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Abstract

Inflation targeting has worked so well because it leads policymakers to debate, decide on, and communicate the inflation objective. In practice, this process has led the public to believe that the central bank has a long-term inflation objective. Inflation targeting has been successful, then, because the central bank decides on an objective and announces it, not because of a change in its day-to-day behavior in money markets or the way it reacts to news about unemployment or real GDP. By deciding on an inflation rate and announcing it, the central bank is providing information the public needs to concentrate expectations on a common trend. The central bank gains control indirectly by creating information that makes it more likely that people will price things in a way that is consistent with the central bank's goal.

The way to improve inflation targeting is to be more explicit about the average inflation rate expected over all relevant horizons. Building a target path for the price level, growing at the desired inflation rate, is the best way to institutionalize a low-inflation environment. In a wide variety of economic models, a price-path target mitigates the zero lower bound problem, eliminates worries about deflation, and improves the central bank's ability to stabilize the real economy.

KEYWORDS: Price path targeting; inflation targeting.

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Inflation Targeting: Why It Works and How To Make It Work Better

Inflation targeting has replaced monetary targeting as the default anchor for the paper money standard. Understanding why inflation targeting works is important for understanding how it should be implemented. Implemented well, a long-run inflation-targeting strategy looks like a target path for the price level. It reduces 1) uncertainty about inflation at long horizons, 2) the risk of deflation, 3) confusion about the medium-run stance of monetary policy, and 4) the likelihood of asset pricing bubbles and other forms of economic instability. A well-designed policy imposes little or no short-run constraint on the central bank's use of discretion to manage economic risks. Instead, such a policy removes some risks and enhances the central bank's ability to deal with those that remain.

Inflation targeting works. Its precursor, monetary targeting, did not. Over the past decade countries that have targeted inflation have achieved low inflation. It is true, however, that some countries that don't have explicit inflation targets also have low inflation, but that ignores the critical fact that the countries that adopted inflation targeting did so following long periods of high and uncertain inflation. Bernanke et al. (1999) document the success of inflation targeting while being a bit vague about the exact definition of the concept. There is a large and growing literature on inflation targeting that includes much disagreement about what it is and whether it is good policy. The conference volume by Bernanke and Woodford (2003) includes an excellent compilation of papers detailing the state of this debate.

Why Does Inflation Targeting Work?

The main point of this paper is that inflation targeting has worked so well because it leads policymakers to debate, decide on, and communicate the inflation objective. In practice, this

process has led the public to believe that the central bank has a long-term inflation objective. Inflation targeting has been successful, then, because the central bank decides on an objective and announces it, not because of a change in its day-to-day behavior in money markets or the way it reacts to news about unemployment or real GDP.

Actually, central bankers themselves did not seem fully aware that they were, in fact, deciding about the long-run inflation objective when they were first setting inflation targets. As time went on, however, the targets became institutions that were perpetuated at or near the same values year after year. If a country adopted inflation targets because it had a history of high and costly inflation, as was the case in New Zealand, Canada, and many countries that wanted to join the EU, then there was a period of gradually falling inflation targets. These central banks usually announced a plan to go through this transition to a low-inflation environment, which was made explicit in terms of a particular price index and numerical limits.

The success of inflation targeting has little or nothing to do with how inflation-targeting central banks have reacted to incoming news about inflation. Most of the shocks affecting the monthly inflation rate in a low-inflation environment are caused by real disturbances that are transitory and, therefore, best ignored by policymakers. This is an important concern that causes some policymakers to reject inflation targeting. For example, Kohn (2003) objects to inflation targeting because it might constrain the Fed's "ability to adapt to changing conditions."

How Does Inflation Targeting Work?

How can policymakers control the inflation rate when they couldn't control the money growth rate? The historical record shows that central banks did not effectively control M1, M2, or any other M when they tried to do so directly. The Monetary Control Act of 1980 changed

institutions in a way that was meant to give the Federal Reserve more control over M1, but it also made velocity and the money multiplier more volatile and unpredictable.

So what is the mechanism that makes inflation targeting work, where money targeting did not? One way to see the answer is to consider the “Management by Objective” model that underlies most, if not all, successful management programs. In the first step of this model, the top management decides on the objective. In the second step, it communicates the decision to all employees, and then, most difficult of all, it adopts a culture that empowers employees at all levels to make decisions consistent with the objective. Everything else is detail.

