

INFLATION TARGETING AND OUTPUT STABILISATION

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Abstract

Inflation targeting has been criticised for being ‘inflation only’ targeting and hence, for ignoring output and employment. This paper argues that this criticism is misplaced. The inflation-targeting framework has sufficient flexibility to allow for the short-run trade-off between output and inflation. The extent to which it does so in part reflects some design features of the inflation-targeting framework, such as targeting bands and the policy horizon, that have been adopted in practice in the inflation-targeting countries. Medium-term price stability can be maintained while still allowing some degree of short-run inflation variability, thus providing scope for lower output variability.

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1. Introduction

Inflation targeting has been adopted as the framework for monetary policy in a number of countries over the past decade. The adoption of a monetary policy framework that focuses explicitly on inflation has reflected the growing realisation that the major contribution that monetary policy can make to economic growth and welfare in the long run is the maintenance of a low and stable inflation rate. This realisation has been supported by the empirical evidence on the detrimental effects of higher inflation on economic growth, and also by the evidence of the absence of a negatively sloped long-run trade-off between inflation and growth.

However, some have criticised inflation targeting for its perceived focus on inflation as the only goal for monetary policy, to the exclusion of other goals, most notably output (see for example, Friedman and Kuttner (1996)). While the empirical evidence may suggest the absence of a negative long-run trade-off, there is ample evidence of a negative short-run trade-off. The short-run trade-off, often represented by the short-run Phillips curve, implies a trade-off between output and inflation variability. An exclusive focus on returning inflation to the target rate as quickly as possible may come at the expense of creating excessive volatility in output.

Given that the ultimate goal of policy is not inflation stabilisation *per se* but rather welfare maximisation, is inflation targeting too narrow a framework for monetary policy? Does inflation targeting pay sufficient attention to output stabilisation, as, for example, a nominal income targeting framework might? This paper considers these questions drawing on the existing theoretical and empirical literature.

The next section presents a simple model to illustrate the interaction between output and inflation. The following section considers output and inflation variability in more detail. Section 4 summarises some empirical evidence on the trade-off between output and inflation variability, focusing particularly on the

Australian evidence. Section 5 discusses how the design of the inflation-targeting framework can allow more scope for output stabilisation and can address some of the issues involved in the variability trade-off. Section 6 illustrates these issues by considering the actions of monetary policy in three recent episodes in Australia. Section 7 concludes.

This paper argues that inflation targeting does take output stabilisation into account. In general, the inflation-targeting framework has sufficient flexibility to allow for the short-run trade-off between output and inflation. The extent to which it does so in part reflects some design features of the inflation-targeting framework, such as targeting bands and the policy horizon, that have been adopted in practice in the inflation-targeting countries. Medium-term price stability can be maintained while still allowing some degree of short-run inflation variability, thus providing scope for lower output variability.

2. Theory

The role of output stabilisation in inflation targeting can be illustrated by the following simple model (see Taylor (1994), Svensson (1997a) or Ball (1997)) which consists of a Phillips curve, aggregate demand equation and the central bank's loss function:

$$\pi_t = \pi_{t-1} + \alpha(y_{t-1} - y_{t-1}^*) + \varepsilon_t \quad (1)$$

$$y_t = y_t^* + \beta(y_{t-1} - y_{t-1}^*) - \gamma(r_{t-1} - r^*) + \eta_t \quad (2)$$

$$L_t = E_t \sum_{s=t}^{\infty} \delta^{s-t} [(1-\lambda)(\pi_s - \pi^*)^2 + \lambda(y_s - y_s^*)^2] \quad (3)$$

where π is inflation, π^* is the inflation target, y is output, y^* is potential output, r is the short-term real interest rate which is assumed to be the instrument of monetary policy, δ is a discount rate, and ε_t and η_t are i.i.d. shocks which are not known to the policy-maker when the interest rate in time t is chosen. r^* is the neutral real interest rate.

Interest rates affect output with a one-period lag, and inflation with a two-period lag indirectly through the impact of interest rates on the output gap. This accords with the lag structure in many economies.

