VIII. STRATEGIC CHOICES FOR INFLATION TARGETING IN THE CZECH REPUBLIC
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A. Introduction

This chapter is about choices for the conduct of monetary policy in the Czech Republic that to a large extent have already been made. Section 2 traces the evolution of events and thought that led to the adoption of inflation targets by the Czech National Bank (CNB) early in 1998. Section 3 outlines the operating principles elaborated a year later, and argues that these conform to the main lessons spelled out in the recent literature on inflation targeting. Section 4 advocates the development and use of models specifically adapted to an inflation targeting framework, and discusses aspects of such modeling that are of particular relevance to the Czech Republic. Transparency and communications are crucial aspects of such an approach, and Section 5 describes the remarkable progress of the CNB in this regard. Other strands are of the argument are summarized in the concluding section.

B. Searching for a Nominal Anchor

Fixed-exchange rate phase

Since 1990, the Czech government has had in mind eventual accession to the European Union.[2] This would imply adopting its monetary institutions, and replacing the koruna with the euro at some future date. In the meantime, the CNB has sought the most effective means to that end. Until 1998 the CNB used an approach to monetary policy based on three guidelines:

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[2] Prior to its division in January 1993, the sovereign entity was the Czech and Slovak Republic.

- a fixed exchange rate against a currency basket initially composed of five currencies but later of just two, the U.S. dollar and the German mark; and

- a money supply target, expressed as a range for the growth of M2;[3]

- a disinflation target, usually an inflation rate for the year ahead, which is somewhat lower than the realized rate the year before.

This approach, underpinned by the CNB's strong reputation at home and abroad for competence and discipline, was relatively successful for some years.[4] Until 1996 the potential for conflict between these guidelines was minimal because the overriding factor, both officially and in practice, was the fixed exchange rate. Moreover, in the early 1990s cross-border mobility of capital was fairly low because of exchange controls and the uncertainties perceived by foreign investors in the unfamiliar new regime. This allowed a degree of freedom to pursue domestic objectives that would diminish over time.

Table 1. Year-end exchange rate: Koruna /US dollar

1989	1990	1991	1992	1993	1994
14.3	28.0	27.8	28.9	30.0	28.0
1995	1996	1997	1998	1999	
26.6	27.3	34.6	29.7	35.6	

a. "Principal Rate," IMF International Financial Statistics

The authorities pointed to the stability of the exchange rate, from 1990 through 1995 (Table 1), as evidence of successful monetary policy. Although they accepted the argument that the accumulation of foreign exchange reserves was creating an inflationary increase in the money supply, the alternative option of allowing the nominal exchange value of the koruna to rise was explicitly ruled out. Thus, inflation remained at almost 10 percent, much higher than in the European Union, and it was thought preferable to keep the nominal external value of the koruna stable, and to let the real value rise by means of the higher domestic rate of inflation.

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[3] In practice, the growth of the M2 aggregate has tracked the trend in inflation reasonably well. However, this leg of the tripod has never been the pivot that the exchange rate was until 1996, and that the inflation target is now.

[4] The international recognition given to Governor Tosovsky is ample evidence of this reputation. His stature within the Czech Republic is such that he was called upon to serve as interim Prime Minister (1997–98).

However, by the end of 1995, the CNB was becoming increasingly concerned. The capital inflow remained very strong, and M2 was expanding well in excess of the 13–16 percent guideline, as the CNB was not able to fully sterilize the monetary impact of its purchases of foreign exchange. Ample supplies of liquidity combined with lax lending standards of the banks led to a credit bubble. By the middle of the decade, there were many signs of overheating in the economy, such as a rapidly deteriorating trade balance.

Table 2. Data for the Czech Republic: December/December percentage changes

| | Inflation | | | | 3-month interest rate | Real GDP |
	CPI	Regulated prices	Net	M2	December level	Q4/Q4
1993				19.8	8.0	
1994				19.9	12.6	6.1
1995	7.9	10.2	7.3	19.8	11.0	4.9
1996	8.6	13.8	6.6	9.2	12.6	3.2
1997	10.0	22.7	6.8	10.1	17.5	2.2
1998	6.8	20.4	1.7	5.2	10.3	-4.2
1999	2.5	4.0	1.5	9.3	5.6	0.8
				(Nov.)		(Q3/Q4)

Sources: CNB Inflation Report and IMF International Financial Statistics; updates from the "Monetary Indicators" page on the CNB website.

A major wave of price increases was looming: the level of regulated prices, which make up over 20 percent of the Consumer Price Index (CPI) basket, would increase 70 percent over the next three years (Table 2). Preventing an induced spiral of secondary increases, subsequent to the price liberalization, would require shutting off this monetary stimulus. The CNB responded, in early 1996, by widening the fluctuation zone around the official parity rate for the price of foreign exchange from ±0.5 to ±7.5 percent. This allowed a modest appreciation (3 percent against the dollar) to occur. More important, the widened band introduced an element of exchange risk, which was sufficient to shut off much of the capital inflow. This allowed the CNB to raise short-term interest rates steadily through 1996, and to reduce money growth. By the end of the year, the rate of increase of M2 was reduced to about 10 percent.