Think of the economy as a large decentralized organization in which you want individual decisions about wages, prices, and interest rates to be consistent with the inflation objective. Almost all investment decisions depend on an assumption about inflation. Wage negotiations, multi-period pricing decisions, and long-term contracts generally require an inflation forecast. There is one important difference between the management problem for the central bank and the management problem for large corporations. In a large corporation, it is relatively easy to define the objective (some variation on maximizing profit streams), but difficult to get the managers at each level to empower their employees to make important decisions. For the Fed it is easy to empower citizens to make decisions—it would be impossible to stop them. However, it appears more difficult to take the first step.

By deciding on an inflation objective and making it public, a central bank provides information the public needs to concentrate expectations around a common trend. The central bank gains control indirectly by creating information that makes it more likely that people will price things in a way that is consistent with the central bank’s goal. With monetary targets, there was little information in the process that would inform the average citizen. In Germany, one

country that seemed to have a successful monetary targeting process, each December's announcement of the next year's money supply target included an explicit statement of the inflation rate that was assumed in setting the target. Between December 1984 and when Germany joined the monetary union in 1999, this price assumption was constant at 2 percent.

There is a bit of evidence that business economists' forecasts of inflation are more concentrated among individual forecasters when they forecast for inflation-targeting countries. Table 1 shows the spread between the high and low forecasts among the Blue Chip respondents who made inflation forecasts for the major currency countries. Two countries, the United States and Japan, stand out as having the largest spread separating the high and low forecasts for the next year ahead. All the other countries have explicit inflation objectives and smaller spreads.

In Gavin (2003) I examined the FOMC forecasts for GDP, inflation, and unemployment in the United States that are reported to Congress every 6 months. The report includes the range of individual policymaker forecasts. The width of this range represents a measure of the degree of consensus (or lack thereof) about the forecast. I constructed a forecast error by subtracting the actual value first reported from the midpoint of the FOMC range. Then I assumed that inherent uncertainty in the variable was measured by the root-mean-squared error of that forecast. Then I measured the *relative* degree of consensus—that is, the degree of consensus relative to the amount of inherent uncertainty—by taking the ratio of the RMSE to one half the width of the spread between the high and low forecasts. This measure, reported in Table 2, varies directly with the relative degree of consensus.

I found that members of the FOMC agreed most about the unemployment rate and real GDP forecasts, where the inherent uncertainty is really quite large and the FOMC has little responsibility for the trend. In contrast, the least consensus emerges for the inflation forecasts

with the longest horizon, where the predictive uncertainty is relatively low and, potentially, the Fed has the most influence.

This evidence is weak and there really are good reasons to believe that the short-horizon (current year or one-year-ahead) inflation forecasts are dominated by real factors such as energy price shocks. Perhaps the best evidence that the United States could benefit by being more explicit about their long-term inflation objective can be found in Gurkaynak, Sack, and Swanson (2003). They show that the long-term U.S. interest rates react excessively to macroeconomic data releases and news about monetary policy. They provide evidence that this overreaction is caused by changes in the market's long-term inflation expectations. If policymakers do not make an explicit decision about the long-run inflation objective, then the objective becomes endogenous and is determined by a series of discretionary responses to largely unpredictable shocks.

How Can We Make Inflation Targeting Better?

It is the explicit choice and communication of the inflation objective that has made inflation targeting work. The way to make it work better is to clarify the long-run inflation objective. One way to clarify the objective is to implement the inflation target as a single number rather than as a range. Another way is to make it clear that the objective is the long-run inflation rate, not the year-to-year rate. To make these ideas concrete, consider the inflation targets in Canada and the United Kingdom.

Canada's annual inflation targets are shown in Figure 1 with year-over year growth in the headline CPI. Showing inflation as a year-over-year growth rate eliminates the high-frequency noise in the series, but this still does not tell us whether these fluctuations are self-correcting or

require a policy response. To set its short-term rate, the Bank of Canada has a research unit that analyzes the current state of the economy and makes forecasts assuming alternative policy responses. Evaluating short-run policy is every bit as difficult as formulating it. To do so, we need highly technical and detailed information about the economy, the distribution of the shocks hitting the economy, and a model that maps policy actions into alternative outcomes. As Greenspan (2003) emphasized in his remarks at the most recent Jackson Hole conference, there is no consensus about a model that does this reliably. The complicated nature of the problem means that it is very difficult to say, even after the fact, whether a given policy response was the appropriate one. Although analysis of short-run policy is problematic, the analysis of long-run performance is not. Given a low-inflation environment, long-run output growth is largely independent of monetary policy. At an earlier Jackson Hole conference, King (1999) suggested that the long-run performance of an inflation-targeting central bank might be based on a price-path constructed from the accumulation of inflation targets.