Through the choice of its policy instrument (the real interest rate), the central bank minimises the loss function, which is the weighted sum of inflation and output deviations from their target levels.¹ Svensson (1997b) interprets the objective function with $\lambda=0$ as strict inflation targeting, where no direct concern is paid to output variability. Mervyn King (1997) has referred to a policy-maker with such an objective function as an ‘inflation nutter’. Flexible inflation targeting refers to the case where $\lambda>0$. In practice, it appears that all the inflation-targeting central banks have adopted flexible inflation targets to varying degrees.

The model can be solved to yield a reaction function for the central bank of the form:

$$r_t = r^* + \sigma_1(\pi_t - \pi^*) + \sigma_2(y_t - y_t^*) \quad (4)$$

where σ depends on the parameters in the model, and in particular, the relative weight on output stabilisation in the objective function (λ).

Monetary policy is adjusted in response to deviations of inflation from its target value and output from potential. Such a reaction function for monetary policy is often referred to as a Taylor rule.² In this instance, optimal policy can be described by a simple Taylor-type rule because of the simple structure of the economy. In practice, optimal monetary policy involves examining all available economic information affecting the future values of output and inflation. The inflation target provides the filter with which to process that information.

When $\lambda=0$, the optimal policy is straightforward. The instrument is adjusted so that the expected inflation rate two periods hence, is equal to the target inflation rate π^* . The presence of a two-period lag in the effect of monetary policy on inflation

¹ An interest rate smoothing term is often also included in the objective function. See Lowe and Ellis (1997) for a discussion of the rationale for interest rate smoothing.

² Taylor (1993) found that assigning the weight of 0.5 to both σ_1 and σ_2 resulted in a reaction function that provided a good approximation of the actions of the Federal Reserve.

means that the optimal policy corresponds to inflation forecast targeting. In this sense, Svensson (1997a) has referred to the inflation forecast as the intermediate target of policy.

When there is positive weight on output stabilisation ($\lambda > 0$), the optimal solution is to set the interest rate to only partially close the gap between expected inflation (the inflation forecast) and the inflation target two periods hence. The gradual closing of the inflation gap reduces the fluctuations in output.

Note that even with strict inflation targeting ($\lambda = 0$), there is still a positive weight on output in the monetary policy reaction function. This is because of the information content of the output gap for the forecast of inflation.

The interaction between output and inflation and the consequent effects on their respective variabilities can be illustrated by considering the impact of the two shocks in the model. Ball (1997) and Svensson (1997b) discuss this in more detail.

Firstly, consider a positive demand shock ($\eta_t > 0$) that increases output above potential, which, in the following period, leads to an increase in inflation. The policy response in this case is to increase interest rates to counteract the inflationary impulse. The extent to which interest rates are adjusted will depend on the relative weight on output stabilisation in the loss function. The higher the weight on output, the smaller the interest rate response. A smaller interest rate response decreases the variability in output but increases the extent to which inflation remains above target, increasing inflation variability.

In general, both the shape and position of the trade-off between output and inflation variability may be affected by the design of the inflation-targeting framework. This is discussed in more detail in Section 5.

Note that the above variability trade-off arises because of the differing lags between the impact of a change in interest rates on output and inflation. Absent the lag structure, the weight on output stabilisation would be irrelevant in the case of a demand shock; interest rates would be adjusted to close the output gap, returning output and inflation to target immediately. In this case, there is no trade-off between output and inflation variability.

Secondly, consider a supply shock ($\varepsilon_t > 0$) that increases inflation only, output remains at potential. Regardless of the lag structure, there is a trade-off between output and inflation variability. A negative output gap is required to return inflation to its target rate. The larger the output gap generated, the quicker inflation returns to target, thereby decreasing inflation variability but at the expense of increased output variability.

Again, as was the case with a demand shock, the impact of small supply shocks can be accommodated by appropriate design of the inflation-targeting framework. However, large negative supply shocks that result in a large increase in the price level and the inflation rate, and possibly also open up a negative output gap create more difficulties for the policy-maker. Some trade-off between inflation and output variability is unavoidable.