Although the revision to the exchange rate band was not announced as a shift in regime, it almost amounted to one because the official range of fluctuation was now so wide. A 15 percent range does not act as a tight constraint on the conduct of monetary policy. In any event, the wide-band, fixed-rate experiment was short-lived, since shortly after the onset of a speculative attack in May 1997, which monetary policy initially resisted with a sharp rise in interest rates, the CNB moved formally to a floating rate. In retrospect, several common drawbacks of a fixed exchange rate system had been present throughout its tenure:

- **Difficulty finding a sustainable exchange rate.** Searching for a sustainable value, after many years of inconvertibility, the authorities devalued the koruna three times in 1990, halving its official U.S. dollar value. But by 1993, upward pressures on the currency had emerged, and these were to strengthen over the next few years.

- **Credibility problems.** Early in the decade, it was by no means clear to exchange markets that the new central bank could or would, under pressure, hold to the official parity rate of exchange. An initial problem was the weakness of the balance of payments, which was not helped by a web of capital controls. Later on, as the exchange rate stabilized, there was an evident inconsistency between the wide interest spreads against the United States and Germany and expectations of continued exchange rate stability.

- **Moral hazard.** The official commitment to a fixed exchange rate, and its realization for some years, made investors less cautious about cross-border capital transactions. During the middle years of the decade, Czech corporations borrowed heavily abroad. For the most part this inflow would have been justified by the needs and high returns of a restructuring economy, by low existing levels of foreign indebtedness, and by prudent macroeconomic policies. But implicit government guarantees and the explicit commitment to a fixed exchange rate contributed to an environment in which risks were underestimated. In consequence, the level of foreign borrowing quickly rose to an imprudent level.

- **Conflict with domestic price stability.** From 1993 through 1995, the commitment to the exchange parity required a rapid rate of domestic monetary expansion. Higher interest rates were necessary to reduce inflationary pressures, but these would have further increased the upward pressure on the koruna, and hence would have been at variance with maintaining the parity rate.

The floating of the koruna eased some of these inconsistencies. Although it had no specific nominal objective to replace the fixed exchange rate, the central bank was able to focus on reducing excess demand. Monetary conditions were tight throughout 1997, with real short-term interest rates exceeding 5 percent in the second half of the year. This brought the credit bubble to a close and exposed massive bad loans in the banking system—a situation which would result in serious capital impairment, official assistance, and closures. The CNB had to divert key resources from monetary policy to crisis management, and also had to fend off criticisms of its supervisory practices. Abroad, the emerging crisis in southeast Asia had contagion effects on economies in transition generally, including the Czech Republic, and resulted in further downward pressure on the koruna. In short, as 1997 drew to a close, expectations of inflation were coming adrift, the exchange rate anchor was gone, and the reputation of the CNB had been damaged.

C. CNB Inflation Targeting

Explicit inflation targets may have been an obvious option to replace the fixed exchange rate as the anchor for monetary policy. But there were widespread doubts about their practicability as a nominal anchor in the Czech Republic. In the late1990s, the Czech economy, in the aftermath of decades of decay under state repression, was still suffering from structural flaws and distortions. Particularly awkward for the notion of inflation targeting was that price controls on products such as utilities and housing were scheduled to be lifted over the next few years. Deregulation would cause large, discrete increases in the cost of living at uncertain future dates. Another difficulty was lack of knowledge about the effectiveness of monetary policy in the new, incomplete market environment, and about the transmission mechanisms. For these reasons, many economists were skeptical that the CNB could realistically commit to any quantitative targets for inflation reduction and control, and there was no ground-swell of opinion favoring them.

Thus, the CNB declaration early in 1998 of an inflation-targeting approach was not widely anticipated. The central bank itself took the lead in assuming responsibility for a clearly defined and published objective. In April 1999 a CNB inflation-targeting strategy document laid out the main parameters of the approach to be followed towards this objective. The main principles enshrined in the April 1999 strategy document were as follows.

Numerical targets for net inflation

- A schedule of declining targets was set for net inflation (i.e. the rate of increase of the CPI, excluding regulated prices).

- By 2005, net inflation was to be 2 percent ±1 percent—this range thus became the CNB's operational definition of price stability.

- The inflation-reduction path was embodied in a target for 2000 of 4.5 ±1 percent and thereafter declines of 0.5 percent per annum.

- Special factors that might disturb this path would be take into account through modified annual targets, if necessary. Each year, targets for the next full year ahead would be set in April (e.g., in April 2000 for calendar year 2001). The annual targets will be constrained, in that they must not imply: an acceleration of target inflation from one year to the next, or an annual target below the price stability range of 2 percent ±1 percent.

Explicit exceptions for price level shocks

In a given year, it was recognized that certain unforeseen events might knock the price level off the planned trajectory. There were two sources of particular concern:

- sharp changes in commodity prices and the exchange rate, or other extraordinary events; and

- changes in relative prices as the economy adapts to European Union norms. While such shocks may affect the price level, and hence the inflation rate in a given year, this would be a one-off effect.

