policy decision-making process sufficiently to beat inflation. These targets also made it possible to clearly communicate SNB intentions, specifically the 1975 restrictive monetary policy, an easing trend in 1976, and maintenance of price stability by slightly reducing the M1 growth target beginning in 1977. These performances are acceptable, even if it appears, strictly speaking, that the annual M1-based quantitative targets were only partially attained. Table 1 summarizes the results.

Table 1

	Annual changes			
Year	**Target**	**Target**	**M1**	**CPI**
1975	M1	6%	4.4%	6.7%
1976	M1	6%	7.7%	1.7%
1977	M1	5%	5.5%	1.3%
1978	M1	5%	16.2%	1.0%
1979	DM/SFr, floor 0.80	–	–	3.6%

Note: CPI, consumer price index.

The 1978-posted M1 growth rate, more than 11 percentage points above the annual target, shows that something unusual happened that year.

2.2 1978–79: Two exceptional years

Although monetary targets have been the central feature of monetary policy since the introduction of flexible exchange rates, the SNB has never wished to follow a rigid monetary strategy and ignore exchange rate shocks. For this reason the SNB has allowed monetary growth to deviate significantly from its target on a number of occasions when the rise in the franc endangered economic conditions in Switzerland. The monetary target did remain a priority except in emergencies. Swiss industry obviously depends on real variations in the franc, and the share of Swiss exports in real GDP was already over 30 per cent by the end of the seventies.[15] It was never possible for the SNB to approach the exchange rate with benign neglect. Nineteen seventy-eight was a year of deep crisis. By the end of 1977, the franc began to rise strongly in both nominal and real terms. By mid-1978, the extent of

15. Up to 43 per cent for the first quarter of 1999.

this increase was sufficient to seriously compromise the Swiss economy. To avoid the deflationary risks associated with a major recession, in early October of 1978 the SNB decided to suspend its M1 target and temporarily replace that target by an exchange rate target in the form of an exchange rate floor for the German mark expressed in Swiss francs. On 1 November 1978, the SNB measures were supported by joint intervention of the American, German, and Japanese central banks. The impact of this exchange rate intervention on the progression of monetary aggregates was dramatic. In the last quarter of 1978, the money supply increased by 27.8 per cent compared to the corresponding period of the preceding year, and M1 rose more than 23 per cent. As the SNB did not know at the end of 1978 when it would be in a position to return to a quantitative strategy, it decided against setting a monetary target for 1979. In the spring of 1979, exchange rate turbulence calmed sufficiently to allow the SNB to gradually absorb a portion of the excess money supply. This process continued throughout the year, enabling the SNB to set a new monetary target for 1980.

2.3 Swiss monetary policy from 1980 to 1988: Annual objectives defined on the basis of the adjusted monetary base

Beginning in 1980, M1 was abandoned as an intermediate monetary target and replaced by the monetary base. The two-phase process required to steer M1 was abandoned, and SNB attention focused exclusively on changes in the monetary base. The annual target based on monetary base, kept internal to the bank in the old procedure, now became public.

The reasons for changing the target aggregate from M1 to the monetary base are to be found in the turbulent years 1978 and 1979. The situation sufficiently destabilized the demand for M1 to make the monetary multiplier forecast model obsolete. To maintain a quantitative monetary strategy the SNB opted to base its target directly on the aggregate that it directly controlled; i.e., the monetary base. A variety of scientific studies undertaken at the time clearly demonstrated that the change in aggregate was an appropriate measure. These studies produced two especially interesting results: On the one hand, whereas demand for M1, and thus the multiplier that links the aggregate to the monetary base, was at that time sensitive to anticipated variations in the exchange rate for the Swiss franc, monetary base demand was not; on the other hand, the link between money-supply creation and subsequent price increase was similar to the results obtained with M1 prior to 1978–79.

As the monetary base is completely controllable, it soon did a better job than M1 in meeting all criteria necessary for a monetary aggregate to serve as an intermediate target. In December of each year, the SNB

announced to the public an intermediate monetary target defined on the basis of the monetary base and valid for the coming 12 months. The target was set as follows: Taking into account a price-increase goal of 0 to 1 per cent and assessment of potential Swiss growth at approximately 2 per cent per annum, the monetary base was evaluated at 2 to 3 per cent, assuming an increase in transactions velocity of this aggregate of not more than 1 per cent per annum to be plausible. An increase of 2 to 3 per cent per annum in the monetary base should reflect a neutral monetary policy. When the SNB decided to implement a more (less) generous monetary policy, it announced an annual objective for growth of its target aggregate greater than or equal to (less than or equal to) the upper (lower) limit of this 2 to 3 per cent range. On the basis of this objective the SNB made every effort to forecast changes in outstanding bank notes for the following 12 months and deduced, from this forecast and the monetary base target, a level growth path for clearing account balances, figures consistent with the Bank's operational objective. The growth path was obviously not completely binding in that, if the situation so warranted, the SNB could deviate from it. However, as far as possible, the Bank attempted to offset such deviations during the year in order to come as close as possible to the annual target set for the monetary base.

In fact, things were a little more complicated in that the monetary objective was not based directly on the monetary base but on a variant that the Bank called "adjusted monetary base," which is simply the monetary base adjusted by the estimated amount of end-of-month loans that the SNB made to commercial banks at the end of each month to enable those banks to meet the minimum requirements of the liquidity-adequacy regulations.

In spite of the change of aggregate, the targets were not reached in 1980 or 1981. This was not because of problems in controlling the aggregate target, as the SNB was always able to steer the monetary base by adequately varying the reserve supply available to the banking system. Rather, the reason can be found on the one hand in an underestimation of monetary base demand interest elasticity and on the other in the fact that the SNB was obliged in 1980 and 1981 to implement a more restrictive monetary policy to combat a marked recurrence of price increases. This in turn was the result of the impact of the second oil shock and, with the usual lags, the excess money creation required to counter the 1978–79 rise of the franc.

One may question the relevance of setting an annual monetary base growth target of 4 per cent for those two years, at which time it could be expected that, under a restrictive monetary policy, the monetary base was certainly not going to increase at such a high annual rate. The response can be found in the fact that in 1979 the SNB did not expect the rise in inflation to be as strong in 1980, as the Bank had already succeeded in withdrawing

much of the liquidity placed on the market to defend franc/German mark parity. Neither did it expect the franc to lose over 13 per cent of its value in real terms between 1979 and 1981. To combat this inflationary wave, both domestic and imported, the SNB was obliged to introduce a far more restrictive monetary policy than anticipated at the time the annual target for 1980 was set. To produce a sufficiently high increase in interest rates, the Bank allowed the monetary base to shrink, bringing it far below its 4 per cent target. In 1981, the SNB believed the fight against inflation would be temporary and would not necessarily halt a resurgence of monetary base growth beginning in 1981. (Setting an annual target allows de facto adjustment to the base for calculating the following year's target.) This base drift effect might very well have been sufficient, ex ante, to make a 1981 adjusted money supply annual growth rate target of 4 per cent realistic, if the fight against inflation had already produced results in 1980. But a longer fight than initially expected was necessary to stamp out this stubborn return of price increases. High interest rates significantly depressed the demand for bank notes, exacerbating the drop in the adjusted monetary base in 1981. The price increases began to slow down in 1982, but price stability was not fully restored until 1986.

The policy of gradually reducing inflation was deliberately chosen by the SNB. By applying a smooth monetary policy, it aimed to avoid excessive fluctuations in interest rates and exchange rates, and did so. Furthermore, it had to act prudently, considering the world recession and the slow pace at which the Swiss economy, affected as early as 1982, was once again on a growth path.

In the years that followed, specifically 1982 to 1986, the intermediate targets based on the adjusted monetary base were relatively well-achieved. The over-expenditure of 1987 was an exception, resulting essentially from the additional liquidity made available to the markets to offset the effects of the October stock market crash.

By following a more restrictive monetary policy than forecast for 1980–81, the SNB deliberately opted to prioritize a return to price stability as opposed to meeting monetary targets. To maintain credibility, it was essential that the Bank's various newsletters clearly explained the reasons for these disparities.

On the whole, setting an annual growth target for the monetary base was a fairly positive experience until 1986. In succeeding M1, the monetary base inherited the difficult mission of controlling a largely predetermined increase in inflation, and until 1986 it was successful in its role of nominal anchor, demonstrating to the SNB the path to take to re-establish normal monetary conditions once price stability was again a reality.