The trade-off between inflation and output variability can be made starker if we consider a slightly modified model where the transmission of monetary policy changes to inflation is particularly rapid. For example, assume that changes in short-term interest rates result in immediate changes in the exchange rate which are rapidly passed through to consumer prices.³

In response to a deviation of inflation from target, interest rates could be adjusted by an amount large enough to engender a sufficient movement in the exchange rate to return inflation to its target rate almost immediately. While this might be feasible, it may not be desirable, if (as is the case in many countries) the required movement in interest rates and the exchange rate are destabilising for the real economy. The volatility of interest rates and the exchange rate would also increase substantially, raising the prospect of instrument instability.

In conclusion, output stabilisation clearly has a role to play in inflation targeting. The critical question is how large a role should it have. The answer is essentially an empirical issue. Before turning to the empirical evidence however, the next section makes a short digression to consider the variability trade-off in more detail.

³ Bharucha and Kent (1998), Svensson (1998) and Ball (1998) all consider an open economy version of the above model that incorporate this feature.

3. Inflation and Output Variability

The objective function in Equation (3) implies that stabilisation of inflation and output is an appropriate goal for policy. The objective function is however, only a shorthand way of making practical the policy-maker's ultimate aim which is to maximise welfare. This raises the question of why variability of output and inflation is detrimental to welfare.

Why should output variability be of concern to the policy-maker? Schumpeter has raised the possibility that some degree of output variability may indeed be beneficial. More recently, this has been characterised as the 'cleansing effects of recessions' (Caballero and Hammour 1991). Countering this argument, if there is convexity in the Phillips curve, there is a negative interrelationship between the variability of output and level of output. The greater the variability of output, the lower the average level of output (through a simple application of Jensen's inequality). A growing body of evidence suggests that there may indeed be convexity in the short-run Phillips curve.⁴ Moreover, it would appear that large recessions are particularly costly and hence, should be avoided where possible.

Why should inflation variability be of concern? Excessive inflation variability reduces the credibility of policy-making, as will be discussed further below. The loss of credibility may be reflected in a drift upwards in inflation expectations above the targeted rate, which in turn will increase the costs of bringing inflation back to target. There is also substantial empirical evidence of a positive relationship between inflation variability and the level of inflation.⁵ If higher inflation variability leads to higher average inflation, this will be detrimental to the long-run performance of the economy.

A variable inflation rate also reduces the predictability of future prices, thereby increasing the costs of writing long-term contracts. A price-level target would decrease these costs even further than an inflation target, although no central bank has adopted such a regime at this stage.

⁴ See DeBelle and Laxton (1997) and the references therein.

⁵ However, as Ball (1993) illustrates, this again may be another manifestation of lack of policy-making credibility. In response to the higher inflation, the policy-maker attempts (ultimately unsuccessfully) to cause a disinflation. These frequent transitions between high and low inflation rates increases the variability of inflation.

The trade-off between output and inflation variability also effects the monetary policy strategy in a disinflation. Ball (1994) presents some evidence that the sacrifice ratio may be lower in faster disinflations. Thus, output variance would be lower in a more rapid disinflation. This, however, runs counter to the evidence on convex Phillips curve which suggests that deep recessions are excessively costly and do not provide much added disinflationary impetus.

Finally, while the above discussion has focused on the variability trade-off, the cross-country empirical evidence suggests that there is a *positive* relationship between output and inflation variability (Debelle and Fischer 1994). However, this result most likely reflects the general competence of policy-making: countries which have unsound policy regimes are likely to generate both higher inflation variability and output variability. The evidence from within individual countries based on simulations of small estimated macroeconomic models, which is summarised in the next section, clearly demonstrates the negative relationship.