Cooperative government-central bank approach

The April 1999 document invites the government to endorse the main outlines of the CNB inflation targeting strategy, arguing that it will work better if its main parameters embody a consensus among the Czech authorities. At a minimum, the CNB called for budget forecasts embodying inflation assumptions in line with its announced targets.

At the same time, the CNB underlined that it has the mandate and the powers to control inflation independently. Adhesion to this objective by the government would not be necessary to its feasibility, since the central bank possesses both the mandate and sufficient powers to the announced target independently. Instead, the advantage of government backing would be that the strategy would have stronger credibility. The CNB argued that expectations of inflation might fall into line with the policy targets more quickly, which would reduce the short-run losses of output that occur during a period of disinflation. Also, interest rate risk premiums, which impose a deadweight burden on a debtor country, might be somewhat lower. However, at the time of this writing, the government had not yet explicitly endorsed the CNB proposal.

D. Assessment of the CNB strategy

The components of the CNB's strategy can be assessed one by one, and as a whole, against lessons drawn in the literature on inflation targeting.

Choice of index—net inflation

Inflation targeting central banks have focused on the CPI, which gauges the cost of living for a representative consumer, or on a measure of "core inflation," which excludes certain volatile components, such as food and energy prices, or mortgage interest or indirect taxes. Whatever the exact choice, the CPI family has overwhelming advantages over other price level measures (e.g., the GDP deflator, which covers a broader range of output) because it is of direct interest to the population, and because it is rarely revised.

In the Czech Republic, the integrity of the data is unchallenged. At the suggestion of the CNB, the Czech Statistical Office (CSO), an independent government agency, began calculating and publishing an official measure of net inflation, in addition to the CPI and other indexes for which it is responsible. To make the changes in the CPI and net inflation more transparent to the public, the CNB releases a detailed breakdown by component, based on CSO data.

However, the Czechs have to deal with a problem not faced by the more advanced inflation-targeting countries—major price deregulation—a factor that has still has some way to go, and is likely to cause significant jumps in the CPI at irregular intervals over the next few years. The CNB's choice of net inflation, as opposed to the CPI, as the target has one great convenience in this regard: the government does not have to worry about possible monetary policy reactions to price liberalization (e.g., that a faster liberalization of rents, or utility prices, might lead to higher interest rates). The target for net inflation would allow the government to focus just on the allocative and efficiency aspects of price deregulation. Under its proposal, the CNB would accommodate the first-round impact, but it would not allow a second round, as might occur if people thought they could protect their real incomes by passing on price increases or by raising wage demands.

To the extent that it is understood by the public, the concept has some related advantages. It improves accountability, since it excludes some price level changes originating outside the purview of monetary policy. And, it tends to reinforce the idea that inflation targeting is based on long-term objectives, since it is less sensitive to short-run price level shifts than the overall CPI.

A disadvantage is that net inflation might not reflect the change in the cost of living very closely. An index that leaves out large items, such as housing rents and electricity costs, might be regarded skeptically. If people are going to accept the central bank's policy, they must be persuaded that ultimately the overall cost of living will be stabilized. The CNB has had the challenge of showing convincingly that, at the end of the deregulation process, there would no longer be a systematic difference between overall inflation and core inflation. One means to this end might be to announce that the CPI (unadjusted) would become the operative inflation target by, say, 2005, a date at which the price deregulation process should be virtually complete.

The target level of inflation—long-run and short-run

Long-run target

As Bernanke et al (1999) emphasize, the rationale for inflation targeting is essentially a long-term one. The output and employment costs of inflation reduction, although not long-lasting, are readily apparent, whereas the benefits to economic efficiency of maintaining price stability, which may be small and barely noticeable in any given period, are permanent. In setting low inflation as the primary long-run goal, the central bank is not denying that it can affect output in the short run, or being negligent of the more important real economic objectives of society. It is merely recognizing that in the long run the options open to monetary policy boil down to a higher or lower rate of inflation, and that the chances for good economic performance are better at low inflation or price stability.

While accepting this point in principle, economists have been debating for a long time what particular low rate of inflation would be optimal. For example, some believe there is

a substantial positive bias in the measurement of consumer price inflation, or that there is a large degree of downward wage rigidity, or that it is important to allow real interest rates to become negative at troughs in the business cycle.[5] This leads them to recommend a relatively high target rate—typically 3 percent. Those who think the measurement bias is small and wages flexible would go for a lower rate, but there is a broad consensus that a zero target would raise too high a risk of falling into a deflationary spiral. Thus in practice the range of recommendations taken seriously in advanced economies, i.e. 1-3 percent, is not very wide.[6]

However, uncertainties about the underlying issues are more acute for an economy in transition than for an advanced economy. The more rapid the pace of change and the less experienced statistical bureaus increase the likelihood of bias. At the same time, less is known about key parameters in the optimizing problem, such as the rate of growth of productivity and the degree of wage flexibility. Precisely for these reasons, many economists in the Czech Republic have contested the desirability of inflation targets.