Table 2

	Annual variations			
Year	**Target aggregate**	**Target**	**AMB**	**CPI**
1980	AMB	4%	–0.6%	4.0%
1981	AMB	4%	–0.5%	6.5%
1982	AMB	3%	2.6%	5.7%
1983	AMB	3%	3.6%	3.0%
1984	AMB	3%	2.6%	2.9%
1985	AMB	3%	2.2%	3.4%
1986	AMB	2%	2.0%	0.8%
1987	AMB	2%	2.9%	1.4%
1988	AMB	3%	–3.9%	1.9%
1989	SAMB	2%*	–1.9%*	3.2%
1990	SAMB	2%**	–2.6%**	5.4%

Note: AMB, adjusted monetary base; SAMB, seasonally adjusted monetary base.
* Arithmetic mean of the 12 monetary base growth rates compared to the last quarter of the preceding year, annualized and based on the month of November.
** Mean for the fourth quarter of 1990 compared to the fourth quarter of 1989.

However, if, in Switzerland, price increases follow two or three years after creation of excess money, the inflation of 1989–92 undoubtedly had its roots in some excess creation of money in the years 1986–87. What is the reason underlying this slippage? Is it attributable to selection of the monetary base as the aggregate of reference? Why did the monetary base not signal the danger in time? The responses to these questions are the subject of the following section.

2.4 Another transition period

In describing 1985, the SNB annual report uses the term "satisfactory situation," characterized by vigorous economic growth with a small rise in price increases that the Bank attributed to current conditions and the soaring rise of the dollar, both factors that produced a significant increase in goods imported at the beginning of the year.[16] On the subject of monetary policy the report stresses that this growth of the economy enabled monetary policy to become more restrictive and close in on the 2 per cent growth target for the medium term more rapidly.

Adjusted annual growth of the monetary base slipped from 2.6 per cent in 1984 to 2.2 per cent in 1985, and the growth in broad monetary

16. Swiss National Bank (1986, 7).

aggregates slowed from 2.7 per cent to 0 per cent for M1 and from 6.2 per cent to 4.9 per cent for M3. Conversely, as shown in Figure A2.5, credit shot up at an annual rate of over 10 per cent in 1985.

Beginning that year the rise in the exchange rate of the franc and its eventual impact on the economic situation began to worry the Bank's senior executives. Figure A2.1 shows that the Swiss franc rose appreciably throughout 1985 and 1986. In 1986, the increase began to strongly depress exports. As the Swiss economy was barely out of the recession that went hand in hand with the disinflationary period of the early 1980s, the SNB was very sensitive to the risks to the economy entailed in the rise of the franc and the drop in exports. Because the target had been reached in 1985 and 1986 (Figure A2.4) and the behaviour of the monetary base made it possible, the reins of monetary policy were slackened. Interest rates suffered no liquidity effect (Figure A2.2) in view of the strong demand for credit, although the supply of M3 rose rapidly by the end of 1985 (Figure A2.5). The negative effect on the economy of reduced exports was evident by 1986, as indicated in the output gap (Figure A2.3).[17] The negative effects worsened in the second quarter of 1986, when the domestic demand for goods and services weakened as well. By mid-1986, the SNB again softened its monetary policy by making additional liquidity available to the commercial banks at month end.[18] The banks' demand for liquidity to meet the end-of-month regulatory requirements had in the preceding months led to temporary interest rate hikes that had a massive impact at month end. To offset this situation the SNB adopted a more flexible attitude, increasing the annual growth rate of assets in clearing accounts held by banks with the SNB from a mean of 2.9 per cent for the first six months in 1986 to 6.1 per cent in the last six months. At the end of 1986, the SNB had a clear intention of backtracking and tightening its monetary policy as soon as encouraging signs were seen in the foreign exchange market. Unfortunately, the events of 1987 did not fit in with those plans.

A number of exogenous events in 1987 frustrated SNB intentions. The first was an unexpected rise in exports in the second quarter of 1987 due to a strong recovery of world trade (Figure A2.6) in spite of the continuing high level of the franc (Figure A2.1). This soon stimulated domestic production, and by the end of 1987 the production gap had closed.

The October 1987 stock market crash required a temporary increase in liquidity volume on the money market. This injection was made as

17. This analysis is based on data on the economic situation, data that have been repeatedly revised since the mid-eighties, at which time monetary authorities did not have access to such detailed information.
18. Swiss National Bank (1987, 8).

reflected in the rates of change of the monetary base during the final quarter of 1987 (cf. Figure A2.7).

Finally, two technical innovations significantly influenced demand for the monetary base by early 1988. In mid-1987, a new electronic interbank payment system (known as SIC) was introduced, enabling commercial banks to drastically reduce their need for reserves with the SNB. As a result the SNB could no longer require the banks to hold so much in the way of zero-earning regulatory reserves. A revamped minimum reserve system became a necessity; it came into force on 1 January 1988. As illustrated in Figure A2.7, the banking system needed time to adjust to the changes, time during which demand for clearing account assets by banks, and thus demand for the monetary base, suffered repeated structural shocks. The extent of the drop in demand for the monetary base that began in January of 1988 surprised the SNB and had a significant liquidity effect on money market interest rates. The SNB was not overly concerned because of the virtual absence of interest rate reaction on capital markets, indicating that the financial markets had correctly interpreted these liquidity shocks as temporary. The Bank reacted gradually to absorb the excess market liquidity, raising short-term interest rates to end-of-1987 levels by mid-1988.

These structural shocks did have serious consequences for monetary policy in that they temporarily made the monetary base useless as an indicator. Deprived of its compass, the SNB had no other choice but to adjust to exogenous changes in monetary base demand, causing that aggregate to rise far less than the annual growth target defined for 1988. Using interest rate changes as a compass during this troubled period, the SNB avoided flooding the financial markets with liquidity, which would certainly have further fuelled an inflation that was already beginning to accelerate following excessive money creation in preceding years. The SNB could have realized that money creation was excessive prior to 1988 by observing the acceleration in M3 growth as early as 1986 and bank loan growth in 1984; however, very limited confidence was placed in changes to broad monetary aggregates and bank loans, both factors being deemed unstable. Considering the elements available at the time, we can only observe that this attitude of mistrust was justified: The functions of demand for these aggregates were unstable when estimated from samples that contained only data on the years 1975–88.[19]

The set of exogenous shocks precluded timely action by the SNB to neutralize the expansive effects of the policy in place from mid-1986 to the beginning of 1987. However, aware of the situation, from mid-1988 the

19. Peytrignet (1996).

SNB continued to limit the money supply, resulting in a short-term spike in money market interest rates from 1.6 per cent in February 1988 to 9.5 per cent in January 1990. The result of this restrictive monetary policy was that the monetary base reached levels far below the 1989 and 1990 targets in spite of an adjustment to the method used to calculate the annual monetary target, a method designed to take into account structural changes in the monetary base. The annual targets for 1989 and 1990 were based on the seasonally adjusted monetary base rather than the adjusted monetary base as the latter had de facto ceased to exist with the demise of end-of-month peaks in demand for liquidity as the result of regulation reform.

This episode illustrates how technological change can skew the behaviour of a monetary indicator. The temporary consequence of these exogenous shocks was the exclusion of the monetary base as key indicator of monetary policy for 1988 and 1989. The lasting consequences were review of the SNB's monetary policy concept and transition to a far more flexible system.

2.5 Swiss monetary policy from 1991 to 1999: Multi-year targets defined on the basis of the seasonally adjusted monetary base

After several years in which the annual monetary base target was not reached, the SNB was obliged to rethink its monetary policy concept to avoid continuing along a path that in the long run would have damaged its credibility. It did, however, remain convinced that the monetary base would once again be stable after the banking system had completed its adjustment to the above-mentioned technological changes. It wanted to keep this narrow aggregate as a target because of the intrinsic features not shared by any other monetary aggregate; i.e., low sensitivity to interest rate variations, controllability, and daily availability of reliable statistical data that do not require revision. However, an increased need for flexibility became necessary for a number of reasons.

