

# Ten Years' Experience with the Swiss National Bank's Monetary Policy Strategy

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## Introduction

Over the past 30 years a growing consensus has emerged that price stability is the overriding goal of monetary policy. Once this was identified, the crucial question was how a central bank should conduct monetary policy to achieve its ultimate objective. Different approaches have been adopted in the past by different central banks. In the 1990s, after a breakdown in many countries of the relationship between monetary aggregates and price movements, inflation targeting emerged as the new standard for monetary policy regimes and was adopted by many central banks. The Swiss National Bank (SNB) also modified its monetary policy strategy during that period. It did not adopt inflation targeting but opted for its own strategy. The SNB did not change its main ultimate objective of maintaining price stability in the medium term, which it had been pursuing since the switch to monetary targeting in the early 1970s, although it did make it explicit. In order to reach this goal, the SNB developed a forward-looking strategy with transparent communication and clear implementation. The cornerstones of the new framework for monetary policy are an explicit definition of what the SNB regards as price stability, a forecast of inflation over a three-year horizon, and a target range for the three-month Swiss franc Libor (3M Libor).

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In this paper we look back and reflect on ten years of experience with this new strategy. In Section 1 we begin with a brief account of the developments which prompted the SNB to adapt its monetary policy strategy. In Section 2 we explain its key elements, followed in Section 3 by a comparison with the monetary policy regime commonly referred to as inflation targeting. The next section provides a description of the “rule-like” aspects of the strategy. In Section 5 we present a general account of the strategy’s implementation and in Section 6 we analyze the tactics pursued in setting interest rates. Section 7 describes some monetary policy decisions which had a particularly strong effect on financial markets. Then we investigate how the Swiss economy has fared under the new monetary policy framework. Section 9 is dedicated to the measures adopted by the SNB to secure adequate liquidity after the unfolding of the financial turmoil in summer 2007. Next we assess the robustness of the strategy in the financial crisis. Afterwards we take up a few questions that have a crucial bearing on key aspects of the strategy. Section 12 concludes.

## 1. The Need for a New Monetary Policy Strategy

Following the collapse of the Bretton Woods system, the SNB modified fundamentally its approach to monetary policy. Since 1974, an annual growth target for the money supply has substituted the fixed exchange rate as the new anchor for the domestic price level. Monetary targeting reflected a firm belief in three policy principles, namely: price stability as the ultimate objective; tight control of growth in the money stock as a necessary condition to achieve the ultimate objective; and the commitment to a policy rule.<sup>1</sup> Although it did not explicitly state how it defined price stability, the SNB regularly explained to the public the assumptions underlying its monetary targets, resulting in an annual implicit CPI inflation objective of roughly one percent.

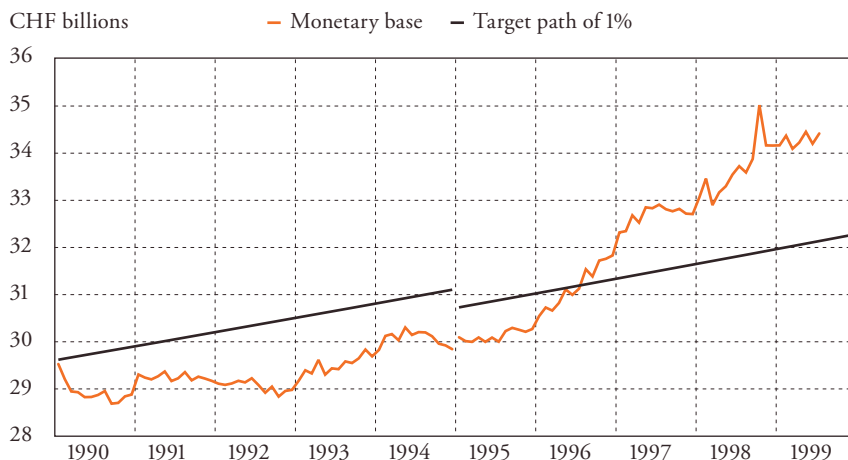
Monetary targeting was pursued – with a brief interlude – until 1999.<sup>2</sup> It enabled the SNB to obtain results that can be regarded as generally satisfactory.<sup>3</sup>

1 Cf. RICH (1997, p. 115).

2 Due to a massive appreciation of the Swiss franc, in the fall of 1978 monetary targeting was abandoned temporarily and replaced by an exchange rate peg to the D-Mark. At the end of 1979 it reintroduced a monetary target but switched the monetary aggregate targeted from M1 to the monetary base. After failing to hit the intermediate annual monetary target for a number of years, the SNB began from 1991 onwards to set a multi-annual target for the seasonally adjusted monetary base.

3 Cf. RICH (1997; 2007), HILDEBRAND (2004), and PEYTRIGNET (2007) for an assessment of monetary targeting pursued by the SNB.

Figure 1: Evolution of the Seasonally-Adjusted Monetary Base



The strategy was abandoned because distortions in the demand for base money increasingly called into question the suitability of the monetary base as a reference value, and not because the implicit price stability objective was no longer reached. As can be seen in Figure 1, since 1997–1998 it became increasingly difficult to interpret the signals transmitted by the seasonally adjusted monetary base – the intermediate monetary target. Moreover, implementing this policy through strict control of the size of banks' sight deposits with the SNB (an element of the monetary base) gave rise to excessive volatility of the overnight rate. The switch to a broader monetary aggregate could have been a viable alternative. Despite the extensive financial innovation and changes in payment patterns that had occurred, broad money supply measures had remained quite stable in Switzerland (Figure 2 and 3).

However, due to its limited controllability, broader money aggregates comply less well with the criteria required to act as an effective intermediate target than the monetary base. Another drawback of a broad monetary aggregate is that if the targets are frequently missed but the policy objective is met, their usefulness in signaling the monetary policy stance and as a means of communicating the central bank's intentions are called into question. The central bank's credibility and reputation may become tarnished, even if the targeting regime restrains inflation in the longer run, as had been the case in Switzerland (Figure 4). The credibility problems related with monetary targeting – but eventually also the

Figure 2: M2 Velocity

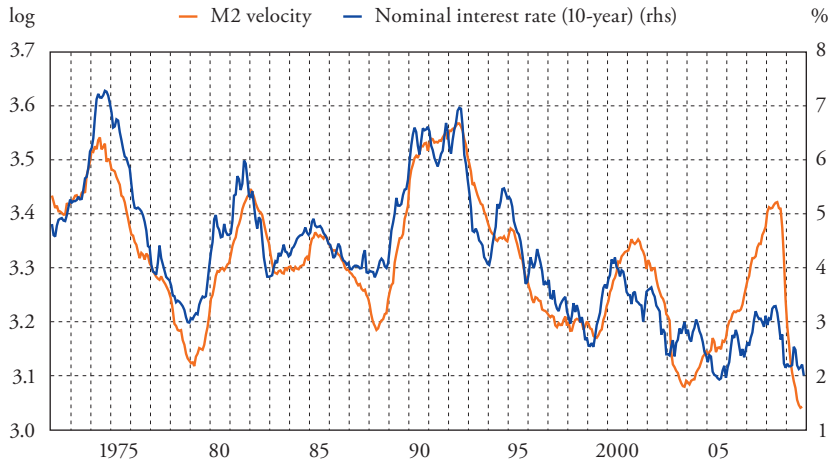


Figure 3: M3 Velocity

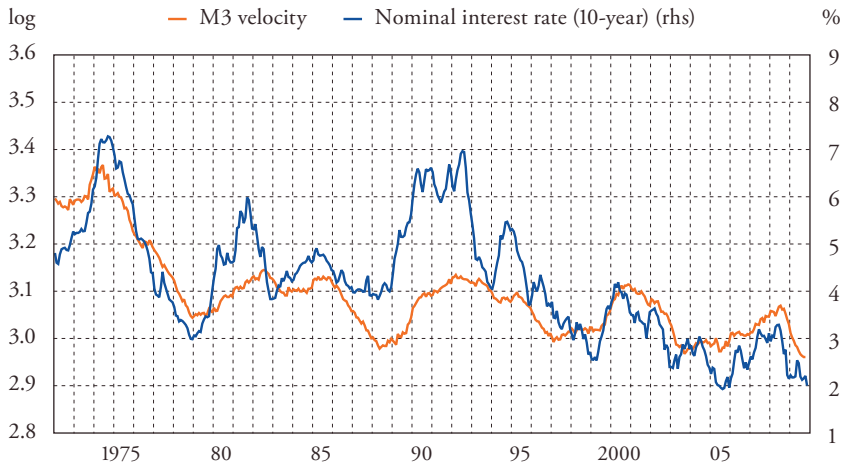
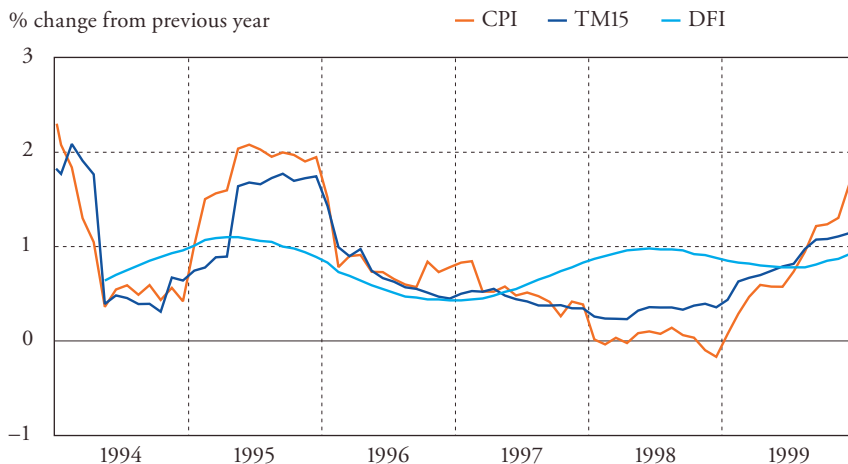


Figure 4: Core Inflation Measures SNB



*Note:* CPI is the consumer-price index, TM15 is the 15 percent trimmed mean, and DFI (Dynamic Factor Inflation) is a measure of core inflation which makes use of 450 nominal and real (daily and monthly) variables.

wish to use a broader set of information variables – compelled the SNB to look for a new, more modern approach to conducting its monetary policy.

## 2. The New Strategy

The new strategy was drawn up during the course of 1999 and came into effect in December 1999 when the first monetary policy decision was taken on this basis. The strategy switch represented the most important conceptual change since the mid-1970s. However, while it brought in important new elements, it did not mark a complete break with the past. Rather, it aimed at a certain continuity in monetary policy to maintain the credibility built up in the past. The new strategy was intended to guarantee a transparent monetary policy based on a clear procedure. The public was supposed to be able to predict correctly how the SNB would act and therefore form expectations for short-term interest rates and long-term inflation that are compatible with the SNB's intended policy. Moreover the strategy was intended to provide a pragmatic monetary policy framework to respond quickly and flexibly to different kinds of shocks.

## 2.1 Principles

The three principles on which the new monetary policy strategy is grounded reflect both SNB experience and economic research findings.<sup>4</sup> Firstly, ensuring price stability in the medium and long run remains the focus of monetary policy.<sup>5</sup> The price stability objective creates an anchor for long-term inflation expectations and a benchmark against which its monetary policy can be measured and held accountable. Reaching the overriding goal also broadens the scope for monetary policy, allowing the central bank an enhanced risk-taking attitude with the aim of stabilizing the business cycle in the medium term and the money market in the short term, as required by the law.<sup>6</sup>

Secondly, given the long and variable time lags between a monetary policy impulse and the reaction of the economy and inflation, a clear idea of the transmission channels and greater attention to the future are essential. Since no clear consensus on the varying transmission mechanisms exists, a pragmatic approach to analysis and forecasting models is required. This implies the continued use of various measures, including money aggregates, as indicators of long-term inflation trends.

Thirdly, policy announcements in terms of an operational interest rate target effectively inform the general public about the SNB's intentions. The SNB's Governing Board decides on interest rates after an in-depth quarterly assessment of the monetary policy situation scheduled for March, June, September and December.<sup>7</sup> If circumstances so require, rate adjustments are made between the scheduled assessment dates. Decisions taken between the scheduled monetary policy meetings have in common that they are not supported by a new inflation forecast, unlike those ensuing from scheduled policy assessments.

4 Cf. BALTENSPERGER, HILDEBRAND and JORDAN (2007) for a detailed discussion of the basic principles guiding monetary policy at the SNB.

5 Until April 2004, the SNB was instructed to "regulate the country's money circulation, to facilitate payment transactions and to pursue a credit and monetary policy serving the interests of the country as a whole." What was meant by the "interest of the country as a whole" was not explained. In practice the SNB regarded price stability as the principal objective of monetary policy. Since the adoption on 1 May 2004 of the new Federal Act on the Swiss National Bank (NBA), the principle of maintaining price stability has become an explicit legal constraint (art. 5 para. 1).

6 According to the NBA (art. 5 para. 1) the SNB shall, in ensuring price stability, take due account of the development of the economy. In addition, the mandate conferred upon it stipulates in art. 5 para. 2 (a) that it must supply the Swiss franc money market with liquidity.

7 The quarterly assessments of June and December are followed by a press conference.

## 2.2 *Three Elements*

The main elements of the strategy with which the SNB implements its public mandate are threefold.<sup>8</sup> The first element is an explicit quantitative definition of price stability. The second consists of an inflation forecast over the subsequent three years. The third is a range for the 3M Libor as operational target.

After years of experience with an implicit, veiled definition of price stability through the money supply targets, the SNB began to define price stability explicitly to give the markets and the general public a clear point of reference for its medium to long-term policy direction. Price stability is equated with a rise in the consumer price index (CPI) of less than 2 percent per annum. The SNB has not set an explicit floor to its definition of price stability. Setting a range of 0–2 percent, for example, would imply a target of 1 percent with an alleged dispersion of  $\pm 1$  percentage point. It does not want to give the impression of targeting precisely 1 percent inflation all the time. Whether inflation hovers close to 2 percent or below 1 percent over a longer period of time is irrelevant or of minor relevance from an economic point of view. Thus no fine-tuning of inflation in this range is intended. We also abstain from using the measurement error of the CPI (estimated to be around 0.5 percent) as the lower boundary for the definition of price stability. On the one hand, the size of the measurement error is uncertain. On the other, the SNB wants to avoid having to modify its definition of price stability each time the calculation mode of the CPI, and thus the measurement error, is revised. However, as the SNB stated clearly from the outset, persistent deflationary developments will be firmly countered.

The second element, a broad-based inflation forecast and factoring in all of the relevant information, results from the well-known existence of lags in the transmission of monetary policy impulses. In Switzerland they are up to three years because of diverse and sizeable rigidities in the economy. Since 2003 the inflation forecast is published quarterly following the monetary policy assessment.<sup>9</sup> It serves as the main indicator for monetary policy decisions and as an important communication tool. It is a consensual forecast based on a suite of (univariate and multivariate) time-series and econometric (semi-structural, structural and medium-sized estimated and calibrated DSGE) model predictions,<sup>10</sup> a blend of other inputs (including monetary indicators), and judgmental adjustments. Being a main indicator and not an intermediate target in itself means that monetary

8 Cf. RICH (2000), ROTH (2003), HILDEBRAND (2006), and JORDAN and PEYTRIGNET (2007).

9 From 2000 to 2002 the inflation forecasts were computed and published only semiannually.

10 Cf. PEYTRIGNET and SAVIOZ (2010) for a survey of the SNB's forecasting models.

policy decisions need not be based (entirely or always) on the inflation forecast. The published inflation forecasts are conditional on the assumption that the level of the 3M Libor decided at the last monetary policy assessment remains unchanged for the whole forecasting period of three years.<sup>11</sup> Since the inflation forecasts take account of the last interest rate decision, they play a crucial role in the communication of possible future interest rate decisions; their shape makes it possible for economic agents to infer the probable course of future monetary policy. If the inflation forecast indicates a deviation from the range of price stability, an adjustment of monetary policy could prove necessary. An inflation forecast is only valid until the next quarter, when it is estimated anew based on new data and complemented by an updated assessment of risks by the Governing Board.

Policy implementation, the third element, is achieved by determining a target range for the 3M Libor. Libor (London Interbank Offered Rate) represents the offered rate for unsecured loans between prime banks in the respective currency and term. As the rates for interbank loans actually paid are not publicly available, a fixing process is employed for Libor. In this fixing process, the Libor rates are calculated based on a trimmed mean of the designated contributor banks' reported rates. While the long-term monetary stance is communicated with the inflation forecast, the target range for the 3M Libor set by the SNB serves as an indicator for its intentions in the money market in the short term. Normally, the target range has a width of 100 basis points. The SNB also announces which part of the target range it is aiming at.<sup>12</sup>

Such an operational target is unusual in four respects.<sup>13</sup> Firstly, the SNB targets an interest rate that serves as benchmark for the pricing of most Swiss franc debt instruments and is therefore directly relevant for economic decisions of firms and households. In contrast, most central banks of industrial nations implement their monetary policies by explicitly or implicitly targeting an overnight rate, which only indirectly transmits into the relevant benchmark rates for the

11 The inflation forecasts are also conditional on a basic scenario of the world economy adopted by the Governing Board and on constant oil price and dollar-euro exchange rate assumptions over the forecast horizon.

12 During the financial turmoil in 2008, the reliability of banks' borrowing costs reported in the Libor fixing was called into question. Since a bank reveals its refinancing cost through the rate contributed in the Libor fixing, banks have possibly been reluctant to contribute a rate significantly above the other banks' rates. However, SCHLEGEL (2009) found no evidence that the Libor for Swiss francs is significantly distorted because of these signaling issues.

13 Cf. JORDAN and PEYTRIGNET (2007).



pricing of debt instruments. Secondly, having a target range rather than a point target allows the SNB to respond flexibly to exchange rate shocks without signaling an immediate change in its basic policy orientation. Thirdly, the choice of a three-month rate allows the SNB to stabilize the monetary policy stance in case of shocks to the risk premium in the money market. By lowering its repo rate, usually the one-week rate, the SNB can hold the Libor constant and thus compensate for a rise in the risk premium. Fourthly, the target refers to an interest rate that is set outside the Swiss market.<sup>14</sup> Having the reference rate set outside the own jurisdiction is not regarded as a problem. Since the Libor is the most important reference rate in the Swiss economy, it is an effective operational target which represents the most direct transmission to credit conditions in the economy. Experience has shown that the SNB is able to tightly manage the Libor, despite it being an offshore rate.

The SNB does not have direct control over the 3M Libor. It attempts to steer it by concluding repurchase agreements (repos).<sup>15</sup> Repos, whose introduction in the Swiss financial market was strongly promoted by the SNB, appeared almost simultaneously with its new monetary policy strategy.<sup>16</sup> Banks domiciled abroad are also eligible to participate in the SNB's repo operations and a considerable amount of allocated reserves go to these foreign institutions. A feature of the operational framework is a high level of flexibility in the rate, allotment volume, maturity (usually one-week) and frequency (usually daily). The 3M Libor is normally quite closely linked to very short-maturity rates, especially the overnight and the one-week repo rates via the expectations theory of the term structure of interest rates (at a given term premium).

14 When the new policy framework was introduced, there was no other established benchmark rate for the Swiss franc. At this time the repo market was still developing and large Swiss banks tended to dominate the interbank market.

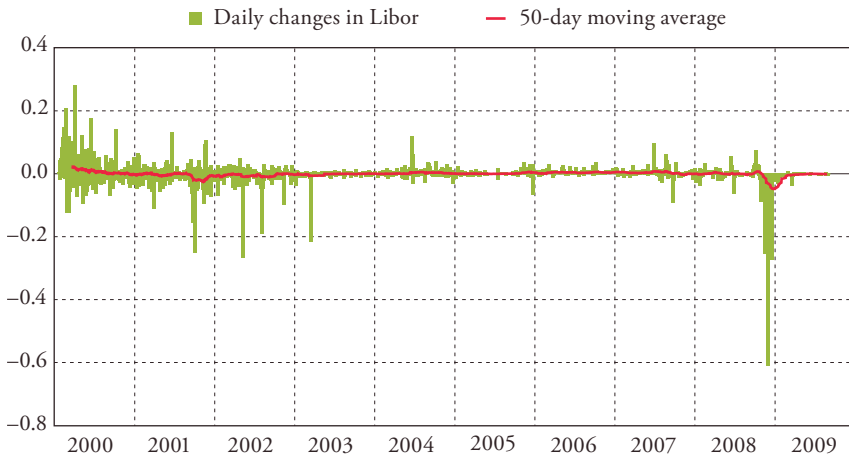
15 In a repurchase agreement (repo) a cash-provider buys a security from the cash-taker and agrees to sell it back after a set term for a set price. The difference between the price paid by the cash-provider and that paid by the cash-taker to repurchase the security, expressed as a percentage, is the repo interest rate. To protect the SNB against losses and to ensure equal treatment of business partners, collateral eligible for SNB repos are denominated in Swiss francs and foreign currencies and must meet certain liquidity and credit-rating criteria. For details on collateral eligible cf. [http://snbwebsite.snb.ch/en/mmr/reference/repo\\_mb22/source](http://snbwebsite.snb.ch/en/mmr/reference/repo_mb22/source).

16 Repo trading began in April 1998, but only in June 1999 did electronic trading substitute phone trading.

### 2.3 Qualifications

The strategy fixes the general outline for the conduct of the SNB's monetary policy. However, it does not provide any guarantee of success by itself. Decisive for success is the handling of the many elements within the framework. This requires constant work. To ensure a successful implementation of its strategy, the SNB has kept expanding and improving its analytical tools by developing new models and indicators which constitute the basis for the inflation forecast on the one hand and the technical know-how for steering the 3M Libor on the other. The result of the learning process in steering the 3M Libor during the first few years can be observed in Figure 5, which shows that daily changes in the Libor were reduced significantly with growing experience in the management of interest rates. The monetary policy strategy entails a self-enforcing mechanism: the better the SNB fares with its strategy, the more its credibility grows, and the more it increases its leeway for economic stabilization.

Figure 5: Daily Changes in Libor



### 3. Differences to Inflation Targeting

In the literature it is common to interpret inflation targeting (IT) as a targeting rule with the assignment of a relatively explicit quadratic loss function to be minimized. The intertemporal loss function to be minimized reads as follows

$$E_t \sum_{\tau=0}^{\infty} \delta^\tau L_{t+\tau} \quad (1)$$

with the period loss function typically given by

$$L_t = 0.5[(\pi_t - \pi_t^*)^2 + \lambda(y_t - y_t^*)^2] \quad (2)$$

where  $E_t$  denotes expectations conditional on information available in period  $t$ ,  $\delta$  a discount factor,  $\pi_t$  an inflation measure in period  $t$ ,  $\pi_t^*$  the time-varying inflation target,<sup>17</sup>  $y_t$  log output,  $y_t^*$  log potential output, and  $\lambda$  the weight on variability of the output gap relative to variability of inflation.<sup>18</sup>

Inflation targeting central banks are usually characterized by<sup>19</sup>

1. an explicit numerical target for inflation, either as a point target or the mid-point of a target range;
2. a framework for policy decisions which uses an inflation forecast as an intermediate target variable, with a reduced role for intermediate targets such as money growth;

17 Although often not modeled explicitly (as, for instance, in SVENSSON, 1999, p. 625), the inflation target of a typical inflation targeter is, in effect, time dependent.