The CNB has also had to address a spurious argument for inflation which is based on the current low international purchasing-power value of the currency and the expected rate of growth of productivity. It is argued that the current real value of the koruna is below its long-run equilibrium value. As Czech productivity catches up to the rest of Europe, real wages will increase relatively quickly, and so will the price of non-tradeable goods. Therefore, if the exchange rate is stable, the price level can be expected to rise more rapidly at home than abroad and that the target rate of inflation should be higher than the 2 percent espoused by the European Central Bank (ECB). An obvious logical flaw in the argument is the proviso about a stable exchange rate: the koruna floats, and must float in an inflation-targeting regime. Any required change in the real equilibrium value of the currency over time could easily be accomplished by a trend in the nominal value: the modest annual changes that would be required (say 1 percent) would be quite small compared to the normal variance of a flexible exchange rate (e.g., over the period 1993–1998, the mean monthly change in the trade-weighted exchange value of the German mark, one of the world's most stable currencies, was almost 1 percent).

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[5] For example, see Akerloff et al (1996), Fortin (1996), and Summers (1991).

[6] At low rates of inflation, a more important question than the precise long-run target rate concerns whether the goal should be shifted from the rate of change to the level of prices. A target for the annual inflation rate implies that the variance of the price level increases without bound with futurity, whereas a target path for the price level would result in a constant variance. A credible price level target would also reduce the risk of falling into a deflationary trap. See Duguay (1994) and Svensson (1997) for arguments on the merits of this alternative. Also refer to Chapter III of this volume, "Controlling Inflation after Bretton Woods: An Analysis Based on Policy Objective by William T. Gavin, for an empirical investigation supporting the use of a price-level target.

There is also a less obvious flaw in the economic reasoning. One could just as well argue that a high rate of growth of productivity lowers the optimal rate of inflation. With rapid productivity growth both downward stickiness of nominal wage rates and the zero floor to nominal interest rates are less likely to pose problems. Consider first the argument of Akerloff et al. (1966), that a very low inflation rate might impede employment by reducing the adjustment of real wages in declining sectors. The idea is that if nominal wages are rigid downwards, inflation might be an effective way to reduce real wages. But if the overall equilibrium real wage is rising rapidly, as it would be with higher productivity growth, there is less need for real wage reductions. Therefore, given nominal wage stickiness, with high productivity growth there is less need for inflation. For example, whereas for an assumed rate of productivity growth of 1 percent, Akerloff et al. recommend an inflation rate of 3 percent, for productivity growth of 2 percent their argument would support an inflation target of 2 percent.

Next, consider the nominal interest floor argument put forward by Summers (1991). This argument suggests that in recessions a negative real interest rate might be appropriate, but impossible to achieve if nominal interest rates were already close to zero because of a long-run environment of very low inflation. However, a faster underlying rate of growth would imply a higher real return to capital, and less need for negative real interest rates to stimulate output during recessions.

In summary, there is nothing to suggest that the CNB's 2 percent long-run objective is inappropriate. It is squarely in the mainstream of the targets adopted by inflation targeters. More important, given the deep political desire in the Czech Republic for European integration, it would be roughly consistent with the ECB's objective of holding inflation at less than 2 percent. Although EU membership does not formally require low inflation, a rate much above the ECB target might pose questions about economic readiness for entry.

Short-run targets and outcomes

A transparent, accountable policy process requires not just the definition of an objective, but also some public indication of the strategy that the policy-maker intends to follow in the pursuit of this objective—for example, to deal with unexpected contingencies. The CNB's strategy for keeping inflation in line with the announced path involves setting transitional targets annually. These annual targets would be consistent with the longer-run objectives, and at the same time take account of any surprises that actual data may reveal. Thus, short-run (but not longer-run) targets may be revised, subject to two constraints: first, the annual inflation target must decline at least as rapidly as originally announced to the ultimate 2 percent rate; and second, the target for the next year ahead would never fall below this level. This procedure would be loosely in line with the suggestion of Svensson (1997) that the central bank should target its own, published forecast of inflation. Moreover, since there would not be an attempt to follow closely a frequently revised

target, the proposal avoids the theoretical risk of dynamic instability pointed out by Bernanke and Woodford (1997).[7]

As a practical matter, the CNB proposal does describe a transparent process for bringing inflation back into the target range should a deviation occur. It would oblige the central bank to present a precise view of the sources and degree of permanence of any shocks that may affect the current inflation rate, and an indication of how long it would take to get back on track, taking into account the lag effect of monetary policy. Moreover, since the published annual target provides an ex ante yardstick for monitoring the performance of monetary policy, it sets a standard by which to judge the accountability of the central bank.

It is as yet too soon to judge how well the framework may be working. Meanwhile, one should not make too much of the fact that inflation in 1999 fell significantly short of the one-year target announced in November 1998, or that net inflation was actually negative for much of the year. Special factors, included a temporary fall in oil prices and prolonged tightness of bank credit following the banking crisis. In addition, economic restructuring, which had been postponed because of easy credit, led to layoffs and uncertainty about future job prospects. These factors had an unexpectedly strong disinflationary impact.