1. The experience of the 1980s had demonstrated that a monetary concept based on annual targets handled exchange shocks badly, a situation that could affect a small country largely open to the outside world. In a situation like this, an independent monetary policy can only be maintained in a framework based on a concept sufficiently flexible to take these shocks into account and avoid credibility problems due to consistent failure to reach an annually defined monetary target.
2. The growing need for flexibility also became apparent in light of the risk of instability associated with financial and technological change (specifically the soaring use of cashless transactions) in the demand function of monetary aggregates; this was particularly true of narrow

aggregates. The SNB had to adopt a monetary policy regime that allowed it to react flexibly to exogenous shocks affecting monetary base velocity.

3. The need for flexibility was even greater—if the monetary base was to be maintained as the target aggregate—because the clearance account share of assets in this aggregate had fallen by 25 per cent before introduction of the SIC payment system and reform of liquidity regulations (less than 9 per cent after reform). Since 91 per cent of the monetary base was made up of outstanding bank notes, offsetting endogenous annual movement in demand for bank notes became extremely problematic. Although always theoretically possible, such action would undoubtedly have led to significant changes in interest rates on the money market, changes that in turn could have produced unwanted changes in the spot rate for the franc. Because demand for outstanding bank notes is a negative function of interest rates paid on savings accounts, following money market interest rate movement with a 2- to 3-quarter lag, the demand for bank notes, and thus the demand for the monetary base, is dominated by endogenous movements that are difficult to offset on an annual basis. Furthermore, such action would have been absurd from a monetary policy point of view. The problem certainly existed before reform of the liquidity regulations; following reform it intensified enormously. Because a relatively weak portion of assets were in monetary base clearance accounts, this aggregate became significantly more sensitive to changes in interest rates.

To respond to this increased need for flexibility, the SNB decided to set a multi-year target based on the seasonally adjusted monetary base for 1991 and subsequent years. By opting for this solution it retained a medium-term monetary compass, at the same time taking into account the drop in short-term controllability of the monetary base. The SNB selected a medium-term seasonally adjusted annual progression of 1 per cent for the monetary base. No specific time frame was announced, only an order of magnitude of three to five years. One per cent represented a figure identical to that used to set annual targets for price increases (1 per cent) and potential real progress of the Swiss economy (about 2 per cent). However, growth in monetary base velocity had increased from 1 per cent to 2 per cent following the reduction in the share of bank reserves in the aggregate. One per cent annual mean growth in the seasonally adjusted monetary base should have sufficed to ensure sustained stability of prices implicitly defined in target calculation.

Early in 1993, because of a concern for transparency, the SNB decided to broaden the framework of its concept in two directions. First, it

published a growth path for its target aggregate (cf. Figure A2.7).[20] By so doing, it showed the public that the new concept had been working retroactively since the last quarter of 1989. It did not explicitly explain that the medium-term horizon was a 5-year period. The medium-term objective was a comparison of mean growth of the seasonally adjusted monetary base in the final quarter of each year to the corresponding period of the previous year. The medium-term growth path of the monetary base became a visual aid, serving as a guideline to measure change in the target aggregate. A second measure to enhance transparency was quarterly publication of a seasonally adjusted monetary base forecast for the next quarter so that financial markets would receive information regularly. This publication complemented the Bank's various bulletins, in which seasonally adjusted monetary base movement compared to forecasts and disparities compared to medium-term aggregate growth path were discussed at length.

The SNB began by defining a medium-term growth path clearly above the 1991 monetary base position to take into account the fact that it had been implementing a highly restrictive monetary policy for a number of years and should therefore tend towards normal monetary conditions in the more or less immediate future to ensure that the Swiss economy did not achieve price stability equilibrium by way of a deflationary period.

The SNB, aware of the risk, had attempted as early as 1990 to loosen some of the restrictions in its monetary policy. It was still too soon. The reaction of the currency market was instantaneous. The Swiss franc plunged and imported inflation soared, convincing the SNB to backtrack. In 1991, growth in the seasonally adjusted monetary base nevertheless reached 1.4 per cent, above the 1 per cent mean. Only in mid-1992, when the trend to a price increase slowdown in Switzerland became clear and the European monetary system entered a crisis, was the SNB able to successfully ease its monetary policy. From the end of 1992 to mid-1994, the monetary base came close to its medium-term growth path, but did not yet reach it. As Table 3 shows, 1992 growth in the seasonally adjusted monetary base was again negative (−1 per cent), largely because of a drop in the demand for bank notes. This stemmed from changes in the economic situation and the extremely restrictive monetary policy implemented during the first quarter of the year. In 1993, monetary base growth reached 2.8 per cent, reflecting the looser monetary policy the SNB had wanted for several years. The changes in the target aggregate were less satisfactory beginning in the second quarter of 1994 following a strong appreciation of the franc, in turn producing rapid disinflation and a drop in monetary base demand. The SNB reacted by allowing money market interest rates to fall, but the decrease was

20. Cf. *Monnaie et conjuncture* (1993, 57).

Table 3

	Annual change			
Timing	**Target aggregate**	**Target**	**SAMB**	**CPI**
1990	SAMB	1.0%	–2.6%*	5.4%
1991	SAMB	1.0%	1.4%*	5.8%
1992	SAMB	1.0%	–1.0%*	4.0%
1993	SAMB	1.0%	2.8%*	3.3%
1994	SAMB	1.0%	0.6%*	0.8%
Mean		1.0%	0.24%	
1995	SAMB	slope		1.8%
1996	SAMB	of		0.8%
1997	SAMB	medium-term		0.5%
1998	SAMB	growth path		0.0%
1999	SAMB	1.0%		0.6%

* Rate of change calculated for the fourth quarter of a given year compared to the fourth quarter of the preceding year.

timid. Ex ante fears of the risk of increased inflationist anticipation in preparation for the January 1995 introduction of the VAT had made the SNB extremely prudent, in fact, too prudent in hindsight.

The end of 1994 saw completion of the first exercise in setting a multi-year target based on the seasonally adjusted monetary base. The experience of this period teaches the following. With a mean target aggregate growth rate of 0.24 per cent over five years and a negative disparity of 4 per cent with its medium-term growth path by the last quarter of 1994, price stability was restored thanks to a particularly restrictive monetary policy. During this period, priority was once again given to returning to price stability rather than reaching the monetary target. However, by clearly indicating the general direction in which the money supply should be adjusted in the medium term to re-establish normal monetary conditions following the restrictive phase of the early nineties, the medium-term growth path of the seasonally adjusted monetary base played the roles of indicator and monetary anchor that one could expect of it.

The SNB was unable to set the monetary base on its medium growth path in 1994, the Bank's intention at the time it introduced this new reference framework. There are two reasons for this. The first was the need to maintain a restrictive policy longer than expected because of an inflation that was particularly persistent and difficult to overcome, fuelled by an endemic trend towards weakness of the franc during the first part of the decade. At the same time, the aggregate's persistent deviation from its growth path was caused by exogenous shocks that affected both demand for assets in clearance accounts following adoption of new technology that

enabled commercial banks to improve liquidity management and demand for outstanding notes with the growing volume of cashless transactions. These two innovations did not destabilize long-term behaviour of the monetary base sufficiently to make the SNB rethink the system.

In December 1994, the SNB decided to continue with the principle of a multi-year target based on the seasonally adjusted monetary base and set a new target for the period from 1995 to 1999. At the same time, to allow for the effects of the above-mentioned innovations on demand for the two components of the monetary base, it decided to adjust the medium-term growth path downward. It did leave the growth-path position above the monetary base to allow a return to "normal" monetary conditions in the years to follow. To avoid the cumulative effect of monetary base growth rates offsetting changes in this aggregate, the SNB decided to stop assessing performance in relation to the medium-term target by recording mean growth rate in the seasonally adjusted monetary base for the last quarter of each year. The Bank thus simplified its monetary policy concept, keeping only the medium-term growth path as a target. The change in monetary base in relation to growth path became the means used to assess the course of monetary policy. The SNB continued to indicate, at the end of each year, anticipated growth in the seasonally adjusted monetary base for the subsequent year. This forecast could be more or less formal, as at the end of 1994 when the SNB announced its 1995 forecast of an annual growth of 1 to 2 per cent in the seasonally adjusted monetary base; or strictly informal, as at the end of 1995 when the Bank simply announced that the monetary base should approach its medium growth path in 1996. At the end of 1996, the SNB reported only that the monetary base should remain above its medium-term growth path throughout 1997. These announcements were intended to provide additional indicators to the financial markets on the course the SNB intended its monetary policy to take in the short term. At the end of 1994, the SNB again announced that it intended to ease its monetary policy a little further to close the gap with the medium-term growth path in 1995. Although changes in the economy were far different from what had been anticipated at the end of 1994 (in 1995 the franc rose by 7.2 per cent; price increases and changes in the economic situation were slower than forecast), in spite of a set of negative factors the SNB was able to produce a 1.4 per cent growth in the monetary base, a rate above the medium-term mean of 1 per cent. To achieve this result the money market interest rate was lowered from 4 per cent to about 2 per cent. This change was confirmed by a 4-step reduction in the SNB discount rate. However, the seasonally adjusted monetary base did not reflect this drastic measure until the end of 1995, with the expected 2- to 3-quarter lag it takes a monetary policy shift to move from affecting short-term interest rates to affecting savings account yields and changes in outstanding notes.