18 As pointed out by SVENSSON (2006, p. 6f.) the central bank may also be concerned about the variability of exchange rate changes which would lead to an additional term in the loss function  $\lambda_{\Delta e}(e_t - e_{t-1})$ , with  $\lambda_{\Delta e}$  denoting the relative weight on exchange rate changes and  $e_t$  the (log) exchange rate in period  $t$ . As Switzerland is a small open economy, the SNB may indeed be concerned about the variability of exchange rates as well. In normal circumstances, the parameter  $\lambda_{\Delta e}$  is nil. However, in the event of extraordinarily large exchange rate shocks unrelated to economic fundamentals,  $\lambda_{\Delta e}$  may be positive as the SNB may act against a sudden undesirable appreciation of the Swiss franc.

19 Cf., for instance, SVENSSON (1999) and MISHKIN (2007). Note that the term “inflation targeting” itself has been defined in different, and in some cases, conflicting ways. Cf. ISSING (2004, p. 171, fn. 7). Sometimes every halfway sensible monetary policy framework is called “inflation targeting”. This interferes with a serious discussion about differences in monetary policy strategies.

3. the announcement of a clear horizon for achieving the inflation target;
4. the concern about stability of the real economy, which is referred to as flexible inflation targeting (boiling down to  $\lambda > 0$ );
5. increased transparency and accountability.

The SNB's new framework was designed after careful examination of the (IT) model, with which it shares some important elements.<sup>20</sup> However, the SNB did not follow it without modification. In general, its monetary policy strategy appears to be more moderate and flexible than the IT model.

The SNB's mandate is enshrined in the Federal Constitution and specified in detail in the National Bank Act (NBA). According to article 99 of the Federal Constitution the SNB is entrusted, as an independent institution, with the conduct of monetary policy in the interests of the country as a whole. The NBA (art. 5 para. 1) requires the SNB to ensure price stability and, in so doing, to take due account of the development of the economy. This legal mandate can be analyzed formally, as a first approximation, in terms of an intertemporal loss function as introduced above. Based on this common analytical framework, two fundamental differences emerge versus countries which refer to their regimes as IT.

Firstly, price stability is defined by the SNB as a ceiling – any non-negative inflation rate under 2 percent is acceptable. Hence  $\pi^*$  can be any value within the interval  $[0; 2]$  percent. This implies that the first term of the loss function,  $(\pi_t - \pi^*)$ , is not defined at any time.

Secondly, the SNB never made any attempt to fix a time frame for reaching the zone of price stability, should inflation surpass the two-percent threshold. In other words the value of the parameter  $\lambda$  has never been specified.<sup>21</sup> Leaving  $\lambda$  unspecified (except for being positive) amounts to leaving open the horizon over which price stability is supposed to be met. An unspecified  $\lambda$  parameter is tantamount to declaring the inflation forecast the main indicator for monetary policy and not an intermediate target in itself, as pointed out in Section 2. Consequently, interest rates will not be reset mechanically if the inflation forecast shows a clear violation of the definition of price stability (cf. Section 4). In particular, in deciding how quickly to move back to price stability after an economic

20 Also of importance to the design of the new SNB strategy was the two-pillar system of the (then) newly founded European Central Bank (ECB). In common with the latter – and in contrast to IT countries – money was allotted a prominent role right from the start. Cf. JORDAN, PEYTRIGNET and RICH (2001).

21 The discount factor is not explicitly stated either, but may come very close to one given the reiterated emphasis on the medium term orientation of Swiss monetary policy.

shock, the SNB will always take into account the consequences of its actions for near-term economic and financial stability. The only binding constraint for the SNB is given by the obligation to maintain price stability in the “medium term”, giving it adequate scope for stabilizing the real economy in addition to stabilizing inflation while leaving open the meaning of the “medium term”. Moreover, no escape clause is defined *ex ante*, nor is any reaction to large deviations from the price stability definition specified – through, for instance, an open letter.

A survey encompassing eight “rich country” central banks practicing IT showed that seven of them either have an explicit horizon for achieving the target or present an explicit horizon when inflation has clearly deviated from the target.<sup>22</sup> The same conclusion can be drawn from TRUMAN's (2003) definition of IT comprising four elements.<sup>23</sup>

A less formal comparison gives rise to additional nuances separating the SNB's framework from the IT model. To start with, the SNB had not experienced high inflation periods comparable to those countries which were in the vanguard of the adoption of explicit inflation targets. When the SNB modified its strategy it aimed at preserving continuity in monetary policy. IT countries, by contrast, had to overhaul their institutional structures in order to signal a significant change in the way in which policy will be conducted in the future to create credibility from scratch. CARARE and STONE (2006) refer to a group of five central banks that are highly credible (and make a less clear commitment to an inflation target) as having an “implicit price stability anchor”. One distinguishing feature of this group of countries, which includes Switzerland, is a highly successful inflation record.

The fact that the new monetary policy regime was introduced in a period of price stability and not as a device to *reach* it entails that the SNB's policy objective – a rise in the CPI of less than 2 percent per annum – remains in place for long periods. A quantitative *definition* of price stability is not time-dependent and

22 Cf. BERG (2005, p.28). Australia has no explicit targeting horizon because average inflation over an unspecified business cycle is targeted.

23 According to TRUMAN (2003, p.6) four conditions should be met for a central bank to be considered an IT bank: Price stability – a principal, if not the sole, explicit or implicit goal of monetary policy; a numerical target or sequence of targets – to make the goal of price stability operational; a time horizon – to reach the inflation target or to return to the target; and an evaluation – an approach for ongoing review of whether the inflation target will be or has been met. Concerning the third element, TRUMAN indicates that “most of the inflation targeting central banks have a reasonably precisely specified time horizon over which the target or targets are to be met” (pp.6f.).

by its very nature valid for an extended period.<sup>24</sup> It emphasizes that the objective is a long-term one. Economic agents can make decisions with confidence about the average inflation rate over a long horizon.

Moreover, unlike several countries which have adopted formal inflation targets, the SNB itself – not the government and without consultation with the government – defines, by virtue of its statutory and constitutional mandate, the meaning of price stability.<sup>25</sup> It is impossible for the Federal Council or Parliament to be swayed by political or other reasons to set an inflation target.<sup>26</sup> Any modification to the definition of price stability would have to be rationalized and communicated by the SNB exclusively on economic grounds. The latter is conceivably easier and more transparent than an adaptation of the target rate for short-term political reasons.<sup>27</sup>

#### 4. Rule-Like Behavior in Practice

The related moot question that naturally arises is whether the lack of a precise time horizon in the SNB's strategy implies too much discretion in the conduct of monetary policy. We think not.<sup>28</sup> As is well known from the academic literature, neither rules nor discretion are optimal in their pure form. The theoretically optimal strategy is a state-contingent "rule", which allows flexibility in responding to economic shocks while retaining a credible pledge to price stability.<sup>29</sup> The SNB's attempt to approximate the optimal state-contingent policy rule is reflected in a "rule-like" or, equivalently, "constrained discretion" behavior.

24 In this connection KOHLI (2008) points out that the term "inflation targeting" is outdated once price stability has been achieved. Setting yearly inflation targets only makes sense when the initial conditions include a high rate of inflation with the intention to lower it.

25 The SNB can thus be described as enjoying instrument independence and strong goal independence, cf. BALTENSPERGER, FISCHER and JORDAN (2007).

26 Art. 6 of the NBA defines the notion of the SNB's independence as follows: "In fulfilling its monetary tasks according to article 5, ... the National Bank and the members of the Bank's bodies shall not be permitted to seek or accept instructions either from the Federal Council or from the Federal Assembly or any other body."

27 In BERG's (2005, p.23) account of eight industrialized central banks pursuing IT, six have their targets set either by the government or in consultation with it.

28 FAUST and HENDERSON (2004) show that a fixed horizon is inappropriate for most circumstances.

29 Cf., for instance, KING (1997). KUTTNER (2004) provides an illuminating discussion and clarification of the conflicting definitions of the term "policy rule" in the literature and SVENSSON (1999) a survey and discussion of inflation targeting in the context of monetary policy rules.

Like under monetary targeting, the SNB is committed, as far as possible, to an “activist policy rule”. The latter consists in setting the policy instrument(s) in a well-chosen course of action consistently over time. Such behavior comes close to what the academic literature refers to as an ongoing process involving a firm commitment to an overarching long-term objective, excluding period-by-period (“discretionary”) optimization of a short-term loss function. The “rule” is not designed to be optimal with respect to any single model of the economy, but represents a compromise that generally performs reasonably well with the portfolio of forecasting models used by the SNB. Neither does the “rule” force the SNB to be mechanical in its conduct of monetary policy, as in following closely a fixed rule. Rather it provides the Governing Board with the possibility of making use of the necessary flexibility of action.

The “rule” itself has remained effective over the past decade, since the SNB’s perception about how the Swiss economy works has not changed. In essence, it is communicated by the regular publication of inflation forecasts. It basically states that, should inflation threaten to persistently exceed 2 percent in an unspecified future period, a monetary policy tightening should be considered. Conversely, monetary policy should tend towards relaxation if there is a threat of deflation. However, given that the lags in the transmission process in Switzerland are not only long (up to three years) but also quite *variable*, it is not only the final forecast value or the form of the inflation forecast at the end of horizon which matters for the interest rate decision of the SNB. Experience shows that, being a main indicator and not a target, it is rather the whole inflation forecast profile over the following three years and the accompanying communication that conveys information on the underlying inflationary pressure expected in the future. Hence, in general, if a forecast at a given interest rate level showed a sustained deviation from price stability, the SNB would not react mechanically.

As can be inferred from Table 1 (cf. Appendix), 16 out of 34 published inflation forecasts exhibited a final value below two percent, two had a value of exactly two percent and 16 ended with more than two percent after three years. Most endpoint forecasts changed from quarter to quarter (q-o-q), regardless of whether the underlying fixed interest rate assumption had changed or not. Most of the time the changes in the endpoint values were concentrated on the interval [−30 bp; +30 bp]. Moreover, 14 forecast values were above and 14 below the endpoint value of the preceding forecast. The highest q-o-q downgrade arose in the fourth quarter of 2008 (−70 basis points) whereas the strongest upgrade cropped up in the third quarter of 2009 (+160 basis points). The reasons for the exceptionally large change in the slope of the curve towards the end of the three-year horizon in the third quarter 2009 were manifold – a substantial improvement in the global

economic outlook, upward revision of past Swiss growth rates, and a significant increase of liquidity in the economy.

Table 2 and 3 do indeed show that the SNB has not reacted mechanically in the last 10 years. Table 2 summarizes the interest rate decisions and the endpoint of the respective *current inflation forecasts*.<sup>30</sup> In seven cases an interest rate hike coincided with an inflation forecast overshooting the two percent ceiling at the end of the forecasting period. On the other hand, in four instances interest rate increases went hand in hand with a long-term forecast lying below two percent. By contrast, in nine instances interest rates remained unchanged although the forecast implied a violation of price stability in the longer term. And in two cases even an interest rate cut was implemented although the forecast suggested inflationary pressure down the road. In one third of rate decisions the reference rate remained unchanged or was lowered when the forecast endpoint was below 2 percent.

**Table 2: Interest Rate Decisions and Current Final Inflation Forecast Value**

Change in target range for 3M Libor in $t$ based on current inflation forecast	Inflation $_{t+12k} \geq 2\%$	Inflation $_{t+12k} < 2\%$
Increase	7	4
No change	9	6
Reduction	2	5

*Note:*  $k$  refers to the forecast horizon in quarters.

A similar picture emerges from Table 3, which deploys the policy actions linked to the *last quarters' inflation forecast*. Eight times the target range was lifted after a previous quarter's inflation forecast had overshoot the price stability ceiling. Nine times interest rates remained unchanged even though the last forecast had exhibited a forecast value above the upper limit three years ahead. In one instance rates were cut despite an endpoint of the previous forecast exceeding 2 percent. By contrast, rates were raised three times even though the previous forecast was below 2 percent at the end of the forecast period. In more than one third of cases monetary policy either did not budge or became more expansionary if the previous quarter signaled price stability at the end of the forecast horizon.

30 The complete set of inflation forecasts published by the SNB is reported in appendix I.



**Table 3: Interest Rate Decisions and Final Inflation Value of Previous Forecast**

Change in target range for 3M Libor in $t$ based on previous inflation forecast ( $t-1$ )	Inflation $_{(t-1)+12k} \geq 2\%$	Inflation $_{(t-1)+12k} < 2\%$
Increase	8	3
No change	9	6
Reduction	1	6

*Note:*  $k$  refers to the forecast horizon in quarters.

To sum up, even if the SNB's strategy corresponds to neither a strict targeting nor a strict instrument rule as put forward by SVENSSON (1999), it is well defined and communicated and cannot be equated with unbounded discretion. It represents a case of a rule-based or constrained discretion approach to monetary policy that boils down to the systematic use of data and information from models and indicators in order to consistently achieve the ultimate goal of price stability over time. As long as annual inflation is within the range equated by the SNB with price stability, other aspects, such as the business cycle or the leeway to take aim at additional targets, may come to the fore.

The pragmatic approach pursued by the SNB is also borne out from a theoretical point of view. Recent progress in macroeconomic and monetary policy research shows that if we augment the New Keynesian model à la WOODFORD-SVENSSON-GALÍ, according to which IT represents an optimal monetary policy for a central bank, once labor market frictions – real wage rigidity as in BLANCHARD and GALÍ (2006; 2008), and search externalities as in FAIA (2009) – or financial market frictions – i.e. a financial accelerator as in CHRISTIANO, MOTTO, and ROSTAGNO (2007), and CHRISTIANO, ILUT, MOTTO, and ROSTAGNO (2007) – are considered, narrowly-defined IT is no longer the optimal monetary policy framework. The pragmatism of the rule-like behavior embodied in the SNB strategy appears sensible given that academics and policy-makers still have only limited knowledge about the (true) functioning of the economy.

## 5. Implementation of Monetary Policy since 2000

The implementation of monetary policy since the beginning of this decade can be divided into four phases as a result of a succession of different macroeconomic shocks.

The first phase, from December 1999 to February 2001, was characterized by a tightening of the monetary policy reins by 1.75 percentage points from 1.25–2.25 percent to 3.00–4.00 percent for the 3M Libor target range. The one-week repo rate, the main instrument for steering the 3M Libor, was steadily increased from 1.1 percent at the beginning of 2000 to 3.40 percent in March 2001. A more restrictive policy stance was necessary in view of mounting inflation pressure in 2000 due to a stronger-than-expected growth pickup and a weakening of the Swiss franc.

The second phase began in March 2001 and lasted until May 2004. It marked a rapid reduction in the targeted range for the 3M Libor from 3.00–4.00 percent to an asymmetric target range of 0.00–0.75 percent with a targeted level of 0.25 percent. The one-week repo rate was gradually cut from 3.40 percent to 0.11 percent and remained at that level, then an all-time low, until the mid-2004 monetary policy assessment. The reasons for this substantial relaxation of monetary policy were a series of negative shocks to the global economy, ranging from the bursting of the technology bubble in March 2001, the uncertainty following the September 11 terrorist attack (9/11), the outbreak of SARS respiratory disease, and the start of the Iraq war. Not only was the economic outlook deteriorating but the Swiss franc was appreciating because of its historical role as a safe haven currency, which was exacerbated by 9/11. This imparted an additional undesired restrictive stance to Swiss monetary policy. The relaxation of the policy stance was called for to prevent inflation from dropping too strongly.

Once the negative deflationary shock had died down, the SNB began the third phase, which lasted from June 2004 until August 2007. The objective of the “exit strategy” was to bring interest rates from their extremely low level up to levels which ensured price stability in the medium term without choking off economic recovery and unsettling the currency market. The strategy chosen implied a gradual lifting of the target range from 0.00–0.75 percent to 2.00–3.00 percent, resulting eventually in a targeted 3M Libor of 2.50 percent. Gradualism was required by the uncertainty of the economic recovery in Switzerland and the risk of currency appreciation. As can be seen from Figure 8, this normalization process can be read as a textbook example of an anticipated policy in a perfect foresight model, i.e. money market participants fully anticipated the next SNB decision on the target range and the corresponding level for the 3M Libor.

Figure 6: Target Range for 3M-Libor and 1W Repo Rate

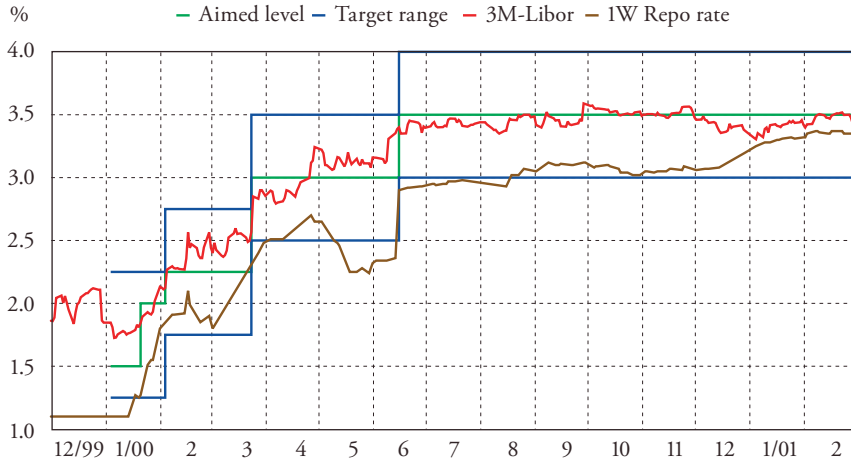


Figure 7: Target Range for 3M-Libor and 1W Repo Rate

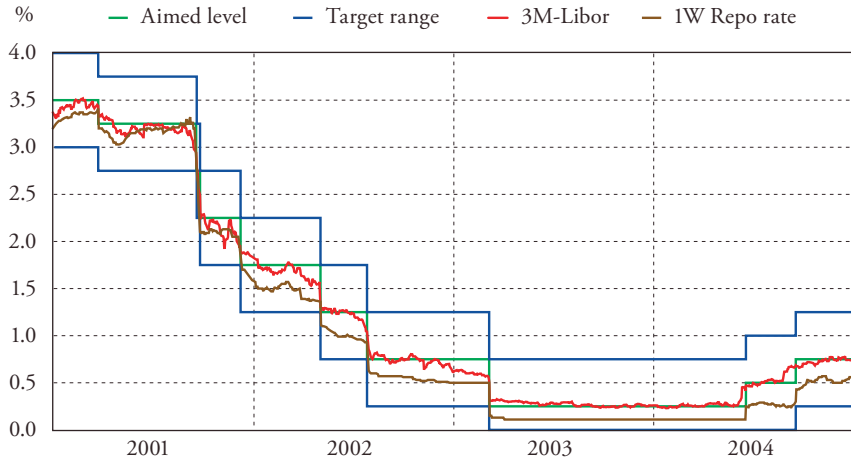
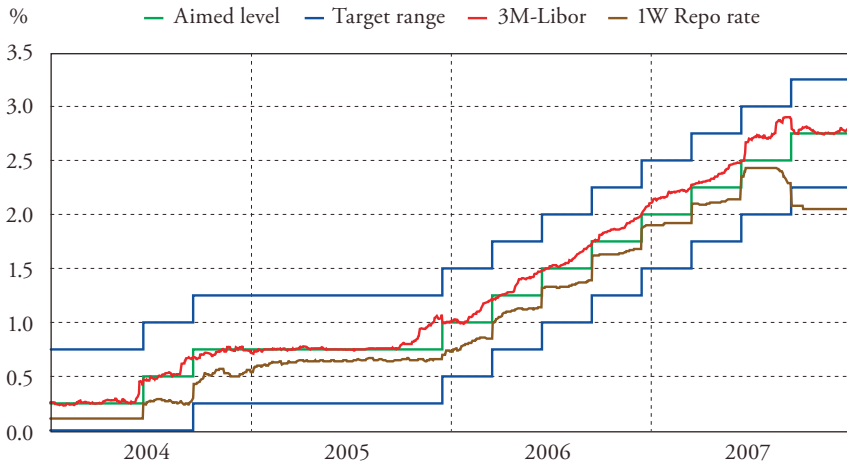


Figure 8: Target Range for 3M-Libor and 1W Repo Rate

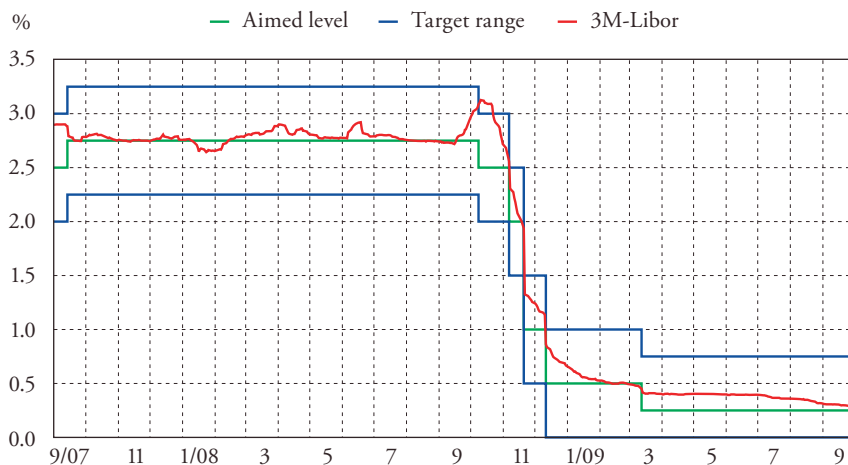


In September 2007 the SNB entered the fourth and most extraordinary and difficult monetary policy phase since the introduction of its new strategy. The cause was the outbreak of the crisis in the US subprime mortgage market and its escalation into a global financial crisis. In response, the SNB took a variety of measures, partly coordinated with other central banks, in order to calm short-term interest rate volatility and to address various types of funding market pressures. At the monetary policy assessment of September 2007, after the 3M Libor had climbed as high as 2.90 percent, the SNB increased the midpoint of the target range from 2.50 percent to around 2.75 percent, but at the same time reduced the 1W-repo rate from 2.29 to 2.08 percent with the aim of calming the money market. The reverse interest rate change posed a challenge for communication. Nevertheless, the SNB succeeded in bringing the 3M Libor rapidly down to 2.75 percent. In the first four quarters after the outbreak of the crisis (from September 2007 to September 2008) the SNB maintained its midpoint target at 2.75 percent. Starting in October 2008, a series of aggressive interest rate cuts counteracted upward pressure on the Libor due to an enormous increase in demand for Swiss franc liquidity (at home and abroad) and brought the targeted level for the 3M Libor down to a targeted value of 0.50 percent by December 2008.<sup>31</sup> At

31 In October 2008 the 3M-Libor temporarily exceeded the upper ceiling of its margin of fluctuation (cf. Section 10) for the first time since the new strategy was introduced.

the monetary policy assessment of mid-March 2009 the SNB decided a further reduction of the target range by 25 basis points, narrowing it to 0.00–0.75 percent with an intended level of approximately 0.25 percent. This level was confirmed at the June and September assessments.