Qualitatively the CNB's policy stance erred in the right direction, given the uncertainties of the situation, and the ultimate objectives of monetary policy. The main priority at the start was not to try to exactly hit the interim target for 1999, but to lay the groundwork for a permanent reduction in inflation. Thus, the April 1999 strategy statement stresses that the objectives are for the longer term, more specifically for a horizon ending in 2005. The CNB also pointed out that, in line with this horizon, its intention to focus on 2000 for the first serious test of the regime of inflation targeting. Moreover, any effective disinflation program requires actions that push down expectations of inflation. If nothing else, this meant ensuring that the inflation rate did not exceed even the interim target for 1999, since a failure of this kind would undermine trust in the program at the outset. In contrast, the outcome has had the considerable advantage of sending to the public a strong message as to the resolve of the monetary authorities. Surveys of financial market analysts conducted by the CNB (October 1999, Inflation Report) confirm that inflation expectations did decline in 1999, to the same range as the announced target range.

Viewed in a broad perspective, the record of the CNB in 1999 is easily defendable. International experience adds additional evidence in this regard: several cases of disinflation of recent memory appear to owe a lot of their success to an initial rigorous phase in which a surprisingly sharp drop in inflation made people notice that monetary policy really had changed for the better (e.g. the United States in the early 1980s, or Canada in the early 1980s and again in the early 1990s).

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[7] Svensson's model (Svensson, 1997) has adaptive expectations, whereas Bernanke and Woodford (1997) use rational expectations.

Width and boundaries of the range

A range is usually given for inflation targets, rather than a single point, mainly to emphasize the considerable imprecision in the central bank's ability to control short-run movements in the price level for the short run. Ranges give a quantitative notion of the uncertainty involved, akin to a confidence interval in statistics. In addition, a range may underscore the authorities' intention to be symmetric in their responses: deviations will be resisted as strongly whether they are positive or negative. In this respect, inflation targeting regimes differ from the framework adopted by the ECB, and formerly used by the German Bundesbank, which has a ceiling on tolerated inflation, but no explicit floor. Economic justification for emphasizing symmetry is that the costs of deflation deserve as much emphasis as those of inflation, and that it is important for the public to be confident that the central bank will act vigorously to prevent a slide into a deflationary trap.[8]

In choosing the width of the range, two considerations compete: a) demonstrating that the central bank intends to be rigorous in its conduct of policy, which argues for a narrow range; versus b) the idea of realism about the actual variance of inflation and potential shocks to the price level, which might argue for a wide range. For example, vector autoregression studies suggested a confidence interval width of 6 percent or more (e.g., for Canada, Crawford and Kasumovich,1996; for the U.K., Haldane and Salmon, 1995; and for Australia, Stevens and Debelle, 1995). Most of the relevant central banks seem to have put more weight on the credibility benefits of a narrow range. Thus the ± 1 percent range frequently chosen could be viewed as an expression of intent to be more rigorous than in the past. And, so far, inflation has generally been inside the announced ranges. Against this background, the range adopted by the Czechs for net inflation looks feasible and appropriate.

At least as important as the width of the range are the presumed consequences of material breaches of the range. There are two considerations here:

- Accountability requires at least some explanation from the central bank of material deviations from target. Inflation targeting countries all have mechanisms to ensure that this takes place. The Czechs would use the informal approach, similar, for example, to Canada's, rather than the more formal approach adopted by New Zealand, in which the target range is part of the performance contract of the Reserve Bank's Governor.

- Instrument instability can occur if the central bank tries to stick narrowly to a given target in the short run. Because of the lags in the transmission mechanism, large movements in interest rates would be required to stabilize inflation year by

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[8] The recent experience of Japan illustrates the severe dislocations that can occur in deflation, the difficulties of getting out of the spiral once it starts, and the importance of credible preventive measures.

year in response to normal shocks. Moreover, each such movement would have strong effects in later years, when they would have to be offset by changes in the opposite direction. The risk of falling into an unstable pattern of policy responses is higher if great importance is attached to the limits of the band. The proposed approach to short-run disturbances makes it clear that Czech target does not have hard edges.

E. Research and Models for Inflation Targeting in the Period Ahead

Inflation targeting has implications for the work of economists in a central bank. It gives a clear sense of direction to the research agenda, affecting the types of models that are appropriate, and the nature of policy advice. A primary job of the economics becomes the derivation of paths for short-term interest rates (or, more generally, monetary conditions) that would result in the achievement of the given inflation targets. Conventional modeling to this end is based on four elements: a monetary policy rule, an aggregate demand function, a Phillips curve, and an international asset-market equilibrium condition.

It is particularly important to have models in which the implications of different simple policy rules can be investigated. Models that are calibrated to provide theoretically plausible simulation results, rather than estimated on the basis of a good fit to historical data have become standard tools for this purpose over the past decade.[9] Such models may embody adaptive expectations, which are easy to implement, or if the computer technology is available (it increasingly is) with model-consistent (i.e., rational) expectations. Similarly, inflation-targeting rules may be based simply on the observed rate of inflation and perhaps the output gap too (as per the well known Taylor rule), or be derived from the forward-looking properties of the model. Both processes are worth exploring if this is technically feasible.