The SNB has continued this expansive monetary policy up to the present day to deal with a financial situation that remains deficient and could produce deflationary pressures if the monetary situation were to return to normal. The ultimate goal of price stability entails deflation prevention.

From mid-1996, the seasonally adjusted monetary base suffered more structural shocks, due to massive transfers by the commercial banks from postal account assets to clearance account assets with the SNB.[21] Furthermore, beginning in February 1997, strong growth in outstanding notes, especially 1,000-franc notes, occurred. After investigating, the SNB soon saw that this growth was unrelated to monetary policy but due to exogenous factors, statistically detectable but of economically obscure origin. These exogenous shocks sufficiently affected the monetary base to cause that aggregate to strongly overestimate the expansion of the monetary policy followed by the SNB in 1997, 1998, and 1999. Faced with uncertainty regarding interpretation of the monetary policy signals issued by the seasonally adjusted monetary base, the SNB informed the public as early as 1997 that it would be using M3 as an additional monetary policy indicator.

The SNB decided against abolishing or further reforming its concept of monetary policy based on money supply. The reason is to be found essentially in the advent of the European economic and monetary union, which entailed in 1999 the replacement of the German mark with the euro as the single European monetary unit in 11 neighbouring countries. Anticipation of this monetary revolution and the fragility of Swiss economic conditions, at that time still largely dependent on export growth, convinced the SNB to pay particular attention to changes in economic conditions and the Swiss franc spot rate. It was able to refocus attention on economic conditions and the exchange rates, considering the moderate growth of M3, compatible with medium-term price stability. Furthermore, the turbulence on the Asian financial markets and the Russian and Brazilian crises naturally slowed recovery of the Swiss economy and growth of M3 in 1998.

At the end of 1999, the concept of a medium-term seasonally adjusted monetary base will come to the end of the road. Owing to instability of the demand for both bank notes and clearance account assets, instability that will apparently continue in the coming years with generalized use of electronic transactions, and as a result of the restructuring of the Swiss banking environment and a variety of technological and

21. Holding assets in postal accounts, like holding assets in clearance accounts, are means of holding liquidity that are accepted by law as compliance with liquidity regulations. While assets in clearance accounts are an integral part of the monetary base, assets in giro accounts are not included in that aggregate.

financial changes that continue to affect bank liquidity management, it would be impossible for the SNB to set a new medium-term target based on this aggregate. A new monetary policy concept must be developed for the year 2000. It appears that monetary aggregates will still play an important role as indicators under the new concept.

Conclusions

Overall performance of the intermediate monetary target system applied by the SNB from 1975 to 1999 has been satisfactory. The various versions of the concept have on three occasions enabled the SNB, by interpreting the monetary targets pragmatically, to re-establish price stability in Switzerland after the central bank was obliged to intervene to offset the negative effects of exchange market disorder. This concept enabled the Swiss to maintain an independent monetary policy, which certainly contributed to the fact that Swiss interest rates, both short- and long-term, are between 150 and 200 basis points lower than the corresponding German rates, typically the lowest in Europe.

However, if the monetary policy in place over these last 24 years has enabled the Swiss to keep the average inflation rate at 2.6 per cent for 1976–98, a truly honourable result internationally (cf. Figure A2.8), the average price increase is more than twice the "normal" rate of 1 per cent implicit in the calculations of monetary targets. According to Rich (1997, 113), "the problem lay in an inappropriate SNB response to such disturbances as unexpected exchange rate shocks." Using a small macroeconomic model with rational anticipations, he (1997, 140) demonstrated that,

> in the presence of policy lags the SNB faces a conflict between short-term price and output stability, on the one hand, and long-term price stability on the other. In particular, if the SNB is to react optimally to an unexpected shift in asset preferences, it must accept considerable short-term volatility in the exchange rate in order to preserve price stability in the long run.[22]

In conclusion, I am tempted to draw three more lessons from this experience.

The use of monetary aggregates as intermediate targets—or perhaps more realistically as key indicators—of Swiss monetary policy proved effective for bearing in mind the long-term implications of monetary policy

22. Rich (1997).

decisions and making preventive decisions. To take the year 1992 as an example, the SNB announced to the public its intention of relaxing its monetary policy while inflation was currently high. Another example is 1994, when the signals issued by the monetary base were not taken seriously enough, an overly tight money policy was implemented for too long.

In my opinion the intrinsic difficulties encountered in monetary policy decision-making depend only slightly on the particular type of monetary policy concept adopted as long as that concept is credible. Concept credibility is largely a function of overall performance in reaching its ultimate goal, the fight against price increases, and the care the central bank takes in its public statements on monetary policy. The use of monetary aggregates as intermediate targets within a simple reference framework has proved an extremely effective method of making communication with the public easier. This inspired Bernanke et al. (1999, 53) to write that the SNB has regularly chosen simple rules with complicated explanations rather than complicated rules with simple explanations.[23]

Finally, for a small open economy like Switzerland's, the task of maintaining price stability has been made especially difficult because of its internationally important financial market and the fact that its currency is often used as a safe haven.

23. Bernanke et al. (1999).

Appendix A1

Figure A1.1
Correlation between money creation and changes in price increases, recursive samples

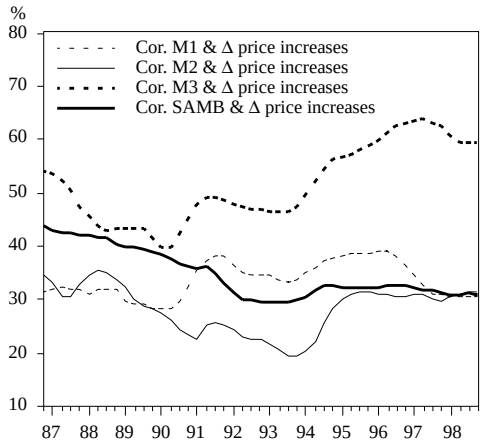


Figure A1.2
Lag in maximum estimated correlation, recursive samples

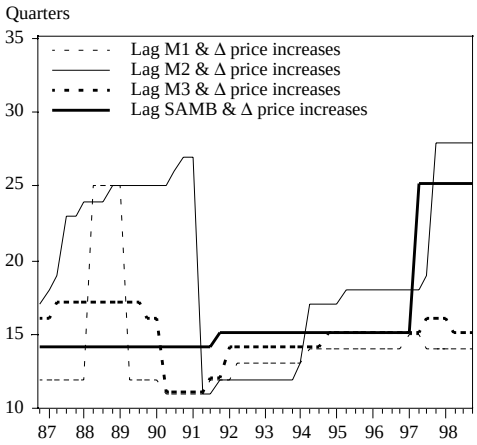


Figure A1.1 shows the maximum correlation coefficients calculated for the changes in Swiss monetary aggregates (M1, M2, M3, and seasonally adjusted monetary base) and the changes in price increases measured on the basis of 12-month growth in CPI. Figure A1.2 shows the lag (quarters) for which the correlation is at a maximum. The estimates are based on a number of samples, each beginning in the final quarter of 1976. The first sample ends in the final quarter of 1986, the second in the first quarter of 1987, and so on up to the final quarter of 1998, the last date for which definitive data on Swiss monetary aggregates are available.