Figure 9: Target Range for 3M-Libor



As in the preceding unscheduled assessments (cf. Section 6) the sharp relaxation of the policy stance decided in October and November 2008 was not based on a new inflation forecast. Circumstances may arise in which a careful judgment may be particularly decisive. An important implicit element of the SNB's monetary policy strategy is the degree of flexibility, which allows the Governing Board to react in a swift and timely way to a changing assessment of the situation, taking account of a broad range of new information and indicators. In turbulent times, like those that followed the deepening of the financial crisis subsequent to the collapse of Lehman Brothers in mid-September 2008, forecasting inflation over a three-year horizon is particularly challenging. The reason is that model parameters are estimated on normal past conditions and regularities in the economy and, moreover, do not (yet) incorporate key features of the financial sector sufficiently. Results have thus to be interpreted with particular care.

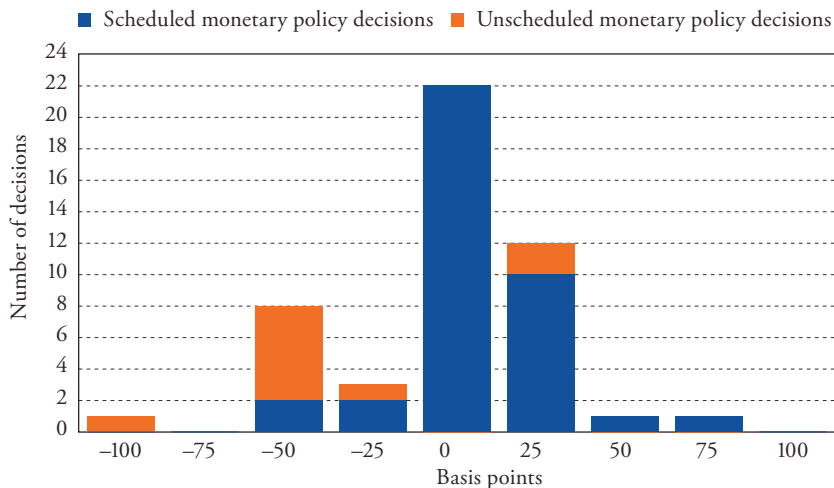
## 6. Evaluation of the SNB's Tactics in Interest-Rate Setting

Based on a comparison of the SNB's types of behavior in the four phases distinguished in Section 5, some interesting observations emerge that allow us to identify the main elements characterizing the tactics pursued by the SNB in conducting monetary policy. One element is a resolute and symmetric response to cyclical shocks. Another characteristic is the choice between scheduled and unscheduled monetary policy decisions. The next element is a tendency to avoiding policy reversals. A further tactical feature is a relatively early interest rate reduction in 2008 despite a comparably good growth performance of the Swiss economy. The last two tactical elements are the way in which oil price movements are taken into account in conducting monetary policy, and the setting of the reference interest rate in comparison with the Taylor rule.

Before examining and rationalizing the tactical elements emerging from an analysis of the four policy phases, we emphasize that policy implementation at the beginning is less comparable to the subsequent phases, because the SNB was about to pick up first experiences with its new strategy. In order to maintain the 3M Libor in the middle of the target range, the SNB thwarted upward trending expectations regarding the 3M Libor in February and again in April/May 2000 by lowering the repo rate, only to surprise the market shortly afterwards by announcing an increase in the target range it was aiming for. For the same reason (i.e. keeping the 3M Libor in the middle of the target range), the SNB pushed up the repo rate in the first quarter 2001 and lowered the target range in March, arguably surprising market participants once more. After these teething problems in implementation of its new strategy, the SNB became more flexible and accommodated market expectations on the 3M Libor as long as they were in line with its policy intentions for the future.

We now turn to a discussion of the tactical characteristics guiding interest rate decisions. Firstly, as summarized in Figure 10, the SNB boosted rates quickly during the first phase when the target range was raised in just two quarters by 175 basis points in total. Symmetrically, rates were eased in a small number of large cuts, in particular in the current financial crisis. Interest rate cuts during the second phase (March 2001 – May 2004) resulted in seven reductions of the midpoint target for the 3M Libor of 325 basis points in total. These were spread over 12 quarters with – on average – one 27 basis-point interest rate reduction per quarter or 46.4 basis points per step. In the fourth phase (particularly since October 2008) the target range was reduced in five steps in less than two quarters by 250 basis points, which amounts to more than 125 basis points per quarter or

Figure 10: SNB Monetary Policy Decisions since 2000



50 basis points per step. By contrast, the speed of interest rate hikes during the third phase (June 2004 – August 2007) was at odds with the steps taken in the first phase. Tightening was realized in 10 steps limited to 25 basis points each. The rate rise of 250 basis points was realized over 14 quarters, amounting to an average interest rate hike of just around 18 basis points each quarter.

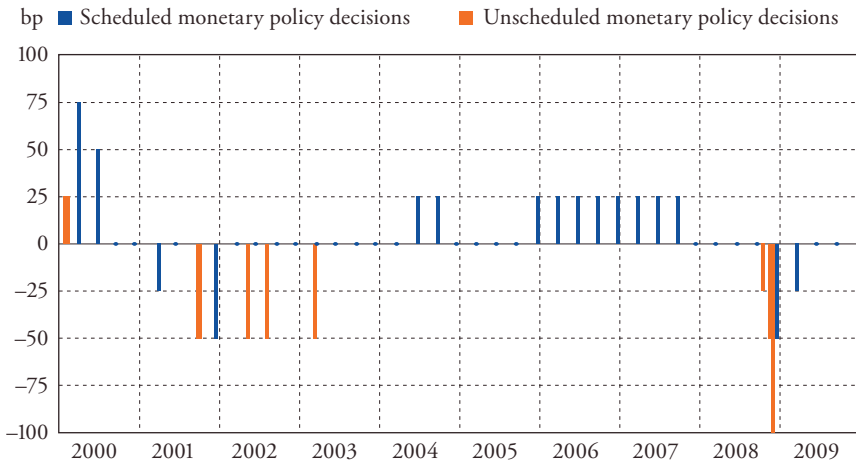
Interest-rate setting tactics were dictated by the extent and the nature of economic shocks. If a need to tighten policy is ascertained but no shock affects the economy, the policy reaction can be gradual, as in the third phase. Indeed, the conviction that – assuming long-term inflation expectations are contained – the economy could adapt continually to higher interest rates without overheating, and the fear that an exchange rate appreciation could undermine the recovery, led to a predominately smooth and modest rate-raising process. By contrast, faced with shocks, monetary policy may be called to act aggressively. In fact, the decisive rate hikes in the first phase were required because of an unexpected growth momentum and weakness of the Swiss franc which exerted upward pressure on prices. Similarly, the resolute rate cuts in the second and fourth policy phase were due to a fast-mounting risk of deflation in the short run, which could only be alleviated through aggressive policy easing, even though such a policy enhances the probability of arriving at the zero lower bound more rapidly.<sup>32</sup> Moreover, by cutting

32 Cf. the discussion in 11.5.

rates aggressively, the private sector will expect higher inflation in the medium term. In turn, medium-term real rates will be lower and boost demand and inflation so that the consequences of the zero lower bound will be less severe. The medium-term inflation pressure shown by the SNB's inflation forecasts in 2003 and 2004 was, at a time of practically zero short-term interest rates, intended and acceptable in a situation fraught with deflationary danger in the short run.

Secondly, rate lifts were, with one exception, decided at *scheduled* monetary policy assessments while 8 out of 12 rate decreases were taken at *unscheduled* assessments.

Figure 11: SNB Monetary Policy Decisions since 2000



How can the choice between scheduled and unscheduled decisions be explained? Generally the SNB tries to avoid surprising market participants because it regards the management of expectations as an essential element of its rule-like approach. It is widely accepted that the ability of a central bank to affect the economy depends critically on its ability to influence market expectations about the future path of very short-term interest rates. Accordingly, unscheduled decisions are the result of unexpected events, necessitating a prompt reaction to avert the negative consequences a postponement of decision to the next scheduled assessment date would bring about. For instance, on 3 February 2000 an interim assessment of



the economy turned out to be much more favorable than expected, calling for a policy firming. By contrast, on 24 September 2001 the stance was loosened owing to an upward valuation of the Swiss franc in the wake of the uncertainties linked to 9/11; this was to thwart the intention to relax the monetary conditions decided the week before. Thus the more dramatic the impact of a shock, the higher the likelihood of an unscheduled decision.

Thirdly, the SNB showed total reversal aversion. In 47 monetary policy assessments the target rate was changed 26 times (55 percent) but no policy reversal took place within three months. Avoiding reversals may prevent a loss in a central bank's credibility if a sequence of policy changes are (wrongly) interpreted as corrections of previous errors. Another reason for reversal reluctance may arise due to concerns about financial stability. A potential downside of reversal aversion is that the central bank may end up falling behind the curve. In the case of the SNB, there is little evidence of this happening. The inflation rate remained within the price stability range in Switzerland, except for a spell in 2008 and 2009 (cf. Section 8), and only in exceptional cases were interest rate hikes called for to meet the long-run objective. Probably the most compelling argument for reversal aversion at the SNB is its concern over a possible loss of credibility brought about by the markets' flawed equating of a radical policy U-turn with the correction of previous errors.<sup>33</sup>

Fourthly, the proportion of 25-basis-point rate changes was 58 percent while 35 percent of rate changes amounted to 50 basis points. This latter proportion stands out in an international context.<sup>34</sup> Moreover, in the current financial crisis the SNB cut interest rates somewhat earlier than the Bank of Japan and the Swedish, Norwegian and Danish central banks (the last three and the ECB even lifted rates for a while in 2008) but later than the Fed and the Bank of England, whose rate reductions had already started in September and December 2007. Note,

33 According to BLINDER (2006) central banks' reversal aversion probably contributes significantly to gradualism in monetary policymaking. In the case of the SNB, the link between the two appears to be loose. In particular, as mentioned above, the SNB cut interest rates aggressively while sustaining a given policy course.

34 BLINDER (2006, p. 32) documents the following proportion of rate changes of 25 basis points or less: 79 percent for the Federal Reserve, 88 percent for the Bank of England, and 89 percent for the Riksbank. However, the comparison with the SNB is somehow blurred in that BLINDER's sample does not include the current financial crisis. Still, until March 2006 (the end of BLINDER's sample), the target range for the 3M-Libor was moved by 25 basis points in 47 percent of SNB changes. The same percentage of changes applies to a rate adjustment of 50 basis points.

Figure 12: Official Interest Rates, G3 and CH

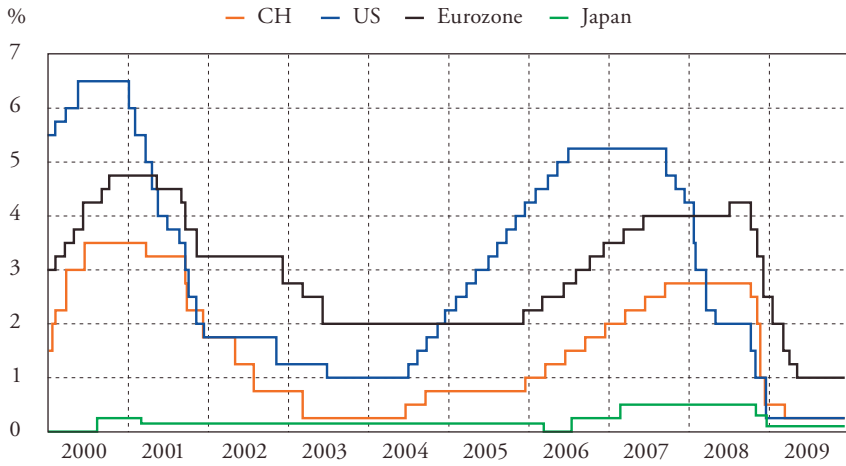


Figure 13: Official Interest Rates, EMU Outsiders

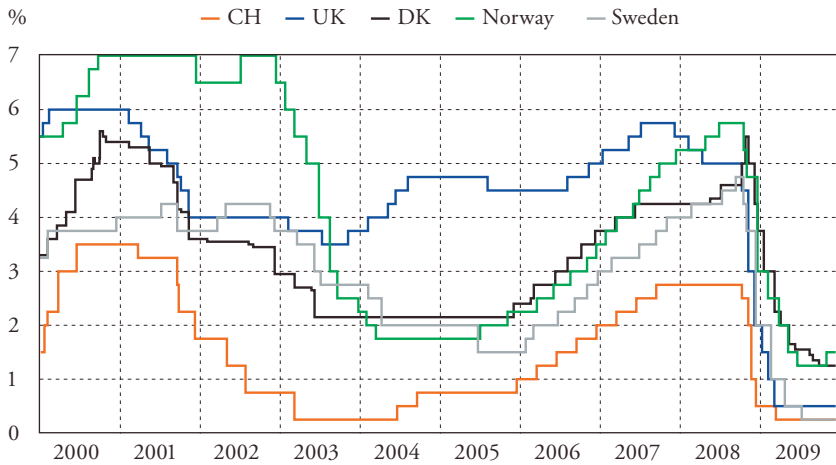


Table 4: First Releases of GDP Growth Rates 2007–2009

	US	UK	euro area	J	CH
Q1 2007	1.3	2.6	2.3	2.4	3.2
Q2 2007	3.4	3.3	1.3	0.5	3.9
Q3 2007	3.9	3.3	2.8	2.6	3.7
Q4 2007	0.6	2.5	1.7	3.7	4.2
Q1 2008	0.6	1.8	3.0	3.3	1.3
Q2 2008	1.9	0.7	-0.8	-2.4	1.5
Q3 2008	-0.3	-2.1	-0.8	-0.4	0.1
Q4 2008	-3.8	-5.9	-5.7	-12.7	-1.2
Q1 2009	-6.1	-7.4	-9.8	-15.2	-3.2

however, that the SNB already cut its repo rate at the beginning of the financial crisis. From September 2007 to September 2008 the 1W-Repo rate was lowered by almost 50 basis points.

What is remarkable about the timing and size of the SNB's rate adjustment is that GDP growth figures since 2007 had been clearly higher than in the US, the UK, the euro area, and Japan.

One way to interpret the SNB's attitude in the critical stage of the financial crisis is that it is forward-looking<sup>35</sup> or, alternatively, attaches great importance to the management of threats to the macro economy.<sup>36</sup> Using monetary policy to take out insurance against tail risks leads to aggressive monetary policy responses when a large shock becomes evident. Its risk-management (pragmatic or flexible) approach may thus be a possible explanation for both its tendency to resort more often to relatively large rate adjustments and, as evidenced in the current crisis, its early shift to an aggressive policy in spite of good growth figures.<sup>37</sup>

35 As highlighted by BALTENSPERGER, HILDEBRAND and JORDAN (2007) foresightedness is one of the guiding principles of the SNB.

36 Cf. JORDAN (2008a) for risk management in monetary policymaking.

37 As pointed out by MISHKIN (2008), the by-now standard textbook theoretical linear-quadratic framework in the conduct of monetary policy exemplified by WOODFORD (2003) does not focus on risk management, which results in considerable policy inertia. Recent research shows that it is optimal for monetary policy to ease very aggressively in response to an adverse financial market shock (cf. DE FIORE and TRISTANI, 2009). This finding contrasts sharply with the Taylor rule, which would prescribe only a mild response to financial meltdown.

Fifthly, elevated oil price volatility has posed a continuous challenge to Swiss monetary policy since 2004. The sharp rise in oil prices, in particular from 2007 to mid-2008, increased inflationary pressure in the near term. As explained in Section 4 the implicit rule states that if inflation temporarily exceeds the 2 percent ceiling in extraordinary circumstances, for example following a sudden massive rise in oil prices or strong exchange rate fluctuations, monetary policy does not necessarily need to be adjusted. This, however, does not mean that the SNB would react systematically to core inflation either, core inflation measures being just one of an array of indicators taken into account in shaping an overall picture of underlying inflationary pressure. The same applies to short-term deflationary pressures.<sup>38</sup>

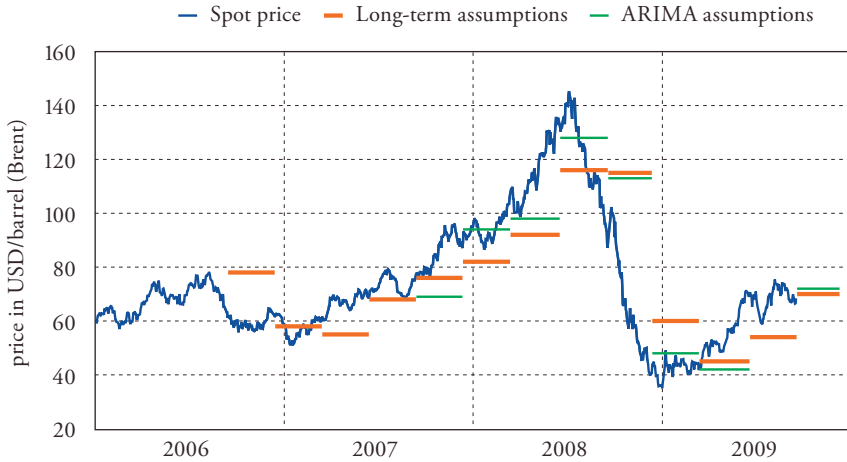
Given that inflation expectations were well anchored, the SNB refrained from interest rate adjustments in response to firming oil prices for three reasons: i) the SNB believes that as long as the risk for second-round effects is small it would be wrong to try to stabilize oil-price-related fluctuations in the price level by raising interest rates. Experience has shown that a monetary policy which seeks – by way of interest rate increases – to prevent oil price rises from having an impact on the price level can significantly reinforce the adverse effect of such rises on the economy; ii) any attempt to compensate for an oil-price-related economic slowdown by cutting interest rates merely increases the risk of a wage-price spiral. In particular, if a liquidity surplus already exists (as it did in 2004), the greater the likelihood of such second-round effects; and iii) the SNB's assumption that the higher oil prices were short-lived suggested that any inflationary impact of these prices would gradually recede of its own accord.

Finally, as can be seen in Figure 15, actual short-term interest rates track those of a Taylor rule based on the CPI ex oil fairly well, at least until the aggravation of the financial crisis in 2008.<sup>39</sup> A closer inspection of Figure 15 reveals,

38 This aspect of the SNB's strategy is very similar to BERNANKE's (2004) OLIR (optimal long-run inflation rate) proposition which he interprets as distinct from inflation targeting as commonly understood.

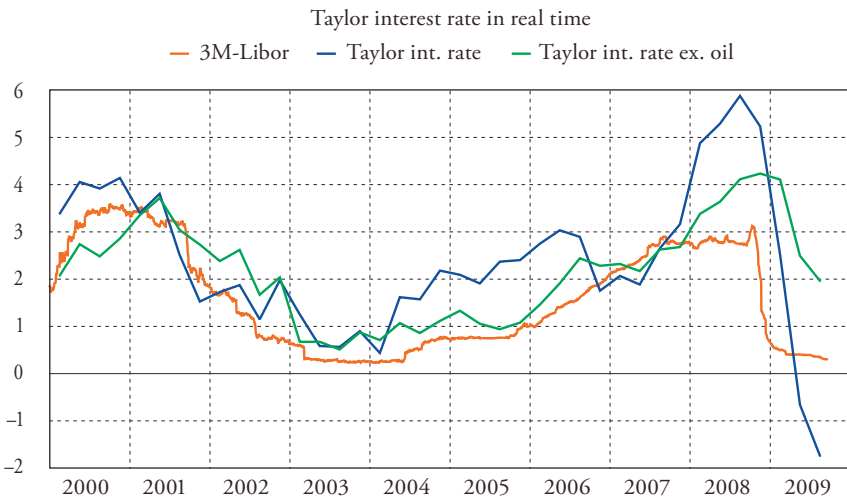
39 Taylor interest rates are regularly computed among other monetary policy rules. The rates shown in Figure 15 are computed with real-time data only from 2007 Q1 onwards. Note that the results are based on the original rule proposed by TAYLOR (1993). This means, in particular, that the rule does not contain the exchange rate as a variable, based on the understanding that any reaction of the interest rate to the exchange rate is indirect, through the effect of the exchange rate on inflation and the output gap. BALL (1999) and SVENSSON (2000) have shown that a Taylor rule with the exchange rate included would hardly dominate the benchmark Taylor rule in small open economies.

Figure 14: Oil Price and Assumptions



Note: Long-term assumptions refer to the oil price assumptions underlying the official inflation forecast in the long term. The ARIMA assumptions are the oil price assumptions underlying the inflation forecast of an ARIMA model in the short term.

Figure 15: Taylor Interest Rate and 3M-Libor



however, that the 3M Libor was (still) systematically below the level proposed by the Taylor rule *ex oil*. From experience we can infer that a systematic undershooting of the Taylor rule (even *ex oil*) does not necessarily imply a policy mistake. On the contrary. In the Swiss case the time-varying difference between the Taylor rule and the actual 3M Libor is the result of the flexibility inherent in the monetary policy strategy or, equivalently, the leeway it offers for the use of judgment by the Governing Board.

## 7. Crucial Decisions

Some monetary policy decisions of the SNB in the past decade had particularly strong and lasting effects on financial markets in the intended direction. Most often they involved the exchange rate of the Swiss franc. The first of these decisions ensued from the scheduled assessment on March 23, 2000, when the target range for the 3M Libor was lifted by 75 basis points. The policy firming was aimed at counteracting the weak trend of the Swiss franc, which was leading to an undesirable relaxation of monetary conditions and posing a threat to price stability. By this move the SNB wanted to make it completely clear that it was pursuing an autonomous monetary policy geared to the domestic economy and not merely following in the wake of the ECB. As a result of this decision, the EUR/CHF exchange rate started to float again after a long period of almost unchanged rates.

Another policy decision which had a visible impact on the currency market was announced following from an unscheduled assessment on March 6, 2003. In the first quarter 2003 global economic and political uncertainties were adversely affecting the business climate in Switzerland and risked to delay the economic upturn that was expected to materialize that year. Therefore, a fortnight before the scheduled monetary policy assessment, the SNB slashed the target range for the reference rate by 50 basis points and announced a targeted level for the 3M Libor at around 0.25 percent. The move was intended to ward off a tightening of monetary conditions that would arise from a currency appreciation. The Swiss franc started to depreciate immediately after the cut. The impact was so strong that the SNB did not have to fall back on unconventional measures during this period.