Suppose we apply that standard to the Bank of Canada. Figure 2 shows two price paths beginning with the actual CPI in January 1991 and growing at rates determined by the limits of the annual inflation target ranges. The CPI went below the bottom of the long-run range in 1994 and never went substantially above the bottom of the range until 1999. This led some analysts to speculate that the true target was the bottom of the range. At the end of 1999, the CPI was 17 percent below the level that would have occurred had inflation risen along the top of the range. Since 1999, however, the inflation rate has started growing faster. The point is simply that, although the Bank of Canada generally kept the price level between these two limits, the use of ranges creates uncertainty about the long-run inflation objective that might be eliminated.

Figure 3 shows the decade of inflation targeting by the Bank of England. In the first five years, the target range was 1 to 4 percent with a midpoint of 2.5 percent. In the past five years, the target was 2.5 percent. Figure 4 shows a price path constructed from the 2.5 percent midpoint for the 10 years. Here, it looks almost as if the Bank of England has a price-path target. The performance of the price level could hardly have been better. An interesting question is whether the outcome for the economy would have been better if the Bank had announced this long-run path in advance. The instinctive reaction of many economists is to say no because they know that the central bank cannot control inflation with any precision. But, my premise is that inflation targeting works because it clarifies the long-run inflation objective, allowing individuals to set prices with good information about future inflation. A more definite long-run objective is more likely to be known and understood.

Returning to our management by objective model, there are many right ways to run a corporation, but they all involve deciding about the objective and communicating it to everyone. Likewise, there are many varied details in actually implementing monetary policy. Details will differ according to the tastes of individual policymakers and the particular institutions that have evolved in a country. Central banks can choose from an infinite variety of operating procedures, forecasting models, and communication strategies. In the end, the only common element that is necessary for success is that they choose an objective and communicate it as clearly as possible to the public.¹

What Has Research Taught Us about Inflation Targeting?

There are three monetary policy problems that have been the focus of economic research for the past quarter century. They are

- the Phillips curve, or in its modern version, how to trade off output stabilization for inflation stabilization;
- the time inconsistency of optimal policy, or how to commit to the desired policy so that one does not end up with too much inflation and too much volatility in both output and inflation; and
- the economic instability associated with interest rate rules, or why interest rate rules may represent incomplete policy strategies.

In the past decade these problems have been analyzed in a wide variety of models that include interest rate rules aimed at inflation targets. The important result here is that long-run average inflation targeting—or price-path targeting—helps to solve all three problems. The research results hold in both New Keynesian and New Classical models, all models in which agents are forward-looking and care about the central bank’s inflation objective.²

The Phillips curve. A growing body of research finds that a central bank has the most flexibility to stabilize employment and output if it has credibly committed to a medium- to long-run inflation objective. Most recently, Cecchetti and Kim (2003) demonstrate that, in a standard policy model, the central bank faces an improved tradeoff if it chooses a longer horizon for its inflation objective. They also cite many papers that have shown similar results. Support for including a price path among the central bank’s objectives is found in the econometric study for Canada by Black, Macklem, and Rose (1997); support for a target based on 12-quarter inflation averaging is found in the econometric study for the United States by Reifschneider and Williams (2000). Support for a degree of price-path targeting has also been demonstrated in a variety of small policy models by Balke and Emery (1994), Dittmar, Gavin, and Kydland (1999), Clarida, Gali, and Gertler (2000), Vestin (2000), and Nessen and Vestin (2000).

¹ McCallum (2003b) argues that the essence of inflation targeting is choosing a target and communicating about it.

² For a comprehensive treatment of the issues in a New Keynesian framework, see Woodford (2003a).