These charts enable measurement of the existence and stability of the link between money creation and the progression of price increases in Switzerland. Figure A1.1 shows that M3 (M2) is the aggregate with the strongest (weakest) correlation to inflation for all (nearly all) samples. The lags where correlation is at a maximum vary enormously for M2 (cf. Figure A1.2); for M3 the lags are clearly more stable, moving only slightly from about 14 quarters. The lag with which the seasonally adjusted monetary base affects price increases was fairly stable, between 14 and 15 quarters, until 1996. In 1997, the lag spiked to 25 quarters, confirming a stability problem for this aggregate, also detected using other statistical methods.

Appendix A2

Figure A2.1

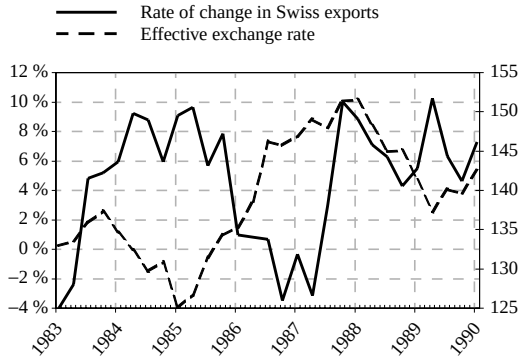


Figure A2.2

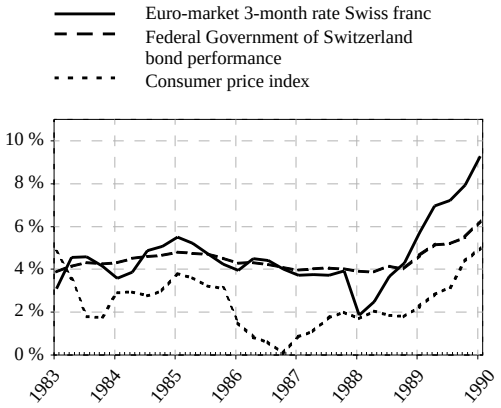


Figure A2.3

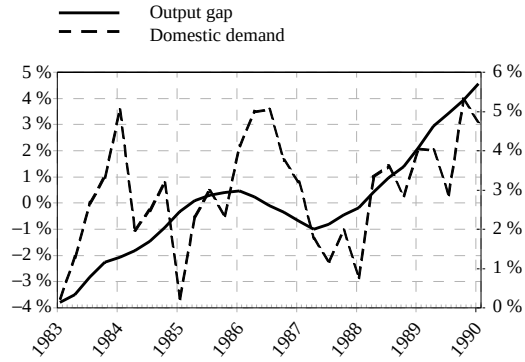


Figure A2.4

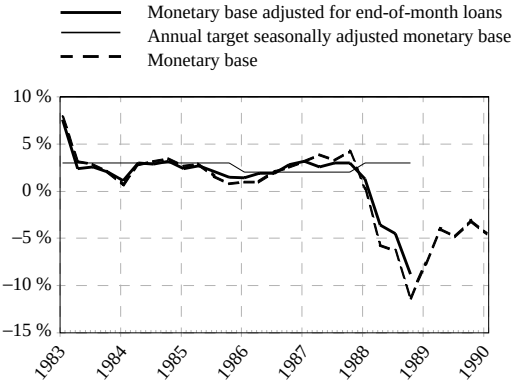


Figure A2.5

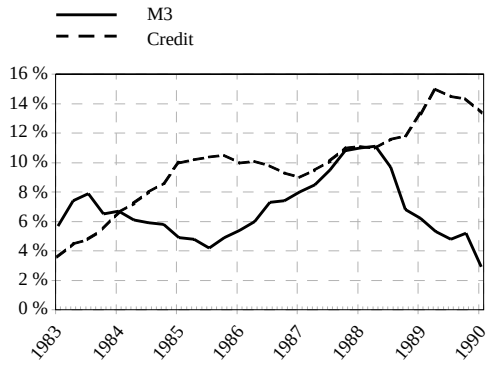
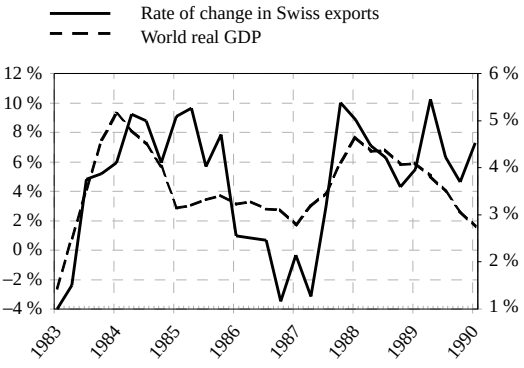
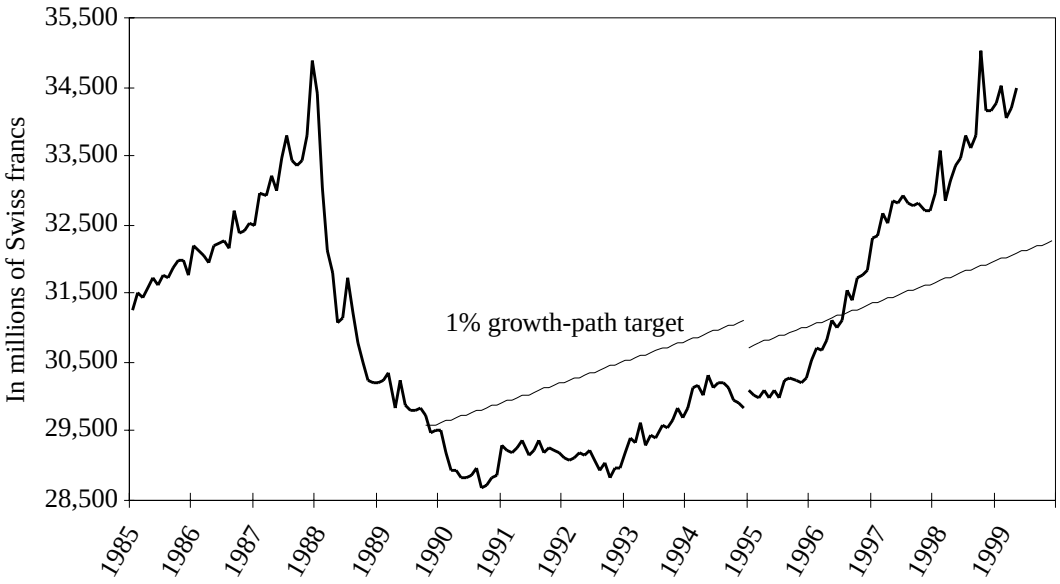


Figure A2.6



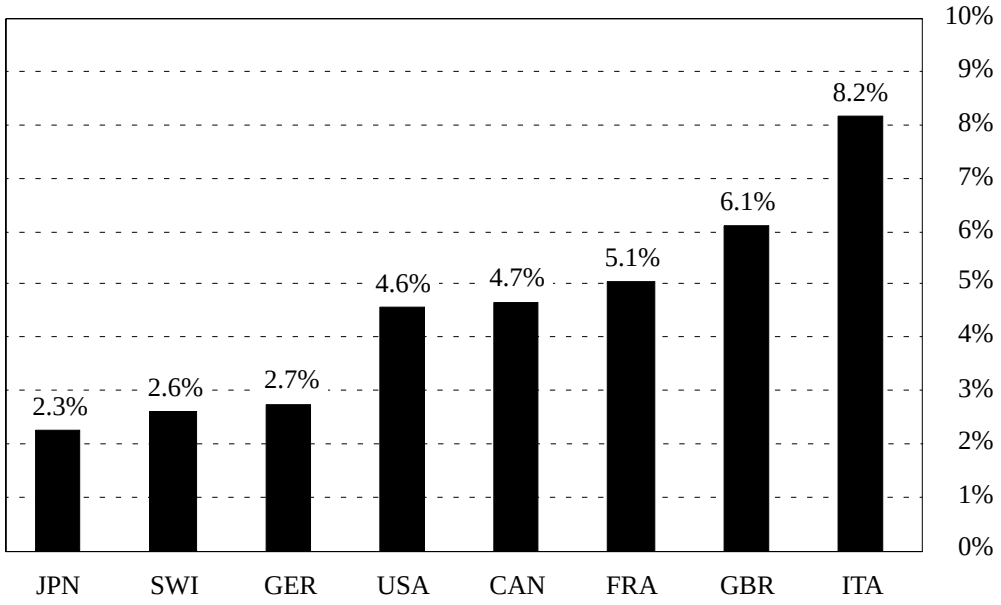
Data source, Figures A2.1–6: Oxford Economic Forecasting.