Issues in modeling

Policy rules

In previous generations of macroeconomic models monetary policy was an ad hoc business, usually represented by an assumption about the policy instrument, the short-term interest rate. Policy reaction functions, if used, would be just a streamlined way to obtain a path for the interest rate. In contrast, the policy rule is an intrinsic element of an inflation-targeting model, since it implements the nominal anchor for the system. It is no

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[9] The Bank of Canada was a leader in this practice, with its QPM model.

accident that the widespread adoption of inflation targeting has been followed by extensive research on monetary policy rules.[10]

A simple generic policy rule can be written as:

$$i_t = r_t + \gamma(E_t\pi_{t+j} - \pi^T) \qquad (1)$$

where i_t is the short-term interest rate, r_t is the real equilibrium interest rate, $E_t\pi_{t+j}$ is a forecast of inflation j periods ahead, and j is a horizon long enough for the interest rate to have a substantial impact on inflation. The elements of this rule include:

- **Inflation target.** As discussed in Section 2, this provides the nominal anchor to the system.[11] Rules of the equation 1 type would eliminate any deviation between expected and target inflation at some future horizon beyond j.

- **Inflation forecast.** The expectation $E_t\pi_{t+j}$ is conditional on the available information, which would exclude the current interest rate, for which a solution is sought. The simplest forecast would be represented by the most recently observed rate, π_{t-1}.

- **Systematic interest rate reaction to expected deviations from target.** The parameter γ affects the speed with which deviations from target are eliminated hence implicitly defines the targeting horizon—a high value would imply a short horizon. However, γ also has implications for the volatility of the interest rate— for example, an overly high value (overly short horizon) will result in instrument instability.

- **Real equilibrium interest rate.** This is the rate at which monetary policy has a neutral effect on the inflation rate.[12] In a small open economy the real equilibrium interest rate is given by the foreign real rate plus a risk premium, and in the long

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[10] See, for example, the 1998 NBER conference (Taylor, 1998).

[11] **A pure inflation target**, however, provides an anchor only for the rate of change of nominal values. The equilibrium level of prices is path-dependent, and would be a function of the shocks to the system.

[12] Blinder (1999) discusses the concept in some detail.

run movements in the exchange rate, rather than the interest rate that equilibrates the market for domestic output.

Most of the rules under serious consideration can be viewed as variants of equation 1. For example, consider the Taylor rule

$$i_t = r_t = 1.5(\pi_{t-1} - \pi^T) + 0.5\ gap_{t-1} \qquad (2)$$

This implicitly relies on a forecast of future inflation based on the most recently observed rate and the output gap (actual-potential). Taylor set the value for the reaction coefficient, γ, at 1.5, such that every percentage point increase in inflation away from the target would lead to a 50 basis point rise in the real interest rate. This rule performs surprisingly well across a range of models, in terms of keeping down the variance of both inflation around target and output around potential.[13] Given this apparent robustness, and the high degree of model uncertainty in the Czech Republic, simple rules of the Taylor variety should be investigated intensively.

The transmission mechanism

One of the reservations about the prospects for inflation targeting in the Czech Republic was the lack of knowledge about monetary policy transmission. This went beyond uncertainties about the likely values of parameters. There was a widespread belief that the market mechanisms that operate in more advanced economies would not be effective in the Czech Republic.

This skepticism was not justified. First, a high proportion of Czech economic activity is sensitive to market conditions: the CSO measure of the share of the non-state sector in GDP for 1998 was 77.3 percent, considerably higher than in a number of west European economies. And the CSO might well understate the share, since the official coverage of rapidly growing sectors such as construction and services tends to be less complete. Second, if it is nevertheless the case that the effect of interest rate changes is smaller than in other countries, the implication is not that policy is ineffective but that policy must allow larger changes in interest rates to achieve a given impact on spending and inflation. Third, given the less-developed capital markets, the credit channel would be a very effective mechanism. Many firms have access only to bank financing, and the banks in turn have been constrained for some years by the weakness of their balance sheets.

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[13] Taylor (1993) also found that he could track the actual behaviour of the Federal Reserve quite well with this equation.

Fourth, to the extent that the internal channels are less strong, the importance of the exchange rate channel would be greater. Finally, there is much uncertainty about this mechanism in all countries—take, e.g., the case of New Zealand, which introduced inflation targets as part of an economy-wide transformation.

Thus, Czech macroeconomists are confronted with much the same set of problems as their counterparts abroad. There may be more work to do in narrowing down the plausible ranges of parameter values, and less data to work with, but there is no reason to think that conventional models are not applicable.

Potential output and the output gap

Measures of potential output and the output gap are necessary for the identification of the Phillips curve, and for the assessment of the effect that monetary policy may be having on the actual inflation rate. Various approaches have been used internationally, but these rely on the availability of long runs of data, and so are not readily adapted to the Czech Republic.[14] Mainly for this reason, there is little work to draw on. To stimulate research, the CNB could usefully take a lead, and it should publish its findings.