A subset of this stabilization problem is found under the label of the zero interest rate bound. There is a growing literature on creative and unconventional methods that a central bank can use to stabilize the economy (output and inflation) when the nominal interest rate gets close to zero.³ Unfortunately, the only one that is simple to understand and likely to work is the one that advises raising your inflation target so that normal fluctuations in the nominal interest rate remain comfortably above zero. In economic models, short-run inflation targets do not solve the zero lower bound problem but long-run inflation targets do. By that I mean that the longer the period over which the central bank averages its inflation objective, the lower the average it can attain while still avoiding welfare losses associated with the zero lower bound. Essentially, this happens because, when there is a target path for a long-run average inflation rate, a surprise deflation must be offset with subsequent inflation. Thus, a surprise deflation raises inflation expectations and nominal interest rates. Reifschneider and Williams (2000) show such a result in the FRB/US econometric model. I would add that the zero lower bound problem did not appear to be a problem during the period of the classic gold standard, and I do not see any indication that it is a problem today in countries that target inflation.

The inconsistency of optimal policy. Kydland and Prescott (1977) showed that a central bank that optimizes each period will follow policies that are not time consistent. Barro and Gordon (1981) showed that optimal discretionary policy results in too much inflation with no offsetting output gain. Subsequently, other researchers have shown that discretionary policy leads to an inefficient stabilization of output and inflation. Svensson (1999) first showed that the discretion solution to model in which the central bank targets a path for the price level (growing at the target inflation rate) is equivalent to the commitment solution in a similar model in which the central bank targets the inflation rate. By choosing a price-path target, the central bank

³ For a summary of such ideas, see Clouse et al. (2000) and Bernanke (2002).

feasibly commits to an inflation target. This result has been repeated in many papers with different models. The solution to the Barro-Gordon problem is just to adopt a long-run inflation objective in which bygones are not bygones and the central bank offsets past deviations from its inflation target.

Asset pricing bubbles and economic instability with interest rate rules. Economists working in theoretical models have long understood that finding solutions to models with interest rate rules and forward-looking agents can be problematic because they often include multiple solutions. Benhabib, Schmitt-Grohé, and Uribe (1999) show that there are at least two equilibria (including one with low output and deflation) in monetary models where the central bank uses a Taylor rule to implement policy. Clarida, Gali, and Gertler (2000) and Carlstrom and Fuerst (2001) show that passive Taylor rules may result in real indeterminacies (the real interest rate may take on many different values) that may lead to economic instability. Even if a central bank has an inflation target, the policy regime may include bubbles and sunspot equilibria if the central bank is not sufficiently aggressive in reacting to inflation. Dittmar and Gavin (2003) report numerical results showing that putting just a small weight on a price-path target eliminates this source of real indeterminacy in the flexible-price models we use and believe that the result will generalize to models with nominal rigidities.

Researchers in the monetary policy literature have shown that some policy rules complete the model and others do not.⁴ This literature has practical importance in the area of institutional design. In particular, if the central bank has a policy that leads to real indeterminacy in a wide variety of economic models, then we should not be surprised to see an increased occurrence of economic instability and financial crises under this policy regime. One thing a central bank can

⁴ See McCallum (2003a) and Woodford (2003b) for a literature review. Bullard and Mitra (2002) provide an interesting application of “learning” to the problem of choosing policy rules that eliminate indeterminacies.

do to lower the risk of financial instability is to design and adopt policies that work well in a wide variety of economic models. My reading of the literature is that price-path targeting meets this criterion.

The one exception to this result is the case where decisionmakers are not forward-looking. In at least two of the papers that I discussed here, Nessen and Vestin (2000) and Cecchetti and Kim (2003), the authors run experiments where some of the agents are not forward-looking. Even in the extreme cases where most of the agents are backward-looking, some averaging of inflation targets is desirable. However, welfare comparisons suggest that economies where more agents are backward-looking are much worse off than those with more forward-looking agents. Although this is only a conjecture, my guess is that, by being clear about its inflation objective, the central bank makes it easier for a larger segment of the population to be forward-looking.

Mankiw (2003) argues that neither New Keynesian nor New Classical models adequately capture realistic inflation-output dynamics. He claims that the empirical facts are better explained in a model with incomplete information. Ball, Mankiw, and Reis (2003) use such a model to show that a flexibly implemented price-path target is the optimal policy in the presence of shocks to productivity, aggregate demand, and markups.