The third decision worth mentioning was made public after the unscheduled assessment on November 20, 2008 which saw a one-percentage-point cut in the target range for the Libor to 0.5–1.5 percent. This time the SNB laid stress on reducing the risk premium in the money market and not on the foreign exchange

Figure 16: 3M-Libor CHF and CHF/EUR

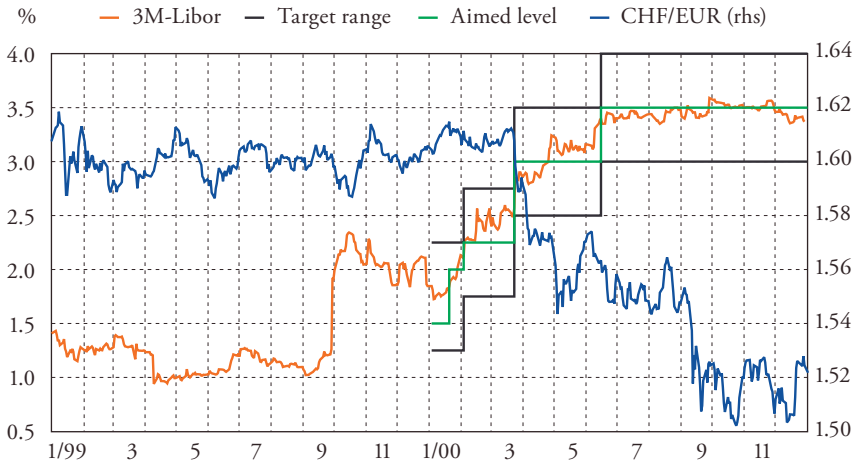


Figure 17: 3M-Libor CHF and CHF/EUR

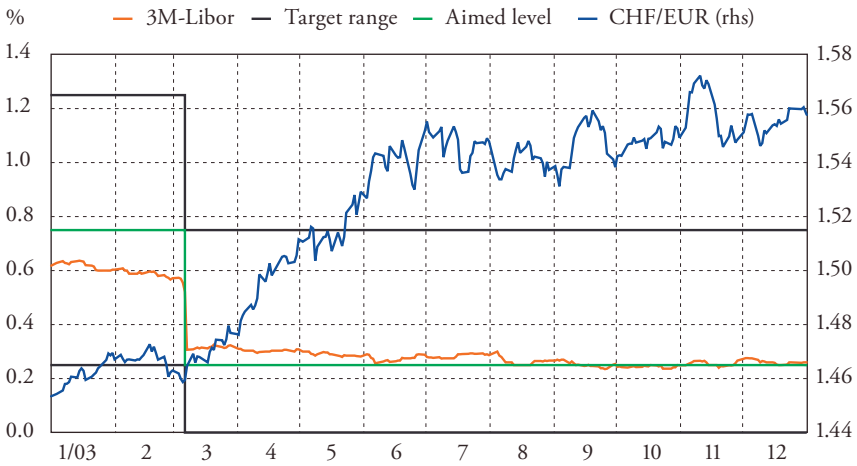


Figure 18: 3M-Libor CHF and Libor/TOIS Spread

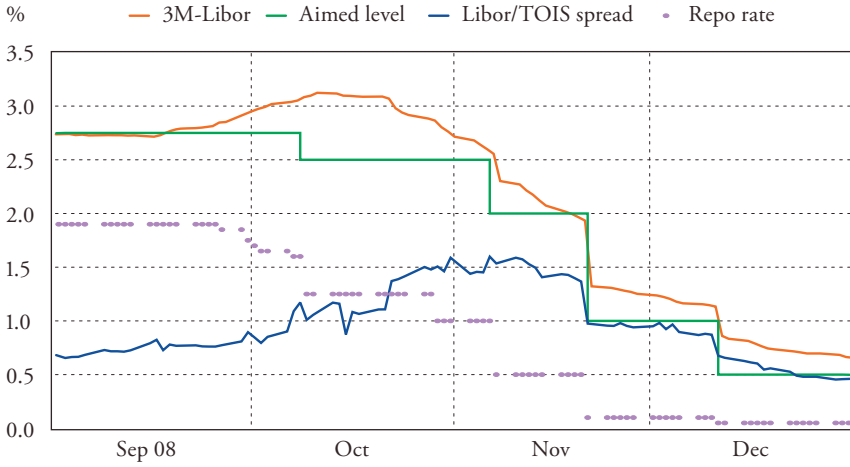
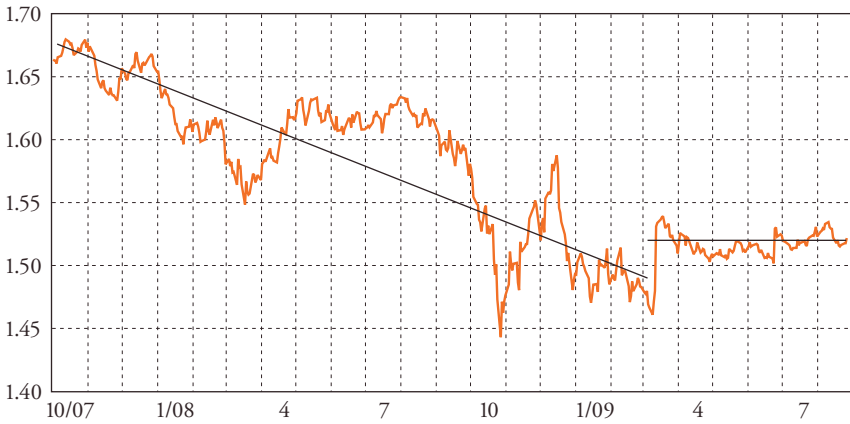


Figure 19: CHF/EUR





market. As can be seen in Figure 18, the firm lowering of the target range led to a significant decline in the risk premium, measured by the spread between the 3M Libor and the corresponding TOIS rate.

The last decision to leave a strong mark upon market participants was made public at the scheduled assessment of March 12, 2009. Against the backdrop of a sharp deterioration in the economic situation and a looming risk of negative inflation over a longer period of time, several monetary policy measures to prevent any further appreciation of the Swiss franc against the euro were announced.<sup>40</sup>

## 8. Impact on the Economy

In this section, we first analyze how the switch to the new strategy affected the Swiss economy and turn subsequently to a comparison over the last three decades. We find growing stability in the Swiss economy in terms of output growth and inflation (volatility) which goes hand in hand with the transition to the new monetary policy strategy. We also perceive a perpetuation of the trend to lower inflation rates which began in the mid-90s under monetary targeting.

### 8.1 *The Last Ten Years*

Legally the SNB is mandated to ensure price stability and in so doing take account of economic developments (cf. Section 3). During the period under consideration the Swiss economy has been subject to several supply shocks. Arguably, by anchoring inflation expectations the economy becomes more stable, reducing the effect on overall inflation of adverse supply shocks. Have the strategy and its implied policy rule been successful? Figure 20 shows that the SNB reached its main objective of price stability in the last ten years, except for 2008–2009.<sup>41</sup> A comparison reveals that the rise in the general price level has been lower than in the euro area, the US, the UK, and Canada.

Recently, the SNB ran the risk of allowing the inflation rate to persist above the price stability definition over a longer period. For the first time since the strategy was implemented in 2000 inflation exceeded the 2 percent ceiling and remained above this level during the first ten months of 2008. The trimmed-

40 Cf. Section 9 and appendix II for an in-depth description of the measures put in place by the SNB in the financial crisis.

41 Inflation has been stationary with a mean of about 1 percent since 1993. This comes down to a successful anchoring of inflation expectations within the price stability definition, without resorting to a precise point target for inflation.

Figure 20: Consumer Price Index

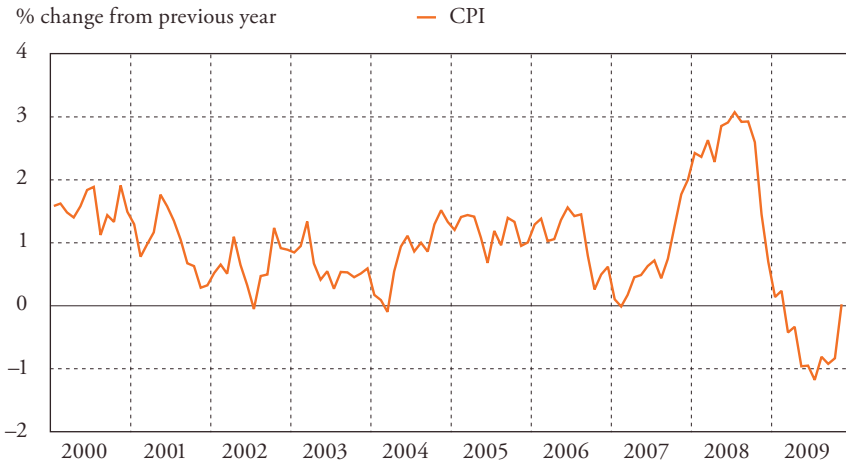


Figure 21: Consumer Price Indices of EA, US, GB, JP, and CA

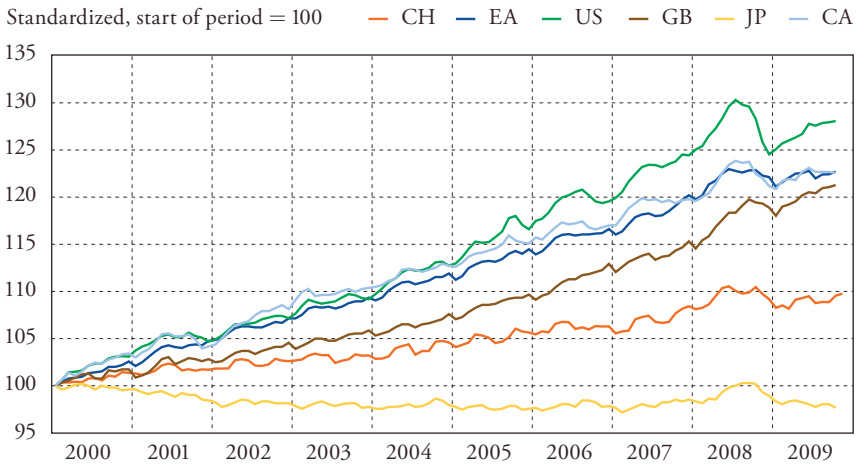
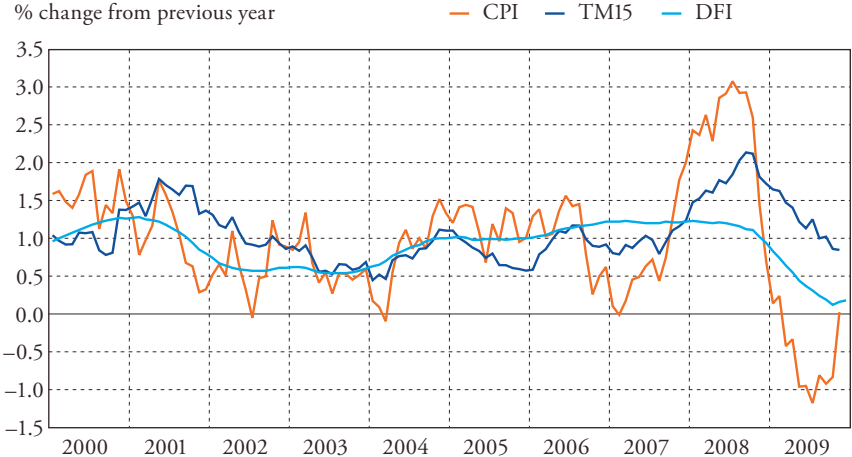
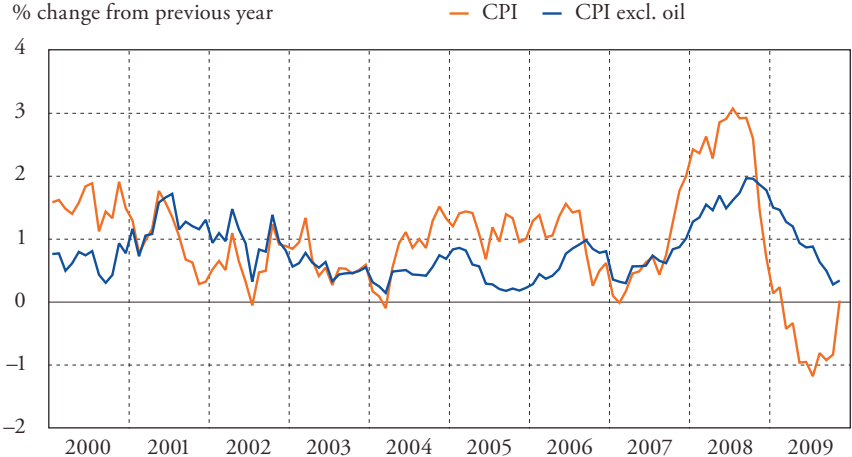


Figure 22: Core Inflation Measures SNB



Note: CPI is the consumer-price index, TM15 is the 15 percent trimmed mean, and DFI (Dynamic Factor Inflation) is a measure of core inflation which makes use of 450 nominal and real (daily and monthly) variables.

Figure 23: Consumer Price Index



mean core inflation measure gauged by the SNB (among other measures of core inflation) also temporarily surpassed the limit of 2 percent.

The bulk of the inflation pressure came from rising oil prices. However, as illustrated in Figure 23, even when corrected for the development in the oil price inflation rose from below 0.5 percent mid-2007 to 2 percent towards the end of 2008.

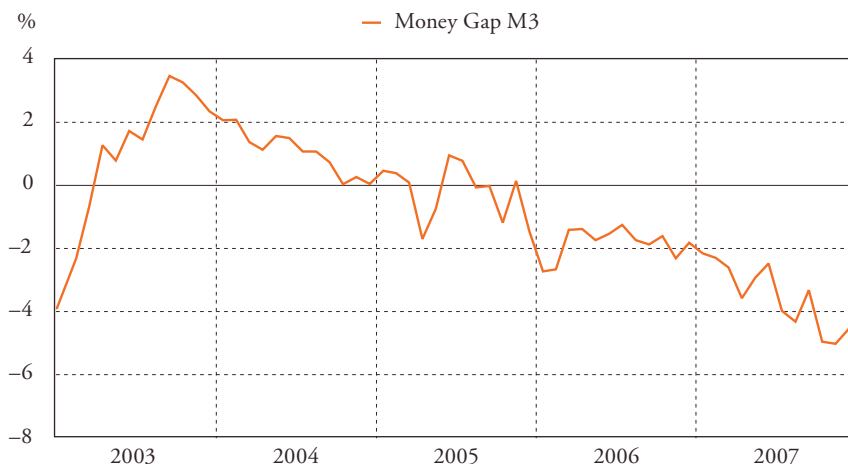
Without the dampening effect brought about by the financial crisis and the subsequent drop in oil and commodity prices the definition of price stability would probably have been violated over a more extended period of time. With hindsight we may conclude that monetary policy was kept too loose for too long during the third phase in light of the weak currency and the existing monetary overhang and, as a result, a forecast medium-term inflationary pressure. As observed in Section 6, the monetary policy tightening in 2006 and 2007 was much more moderate than in 2000 in spite of an almost identical GDP growth outlook. The reason for the subdued policy reaction in 2006/07 was the uncertainty about the strength of the economic activity and the fear of potential currency appreciation. With the wisdom of hindsight, the SNB arguably put too little weight on its prime objective of ensuring price stability, notwithstanding the correctness of the messages delivered by the inflation forecasts published at the time and confirmed by the money gap depicted in Figure 24.<sup>42</sup> We conclude that if the SNB fell a little behind the curve, it was not because of a failure of its strategy but rather because of an arguably liberal interpretation of its mandate to take into account the economic situation. Note, however, that the strategy allows for short-term deviations from the range of price stability. They may be the result of shocks or of non-optimal policy decisions taken under uncertainty. The strategy requires corrections as soon as it becomes uncertain whether the deviation from price stability is only temporary or durable.

## 8.2 *A Longer Perspective*

In a longer perspective it is apparent that the falling trend in annual inflation rate which began in the 1990s continued after the turn of the century and pushed long-term average inflation (up to the past 15 years) within the price stability range for the first time since the 1970s. We may conclude that even if the new

42 As can be seen from the set of figures in appendix I, each quarterly inflation forecast from December 2002 to December 2006 showed clearly that if the 3M-Libor had been left unchanged at the level valid at that time, the rate of inflation would undoubtedly have exceeded the upper limit of 2 percent within a horizon shorter than three years.

Figure 24: Equilibrium Correction Model (ECM) for M3



*Note:* The money gap is a measure of assessing potential inflationary or deflationary risks resulting from an excessive or insufficient supply of liquidity to the economy. The money gap M3 corresponds to the positive (monetary overhang) or negative (money gap) percentage deviation of the actual M3 aggregate from an equilibrium value, which is calculated on the basis of the transaction volume in the economy and the opportunity cost of holding money.

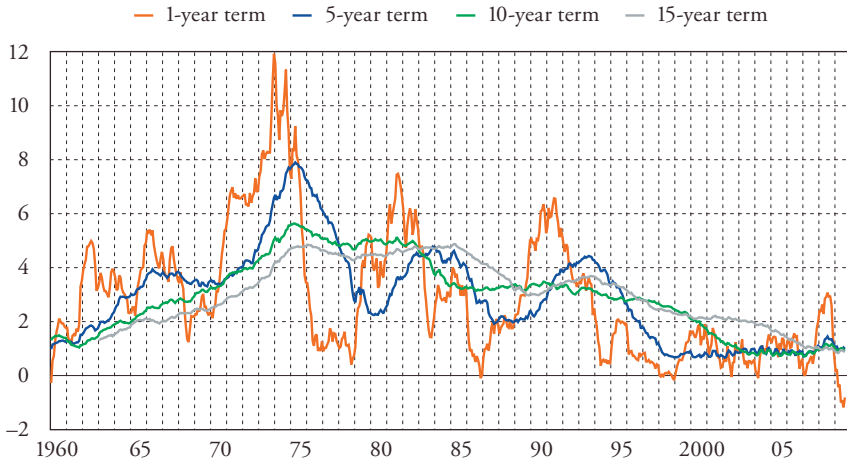
strategy did not improve the SNB's performance on inflation, neither did it endanger the achievement of price stability.

A visual inspection of Figure 25 reveals that inflation this decade was lower and more stable than any decadal average in the post-1960 period. This picture is confirmed in Figure 26, which portrays the evolution of annual inflation and its volatility since the adoption of an autonomous monetary policy by the SNB in 1973.<sup>43</sup> As can be inferred from this Figure, the same conclusion holds for real GDP growth as well. A comparison of the average performance of the Swiss economy from the mid-1970s to the end of the 1990s with the last 10 years yields two notable results. On the one hand, both growth and inflation were lower during the last decade. But on the other hand, the Swiss economy became more stable.<sup>44</sup>

43 Volatilities are calculated as the standard deviation of annual inflation and GDP from their period means.

44 Note that a low standard deviation for a particular year means that growth and inflation have been stable in the preceding ten years up to and including the year in question.

**Figure 25: Historical Inflation Rates for Switzerland for a Period of 50 Years  
Ending August 2009**



**Figure 26: GDP Growth and Inflation**

Standard deviation calculated over period of old (1973.01–1999.12)  
and new (2000.01–2008.12) monetary policy concept.

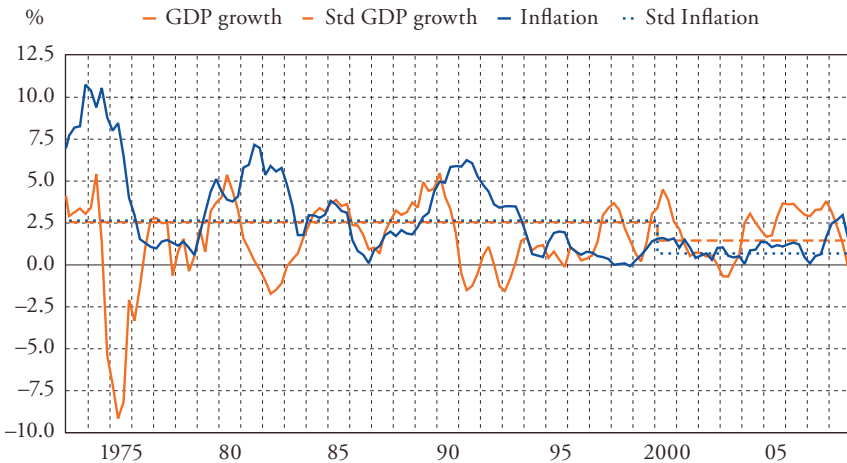
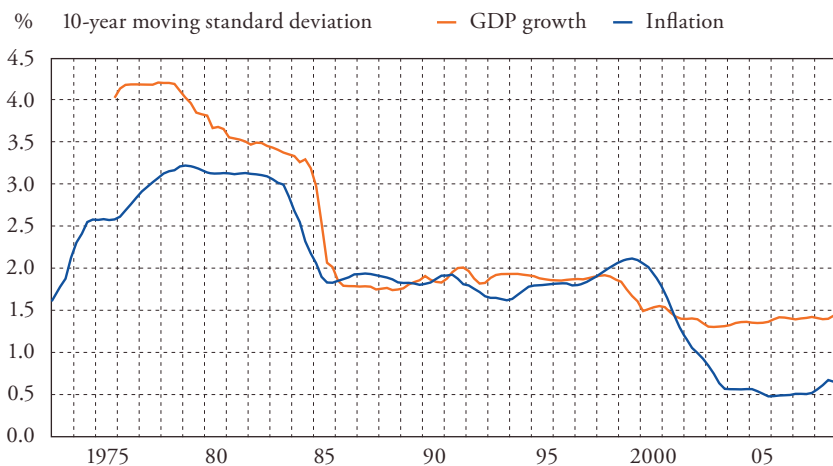


Figure 27: GDP Growth and Inflation



It is also instructive to compare inflation volatility and output volatility on an ongoing basis, as in Figure 27. From this we can deduce a high volatility in inflation and real growth following the end of the Bretton Woods system of fixed exchange rates, which coincided with the early phase of monetary targeting. In the 1980s economic volatility decreased considerably. A further downward shift in volatility can be noted around the turn of the century. Inflation stabilized even more than output growth. Another observation is the substantial co-movement of these volatilities. The lack of a trade-off between growth and inflation suggests that the low and stable inflation rate pursued by the SNB helped reduce output volatility and supported economic activity. By the same token it furnished the SNB with leeway, enabling it to support the development of the economy.

The concurrence of an overall improvement in the performance of the Swiss economy with the transition to a new monetary policy strategy may be coincidental or may match the worldwide improvements in growth and inflation (The Great Moderation). Indeed it is very likely that exogenous factors played a role. Strong international competition and higher productivity dampened inflationary pressure. It is very unlikely, however, that these exogenous factors tell us the whole story. After all, the past 10 years were not uneventful. A series of major changes and disruptions hit the Swiss economy, including the introduction of the euro, the Y2K problem, the burst of the dotcom bubble, 9/11, the 2001–03 recession, the implementation of the free movement of persons from EU countries as of

June 1, 2007 (which gave rise to high immigration), shocks to the exchange rate, the oil price and, in particular, to the financial market; and, in the wake of the latter, a global recession that has posed unprecedented challenges to monetary policymaking. The SNB's policy geared towards maintaining price stability has probably helped it reach its objectives more easily.

## 9. New Measures Taken to Steer the Money Market in the Financial Crisis

In this section we discuss in detail the measures the SNB adopted to achieve its goals in the financial turmoil of 2007 to 2009. Until 2007 money market stability played no decisive role in the SNB's monetary policy decisions. This changed with the onset of the financial crisis in the summer 2007 and its escalation in terms of both depth and breadth. In its wake the stability of the interbank market became an essential element in the conduct of monetary policy, requiring a highly accommodative monetary policy reaction. Its mirror image were short-term nominal interest rates near zero and a major expansion of the SNB's balance sheet. Faced with an impending recession, the SNB resorted to quantitative easing and credit easing to prevent an unwelcome appreciation of the Swiss franc and to lower the credit risk premia on Swiss franc corporate bonds. The measures were necessary because the scope for interest rate reductions had been exhausted.

### *9.1 Measures Supporting the Money Market*

Since the onset of the financial crisis in August 2007, rising risk premia widened the gap between interest rates on unsecured and secured money market transactions. This made steering the 3M Libor, which is based on unsecured transactions, increasingly challenging. In addition to reducing the target range for the 3M Libor and alongside ordinary Swiss franc open market operations, the SNB has taken a slew of other measures to counter the heightened pressure on money markets. They have been coordinated with other central banks and fall into two groups: measures to facilitate access to US dollar liquidity, and measures to facilitate access to Swiss franc liquidity.<sup>45</sup>

45 Unlike measures to access liquidity in Swiss francs, the provision of US dollar liquidity is independent of the SNB's monetary policy strategy and has no direct effects on the Swiss franc Libor. A detailed list of the new measures is included in appendix II.