Until more data are available, such research will consist mainly of theoretical conjectures. Czech economists should be particularly interested in those that involve a varying potential growth rate over time. A lasting result from the theory and testing of the "real business cycle" models of the 1980s is that a substantial part of the business cycle is due to supply factors.[15] (In contrast, earlier Keynesian and monetarist literature had tended to attribute fluctuations in activity around a trend line entirely to demand.) Given the magnitude of the structural changes to the Czech economy, it would be implausible that potential output were simply a uniform rising trend. This has immediate relevance to the current policy debate, as critics of the CNB tend to blame all the recent decline in output on tight macro policies, and thereby exaggerate the extent of usable excess capacity in the Czech economy.

Time horizons and forecasts

Medium-term conditional projections

Traditionally, central bank economists have devoted a lot of effort to forecasting short-run movements in the price level, in line with a typical forecast horizon of one or two years. This has tended to put a premium on the knowledge of sectoral specialists about actual price developments, because for at least a year ahead changes in current monetary

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[14] Dupasquier et al. (1999) provide a survey.

[15] See, for example, King et al. (1991).

conditions have little effect on the inflation rate. That is, an inflation forecast with a forecast horizon of less than a year is basically *not conditional* on monetary policy assumptions. But by the start of the second year, the pervasive effects of monetary conditions start to be felt, and by the end of the second year they should dominate the Inflation outlook. By the same token, sectoral specialists have little specific information about prices a year or more from now.

In an inflation-targeting environment, to capture the relevant dynamics of monetary policy, it is helpful to do regular projections for the main aggregates and price indexes with a horizon of 4–5 years, or even longer. Over such horizons, one wants to see a picture that is conditional on achievement of numerical inflation targets. A logical procedure is to take the target beyond some date a given, toward which the forecast inflation rate will converge. The values of the policy instrument that will make this happen are obtained from the policy rule. Exogenous shocks may cause the actual inflation rate to diverge from the target rate in the short run, but the central bank would have a strategy to ensure that within a certain period such deviations are eliminated. A popular assumption for this period, based on the generally accepted view of the lagged effects of monetary policy, is a period of 4-to-8 quarters.[16]

Effects of exchange rate exchanges

A medium-term horizon is particularly relevant for adequate analysis of policy reactions to exchange rate changes. Under an inflation targeting regime, monetary policy should respond to changes in the exchange rate to the extent that they affect the rate of inflation. The value of the currency operates through two channels. The first is through the direct one-off impact of import prices on the CPI (which the CNB strategy would accommodate). The second is through the pressure of demand, as the real value of the exchange rate affects the level of domestic and foreign spending (the expenditure-switching effect). This could lead to a sustained spiral of inflation and further depreciation, "second-round" effects which monetary policy clearly would not accommodate. For example, following a depreciation, there would have to be some interest rate increase to prevent an escalation of inflationary pressure—precisely how much would depend on the interest- and exchange-rate elasticities of demand for Czech output (for this purpose, the Bank of Canada and some other central banks use a "monetary conditions index," a rough quantitative guide).[17]

Economists in the Czech Republic have been prone to put undue emphasis of the direct effect of the exchange rate on the price level, a plausible estimate of which can be based

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[16] The Bank of Canada projection exercise assumes that deviations from target are eliminated in 6–7 quarters (Duguay and Poloz,1994).

[17] For more details on such indexes see Freedman (1995).

arithmetically on the share of imports in consumption (e.g., if imported goods and services make up 30 percent of the consumption basket, then a depreciation of 10 percent in the koruna might imply an increase in the cost of living of 0.3(10) = 3.0 percent. This kind of calculation has two limitations. First, the ability to pass on changes in costs of imports varies considerably with domestic market conditions, and can be quite low when there is excess capacity. Second, the more durable influence of the exchange rate on inflation is indirect, through the effect on aggregate demand (expenditure switching between foreign and home output) and, in turn, on the output gap. For this reason alone, macroeconomic models are generally more helpful than simple numerical calculations for deriving the potential implications of exchange rate changes for the price level.

F. Transparency and Communications

The international survey by Bernanke et al. (1999) finds in every case examined that the announcement of inflation targets did not achieve rapid credibility. Generally, inflation expectations, as captured, say, in bond yields, or in survey data, have fallen only after the actual rate of inflation has declined. Thus, the crucial factor in establishing confidence in price stability in the Czech Republic is doubtless going to be the extent to which the announced objectives are achieved over a number of years. The central bank can nevertheless help the progress of public understanding by being transparent in its conduct of policy, and by communicating effectively.

Transparency

Announcing explicit inflation targets is itself a striking way to be transparent about the objectives of monetary policy. Moreover, the process that the CNB has followed in formulating its inflation targeting strategy has been unusually open. Its 1999 strategy document set out a clear framework, and invited feedback, before the parameters of the approach were finalized. As for openness in the actual conduct of policy, the CNB has moved ahead in various ways:

- The quarterly Inflation Report is released almost immediately after its approval by the Executive Board responsible for monetary policy. (The CNB website provides a prompt release of the report, which is generally a well-designed and useful source of information.)