Figure A2.7
Seasonally adjusted monetary base



Data source: Swiss National Bank.

Figure A2.8
Average year-over-year price increase (CPI), 1976–98



Data source: Swiss National Bank.

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Discussion

Chantal Dupasquier

I was very pleased to receive an invitation from the Bank of Canada's Monetary and Financial Analysis Department to comment on the paper from my colleague at the SNB, and I have had a great deal of pleasure in preparing my comments for today's session.

Before going into my comments on Peytrignet's study, I would like to take a few moments to briefly look at the Swiss economy's recent performance, both in terms of real growth and inflation. Figure 1 shows how GDP has performed, year over year, since 1980. What stands out is the very pronounced slowdown that hit the Swiss economy during the 1990s. In fact, for more than seven years, 1991 to 1997, GDP simply marked time, with an average annual growth rate of only 0.2 per cent. Not until 1998 did the economy show signs of recovery.

If we now turn to inflation, Figure 2 shows the annual change in the CPI for Switzerland and the G-7 countries since the beginning of the 1970s. It is clear from this figure that the results recorded by the SNB on the inflation front compare very well with those of G-7 countries for the whole of this period. With the single exception of Japan, Switzerland had the lowest average inflation rate among these countries between 1976 and 1998. This result is even more striking when we recall that Switzerland has a small and open economy that is highly susceptible to external shocks, a situation that sometimes makes the conduct of monetary policy more delicate than the SNB might wish.

The central purpose of Peytrignet's paper is to examine the theoretical and empirical basis underlying the SNB's conduct of monetary

Figure 1
Annual change in Swiss real GDP

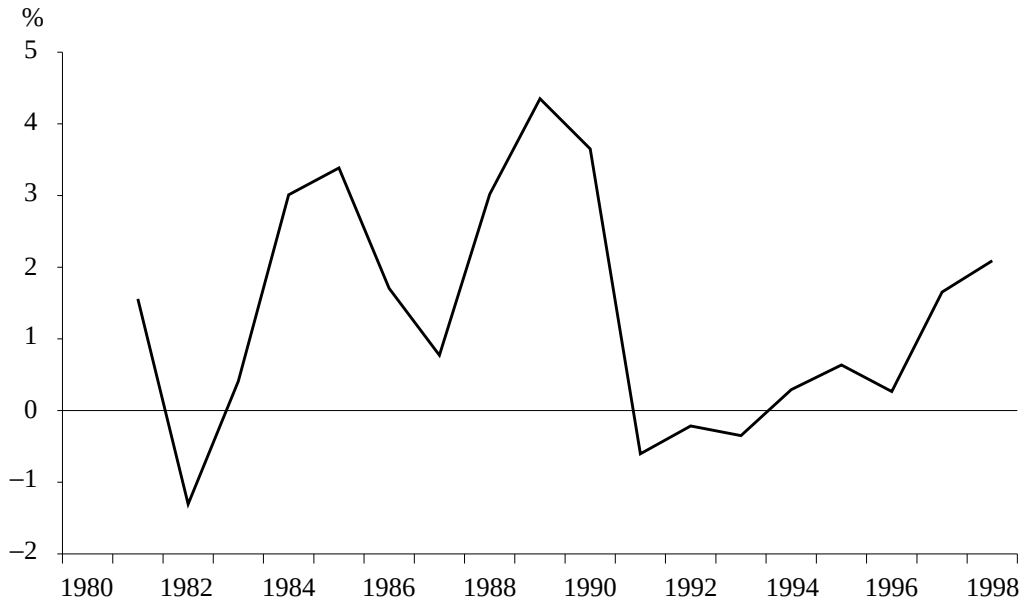
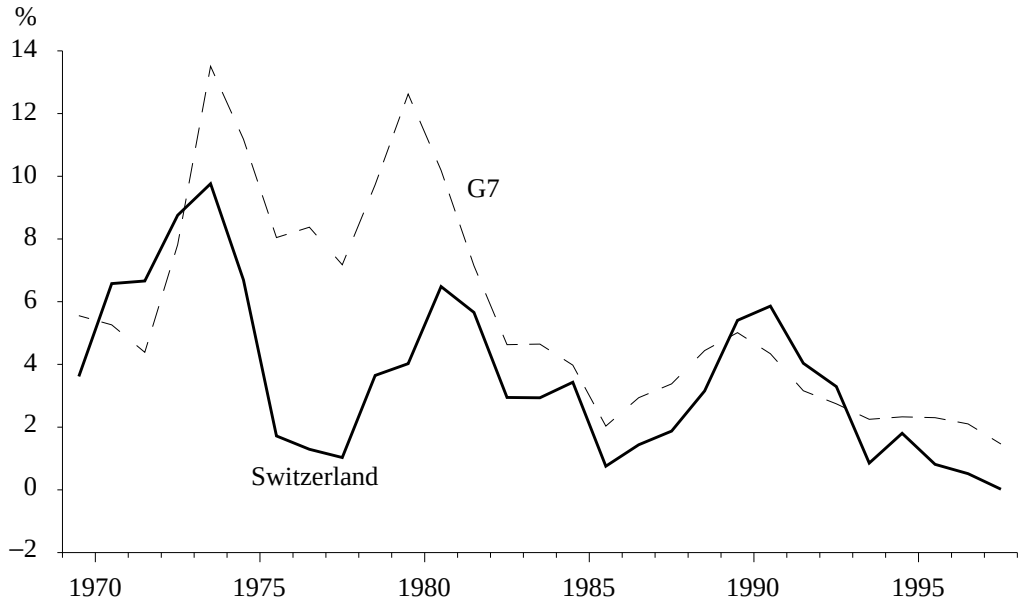


Figure 2
Annual change in CPI for Switzerland and G-7 countries



policy. As he has told us, since the collapse of the Bretton Woods system the SNB strategy has been to set an intermediate target based on a monetary aggregate.

He identified three distinct phases to this strategy:

- 1975 to 1978: annual targets for M1
- 1980 to 1988: annual targets for the adjusted monetary base
- 1991 to 1999: multi-year targets for the seasonally adjusted monetary base

To more clearly understand why the SNB has succeeded so well on the inflation front, we should look first at its mandate. While the Swiss Constitution and the SNB Act are rather vague as to the Bank's mission, which is simply "to satisfy the general interests of the country," the SNB has always interpreted its mission as giving priority to price stability. In itself this mandate is not very different from that of other central banks. Yet the SNB is unique in that it has fixed the growth of the monetary aggregate by taking as its basis an inflation rate of generally between 0 and 1 per cent, an implicit inflation rate that was already being used during the 1970s and 1980s. To my knowledge, few countries were so avant-garde as to tie their monetary target to such a low inflation rate prior to the 1990s, at which time this became a very popular idea among central bankers. A further important aspect for the SNB is that this objective enjoys broad public support, which has no doubt made it easier to meet the target, since the expectations of economic agents are very firmly anchored in this low rate of inflation.

I won't go into the details of the three periods Peytrignet examined. History is history and we cannot change it, but simply interpret it, so I shall focus my remarks on the most recent period.

Since the beginning of the 1990s, the SNB has defined a multi-year target for the seasonally adjusted monetary base, as opposed to an annual target for the preceding two decades. Why this change? If we look at the objectives that the SNB set for itself in the past, we see very quickly that the annual targets for monetary aggregates were not met in more than 50 per cent of cases. Consequently, in order to rescue its credibility the SNB began in 1991 to adopt a framework that it considered more flexible for implementing its policy. However, I want to underline that the adoption of this more flexible framework also coincided with the emergence of a new thrust in the economic literature. Thanks to new developments in econometrics and particularly in cointegration techniques, researchers have developed long-term empirical relationships between money and prices. In this respect, my colleagues in the Monetary and Financial Analysis Department launched a research program on the Canadian economy, and some of their results were presented during this conference. Although

Peytrignet made no explicit reference to long-term demand for money, I have the impression that this is an important element for explaining why the SNB adopted a multi-year intermediate target. I would add another element to explain the SNB's choice of multi-year targets. Since the transmission mechanism for monetary policy extends over a fairly long period of time (one to two years or more), a multi-year objective strikes me as more appropriate given the circumstances in which monetary policy must operate.