Conclusion

Inflation targeting is practical and useful if it accepts that the central bank has no short-run control over inflation. Inflation targets do not inform central banks about how to react to incoming news about inflation. Inflation targets work by informing the citizens who set the prices that make the news. A long-run inflation objective (or, equivalently, a price-path target)

works well because it gives consumers and firms a benchmark for wage and pricing decisions over any relevant horizon.

The literature on price expectation formation finds an enormous amount of diversity among individuals and groups. Empirical studies of expectation formation have found strong evidence of slow learning and incomplete information. By being very clear about the objective, the central bank concentrates expectations and makes them more accurate. Doing so actually makes it easier for the central bank to achieve its objectives.

The way to improve inflation targeting is to be more explicit about the average inflation rate expected over all relevant horizons. Building a target path for the price level, growing at the desired inflation rate, is the best way to institutionalize a low-inflation environment. The recent concern about deflation has caused some economists to advocate higher average inflation targets. Theoretical research indicates that these concerns may arise when the central bank allows the long-run inflation objective to be driven by short-run shocks. Indirect support for this idea comes from countries such as the United States and Japan where there are no inflation targets but there is excessive reaction of long-term interest rates to economic news and talk about deflation.

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Table 1: Blue Chip Monthly CPI Inflation Forecasts
(Percentage Points)

1998-2002	Average spread in forecasts top(3) - bottom(3)	
	Current year	Next year
US*	0.60	1.12
UK	0.86	0.76
JAPAN	0.87	1.18
GERMANY	0.60	0.73
FRANCE	0.61	0.75
CANADA	0.77	0.78

* For the United States it is the top(10) - bottom(10).

These data are computed from the forecasts reported in January each year.

Table 2: Relative Consensus of FOMC members (1979 to 2001)*

	FORECAST HORIZON*		
	6-MONTH	12-MONTH	18-MONTH
Nominal GDP	1.21	1.28	1.28
Real GDP	1.40	1.76	1.72
Inflation	1.08	1.05	0.87
Unemployment	1.35	1.86	1.83

* The relative consensus is the RMSE of the consensus FOMC forecast divided by $\frac{1}{2}$ the width of the range of individual FOMC member forecasts. The consensus forecast is calculated as the midpoint of the range of FOMC member forecasts. See Gavin (2003) for details.

Figure 1 Inflation Targets in Canada (1991 to 2003)
Shown with Headline CPI Inflation

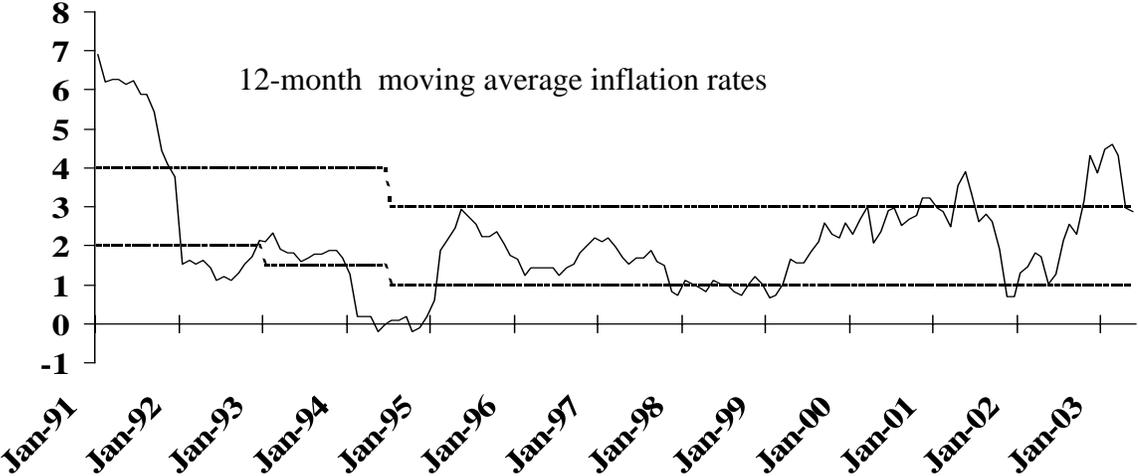


Figure 2 Hypothetical Long-Run Inflation Targets in Canada (1991 to 2003)
Shown with Headline CPI Price level