- Statements by senior management in public presentations and debate are very frank.

- Minutes of Board meetings are released within a few days of the meetings. These are quite revealing with respect to the discussions that take place, e.g., indicating if there were differences of view (although not identifying individuals), for example.

- To implement policy, the CNB announces its operating target for the two-week repo (repurchase agreement) rate. Decisions to change the rate are followed immediately by a press release.

In the Inflation Report, the CNB does not indicate a specific view as to how the repo rate might move in the period ahead. Instead, it tends to emphasize uncertainties in the economic situation. It may be wise for the central bank to let the audience draw its own inferences on the likely future path of interest rates. Monetary policy has to be free to vary short-term interest rates as required by the evolving economic situation and the given inflation targets. Its credibility should be based solely on its adherence to objectives. By contrast, a prediction of interest rate movements by the central bank—even though it may be a conditional projection—might draw attention instead to an instrument of policy. The difference between a conditional projection and a commitment might not be understood by the press and the public. And if interest rates do not move in the direction indicated by the central bank, its credibility is not enhanced.

Communications

Consistent with increased transparency, the CNB has improved public communication of its policies. The very title of the main policy release, the quarterly Inflation Report, immediately highlights the main concern of the central bank. Previous to 1998, it was not always clear what priorities the CNB was expressing. For example, its annual and mid-year reports would usually put the balance of payments at the top of the agenda, as if there was something constructive that monetary policy should do about the current account, beyond maintaining a stable price level.

The Inflation Report details on several measures of inflation, on specific sectoral price changes, and on other relevant economic developments. This shows that the central bank does an enormous amount of serious analysis of the relevant aspects of price setting and other economic behavior. Moreover, in successive issues of the Inflation Report, one can see a movement toward a clearer, more succinct, statement of the CNB's view on key macroeconomic questions. These include the question of: just what the overall demand and supply trends in the economy; and whether there is an output gap that is affecting the underlying inflation rate. Other positions that are clarified in the Inflation Report include: (1) the state of expectations (the CNB has launched its own monthly survey of financial market participants); (2) whether special factors are temporarily affecting the inflation rate; (3) the net contribution of monetary conditions to actual inflation; (4) the growth rates of money and credit and whether they are broadly consistent with the inflation targets; (5) current monetary conditions and how they affect the inflation rate one way or the other, or do they have no effect?

Moreover, the CNB uses the Inflation Report, as well as other channels of communication to insist on the few obvious facts that everybody should know about monetary policy: that it can in the end only deliver a higher or a lower rate of inflation; that the economy is more likely to prosper with a low rate of inflation; and that monetary policy will be aimed unconditionally at the latter objective.

G. Conclusions

Although the abandonment of the fixed exchange rate in 1997 created a need for some other long-run nominal anchor for monetary policy in the Czech Republic, explicit inflation targets were not immediately regarded as the obvious choice. The main obstacle to their adoption was a high degree of skepticism about their feasibility or desirability. Many economists thought that the Czech economy had not yet developed the market mechanisms that would allow monetary policy to be effective enough to achieve explicit quantitative targets for inflation. There was a widespread attachment to the view that monetary policy should be governed by multiple objectives, which would include employment and output and the balance of international payments, as well as the price level. Moreover, the general public had become accustomed since 1990 to an inflation rate seemingly stuck at about 10 percent.

The CNB confronted this situation with two major policy announcements. The first, released early in 1998, set out interim numerical targets for inflation reduction, while the second, published in April 1999, outlined a coherent strategy designed to achieve 2 ± 1 percent percent inflation by 2005. The latter document takes full account of the main lessons drawn in academic studies of the inflation-targeting approach to monetary policy.

These studies not surprisingly found that credibility requires more than announcing targets. Crucial in convincing the public that inflation targets are to be believed is that the realized inflation rate stays within the target range for a period of years. To start with, the CNB made sure that monetary conditions were tight enough to ensure a rapid disinflation—indeed, its policy settings in 1998–1999 erred on the tight side. Since building the credibility of price stability is the essence of the task in the early days of an inflation reduction program, this was been a reasonable way to start. Internationally, an initial sharp disinflation has often marked the start of a successful drive towards price stability. Such an experience grabs attention, and forces people to recognize that low inflation is more than a pious hope.

Inflation targeting has often been viewed as part of a more general movement to make monetary policy more transparent and accountable, and this has also been the case in the Czech Republic. The CNB has followed up with an enhanced program of communications, notably a quarterly Inflation Report, which discloses the strategic economic thinking of the central bank.

All in all, Czech inflation targeting is off to a promising start. For the period ahead, one of the contributions that economists can make is to develop models that embody monetary rules for achieving inflation targets over a medium-term horizon. High on the research agenda would be resolving some of the quantitative uncertainty about the monetary policy transmission mechanism, especially with respect to (a) the potential level of output, and (b) the effect on aggregate demand of interest rates and the exchange rate.

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