On reading his paper I was not completely convinced that the adoption of a target, or more accurately of a monetary target, was the crucial element that allowed the Swiss monetary authorities to meet their inflation goals. Throughout the last three decades the SNB used a specific framework to explain its policy to the public and thus be in a position to readjust its efforts in order to meet its mandate. I think the most important element here is the fact that the Swiss authorities set an explicit target for themselves. In this respect, setting an inflation target may well have allowed them to achieve a low inflation rate.

What lessons should we draw from the Swiss experience? I would point to two:

- Using a target can help to restrain inflation over the long-term.
- Flexibility and transparency would seem to be key ingredients of success.

In closing, I would like to raise some questions that remain unanswered after reading Peytrignet's paper and that perhaps deserve more attention. Although his study deals at length with the credibility of Swiss monetary policy, he had nothing to say about how this element has been integrated into the SNB decision-making process. On this point I refer to certain studies showing that despite the high credibility that the SNB enjoys, the cost to the Swiss economy of reducing inflation (the sacrifice ratio) is not very different, statistically, from the cost to other countries that have definitely not enjoyed the same degree of credibility.

On another point, what role do economic agents' expectations play in the dynamics of Swiss inflation? Inflation has declined sharply, dropping from nearly 6 per cent in 1991 to virtually zero in 1998. I come back again to the performance of real economic growth since the early 1990s, and I wonder if inflation should not have fallen even further, given this very long period of stagnation.

Finally, one more question remains hanging at the end of his paper. Where will the SNB go in the year 2000? Peytrignet was rather vague about the options the SNB is considering for the conduct of its future monetary policy. Is it possible that, like the European Central Bank or many other

central banks around world, the SNB will turn to explicit inflation targets, or will it instead continue with monetary targets, which would seem, from many viewpoints, to be more an indicator than an intermediate target?

Discussion

Daniel Racette

Michel Peytrignet drew for us a broad picture describing in great detail the various phases of Swiss monetary policy from 1975 to today.

His description is certainly interesting, if only because it allows us to follow the course of a monetarist experiment that, if not unique, is exceptional at least for its length. Peytrignet's paper goes to the very heart of the topic of this conference in that it recounts the risks that a central bank runs if it uses monetary aggregates as intermediate targets. Since monetary aggregates have receded into the background, or have been completely forgotten, in the conduct of monetary policy in most industrialized countries, a comparative analysis of the Swiss experience should allow us to draw some lessons about the chances of rehabilitating them.

In my comments I shall attempt such a comparative analysis, starting by highlighting the sometimes fascinating similarities between the Swiss experience and our own in Canada. Next I shall look at the aspects that distinguish the Swiss experience in monetary policy. In both cases my goal will be to see whether similarities are sufficiently strong, and differences sufficiently negligible, to permit us to think that at least some aspects of the SNB's use of monetary aggregates could be transferred to other contexts.

Some Fascinating Similarities

Like Canada, Switzerland is what we have come to call a small open economy. The parallel between the two countries in this regard is certainly not complete, since first, the Swiss franc has often been perceived as a safe-

haven currency, a status the Canadian dollar has never (as yet) achieved, and second, because Switzerland is not what most people would consider a major producer of natural resources. Yet the two countries are sufficiently similar in terms of the openness of their economies that their central banks cannot afford to ignore exchange rate movements regardless of other strategic elements in the bank's monetary policy. In fact, an analysis of Swiss monetary policy shows clearly that, as with the Bank of Canada during certain episodes in the 1970s and 1980s,[1] the SNB has been preoccupied with movements of its currency, both downwards and upwards (as in the late 1970s), even if this at times has detracted from the credibility of its monetary targets. We may also say that it was precisely because of the openness of its economy that the SNB, like the Bank of Canada, has been obliged to take an approach that, while based on a sound theoretical framework and on important considerations of transparency and accountability, has had above all to be pragmatic; i.e., adaptable to an environment in constant flux.

This may be the basis for several similarities between episodes in Swiss monetary policy and their Canadian equivalents. Thus, just as the Bank of Canada did with the arrival of the then-infamous GST in 1991, the SNB went through the agony of having a value-added tax introduced (in 1995), fear of which, Peytrignet told us, led the Bank to take preventive action that was probably "too prudent." As well, the SNB seems to have reacted to the 1987 stock exchange crash, like many other central banks, by relaxing its policy, no doubt to the detriment of achieving its adjusted monetary base target.

In 1990, the Swiss and Canadian central banks were faced with virtually the same situation. Peytrignet described it as follows: "The SNB, aware of the risk, had attempted as early as 1990 to loosen some of the restrictions in its monetary policy. It was still too soon. The reaction of the currency market was instantaneous. The Swiss franc plunged. . . ." (page 210). The Bank of Canada experienced something very similar when in January 1990 it attempted to force the bank rate down by 29 basis points, something that markets were not expecting. The dollar fell so far that the Bank had to jack interest rates back up again very sharply. It would seem that the SNB's monetary targeting was no panacea under such circumstances.

Finally, we may point to the strongly similar decisions taken by the two central banks in 1975, when they both adopted an intermediate monetary target in terms of the M1 aggregate in order to combat record

1. On this point see Courchene (1981) and Howitt (1985).

inflation.[2] In both cases, M1 was chosen because it could be easily controlled and because of the presumed link it bore to inflation.[3] In Switzerland, as in Canada, the experiment seemed to work until 1978, but things started to fall apart in 1979, when the behaviour of M1 became unstable.[4]

Although to this point there is a certain parallel between the two situations, the lessons that the two central banks drew from the failure of this experiment with monetary targets were in fact quite different. In 1980, the SNB undertook the redefinition of its monetary targets by adopting a new monetary aggregate, the "adjusted monetary base." In Canada the experience was so painful that the Bank of Canada not only abandoned monetary targeting, but also shunted monetary aggregates to the sidelines of policy-making for at least several years thereafter.[5] Can we explain these widely different attitudes about using monetary aggregates in the policy process on the basis of the factors that distinguish the Swiss and Canadian economic and monetary contexts?

Marked Differences

One noticeable difference between these two contexts is the fact that, according to Peytrignet, Swiss monetary policy has pursued price stability as its ultimate objective since the 1930s, and that means that the SNB was well ahead of other central banks in this regard. Moreover, because price stability enjoys wide popular support, the SNB has long been able to interpret this philosophy fairly rigorously. Thus it regarded the 1975 inflation rate of 6.7 per cent as intolerable, and it defined price stability as

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2. Switzerland's "intolerable" 1975 inflation rate was 6.7 per cent, while inflation was close to 12 per cent in Canada; however, in the turbulence that followed the end of the fixed exchange regime, Swiss inflation climbed as high as 11.9 per cent in December 1973.
3. In Switzerland, however, the controllability of M1 was exercised through the monetary base and the multiplier, while in Canada, M1 was controlled along a demand curve that was presumed stable.
4. With inflation at 1 per cent, the anti-inflationary success of Swiss monetary policy was more convincing, while Canada's inflation rate was higher than 8 per cent in 1978. Moreover, while instability in the demand for M1 may have led the SNB to prefer the monetary base to M1 as a target aggregate for monetary policy in 1980, Peytrignet clearly explained that it was above all the Swiss franc's sharp appreciation after 1978 that persuaded the Bank to abandon its monetary target temporarily in 1978 and 1979.
5. In fact, monetary aggregates did not officially reappear until 1988, thanks to the study by Hostland, Poloz, and Storer (1988) on the respective merits of 46 different monetary aggregates. But that study merely discussed the qualities of aggregates as indicators without drawing any firm conclusions about their usefulness in the monetary policy process.

keeping the inflation rate well below 1 per cent for the entire period under analysis.