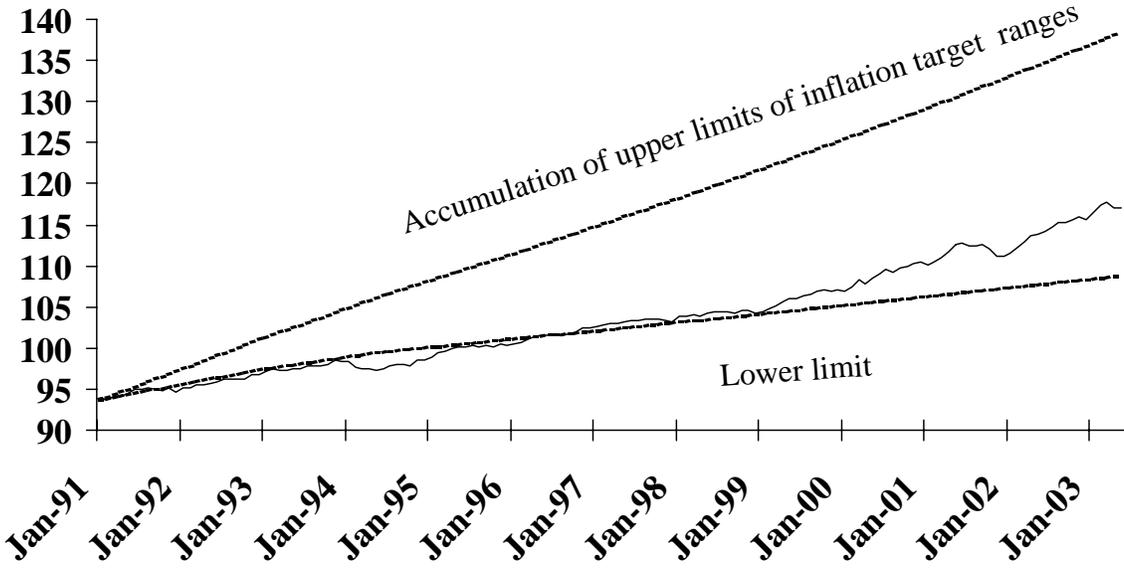


Figure 3: Inflation Targets in the United Kingdom (1992 to 2003)
Shown with Headline CPI

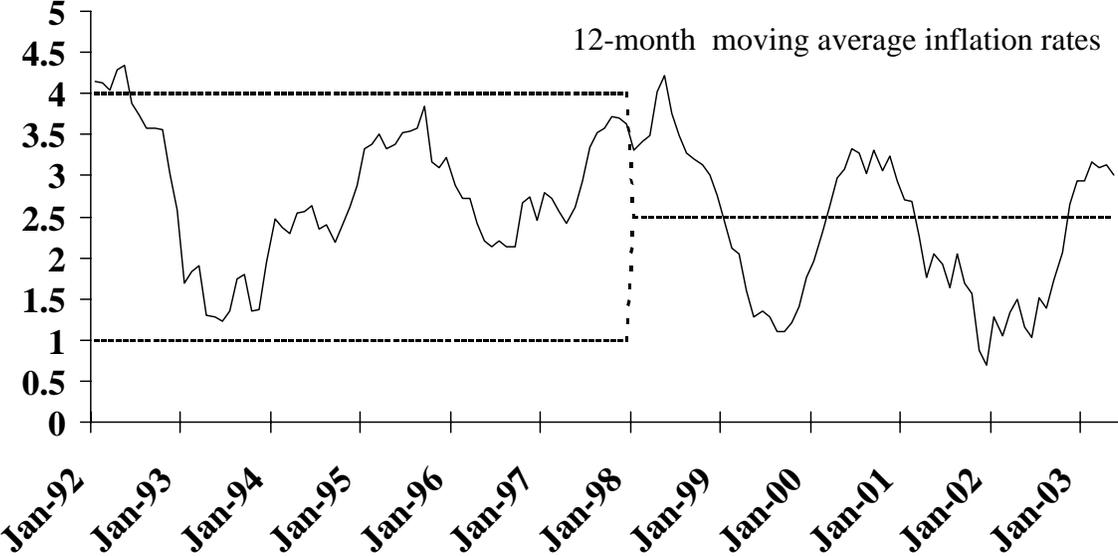


Figure 4: Hypothetical price path target growing at 2.5% per year and headline CPI