4. Evidence

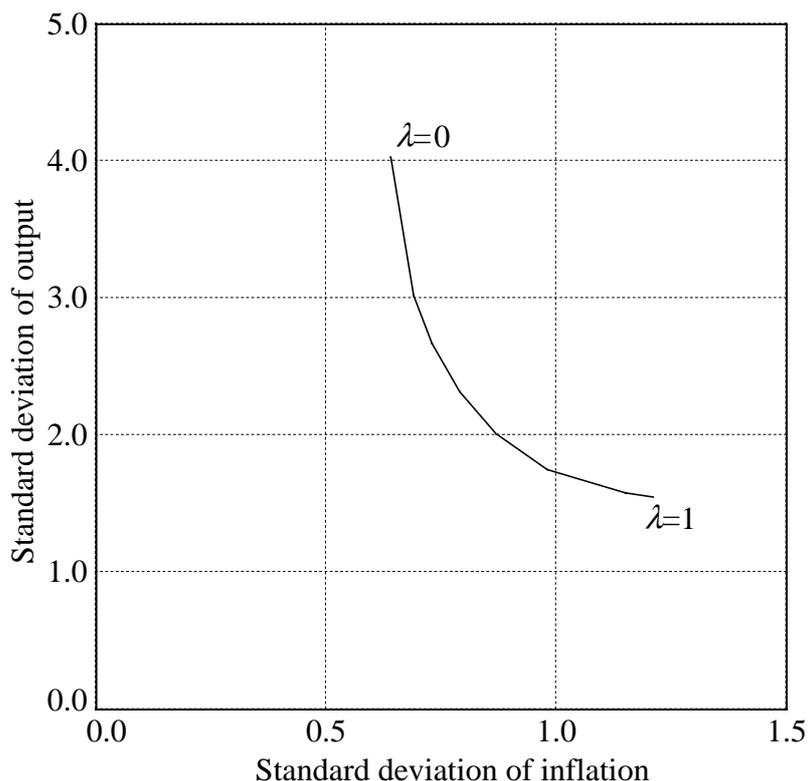
The model presented in Section 2 has provided the basis for a growing body of empirical work examining the trade-off between output and inflation variability.⁶ The general approach that has been adopted in this literature has been to stochastically simulate a version of the model. The weight on output stabilisation (λ) is varied, and a variability frontier is then traced out for an optimal monetary policy response and for various policy rules. This section summarises the findings of the literature, focusing particularly on the results that have been obtained for Australia.

Stevens and Debelle (1995) estimate the model in Section 2 using Australian data, taking into account a slightly more complicated lag structure. The policy-maker is assumed to have complete knowledge of the structure of the economy, but is assumed to respond to shocks with a one-period lag. If policy is conducted optimally, the trade-off frontier in Figure 1 is obtained.

⁶ An early paper examining the trade-off was Taylor (1979). The volume edited by Bryant, Hooper and Mann (1993b) extensively examines the issue.

As Figure 1 shows, the trade-off between inflation and output variability is convex: increasing the weight on output in the central bank's objective function (moving south-east on the curve), increases the variability of inflation while reducing the variability of output relatively substantially in the upper-left portion of the curve, but less so in the lower-right portion.