In the fourth quarter of 2008, the reduced supply of Swiss francs in the inter-bank market exerted upward pressure on Swiss franc interest rates, rendering the management of the 3M Libor extremely challenging. In the previous few years, banks in Eastern Europe had granted Swiss-franc-denominated loans on a massive scale, partly refinancing themselves on the money markets. During the financial market turmoil in autumn 2008, many Swiss banks were no longer prepared to provide funds to refinance these loans to the same extent. When the Swiss franc money market dried up, the foreign banks found themselves in a delicate position since they had no access to SNB loans. The increased demand for Swiss francs led to considerable tension in the Swiss franc money market, pushing up the 3M Libor. The concomitant rise in Swiss interest rates was undesirable from a monetary policy perspective. To satisfy demand from banks domiciled abroad, the SNB has been providing Swiss franc funding to banks with no direct access to its operations. To this end it has been holding concerted auctions of EUR/CHF swaps with the ECB and, as of mid-October 2008 and later on, also with the Polish and Hungarian central banks. These concerted EUR/CHF swap auctions led to an unprecedented level of bank reserves and a significant easing of pressures in the money market rates.<sup>46</sup>

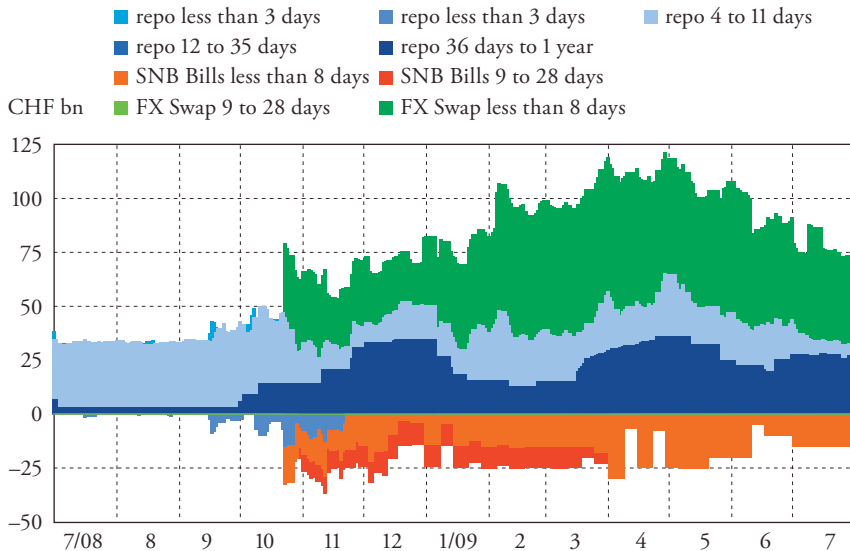
As of October 20, 2008, in a bid to absorb part of the reserves created by the EUR/CHF swaps, the SNB began issuing its own debt certificates (SNB Bills) in Swiss francs. These Bills are an ordinary monetary policy instrument which enables banks to place funds with the SNB in a form other than non-interest-bearing sight deposits. SNB Bills allow the SNB to distribute large amounts of liquidity to banks and later to absorb liquidity again from the market, enhancing the SNB's flexibility in liquidity management. In particular, the Bills allow greater use of cash-providing repo transactions with longer terms and of EUR/CHF swaps. Moreover, SNB Bills are also accepted as collateral in repo transactions, thus expanding the volume of collateral available. Unlike ordinary repo operations, which are auctioned in a fixed-rate tender, the auctions of SNB Bills take the form of a variable rate tender with allotment according to the American auction method.<sup>47</sup>

As a result of its extraordinary liquidity provision, claims from repo transactions and the balances from swap transactions against Swiss francs rose sharply.

46 Foreign-currency swaps have a long tradition in Swiss monetary policy. Under monetary targeting USD swaps were the main instrument for controlling the monetary base.

47 In an American allocation system SNB Bills are allotted at the rate stated in the offer (discriminatory auction). The other auction procedure based on a variable rate tender is the Dutch system, which would allot all SNB Bills at the lowest accepted rate (uniform price auction).

Figure 28: The SNB's Open Market Operations



The banks' sight deposits at the SNB reached unprecedented levels.<sup>48</sup> Between the onset of the financial turbulences and May 2009 the SNB's balance sheet grew by more than CHF 100 bn. Since then it has receded somewhat.

## 9.2 Quantitative Easing and Credit Easing

Once nominal rates reach zero, conventional monetary policy no longer works. Although the monetary strategy offers flexibility to adopt conventional measures to lower the 3M Libor, the SNB was compelled to put in place unconventional measures – which, however, were fully compatible with its strategy. Unconventional policy can be separated into measures of *quantitative easing* on the one hand and *credit easing* on the other. A quantitative easing measure endeavors to ease monetary conditions through the expansion of bank reserves without specifying the corresponding asset to be purchased. Credit easing, by contrast, aims to influence specific market segments by means of interventions in the relevant

48 The average size of sight deposits from 2000 to 2006 was about CHF 4.3 bn.

Figure 29: Claims from Repo Transactions

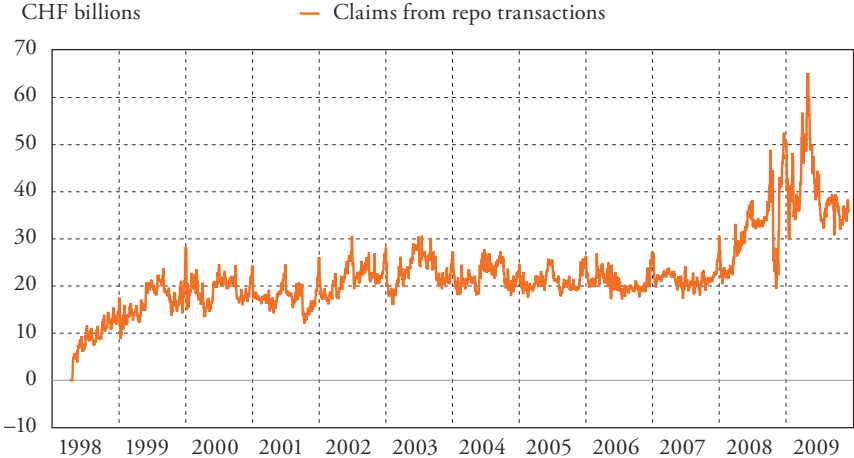
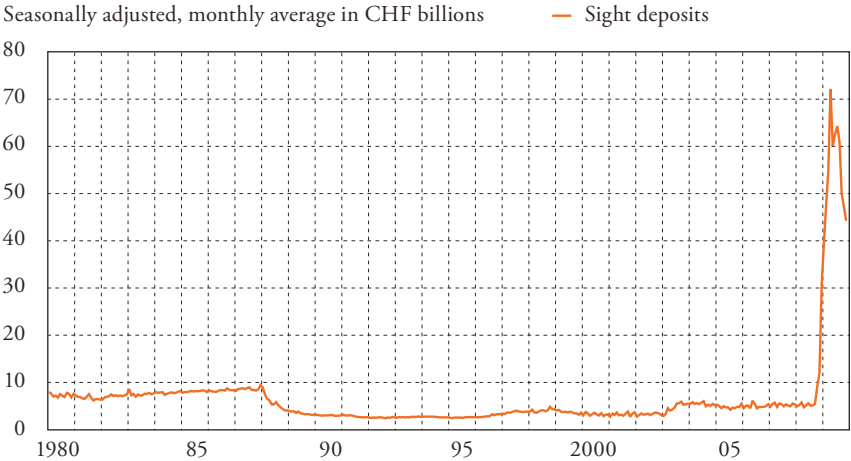


Figure 30: Sight Deposits



asset. The SNB engaged in quantitative easing from December 2008 until March 2009 and has complemented its policy measures by credit easing since then.

Coming under the heading of quantitative easing are *foreign exchange interventions* intended to meet the extra demand for Swiss francs generated by Switzerland's safe haven status. Over the past 15 years, verbal intervention was the SNB's preferred strategy in times of stress for its currency. A 10 percent appreciation of the Swiss franc against the euro between September 2008 and March 2009 and the substantial risk of an even stronger appreciation thwarted the SNB's intention to relax its monetary conditions in view of deflationary risks looming ahead and short-term interest rates essentially at zero. The real effective exchange rate had strengthened by 5.7 percent. Since the outbreak of the financial turmoil in August 2007 the Swiss franc appreciated in real effective terms by more than 9 percent. This, together with a shrinking interest rate differential to other currencies and the fact that other countries were resolutely pursuing a policy of quantitative easing, forced the SNB to take a more hands-on approach regarding the Swiss franc. In order to prevent any further appreciation of the Swiss franc against the euro and to corroborate its resolution to counter the foreign currency trend, the SNB announced at the monetary policy assessment of mid-March 2009 that it was making its first purchases of foreign currency in 15 years. The foreign exchange interventions represented an unconventional policy measure because they increased the SNB's risk exposure and because they were geared towards influencing a particular (relative) price. Moreover, as the purchases of foreign currency were financed by base money creation, they lifted banks' reserves above the level necessary for a zero-interest-rate policy, thus contributing to quantitative easing.

At the same time the SNB also began an unprecedented credit easing policy aimed at soothing the tightening of financing conditions for companies on the capital market which further restrained aggregate demand and encumbered the transmission of monetary policy stimuli. With a view to lowering the term premium and the credit risk premium, the SNB started *purchasing Swiss franc bonds issued by Swiss private sector borrowers* but decided not to announce their size ex ante – unlike the Federal Reserve and the Bank of England. The decision on which class of bonds to be purchased was driven by the aim of facilitating Swiss firms' access to the domestic capital market. The quantity was not fixed in advance but was determined gradually. The SNB also abstained from publishing a target quantity. Both a pre-fixed quantity and the announcement of a targeted quantity would have unnecessarily limited the SNB's flexibility in achieving the intended market improvement. The third unconventional measure focused on the money market in the form of an *extension of the maturity of repo operations*

Figure 31: Nominal Exchange Rate CHF/EUR

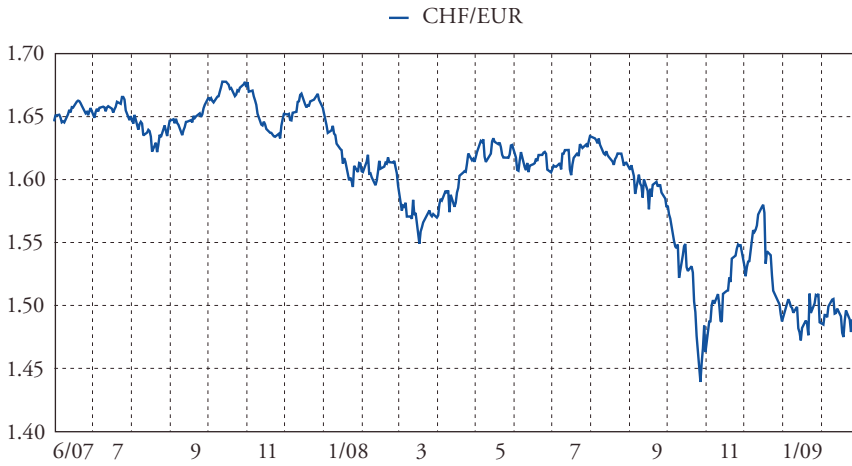
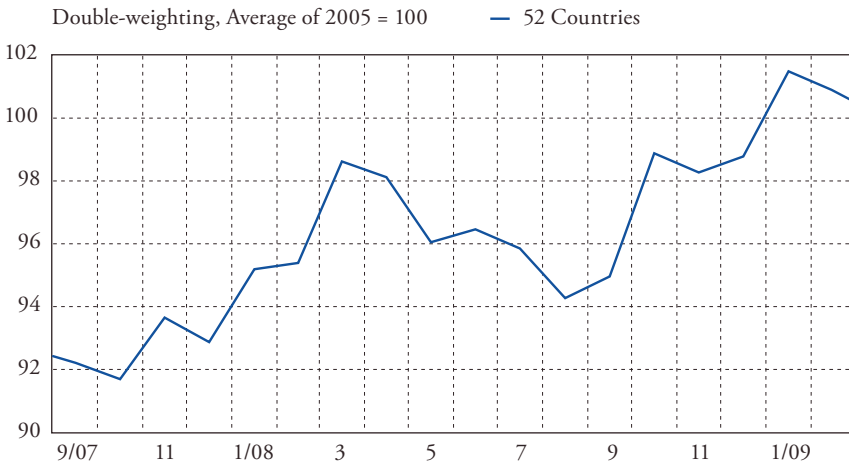


Figure 32: Effective Real Exchange Rate of CHF



by up to one year. From December 2008 to April 2009, the SNB conducted repo operations with a maturity of 3, 6, 9 and 12 months which were fully allotted against normal collateral. The objective was to diminish risk premia on the money market to prevent an unsuitable tightening of monetary conditions.

## 10. Has the Strategy Worked during the Financial Crisis?

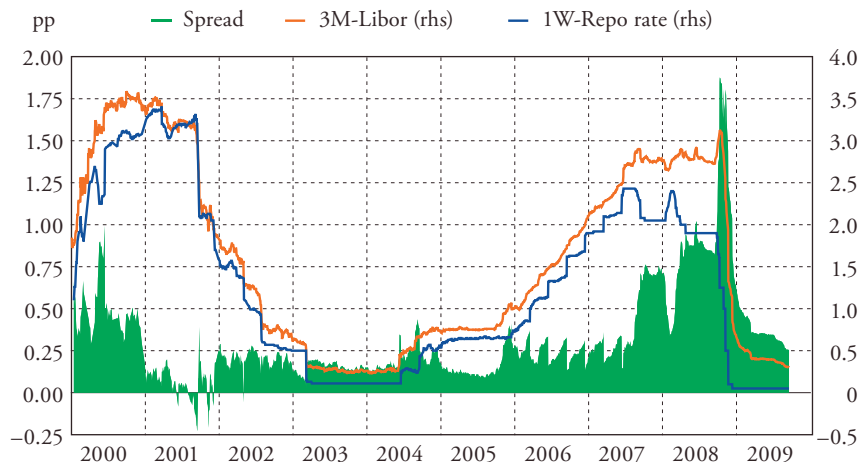
A major goal of the SNB in the current financial crisis was to preserve the monetary policy stance. To achieve this goal it had to ease tension in the money markets. Has the SNB accomplished it? It turns out that the SNB's measures have been effective in stabilizing financial conditions in line with its intentions.<sup>49</sup> The challenge was posed by the fluctuations in the 3M Libor. The key to its stabilization at the intended level consisted in offsetting the sharp rise in the risk premia on the Libor – measured as the spread between the 3M Libor (an unsecured rate) and the 1W-Repo (a secured rate) – by subsequently setting the 1W-Repo rate lower (and injecting a sizeable amount of liquidity into the banking system if required). The risk premia rose from a few basis points before July 2007 to more than 175 basis points at the height of the financial turbulences. During 2009 the spread gradually declined but remained above its pre-crisis average (Figure 33). The volatile path of risk premia made steering the 3M Libor more difficult.

After a first spike in the second half of 2007, risk premia for unsecured money market transactions fell again at the beginning of 2008, which led to an undesired decrease in the 3M Libor. In order to keep the Libor in the middle of its target range, the rate for 1W-Repo transactions was gradually raised from 2.05 percent to 2.40 percent until mid-February. Then, the increase in the risk premia in connection with the problems at Bear Sterns in March 2008 was counteracted by a reduction in the 1W-Repo rate to 1.90 percent. In turn, the 3M Libor could, again, be stabilized at the desired level.

In September, following the collapse of Lehman Brothers, risk premia rose even more sharply, pushing the 3M Libor up to 3.13 percent, i.e. about 40 basis points above the midpoint but still within the target range. The SNB responded by lowering the 1W-Repo rate to 1.60 percent. After the target range had been lowered to 2.00–3.00 percent on October 8, 2008, the 3M Libor briefly moved outside the range, prompting the SNB to further cut the 1W-Repo rate to 1.25

49 For the experience with the strategy before the outbreak of the subprime crisis in 2007, cf. JORDAN (2007b) and ROTH (2006; 2007).

Figure 33: Spread between 1W-Repo Rate and 3M-Libor



percent and offer repo transactions at terms of several months. The three subsequent reductions in the target range for the 3M Libor down to 0.00–1.00 percent were accompanied by corresponding cuts in the 1W-Repo down to 0.05 percent. The rate for 1W-Repo transactions has remained at this level since December 11, 2008. It is the lowest SNB rate since the introduction of (electronic) repo transactions in April 1999. As a result, the risk premia were brought down faster than in other currencies. The flexibility incorporated in the SNB strategy may also have contributed to this outcome.

A related feature of its operational approach, which also proved to be particularly advantageous during the current crisis, is that the SNB can change its repo rates without much fanfare and at short notice while central banks that are geared to a very short-term (repo) rate must announce a change in the key interest rate every single time.

Due to the risk premium, it took a while for the 3M Libor for Swiss francs to approach the aimed-for mid-point of the (asymmetric) target range agreed in March 2009. Since very short-term repo rates are practically at the zero lower bound, does this mean the end of the SNB's monetary policy strategy? We believe not. The EUR/CHF swaps, together with the three unconventional measures taken since March 2009, led to a marked increase in liquidity. The forex interventions, geared primarily towards forestalling deflation, proved successful; and the appreciation trend of the Swiss franc was broken, as intended. Central to the

Figure 34: Nominal Exchange Rate CHF/EUR

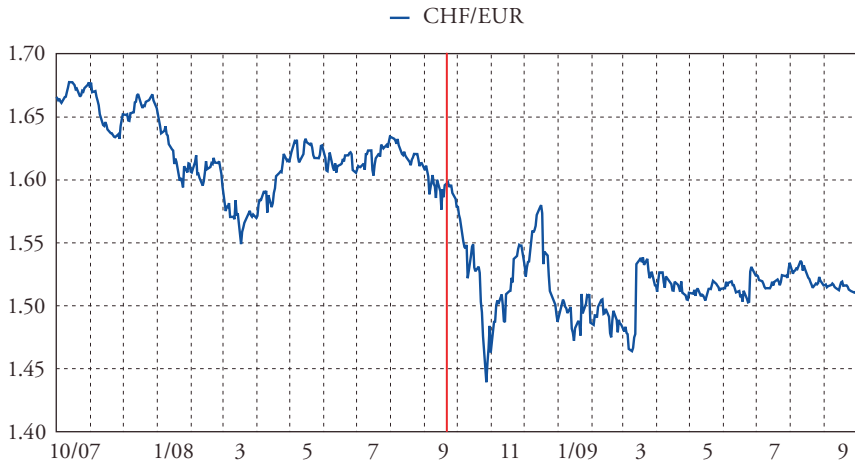
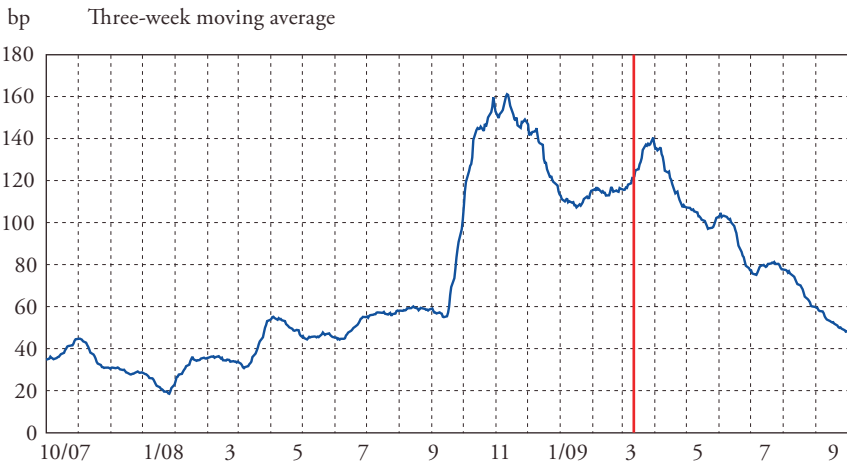


Figure 35: Three-Year Aggregate Credit Risk Premium of all Bonds over a Period of Two Years Ending 29 September 2009





liquidity injections into the capital market was a reduction in the risk premia; this was since observable and has made borrowing cheaper. The long-term repo transactions further enhanced liquidity in the banking system. Given their effectiveness, the three unconventional measures were confirmed at the monetary policy assessment of mid-June 2009. At the mid-September assessment, the SNB reiterated its intention to provide the economy with a generous supply of liquidity and to continue to act decisively to prevent any appreciation of the Swiss franc against the euro. It was announced that the purchases of Swiss franc bonds would be maintained if necessary.

The monetary policy strategy proved successful in coming to grips with unprecedented events during the financial crisis. Consequently, neither the public nor the media called it into question.

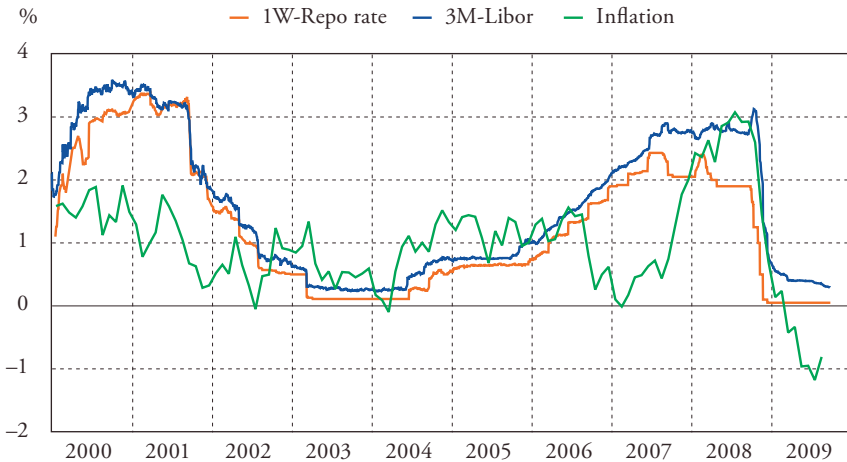
## 11. Crucial Questions

In this section we address some critical questions linked to the SNB's strategy. The first is whether the definition of price stability is appropriate. The second relates to the appropriateness of the 3M Libor as the operational target. We then ask about the set of information underlying monetary policy decisions. The fourth question revolves round the type of inflation forecast to be published. The next question relates to the degree of transparency, and the final one pertains to the flexibility of the strategy.

### *11.1 Is the Definition of Price Stability Appropriate?*

The monetary policy success notwithstanding, the question arises whether the attained level of inflation, while commensurate to the SNB's mandate, has not been too low. There is a broad awareness that below a certain inflation rate, the benefits of reduced microeconomic distortions gained from price stability are outweighed by the costs of short-term nominal interest rates too frequently approaching the zero lower bound and of nominal wage rigidity. This argument underlies the view that a central bank should try to preserve a buffer zone for the inflation rate in normal times. With an inflation rate that is too low, short-term interest rates are likely to be close to zero, raising the probability of deflation and a binding zero bound on the nominal interest rate – which poses a threat to output stability. In such a situation a central bank may want to make short-term real rates negative, but this is impossible if the inflation rate is zero or even

Figure 36: 1W-Repo Rate, 3M-Libor and CPI



negative. If inflation is expected to fall below zero, the real rate will rise, resulting in an effective tightening of monetary conditions. As a result, the economy may be less stable when inflation is kept too low on average. Twice this decade, Swiss short-term interest rates have almost reached the zero lower bound, and the probability of possible deflation rose significantly.