It is hard to believe that, having committed itself to a goal of price stability for so long, the SNB could find itself with credibility problems in the face of inflationary pressures, or even deflationary pressures, particularly since it has given itself a firm anchoring point in the form of intermediate monetary targets. Yet this is the case. Experience would suggest that monetary targeting has not been of much help when shocks have disrupted expectations. But Peytrignet's story quickly gives the impression that the problem lies in the fact that Swiss experience with monetary targeting over the last 24 years has been perhaps distorted not only by the necessary transition periods that have given rise to changes in the targeted aggregate or in the monetary-targeting process, but also by successive (unavoidable?) episodes during which priority was given to different objectives, such as the exchange rate (1978–79, 1990), price stability (1980–81, 1995–99), or the monetary aggregate target (other periods). Moreover, his description of the various episodes when monetary targeting was paramount shows that intermediate objectives were generally interpreted fairly flexibly by the SNB, with very mixed results in terms of attaining them. As a consequence, it may be that the targeted monetary aggregates lost their role, in the eyes of the public and of the markets, as a communication tool or even as a credible nominal anchor. Given that the ultimate objective of Swiss monetary policy remains, as always, price stability, we may wonder if it would not have been better under the circumstances to anchor the entire system to an inflation (or price-level) target rather than risk compromising the spirit of monetary targeting in this way.

This notion acquires more force when we note that during the transitional episode of the late 1980s, the lag between money and inflation seems to have been particularly long in Switzerland. Thus, according to Peytrignet, inflation during the period up to 1992, even to 1993 if we look more closely, "had its roots in some excess creation of money in the years 1986–87" (page 205). Yet, since the growth of the adjusted monetary base in those two years was less than 3 per cent, his statement is only understandable if we turn to the behaviour of M3 (his Figure A2.5), which expanded rather rapidly (around 11 per cent), particularly in 1987–88, but dropped back thereafter. Unless something is missing from Peytrignet's paper that would allow us to judge circumstances differently, we must conclude that the monetary policy process in Switzerland is unique if such a short period of monetary expansion could have effects stretching out over nearly six years. In this context the use of monetary targets is a heroic act indeed, since it demands that monetary policy function over an unreasonably long forward time horizon.

The last significant difference that probably helped to keep Swiss monetary policy focused on intermediate monetary targets for so long is the slow pace at which financial innovations have made themselves felt, at least in comparison with Canadian experience. According to Peytrignet, the first signs of financial innovations showed up only towards the end of the 1980s and were apparently limited to technical changes that allowed the commercial banks to hold less in the way of statutory reserves. It was not until 1996 that a new wave of financial innovations robbed the targeted monetary aggregate, the seasonally adjusted monetary base, of its role as an indicator or an intermediate objective. When we think that in Canada a series of major monetary and financial innovations was already underway in the late 1970s,[6] such a delay is surprising. The difference may lie in the fact that the SNB was targeting such a narrow monetary aggregate that it did not have to worry about the financial innovations that were affecting the broader aggregates. Yet if that was the case, it would have been helpful if Peytrignet had made it clear in his paper, or else if he had explained the peculiarities of the Swiss regulatory framework that kept financial innovations so few, or so weak, that they have had no effect on the monetary process. It is obvious that monetary targeting is much more difficult in a context in which the monetary aggregates have to be constantly modified to keep up with technological or financial innovation.

Conclusions

By way of conclusion, I think that Peytrignet's paper allows us to say, once again, that monetary policy is a difficult business in which success requires not only a sound theoretical basis, but a good dose of pragmatism as well. As we in Canada know well, it is particularly difficult in a small open economy in which it is always hard to accept greater exchange rate volatility for the sake of focusing solely on the ultimate goal of price stability. Since we cannot generally afford to neglect the effects of sudden exchange rate shifts, monetary policy becomes even more complicated to conduct and interpret because tactical and strategic considerations are so intertwined.

The SNB was a pioneer in adopting price stability as the ultimate goal of monetary policy. Peytrignet made it clear, in describing the experience of the late 1970s, that achieving this objective in isolation is difficult. His analysis shows particularly well that it would be hard for Canada to keep its sights fixed on price stability if monetary policy in the United States were to allow inflationary pressures there to get out of hand.

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6. See, for example, the paper presented to this conference by Aubry and Nott.

Given their long experience with price stability as a goal, the Swiss are well placed to confirm the importance of adopting a nominal anchor for monetary policy. Such an anchor must, as Peytrignet's analysis shows, be clearly announced and understood by everyone. The Swiss case is one in which the anchor point for monetary policy was the adoption of intermediate monetary targets. The late arrival of monetary and financial innovations certainly made the SNB's job easier in this respect, and that is no doubt why the Swiss have been able to pursue their monetarist experiment for so long. Whether intermediate objectives were defined on an annual or a multi-year basis, whether the aggregate targeted was M1 (via the monetary base), the monetary base, the (seasonally or otherwise) adjusted monetary base, or more recently M3, monetary aggregates have always had their place in the Swiss monetary policy process over the last 24 years. Peytrignet told us that they will still have a role in monetary policy formulation after 1999. The SNB has kept them because it finds them useful.

Yet an analysis of this long experience with monetary targeting also shows that it is not always easy to keep the course and that the SNB has often had to shift the priority it gives to its different objectives. As I have stressed in my comments, we may wonder if it would not have been easier for the SNB to move, as my colleagues at the Bank of Canada are so fond of proposing, to a simple inflation target.

That said, can we really afford to criticize a central bank that, as Peytrignet's Figure A2.8 shows, has on the whole done better in terms of inflation than any other central bank over the last quarter-century? This success no doubt has to do with the fact that the SNB has always understood that monetary aggregates hold useful information for conducting monetary policy, at least as indicators, and that they must not be ignored. Let us hope that the results of this conference will allow us to conclude that it is possible to bring monetary aggregates back into use in Canadian and other institutional settings.

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General Discussion

In response to Chantal Dupasquier's first comment, Michel Peytrignet recognized that the SNB had indeed failed more than 50 per cent of the time to achieve its annual targets; however, he added that M1 and the monetary base are sensitive to interest rate fluctuations and hence behave in a naturally countercyclical way, and for this reason the occurrence of exchange rate shocks may well mean that annual monetary targets will be missed.

With respect to Dupasquier's second comment, suggesting that it was the adoption of a target, and more specifically a monetary target, that made the SNB so successful in fighting inflation, Peytrignet agreed that what is important is to have a nominal anchor to ensure that long-term considerations are kept in mind in monetary policy decisions.

On Dupasquier's third remark, to the effect that his paper says nothing about how the credibility of Swiss monetary policy is integrated into the SNB decision-making process, Peytrignet declared his belief that credibility was central to the move from annual monetary targets to multi-year targets.

In the wake of the 1990s recession in Switzerland, inflation might have been expected to retreat further, in Dupasquier's opinion. Peytrignet considered it difficult to assess this point during the period in question, since German interest rates rose almost in parallel with Swiss rates following reunification. This tended to diminish the restrictive impact of Swiss monetary policy by weakening the franc and thus fuelling imported inflation. As to the length of the recession that afflicted the Swiss economy during the 1990s, he thought it important to remember that, quite apart from the SNB's tight monetary policy, the Swiss economy also had to cope with

* Prepared by Denise Côté.

various shocks: the bursting of the 1980s bubble in the construction industry, the onset of restructuring in whole swaths of the Swiss economy, the appreciation of the franc in 1995—the SNB did nothing to counter its appreciation—and the weakness of demand for goods and services in European countries, which were struggling to adjust to the Maastricht Treaty's single-currency norms.

To the question of where the SNB will be heading, Peytrignet said that the Bank is preparing a revised concept of monetary policy for the year 2000 and subsequent years and will issue a statement to this effect in December 1999.

Daniel Racette thought a better explanation was needed as to why the excessive monetary expansion of 1986–87 made itself felt only in 1989 and thereafter. Peytrignet pointed out that, as shown in his Figure A1.2, the average lag between monetary creation and inflation in Switzerland is 14 quarters.

In response to Racette's other comments, Peytrignet agreed that the SNB must struggle constantly to maintain its credibility in the face of multiple inflationary shocks, both domestic and from abroad. He also shared Racette's view that the SNB should be willing to tolerate sharper exchange rate fluctuations; however, he added that although exchange rate fluctuations induced by fundamental economic variables can be tolerated, this is not the case with those induced by the Swiss franc's role as a safe-haven currency, since when these exceed tolerable limits they can threaten entire sectors of the Swiss economy. Fortunately, shocks of this type are rare. As Peytrignet sees it, financial innovations have been slower to arrive in Switzerland than in Canada.