Figure 1: Inflation and Output Variability

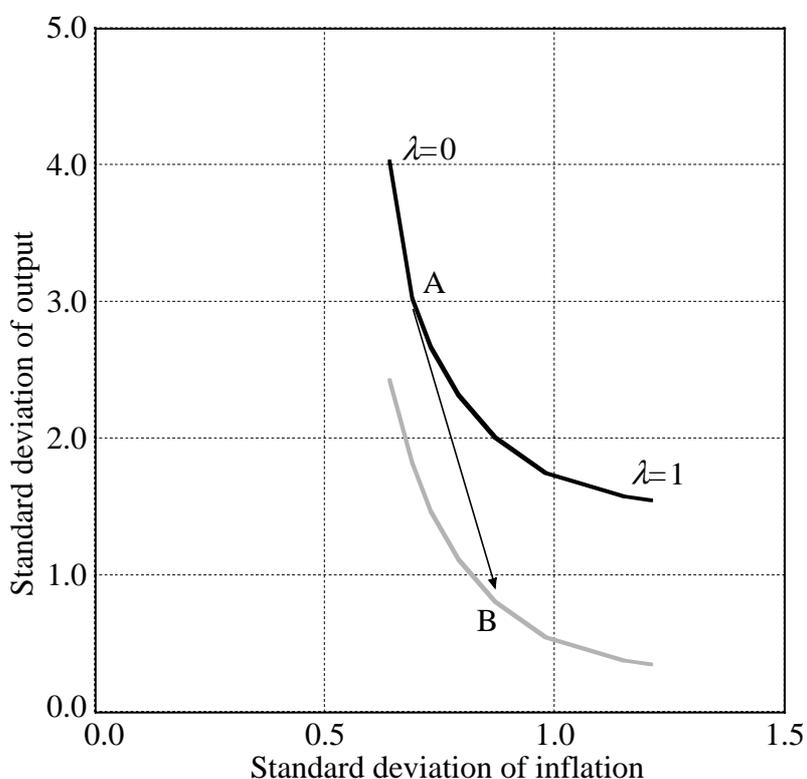


There are two other noteworthy features of the curve. Firstly, when there is no weight on output stabilisation ($\lambda=0$), there is little cost in terms of increased inflation variability from small increases in the weight on output stabilisation, but this significantly decreases the variability of output. Secondly, a large range of values of λ deliver very similar outcomes for inflation and output variability. These are clustered around the part of the trade-off curve closest to the origin. Major differences occur only when very large weights are put on either inflation or output stabilisation. These conclusions have been found for a range of countries.⁷

⁷ See, for example, Black, Macklem and Rose (1997) for Canada, and Bean (1998) for the UK.

In deciding upon the appropriate weight to put on output stabilisation in the objective function, the following consideration should be borne in mind. The initial choice on the variability frontier may influence the speed with which the central bank acquires credibility, and hence, the choices available to it in the longer term (that is, the long-run position of the trade-off curve). A point such as A in Figure 2 which aimed for lower inflation variability may enable a central bank to establish its inflation-fighting credentials earlier than one which aimed for lower output variability. As its credibility became established, the central bank might then be able to follow a more flexible approach (point B), potentially on a variability frontier closer to the origin.

Figure 2: Establishing Credibility



The above results can be used to consider the issue of the appropriate width of the inflation-target band. The curve in Figure 1 was obtained under the assumption of optimal policy where the central bank has full knowledge of the economy's structure. However, even when the central bank puts zero weight on output stabilisation, the standard deviation of inflation is still 0.64 per cent per quarter. Thus a band wide enough to ensure that it was breached only a small fraction of

the time would likely be too large to be credible.⁸ There are some caveats to this conclusion. Most notably, if over time, the inflation target became more credible, the structure of the economy and in particular, the inflation equation would change, lowering the irreducible variance in inflation (this issue is revisited in Section 5).

de Brouwer and O'Regan (1997) extend the above analysis using a more fully specified model of the Australian economy that explicitly incorporates the exchange rate. They evaluate the performance of different monetary policy rules in terms of their effect on inflation and output variability. The rules they consider include:

- nominal income level rule, $i_t = r^* + \pi_{t-1} + \gamma(py_{t-1} - py_{t-1}^*)$;
- nominal income growth rule, $i_t = r^* + \pi_{t-1} + \gamma(\Delta py_{t-1} - \Delta py_{t-1}^*)$;
- price level rule, $i_t = r^* + \pi_{t-1} + \gamma(p_{t-1} - p_{t-1}^*)$;
- Taylor rule, $i_t = r^* + \pi_{t-1} + \gamma_1(\pi_{t-1} - \pi^*) + \gamma_2(y_{t-1} - y_{t-1}^*)$;
- inflation-only rule, $i_t = r^* + \pi_{t-1} + \gamma_1(\pi_{t-1} - \pi^*)$; and
- change rule, $i_t = i_{t-1} + \gamma_1(\pi_{t-1} - \pi^*) + \gamma_2(y_{t-1} - y_{t-1}^*)$.

Again, stochastic simulation of a small model of the Australian economy under each of these different rules yields the output/inflation variability trade-off curves in Figure 3.⁹