Does this buffer argument suggest that any positive rate of inflation of less than two percent is too ambitious and that – also contrary to SNB practice – it is of material importance whether this rate is closer to two percent or less than one percent over the long term? How does the SNB compare with other central banks in this respect? According to a survey of practices at 20 IT central banks, the eight rich countries in the sample use either 2 percent or 2.5 percent as the midpoint of their target range.<sup>50</sup>

From this comparison we deduce that the SNB's *thinking* about what represents price stability is in line with a handful of comparable central banks in industrialized countries. However, its quantitative definition – annual inflation below 2 percent – is somewhat *more ambitious* than in the latter. Thus, the fact that Switzerland flirted twice with the zero lower bound over the past 10 years

50 Cf. BERG (2005, p.23).

while other industrialized countries (apart from Japan) did so only in the course of the current financial crisis suggests that the reason may indeed be a lack of a buffer due to the country's traditionally lower *realized* inflation rate and, hence, lower interest rates than abroad.

Could a more moderate interest rate policy have prevented the 1W-Repo rate from essentially hitting the zero lower bound in two instances, from April 2003 to mid-June 2004 (when it was fixed at 0.11 percent) and since mid-December 2008, with a rate set at 0.05 percent. As first argued by GOODFRIEND (1991) the likelihood of hitting the zero lower bound depends on how much a monetary authority has to move short-term interest rates to affect longer-maturity rates and thus aggregate demand. The longer an interest rate reduction is expected to persist into the future, the greater the impact it will have on long-term interest rates and aggregate demand and inflation. The more gradually the central bank changed interest rates in response to most shocks in times when a zero-bound episode is not threatening, the smaller the size of interest rate moves needed to counter a fall in demand and the lower the likelihood that the central bank will have to bring its rates down to zero. In order to make it more probable that the conventional interest rate policy will still be feasible upon the emergence of large demand shocks, such an approach entails moving rates by less in response to most shocks. However, the downside to these tactics would be increased variability of inflation and output.

Should a relaxation in the definition of what constitutes price stability, say in line with the ECB, be considered? Following a comprehensive review of its strategy in 2003, the ECB Governing Council confirmed the explicit quantitative definition announced in 1998 but explained that it aimed to maintain inflation rates "below, but close to, 2 percent" over the medium term. The clarification emphasized the need for a safety margin against the risk of deflation which was also sufficient to cover the potential presence of a measurement bias in the price index as well as the consequences of inflation differentials within the currency union.<sup>51</sup> Unlike the euro area Switzerland does not face significant persistent inflation differentials among its regions that would necessitate changing the quantitative definition of price stability. And given the variability of Swiss inflation resulting from the openness of its economy, fine-tuning the inflation rate is doomed to failure. Widening the value for annual inflation in the definition of price stability, for instance to two percent, would not seem to be beneficial for the Swiss economy either. First of all, two percent inflation per annum

51 Cf. ISSING (2004, p. 175).

cannot be equated with price stability.<sup>52</sup> It would in all likelihood also raise inflation (expectations) and nominal interest rates permanently – leading to indexation mechanisms in the economy which would perpetuate inflation – and yet have only very uncertain effects in terms of escaping the zero lower bound trap. In this connection it is worth bearing in mind that the zero lower bound is less of a problem for the conduct of monetary policy because there is arguably little downward wage rigidity in Switzerland owing to the SNB's credibility in terms of maintaining a low-inflation regime.<sup>53</sup> Moreover, as explained in Section 9, once the zero lower bound trap snaps shut, the SNB can have successful recourse to unconventional policy tools. We thus conclude that a value for annual inflation between zero and two percent represents an optimal level of inflation for the Swiss economy.

### *11.2 Is the 3M Libor an appropriate operational target?*

Two questions arise in this context. The first is about the ability to control an interest rate with a three-month term. The second relates to the economic relevance and accuracy of the Libor.

A fundamental critique that may be leveled against the strategy of the SNB is that the reference interest rate is not under its direct control. Central banks, some observers maintain, can only control the overnight rate, but not longer-term rates exhibiting risk premia. The SNB's operational approach proved the contrary even under severely stressed market conditions. It is true that the SNB cannot control the 3M Libor perfectly because it is driven by expectations about future overnight rates and is subject to a liquidity, credit and term risk premium which can vary widely. Owing to these properties of its reference rate, the SNB has to communicate its monetary policy intentions openly and clearly, and act accordingly. If the 3M Libor moves ahead of the next monetary policy assessment in accordance with the SNB's aim, it stands on the sidelines. Otherwise the SNB adopts measures to keep the reference rate at the announced level. These measures mainly comprise verbal interventions by the Governing Board and also changes in the repo rate or the liquidity provision.<sup>54</sup> Over the years, the SNB has acquired

52 At an annual inflation rate of one percent it takes 70 years for the price level to double, whereas it takes only 35 years for the price level to double if the annual rate of inflation is two percent.

53 While wage flexibility is relatively high, the country faces higher price stickiness than the US or the euro area (cf. KAUFMANN, 2009), which explains the comparably extensive lag between monetary policy impulses and the response of the economy outlined in Section 4.

54 Cf. RANALDO and ROSSI (2010).

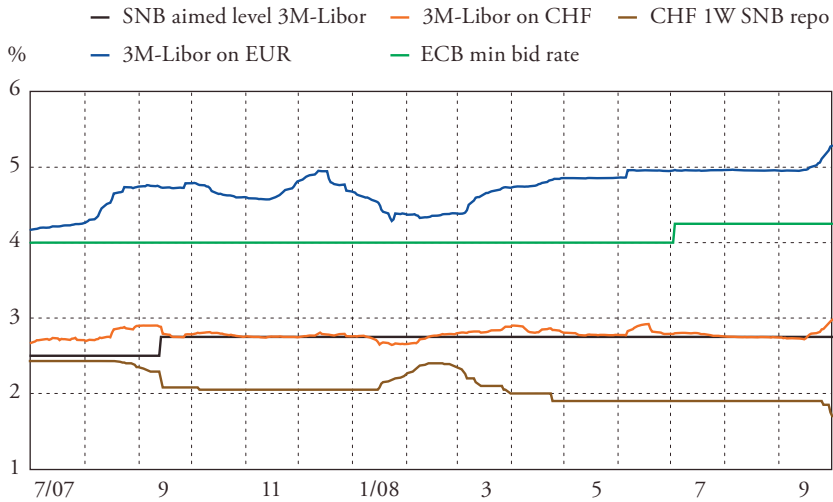
the necessary skills to steer the 3M Libor. Although it cannot be controlled precisely, the SNB has learned how to keep it sufficiently close to its policy target. The high (positive) correlation between the 1W-Repo rate and the 3M Libor rate observable during most of the past decade bears witness to the SNB's ability to keep the reference interest rate under tight control.

In the financial crisis market participants became increasingly aware that the Libor incorporates a risk premium. For years the risk premium was small. During the crisis, trading in 3M Swiss franc interbank loans diminished due to an abrupt loss of confidence on the interbank market. In turbulent times, a three-month maturity is very long. Accordingly, the risk premium increased substantially and became volatile. At the same time some observers argued that the Libor does not accurately reflect the borrowing costs in the unsecured interbank market. The ensuing discussion among market specialists could not uncover any systematic mispricing in the Libor (cf., for example, SCHLEGEL, 2009). A survey conducted by the SNB came to the conclusion that the Libor remains by far the most important benchmark rate for credit and derivative pricing in the Swiss franc business. Importantly, the diminished trading activity on money markets did not reduce the credit supply in the Swiss economy. Unlike other countries, credit activity in Switzerland was not interrupted in the wake of the financial crisis.

By steering an interest rate that directly influences private-sector credit costs and thus final domestic demand, the SNB succeeded in maintaining a monetary policy stance which at least partly shielded the domestic economy from the surge in the level and volatility of money market risk premia. Thanks to this operational approach, the SNB arguably achieved a better stabilization of a key interest rate than other central banks that target the overnight rate. For instance, as is shown in Figure 37, from September 2007 to June 2008 both the ECB and the SNB pursued an "unchanged monetary policy stance". An identical policy objective brought forth striking differences in its effects on the money market. While the SNB's policy intention was reflected in slight fluctuations of the Swiss franc 3M Libor around the aimed-for level, the 3M euro Libor exhibited a significantly higher deviation from the ECB's policy rate. The stabilization of the 3M Swiss franc Libor was the result of the "automatic monetary stabilizers" in the form of fluctuations in the repo rate.<sup>55</sup> By contrast, the ECB kept its minimum bid rate fixed, which enhanced the volatility in the Euribor. We can conclude that the 3M Libor operational target served the SNB well before and during the crisis.

55 Cf. KOHLI (2008).

Figure 37: 3M-Libor and Repo Rates

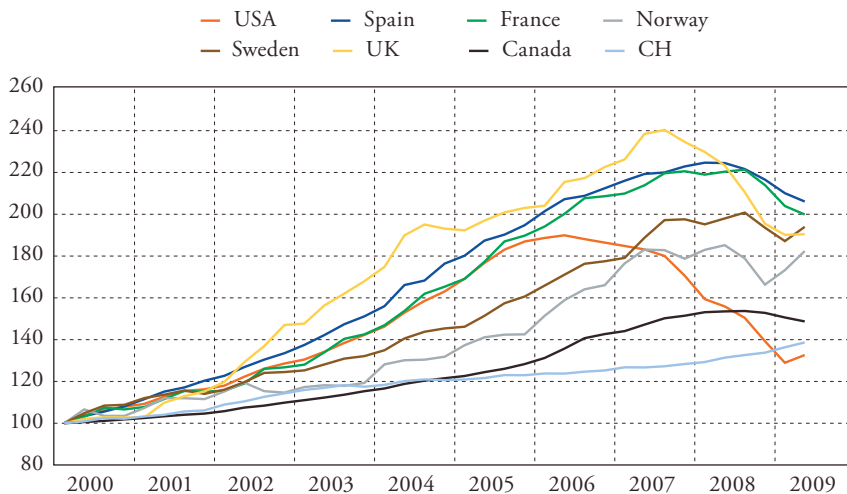


### 11.3 Do Policy Decisions Take into Account all the Relevant Information Available?

The use of narrow inflation targets with one- to two-year horizons has been punished by a failure to manage the credit boom and bust of the last few years. As consumer prices were depressed over the past decade by rapid globalization and technological leaps, central banks, many observers maintain, persisted in setting interest rates with reference to CPI targets and largely ignored huge parallel bubbles in credit and housing markets. As a result, central banks were eventually forced into unprecedented monetary policy remedies to cope with the fallout, discarding explicit or implicit inflation targets in the process.

Did the information set on which the SNB has based its decisions miss decisive elements for the conduct of a successful monetary policy? We believe not. For one thing, its main indicator for future policy decisions, an inflation forecast looking three years ahead, takes into account all relevant information such as the predictions of money models, among other models, with their (albeit imperfect) focus on financial behavior in the transmission mechanism. In addition, a continued emphasis on the role of money and credit in evaluating inflation perspectives has been a distinguishing mark of its inflation forecast-based strategy from

Figure 38: Housing Prices



the beginning.<sup>56</sup> For this reason the SNB regularly analyzed and presented the change in the monetary conditions in its press releases, comprising the growth rate of money and credit aggregates as well as the situation on the domestic real estate market. And in contrast to other industrialized countries, Switzerland was not hit by any credit or real estate bubble in the past decade. Note also that the strategy allows for reactions to the build-up of unbalances even if they have no immediate impact on inflation.

#### 11.4 What Type of Inflation Forecast Should We Publish?

In recent years an intensive debate arose about the type of inflation forecast a central bank should publish. A central bank may or may not announce the policy rate underlying projections of inflation (and other target variables). If it opts for an announcement, the question is about the interest rate assumption to be published. Three options are in principle available. The monetary policymaker can either assume an interest rate path given by market expectations of future rates,

56 Contrary to the ECB, the monetary analysis is not a separate pillar of its strategy. Nor did the SNB define a reference value for the growth rate of a monetary aggregate.

an explicit rate path that can be interpreted as an optimal interest rate plan, or a constant interest rate.

A major drawback of conditioning inflation forecasts on market expectations is the limited ability to predict future monetary policy actions over a longer period. Inflation forecasts based on policymakers' planned interest path appear to be superior to market expectations because the central bank may have more information pertinent to the future course of monetary policy than the market. Market expectations may adjust quickly to a central bank's communication about how it perceives the economic outlook, rendering the transmission of monetary policy impulses to the economy more efficient. As explained in Section 2, the SNB publishes its inflation forecasts predicated on keeping the 3M Libor decided at the last policy assessment constant over the entire forecast horizon. The conditional inflation forecasts published by the SNB convey similar information to an interest rate forecast but without the disadvantages, such as careful and costly explanations in case of forecast errors, reduction in monetary policy flexibility (implicit commitment of the Governing Board), and the risk of diverting public attention from the central bank's main objective.<sup>57</sup> Inflation forecasts based on constant interest rates over a long horizon are likely to be unrealistic and prone to other shortcomings. However, in the end, they may prove less serious than those arising from forecasts resting on market expectations or on policymakers' optimal interest rate paths. The SNB circumvents the inadequacies of its approach by giving the market a clear guidance on how to interpret the forecasts. So far there has not been any convincing reason why the SNB should abandon this practice.

### *11.5 Is the SNB Transparent?*

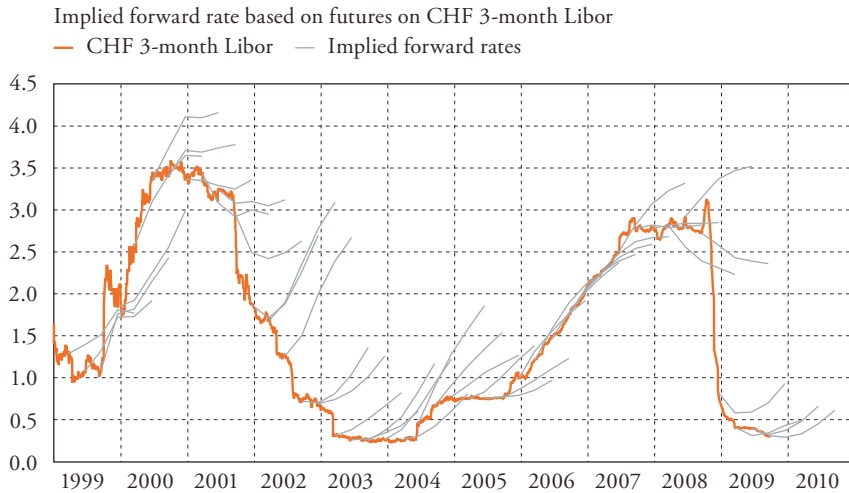
The SNB commits itself to regular and open communication of its strategy, its interpretation of incoming macroeconomic data, the decision-making process, the economic outlook and the view for future policy moves to align market expectations with its own intentions.<sup>58</sup> Figure 39 compares the path of the 3M Libor with market expectations and indicates the extent to which market participants anticipated central bank actions. The heavier line represents the 3M Libor while

57 The forecasting quality of the SNB's conditional inflation forecasts is documented in SAVIOZ and GANARIN (2010). For more on the SNB's attitude to alternative ways to condition inflation forecasts cf. JORDAN (2008b), and JORDAN and ROSSI (2009).

58 Cf. ROTH (2002) and JORDAN (2007a).



Figure 39: Money Market Rate Expectations



*Notes:* Each three-month forward rate yield curve is illustrated using prices of the quarterly issued interest rate futures (Euroswiss 3M) with maturities of 3, 6, 9 and 12 months, which are shifted into the future in line with their maturity. Because Euroswiss 3M-Futures are issued in March, June, September and December, assessments of market expectations are depicted on a quarterly basis. The start date of the yield curves is given by the expiration date of the futures, i.e. the third Monday of the month of expiration.

the thinner lines portray forward rate yield curves. Forecast errors occur when the lighter lines are above the heavier line (overestimation of the 3M Libor) or below it (underestimation of the 3M Libor).

The chart reveals some interesting facts, in particular some persistency in forecast errors. The 3M Libor was underpredicted during the first monetary policy phase (upward shift in the reference rate). By contrast, in the second phase (reference rate cuts) the size of the 3M Libor was overpredicted.<sup>59</sup> In the third phase (rate normalization) interest rate decisions corresponded with market expectations, except for at the beginning when markets expected more aggressive policy

59 Note that this observation is not unique to Switzerland but holds for other countries as well, as documented by MACKIE (2007). Mackie's sample does not include the current financial crisis. However, MACKIE reports that from 2004–2006, the last three years in his sample, the forecast errors in the Swiss market were the second smallest out of 10 currency areas, including the US, the euro area, Japan, Britain, Sweden, Norway, Canada, Australia, and New Zealand.

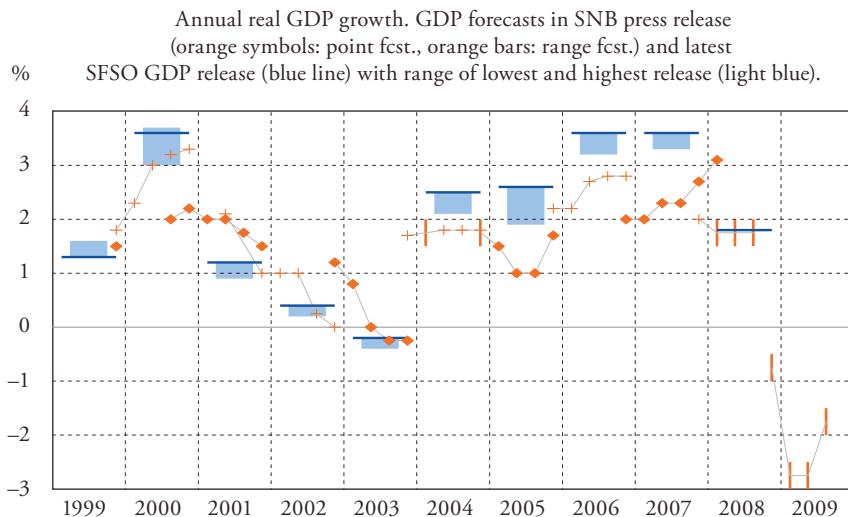
moves. In the fourth phase interest rate decisions again proved difficult to anticipate, which is less of a surprise given the heavy market turbulences that characterized this policy phase. Interestingly, predictions were no longer systematically wrong in the same direction.

In view of the difficulties of market participants to foresee monetary policy decisions, the question arises whether the SNB made good its promise on transparency and predictability or whether it only paid lip service to it. In order to answer the question it is important to distinguish between uncertainty about the shape of the SNB's reaction function, which causes systematic errors in predicting monetary policy moves, and the arrival of unanticipated shocks wrong-footing the SNB itself. Expectation errors may be due either to inadequate or insufficient communication, a radical change in the macroeconomic landscape compelling the monetary authority to abruptly change its policy course, or conscious attempts to surprise market participants.

As the evidence suggests, the SNB kept the markets and the public regularly informed through different communication channels.<sup>60</sup> Notwithstanding its regular efforts to keep the public abreast of its thinking and intentions, the arrival of shocks demands swift changes to previous plans. This occurred on several occasions, as shown in chart 40, which compares quarterly GDP forecasts made public by the SNB with the latest GDP figures released by the Swiss Federal Statistical Office. A “+” means a seasonally adjusted annualized rate (saar) GDP forecast in even years while a “◆” points to a forecast in odd years. The lines link forecasts belonging to the same year. Hence, the first GDP forecast for 2000, announced in 1999 Q4, amounted to 1.8 percent. It was continuously revised up to 3.3 percent. Forecasts for 2001, beginning with around 2 percent issued in Q3 2000, were subsequently revised downward to 1.5 percent in Q4 2001. Forecasts for 2002 were revised downwards even more, from in the order of 1 percent in Q4 2001 to zero growth at the end of 2002. The expected growth dynamics pertaining to 2003 fell even more markedly, from an estimate of just over 1 percent released in Q4 2002 to roughly -0.5 percent in the second half of 2003. The economic outlook for 2004 brightened appreciably, which was reflected in a growth forecast between 1.5 and 2 percent for the year. For 2005 the first growth forecast was 1.5–2.0 percent and the last value announced in the last quarter was just over 1.5. By contrast the growth outlook for 2006 was marked up from just over 2 percent to close to 3 percent. A similar GDP performance was expected for 2007. As for the expectations of 2008, they were set at about 2 percent in Q4

60 Cf. RANALDO and ROSSI (2010).

Chart 40: SNB GDP Forecasts and SFSO GDP Releases



2007 and then in a range of 1.5 and 2 percent. The outlook for 2009 darkened considerably from the first estimate of  $-0.5$  to  $-1$  percent communicated at the end of 2008 down to  $-2.5$  to  $-3.0$  percent announced in Q2 2009, followed by a marked upward revision in Q3 of  $-1.5$  to  $-2$  percent.<sup>61</sup>

As can be inferred from the chart, the massive interest rate cuts from 2001 to 2003 and again in 2008 were the response to the arrival of new information which suggested severe shifts in the macro landscape and required a policy adjustment. While the difference between the first and the final growth prediction was still contained in 2001, it widened to  $-1$  percentage point in 2002 and  $-1.5$  percentage points in 2003. The largest adjustment came about in 2009 with a growth revision of  $-2$  percentage points. The SNB could not help slashing

61 In general the Figure points to a disturbing systematic underestimation of both cyclical downturns and upturns. Forecasting GDP growth is quite a complex process. RUOSS and SAVIOZ (2002) found on the basis of 766 observations by 14 different institutes, including the SNB, that the forecasts of Swiss GDP made during the year for the current year or in the autumn for the following year are both informative and clearly better than naive forecasting methods. However, even the forecasts made at year-end for the current year still had an average forecast error of about 0.5 percentage points. Moreover, CUCHE-CURTI, HALL and ZANETTI (2008) found that Swiss GDP revisions are large. Via its effect on output gaps, the inaccuracy of GDP estimates risks inducing a procyclical bias in monetary policy.

interest rates out of consideration for inflation and growth.<sup>62</sup> However, while an upward growth revision for 2000 of +1.5 percentage points gave rise to a tightening in the 3M Libor of 150 basis points, an improvement in the growth prospects for 2006 and 2007 of +1 and +1.1 percentage points, respectively, resulted in a rate increase of only 100 basis points per year.<sup>63</sup>

Overall, these observations suggest that when the macroeconomic situation shifts abruptly, participants in the financial markets will find it more difficult to predict monetary policy actions, even in the next few months and even with good communication by the central bank. As suggested in Section 7 transparency is not a goal in itself. From time to time *unanticipated* policy moves may prove necessary to align market expectations when they are out of kilter with those of the central bank.<sup>64</sup> This is particularly true in times of major financial market uncertainty. JORDAN, RANALDO and SÖDERLIND (2009) show that the reaction of the 3M Libor to repo rate changes and changes to the target range depends on the market environment. In normal times repo operations are instrumental in smoothing the 3M Libor and thus the monetary policy stance. During turbulent phases, by contrast, *unexpected* changes in the target range (together with a larger liquidity provision through repo operations) have the strongest impact on the level of the 3M Libor.

### *11.6 How Flexible is the SNB's Strategy?*

JORDAN, RANALDO and SÖDERLIND (2009) argue that the most noticeable characteristic of the SNB's strategy is a balance between the long-term objective of price stability and a pragmatic short-term flexibility in the implementation of the monetary policy. Indeed, the strategy turned out to be very flexible along different dimensions. It not only offered ample scope for adding new forecast models and indicators while retracting outdated ones, but it also ensured the autonomy necessary to conduct a policy of stability. The fact that the inflation forecast is only the main indicator and not a target to be met also allowed the Governing Board to take decisions that were not necessarily closely linked to the inflation forecasts but the result of judgment, a broadening of the horizon for the conduct of policy, and a careful risk assessment. As the financial crisis unfolded, the functioning and stability of the money market received more emphasis and, as the turmoil in

62 The variability in the growth forecasts explain to a certain extent the q-o-q changes in the final forecast value for inflation deployed in Table 1.

63 As we argued in Section 8.1, this reticence in tightening was probably inappropriate.

64 Cf. JORDAN (2007a).

financial markets deepened, new policy instruments and actions fully consistent with its strategy could be taken at short notice. JORDAN, RANALDO and SÖDERLIND (2009) show empirically that the short-term flexibility in the SNB's implementation process allowed for a regular provision of liquidity in normal times and a swift response to exogenous financial market shocks one the one hand and the achievement of the intended policy stance in distressed periods on the other. The Swiss franc funding facility introduced to accommodate a high demand for Swiss francs coming from foreign banks in the euro area with no direct access to SNB operations had the planned effect of reducing the 3M Libor.

The SNB's operating framework is characterised by a high degree of flexibility along several dimensions, ranging from repo rate settings to the allotment of liquidity at repo auctions and their frequency. Flexibility has to be dealt with carefully, however. Excessive flexibility can impair transparency and risk a loss in the credibility it has built up with regard to its ability to preserve price stability. In order to avoid potentially detrimental effects to its credibility, the SNB is committed to clear and timely communication of its decisions and to implementing them as announced. This way, the central bank increases its effectiveness and, in turn, contributes to its credibility with regard to its ability to preserve price stability in the medium term.

## 12. Conclusions

At the end of the 1990s the SNB put in place a new framework for the conduct of its monetary policy. This was aimed at guaranteeing a certain continuity for Swiss monetary policy in order to maintain the good reputation for committing to price stability that it had built up in the past. The strategy proved remarkably successful. It helped the SNB to rapidly re-establish the credibility of its policy procedure, which had been gradually undermined under monetary targeting in the second half of the 1990s, and contributed to an impressive performance in spite of an economic climate characterized by dramatic international turbulence and major monetary policy challenges.

Thanks to the width of the target range and the choice of a reference interest rate for three-month loans, the SNB has had the necessary flexibility to respond rapidly to distortions in the financial markets, yet without casting doubt on its underlying policy direction. The announcement of an explicit definition of what constitutes price stability has not constrained short-run policy. The SNB acknowledges that there will be periods when the two percent level will be breached but refrains from setting out a contingent strategy in the event of

specific shocks or a precise time horizon to bring inflation back on target. Given that the monetary authorities of small, open economies can only affect the price level with long and uncertain lags, they cannot be overambitious and try to steer price developments in the short run. Accordingly, the SNB refrains from fine-tuning inflation. Nor would it resist a temporary deviation from the price stability zone if circumstances so demand. Consistent rule-based behavior is sufficient for the public and market participants to understand the way in which the SNB takes policy actions. Judgmental decisions by the Governing Board which need not be based entirely on an inflation forecast are fully consistent with the monetary policy strategy and its implied rule-like approach.

The monetary policy strategy embarked on ten years ago has been beneficial for the variables of ultimate interest. Inflation was kept within the price stability range. In addition, both inflation and GDP growth stabilized with respect to the past. The target range allowed the SNB to absorb the effects of market expectations about the future course of short-term rates on the 3M Libor. The strategy has been particularly successful during the current financial crisis thanks to its built-in “automatic monetary stabilizers”. By varying the repo rates the SNB kept its reference rate, to which mortgage, prime lending, and other retail interest rates are linked, at the intended level. This policy shielded the domestic economy to a very considerable extent from the surge in the size and volatility of the risk premia inherent in the 3M Libor during the financial turmoil. Successful monetary policy in the past 10 years has contributed to strengthening the SNB’s credibility which, in turn, has increased flexibility in the implementation of its strategy.

Reducing the target range for the 3M Libor has not been sufficient to counter the effects of an escalating financial crisis. Policy measures adopted by other central banks made it necessary to introduce unconventional measures in Switzerland as well. With a series of unprecedented operations the SNB revived the interbank money market. Both the conventional policy tools and the unconventional policy actions adopted were perfectly commensurate with the goal and operational framework set out by the monetary policy strategy. In many respects, the actions have been extensions of the traditional methods of operation to establish monetary conditions suggested by the inflation forecasts and the Governing Board’s general assessment of the inflation and economic activity outlook. Some measures have taken the central bank into new territory but were consistent with its monetary policy strategy.

Further challenges still lie ahead. The SNB’s suite-of-model approach is not riskless in the current market environment, for standard macroeconomic models are constructed to replicate normal conditions and regularities in the economy

and may fail to capture and incorporate historically exceptional events. A particular case in point is when large shocks or special circumstances arise, such as asset price bubbles or financial instability. The fact that the current financial problems may not be smoothly squared with inflation forecasts derived from models in which financial assets do not or only incompletely play an active role means that the importance of model-based policy-making must be re-weighted in favor of decisions driven more by simple indicators and good judgment.

Another challenge is the need to absorb the large amount of liquidity created in the last two years to tackle the financial crisis. At some point, when the economy recovers from recession, the SNB is going to have to drain the huge amount of liquidity in the economy and raise interest rates, which will reduce the SNB's balance sheet to a level consistent with price stability in the longer term. An exit strategy to unwind the extra monetary stimulus when market conditions improve raises two questions. The first is related to the tools to be used to withdraw this money, and the second is the question of when is the right time to do so. Technically, reversing the money flow poses no problems as the liquidity provided to the banking system comes largely in the form of short-term repos and currency swaps. When these operations expire without being rolled over, the additional monetary stimulus will be discontinued and the banks' reserves at the SNB drop automatically. In addition, the SNB can issue its Bills when it thinks fit in order to mop up excess liquidity and cease intervening on the foreign exchange markets. Private-sector bonds can be sold and interest rates in that market pushed up, thus helping the SNB to temper growth if the economy begins to overheat. Any (possible) delayed exit from the capital market will have to be compensated by other instruments.

Finding the right time to turn around the current policy course is a more intricate challenge. This will be decisive in order to ensure a non-inflationary recovery. In principle, the exit strategy for the SNB is endogenous to its monetary strategy. The trigger will be a fundamental change in its inflation forecast based on a coherent picture painted by a suite of different models and indicators. However, structural econometric models and indicators do not fully cover all the unconventional measures. Time-series models and indicators as well as judgment, taking into account an array of further information, will be required. The generally positive experience with the exit strategy enacted in 2004 gives us cause for optimism but also warns us against attaching too much importance to uncertainties about GDP growth and expected reactions of the foreign currency market.

A challenging question directly related to the SNB's strategy is whether asset prices should be considered in setting monetary policy. In the last 10 years the

SNB has taken asset prices into consideration in its inflation forecasts. Whether asset price developments should be countered by ‘leaning against the wind’ before finding expression in the inflation forecast remains an open issue.

All in all, based on the knowledge accumulated from 10 years of experience with the monetary policy strategy we conclude that the SNB was right to abandon monetary targeting without tying its hands with an inflation-targeting strategy excessively tailored to the vision of the functioning of a modern economy represented by the New Keynesian paradigm. Modern monetary theory now demonstrates that almost any additional friction – which, after all, brings the theoretical model closer to economic reality – implies that inflation targeting may not be optimal when interpreted relatively strictly. Although sharing many of the characteristics of the inflation targeting framework (same set of information, same tools for decision-making, and identical means of communication), the strategy did not force the SNB to attain a precise inflation target in a prescribed period. This allowed the Governing Board to use its judgment in taking monetary policy decisions, which is particularly important in turbulent times. At the same time, it succeeded in anchoring inflation expectations in accordance with the mandate conferred upon the SNB. The financial markets and the public seem to agree with the SNB’s actions. At no time have they seriously questioned their validity.

## Appendix

**Table 1: Final Value of the Inflation Forecasts and Underlying Interest Rate Assumptions**

Inflation forecast as of	Final forecast value	Quarterly change in forecast in bp	Interest rate assumption
Q4 1999	1.9%		1.75%
Q2 2000	1.6%	–30	3.50%
Q4 2000	1.5%	–10	3.50%
Q2 2001	1.2%	–30	3.25%
Q4 2001	1.75%	+55	1.50%
Q2 2002	1.9%	+15	1.25%
Q4 2002	<b>2.0%</b>	+10	0.75%
Q1 2003	2.5%	+50	0.25%



Inflation forecast as of	Final forecast value	Quarterly change in forecast in bp	Interest rate assumption
Q2 2003	2.5%	=	0.25%
Q3 2003	<b>2.8%</b>	+30	0.25%
Q3 2003	<b>3.0%</b>	+20	0.25%
Q1 2004	<b>3.0%</b>	=	0.25%
Q2 2004	<b>3.2%</b>	+20	0.50%
Q3 2004	<b>2.9%</b>	-30	0.75%
Q4 2004	<b>2.6%</b>	-30	0.75%
Q1 2005	<b>2.6%</b>	=	0.75%
Q2 2005	<b>2.4%</b>	-20	0.75%
Q3 2005	<b>2.6%</b>	+20	0.75%
Q4 2005	<b>2.7%</b>	+10	1.00%
Q1 2006	<b>2.4%</b>	-30	1.25%
Q2 2006	<b>2.7%</b>	+30	1.50%
Q3 2006	<b>2.3%</b>	-40	1.75%
Q4 2006	<b>1.9%</b>	-40	2.00%
Q1 2007	<b>1.8%</b>	-10	2.25%
Q2 2007	<b>1.9%</b>	+10	2.50%
Q3 2007	<b>2.0%</b>	+10	2.75%
Q4 2007	<b>1.5%</b>	-50	2.75%
Q1 2008	<b>1.5%</b>	=	2.75%
Q2 2008	<b>1.3%</b>	-20	2.75%
Q3 2008	<b>1.3%</b>	=	2.75%
Q4 2008	<b>0.6%</b>	-70	0.50%
Q1 2009	<b>0.3%</b>	-30	0.25%
Q2 2009	<b>0.7%</b>	+40	0.25%
Q3 2009	<b>2.3%</b>	+160	0.25%

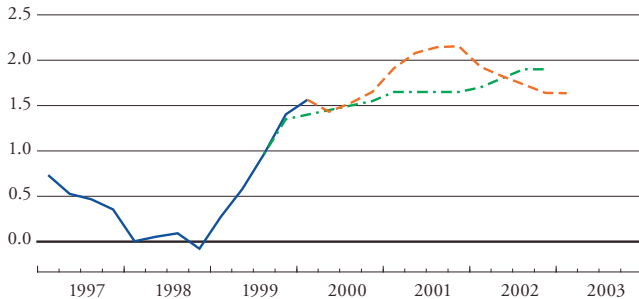
*Note:* The endpoint forecasts amounting to or exceeding 2 percent are shown in bold. Until the end of 2002 changes were semiannual.

I. *Inflation Forecasts Published by the SNB  
(Semi-Annually until December 2002,  
Quarterly since Q1 2003)*

2000

Inflation Forecast December 1999 (Libor = 1.75%) and June 2000 (Libor = 3.50%)

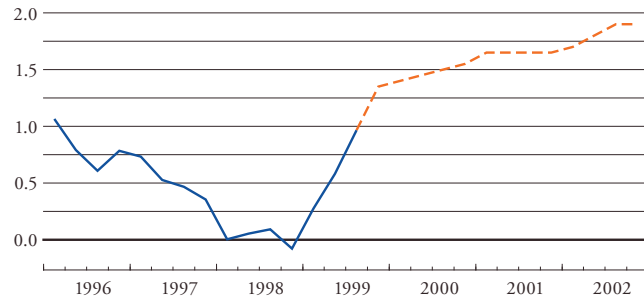
Percentage change in national consumer price index from previous year  
— Inflation — Forecast December 1999 (1.75%) — Forecast June 2000 (3.50%)



1999

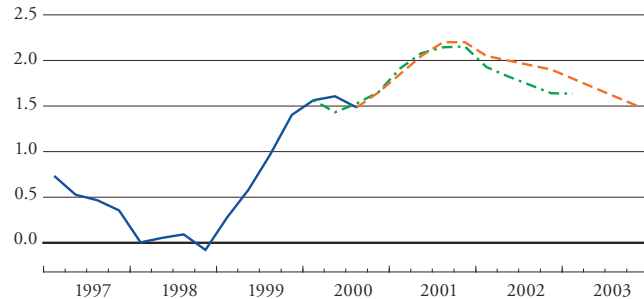
Inflation Forecast December 1999 (Libor = 1.75%)

Percentage change in national consumer price index from previous year  
— Inflation — Forecast December 1999 (1.75%)



Inflation Forecast June 2000 (Libor = 3.50%) and December 2000 (Libor = 3.50%)

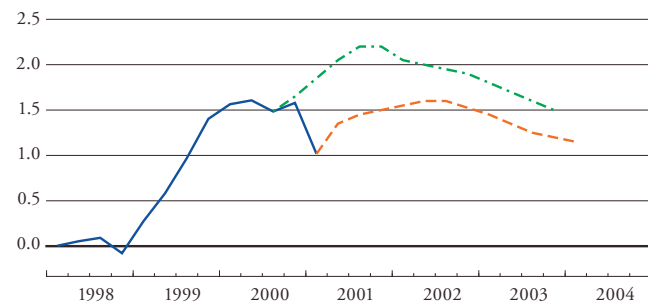
Percentage change in national consumer price index from previous year  
— Inflation — Forecast June 2000 (3.50%) — Forecast December 2000 (3.50%)



2001

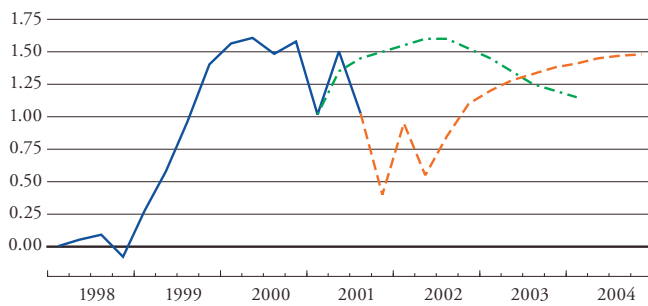
Inflation Forecast December 2000 (Libor = 3.50%) and June 2001 (Libor = 3.25%)

Percentage change in national consumer price index from previous year  
 — Inflation — Forecast December 2000 (3.50%) — Forecast June 2001 (3.25%)



Inflation Forecast June 2001 (Libor = 3.25%) and December 2001 (Libor = 1.75%)

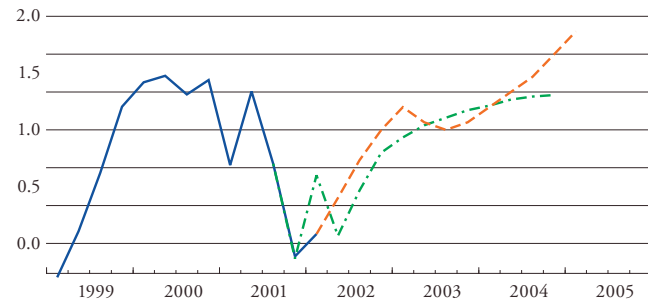
Percentage change in national consumer price index from previous year  
 — Inflation — Forecast June 2001 (3.25%) — Forecast December 2001 (1.75%)



2002

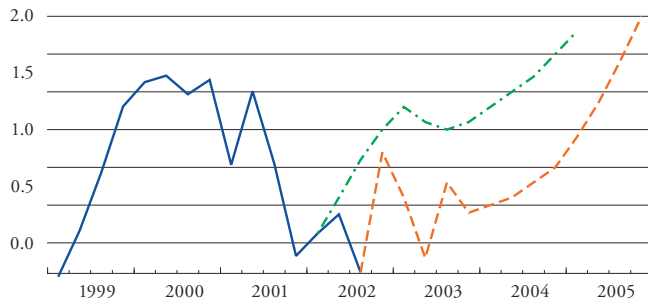
Inflation Forecast December 2001 (Libor = 1.75%) and June 2002 (Libor = 1.25%)

Percentage change in national consumer price index from previous year  
 — Inflation — Forecast December 2001 (1.75%) — Forecast June 2002 (1.25%)



Inflation Forecast June 2002 (Libor = 1.25%) and December 2002 (Libor = 0.75%)

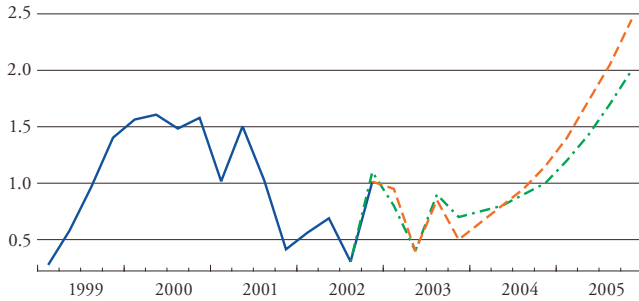
Percentage change in national consumer price index from previous year  
 — Inflation — Forecast June 2002 (1.25%) — Forecast December 2002 (0.75%)



2003

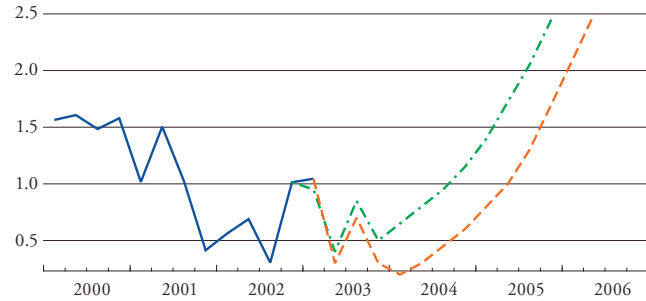
Inflation Forecast December 2002 (Libor = 0.75%) and March 2003 (Libor = 0.25%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast December 2002    - - Forecast March 2003



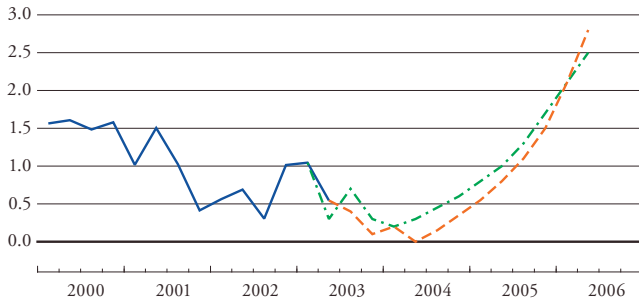
Inflation Forecast March 2003 (Libor = 0.25%) and June 2003 (Libor = 0.25%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast March 2003    - - Forecast June 2003



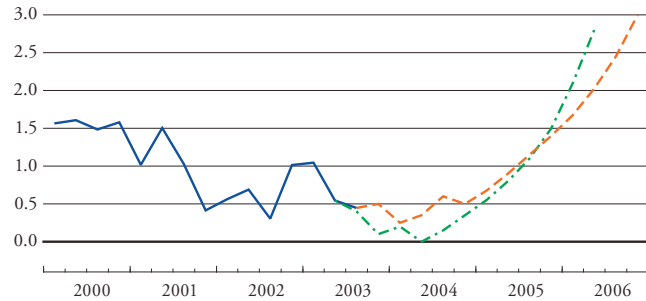
Inflation Forecast June 2003 (Libor = 0.25%) and September 2003 (Libor = 0.25%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast June 2003    - - Forecast September 2003



Inflation Forecast September 2003 (Libor = 0.25%) and December 2003 (Libor = 0.25%)

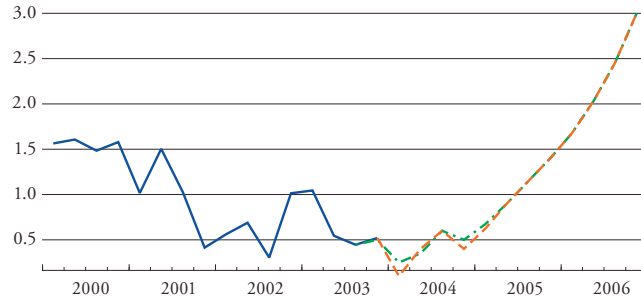
Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast September 2003    - - Forecast December 2003



2004

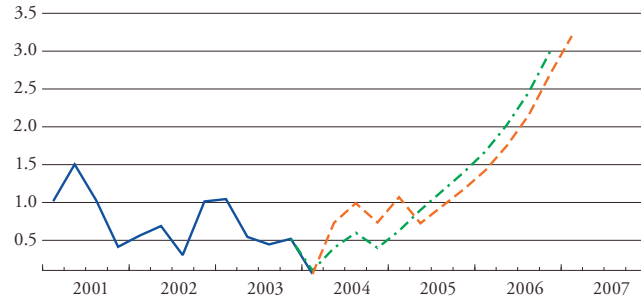
Inflation Forecast December 2003 (Libor = 0.25%) and March 2004 (Libor = 0.25%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast December 2003    - - Forecast March 2004



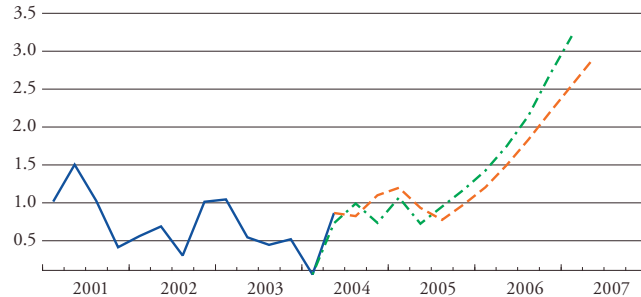
Inflation Forecast March 2004 (Libor = 0.25%) and June 2004 (Libor = 0.50%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast March 2004    - - Forecast June 2004



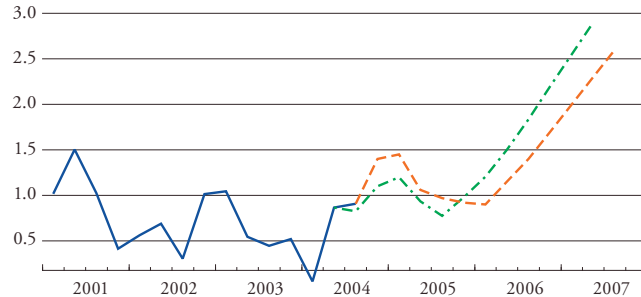
Inflation Forecast June 2004 (Libor = 0.50%) and September 2004 (Libor = 0.75%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast June 2004    - - Forecast September 2004



Inflation Forecast September 2004 (Libor = 0.75%) and December 2004 (Libor = 0.75%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast September 2004    - - Forecast December 2004

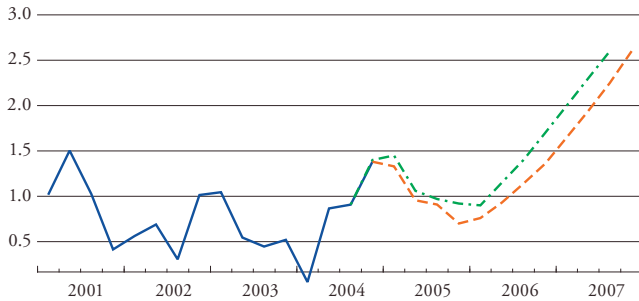


2005

Inflation Forecast December 2004 (Libor = 0.75%) and March 2005 (Libor = 0.75%)

Percentage change in national consumer price index from previous year

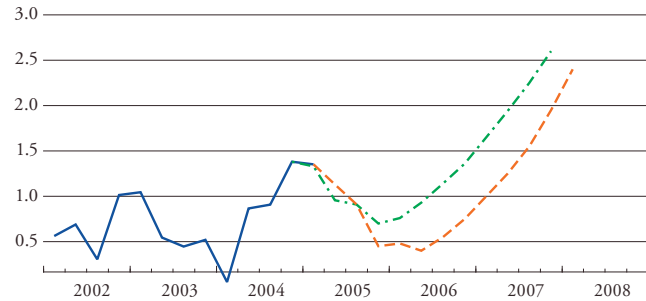
— Inflation    - - - Forecast December 2004    - - - Forecast March 2005



Inflation Forecast March 2005 (Libor = 0.75%) and June 2005 (Libor = 0.75%)

Percentage change in national consumer price index from previous year

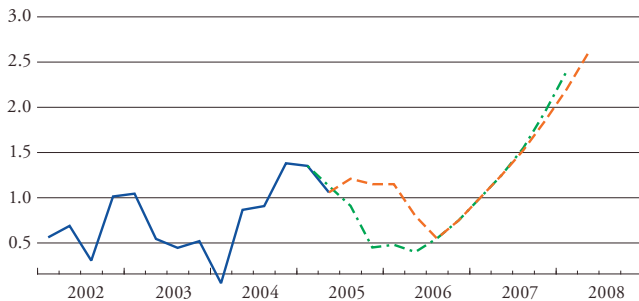
— Inflation    - - - Forecast March 2005    - - - Forecast June 2005



Inflation Forecast June 2005 (Libor = 0.75%) and September 2005 (Libor = 0.75%)

Percentage change in national consumer price index from previous year

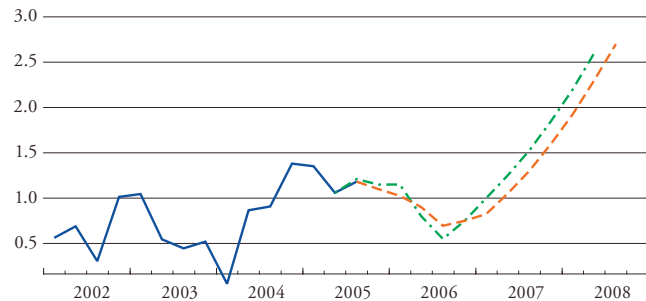
— Inflation    - - - Forecast June 2005    - - - Forecast September 2005



Inflation Forecast September 2005 (Libor = 0.75%) and December 2005 (Libor = 1.00%)

Percentage change in national consumer price index from previous year

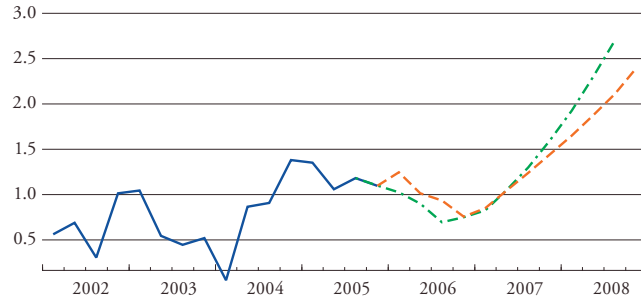
— Inflation    - - - Forecast September 2005    - - - Forecast December 2005



2006

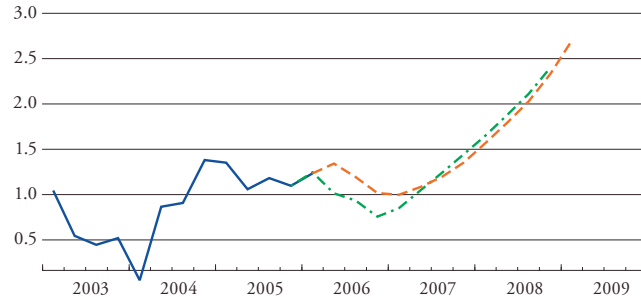
Inflation Forecast December 2005 (Libor = 1.00%) and March 2006 (Libor = 1.25%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast December 2005    - - Forecast March 2006



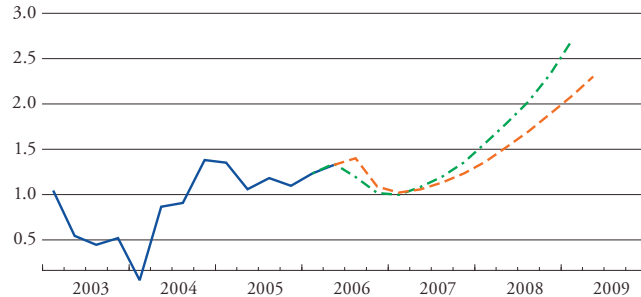
Inflation Forecast March 2006 (Libor = 1.25%) and June 2006 (Libor = 1.50%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast March 2006    - - Forecast June 2006



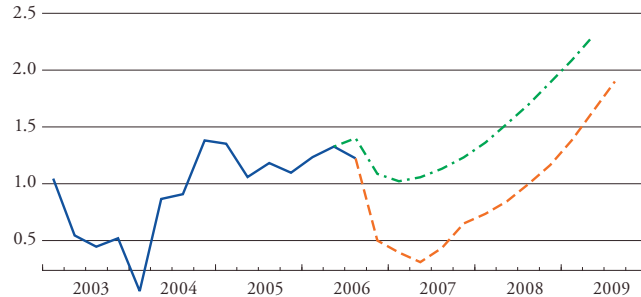
Inflation Forecast June 2006 (Libor = 1.50%) and September 2006 (Libor = 1.75%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast June 2006    - - Forecast September 2006



Inflation Forecast September 2006 (Libor = 1.75%) and December 2006 (Libor = 2.00%)

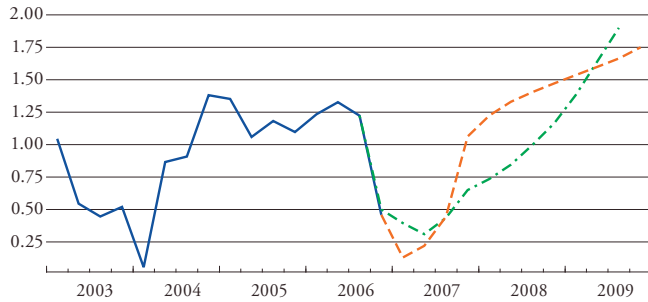
Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast September 2006    - - Forecast December 2006



2007

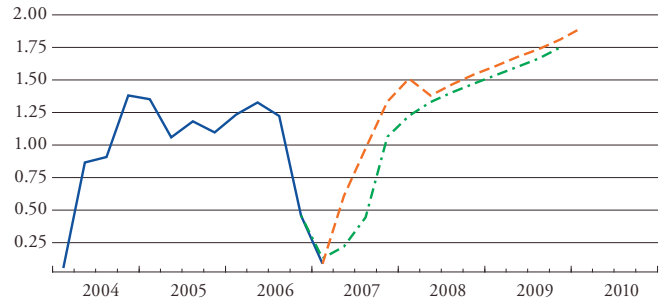
Inflation Forecast December 2006 (Libor = 2.00%) and March 2007 (Libor = 2.25%)

Percentage change in national consumer price index from previous year  
— Inflation — Forecast December 2006 — Forecast March 2007



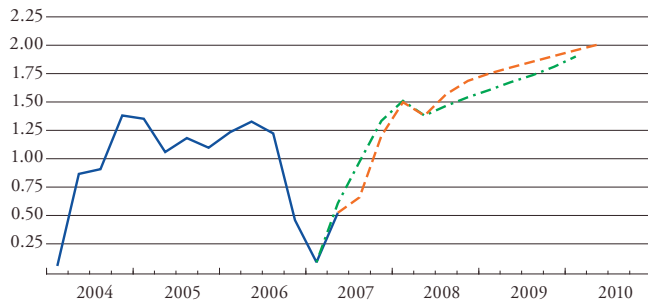
Inflation Forecast March 2007 (Libor = 2.25%) and June 2007 (Libor = 2.50%)

Percentage change in national consumer price index from previous year  
— Inflation — Forecast March 2007 — Forecast June 2007



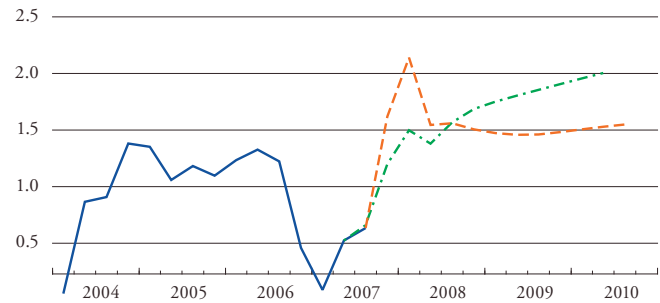
Inflation Forecast June 2007 (Libor = 2.50%) and September 2007 (Libor = 2.75%)

Percentage change in national consumer price index from previous year  
— Inflation — Forecast June 2007 — Forecast September 2007



Inflation Forecast September 2007 (Libor = 2.75%) and December 2007 (Libor = 2.75%)

Percentage change in national consumer price index from previous year  
— Inflation — Forecast September 2007 — Forecast December 2007

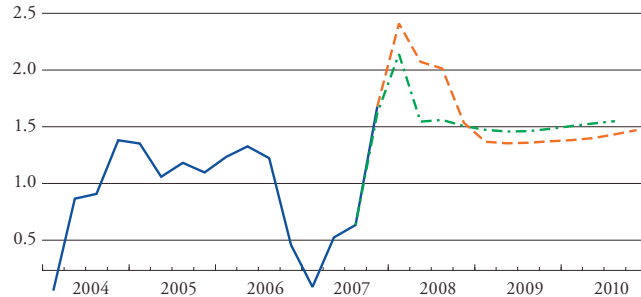




2008

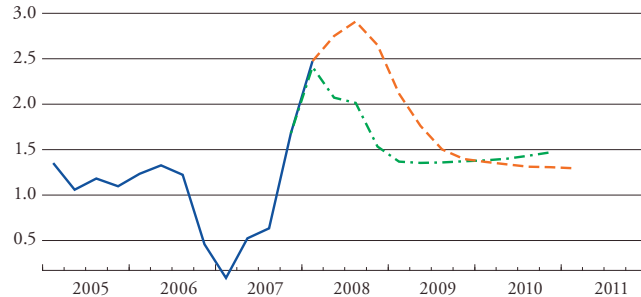
Inflation Forecast December 2007 (Libor = 2.75%) and March 2008 (Libor = 2.75%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast December 2007    - - Forecast March 2008



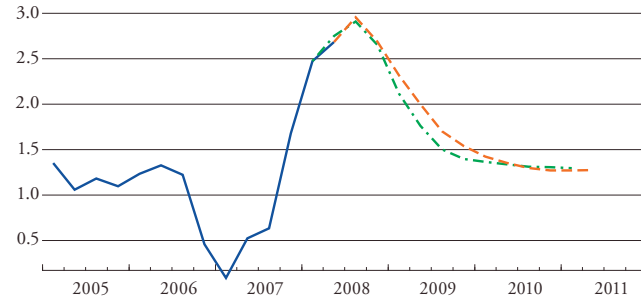
Inflation Forecast March 2008 (Libor = 2.75%) and June 2008 (Libor = 2.75%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast March 2008    - - Forecast June 2008



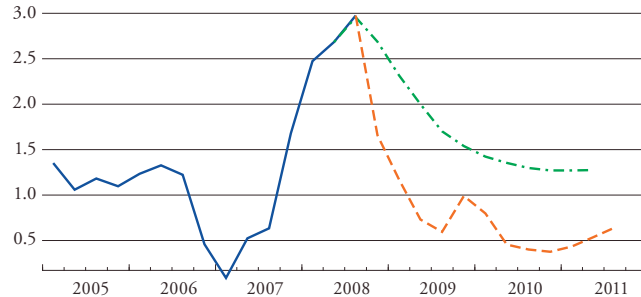
Inflation Forecast June 2008 (Libor = 2.75%) and September 2008 (Libor = 2.75%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast June 2008    - - Forecast September 2008



Inflation Forecast September 2008 (Libor = 2.75%) and December 2008 (Libor = 0.50%)

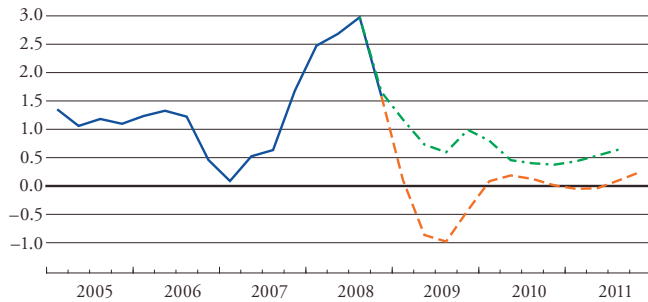
Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast September 2008    - - Forecast December 2008



2009

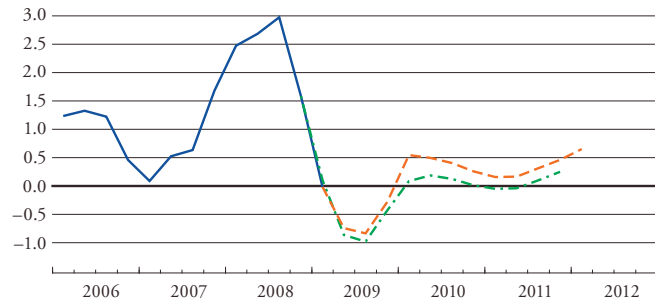
Inflation Forecast December 2008 (Libor = 0.50%) and March 2009 (Libor = 0.25%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast December 2008    - - Forecast March 2009



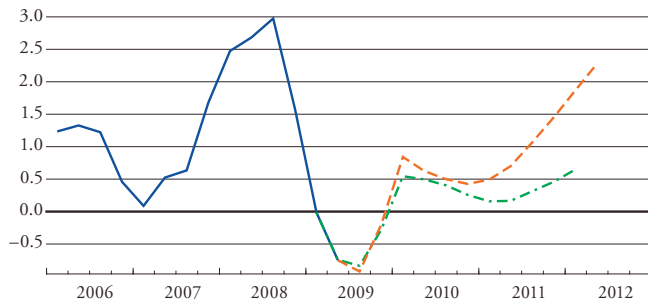
Inflation Forecast March 2009 (Libor = 0.25%) and June 2009 (Libor = 0.25%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast March 2009    - - Forecast June 2009



Inflation Forecast June 2009 (Libor = 0.25%) and September 2009 (Libor = 0.25%)

Percentage change in national consumer price index from previous year  
 — Inflation    - - Forecast June 2009    - - Forecast September 2009



## *II. New Measures Taken by the SNB to Steer the Money Market during the Financial Crisis*

### a) Measures to facilitate access to US dollar liquidity

On December 12, 2007, the SNB announced coordinated action with the Bank of Canada, Bank of England, the ECB and the Federal Reserve to facilitate banks' access to US dollar liquidity. It was also announced that the Fed would make US dollar liquidity available to the SNB in a reciprocal swap agreement. On December 17, 2007 and January 14, 2008, it thus offered 28-day US dollar repo transactions in return for SNB-eligible collateral for up to USD 4 billion on each occasion.

On March 11, 2008, following a break, the SNB announced that it had decided, in consultation with the Fed, to resume its US dollar repo auctions.

On March 25 and April 22, it therefore offered 28-day repo transactions for a maximum of USD 6 billion on each date.

On May 2, 2008, the SNB announced that, in consultation with the Fed, it would be stepping up US dollar repo auctions. It was decided that auctions would be held fortnightly. Since the term (28 days) and maximum amount of liquidity per auction (USD 6 billion) were left unchanged, the total liquidity made available therefore doubled from a maximum of USD 6 billion to a maximum of USD 12 billion. The SNB held auctions on the following dates: May 6 and 20, June 3 and 17, and July 1, 15 and 29.

On July 30, 2008, the SNB decided, in consultation with the Fed, to also make longer-term USD liquidity available. From August 12, it therefore offered 84-day liquidity. The 28-day repo auctions were retained. The maximum outstanding total amount remained unchanged at USD 12 billion.

On September 19, 2008, the SNB decided, in consultation with the Fed, to conduct daily US dollar repo auctions for up to USD 10 billion of overnight liquidity. In addition, the amount made available in 28-day auctions was increased from USD 6 billion to USD 8 billion while the liquidity offered at 84-day auctions was raised from USD 6 billion to USD 9 billion. The maximum outstanding amount for all terms therefore increased from USD 12 billion to USD 27 billion.

On September 26, 2008, the SNB held a US dollar repo auction with a term of 7 days for up to USD 9 billion in order to make available to its counterparties additional US dollar liquidity extending beyond the end of the quarter. At the same time, it temporarily reduced the maximum volume of the daily overnight US dollar repo auctions from USD 10 billion to USD 7 billion.

- On September 29, 2008, the SNB decided – in consultation with the Fed – to raise the limit on its swap line with the Fed from USD 30 billion to USD 60 billion. Concurrently, the term of the swap arrangement was extended until the end of 2009.
- On October 13, 2008, the SNB announced jointly with the Bank of England, the ECB, the Fed and the Bank of Japan that it would in future be conducting auctions for US dollar liquidity with 7-day, 28-day and 84-day terms at fixed interest rates for full allocation. Since this meant that counterparties could borrow any amount in return for the appropriate collateral, the maximum amount of the swap arrangement with the Fed was unspecified. The SNB also announced that it would continue holding overnight US dollar auctions where necessary to accommodate market demand. The overnight auctions for US dollar liquidity that had been held every working day since September 18 were discontinued on November 5 due to the decline in demand.
- On December 19, 2008, the SNB, in agreement with other central banks including the Federal Reserve, will continue conducting US dollar liquidity-providing operations at terms of 7, 28 and 84 days as long as needed. The operations will be carried out as fixed rate tenders with full allotment.
- On February 2, 2009, the SNB announced that it will issue its own debt certificates in US dollars (SNB USD Bills) with terms of less than one year as of mid-February 2009. The new monetary policy instrument will be used until further notice to finance the SNB's loan to the SNB StabFund. The auction will take the form of a variable rate tender with allotment according to the Dutch auction method. The denomination is USD 0.5 million and the SNB USD Bills are offered with terms of 28, 84 and 168 days.
- On February 3, 2009, the SNB announced that it had extended the temporary reciprocal currency arrangements (swap lines) with the Federal Reserve to October 30, 2009 in order to address continued pressures in global US dollar funding markets. The SNB reiterated that it will continue conducting US dollar operations at terms of 7, 28 and 84 days as long as needed.
- On June 25, 2009, the SNB, in accordance with the ECB and the Bank of England, announced to continue conducting US dollar liquidity-providing repo operations at terms of 7 and 84 days during the third quarter of 2009.
- On September 24, 2009, the SNB, in accordance with the ECB and the Bank of England, announced that it will continue to offer US dollar liquidity operations at a term of 7 days through January 2010. Given the improved conditions in funding markets, the SNB will discontinue the 84-day US dollar liquidity operations as of October 6, 2009.

## b) Measures to Facilitate Access to Swiss Franc Liquidity

On October 15, 2008, the SNB and the ECB decided on joint measures to provide Swiss franc funding to banks that do not have direct access to the SNB's market operations. The SNB announced that every Monday, starting on October 20, it would conduct fixed-price currency swaps with a term of 7 days in collaboration with the Eurosystem. The SNB concluded a temporary swap arrangement with the ECB in order to offer the ECB access to Swiss franc liquidity for allocation to banks in its jurisdiction.

Also on October 15, the SNB announced that it was planning to issue its own bills (SNB Bills) on a regular basis in the future. Through this liquidity-absorbing instrument, the SNB gains greater flexibility in ordinary liquidity-creation operations. In particular, it means that greater use can be made of repo transactions with longer terms.

On October 29, 2008, the SNB offered banks currency swaps with a three-month term for the first time. In line with the measures announced on October 15, it provided Swiss francs in return for euros.

On November 7, 2008, the SNB concluded an EUR/CHF swap arrangement with the Polish central bank in order to offer it access to Swiss franc liquidity for allocation to the banks in its jurisdiction. On November 17, for the first time, the Polish central bank took part in the weekly currency swap operation of the SNB and the Eurosystem.

On December 19, 2008, the SNB announced that it had acquired a first tranche of illiquid and other assets from UBS on December 16, 2008. The purchase price of USD 16.4 billion reflects the value of the assets as of September 30, 2008.

On January 16, 2009, the SNB, the ECB and the NBP jointly announced that they will continue the one-week foreign exchange swap operations at least until the end of April 2009 to support further improvements in the short-term Swiss franc money markets.

On January 28, 2009, the SNB and the Magyar Nemzeti Bank (MNB) announced the establishment of a temporary EUR/CHF swap arrangement which allows the MNB to provide Swiss franc funding to banks in its jurisdiction in the form of foreign exchange swaps. Starting on February 2, 2009, the MNB will join the weekly EUR/CHF foreign exchange swap operations conducted under the umbrella of the SNB. The EUR/CHF swap operations will be conducted with a term of 7 days at a fixed price. This measure will be in place at least until the end of April 2009.

- On February 10, 2009, the SNB announced that it had agreed with UBS to acquire assets for a lower maximum amount than originally planned. The maximum volume of assets to be transferred decreased from its original level of approximately USD 60 billion to USD 38.7 billion. The categories of assets not to be transferred comprised securities backed by student loans and assets that have been wrapped by monoline insurers.
- On April 6, 2009, the SNB announced that it agreed to enter into a new temporary currency swap arrangement with the Federal Reserve. The swap line enables the Federal Reserve to draw Swiss franc liquidity of up to CHF 40 billion against U.S. dollars when needed to provide Swiss franc liquidity to US financial institutions. The new swap line mirrors the existing arrangement that enables the SNB to draw US dollars against Swiss francs. Both swap arrangements are authorized through 30 October 2009.
- On September 24, 2009, the SNB, the ECB, the Narodowy Bank Polski and the Magyar Nemzeti Bank jointly announced that they will continue to conduct the EUR/CHF foreign exchange swaps providing Swiss francs against euros with a term of 7 days through January 2010.

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### SUMMARY

In December 1999 the Swiss National Bank (SNB) abandoned monetary targeting and introduced a new monetary policy strategy. The cornerstones of the new framework are an explicit definition of what the SNB considers to be price stability, a forecast of inflation over a three-year horizon, and a target range for the three-month Swiss franc Libor. The strategy lived up to expectations in every respect and contributed to strengthening the SNB's credibility. In particular, the new framework's flexibility proved successful in times of financial stress. The term reference interest rate contains an automatic monetary stabilizer that has insulated the nonfinancial sector from much of the turbulence. The major challenge lying ahead is sustained accuracy in the assessment of future inflation.