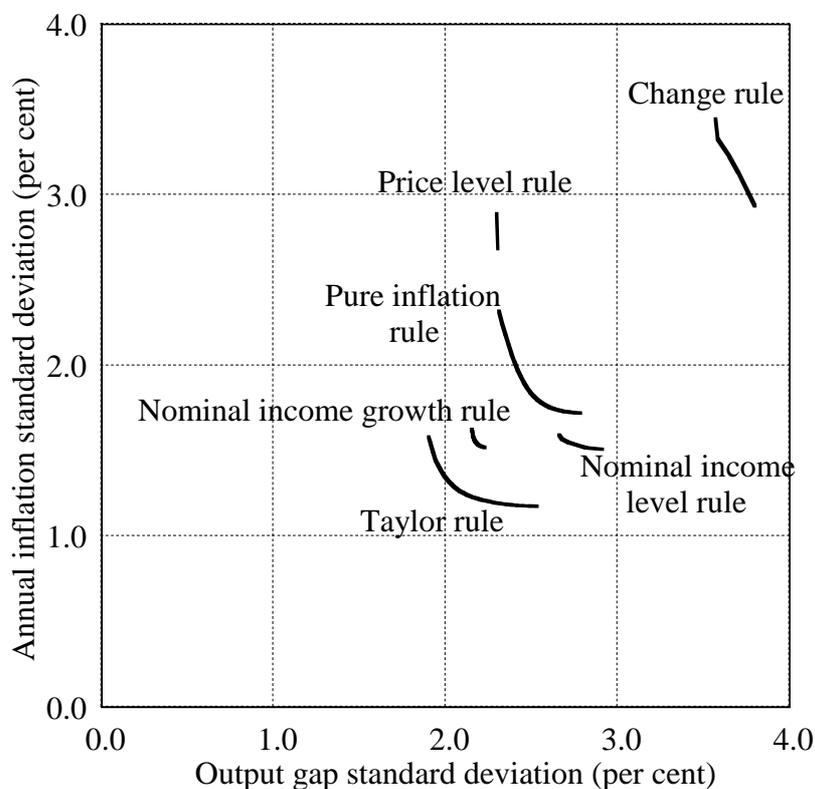
Figure 3 shows that a Taylor rule outperforms other monetary policy rules in terms of reducing *both* inflation and output variability. Notably, a Taylor rule outperforms the 'pure inflation' rule which focuses only on inflation. Not only does it result in lower output variability but it also lowers the overall variability of

⁸ Haldane and Salmon (1995) obtain a similar result for the UK.

⁹ In Figure 3, the curves are constructed slightly different to that in Figure 1. The γ s in the reaction function are varied, rather than the weight λ in the objective function.

inflation. This is because the output gap is a major determinant of inflation, but the inflation-only rule does not pay sufficient attention to output.

Figure 3: Variability Trade-off under Different Policy Rules



It should be noted that the ‘pure inflation’ rule does not correspond to strict inflation targeting. As shown in the model in Svensson (1997b) and Ball (1997), even under strict inflation targeting, the central bank’s reaction function places a positive weight on output. The difference between strict inflation targeting and flexible inflation targeting is reflected primarily in the weight placed on output in the reaction function. The empirical literature demonstrates the choice set or efficient frontier available to policy-makers from conducting optimal policy, or from following a particular type of policy rule. The policy-maker’s preferences embodied in the objective function determine the choice of the point on the frontier.

The Taylor rule also outperforms a nominal-income targeting rule. This result may be particular to the framework employed by the authors. For example, Bryant, Hooper and Mann (1993a) find that the two rules deliver approximately equivalent outcomes. The key issue here is the degree to which agents are forward-looking.

The framework that de Brouwer and O'Regan employ uses adaptive expectations whereas Bryant *et al* uses rational expectations. Adaptive expectations result in greater persistence in the inflation process which tends to improve the relative performance of the Taylor rule.¹⁰

It is important to keep in mind that a Taylor rule is not the optimal policy rule in any but an extremely simple model of the economy. Hence, de Brouwer and O'Regan also examine how the trade-off can be improved (that is, shifted towards the origin) beyond that delivered by the adherence to a simple Taylor rule.

Firstly, the output/inflation variability trade-off is improved the more credible is the policy framework. In particular, the inflation target can serve an important role as an anchor for price and wage setters. The greater the credibility of the target, the less that inflation expectations will adjust to shocks to inflation, decreasing the need for policy to offset the impact of those shocks. Consequently, the inflation process will have more inertia around the stable mean of the inflation target. Measures to increase public understanding of the inflation target, including through a sufficient degree of transparency in the central bank's conduct of policy, can be beneficial in this regard.

In this respect, an inflation target has an advantage over a nominal income target. The nominal income target does not provide an explicit decomposition into an inflation component and an output component, so there is no obvious anchor for inflation expectations. Furthermore, the inflation rate is generally well understood by the public whereas nominal income growth may be a more opaque concept.

Secondly, the Taylor rule in its standard form is a backward-looking rule. However, monetary policy in an inflation-targeting regime (and indeed in most policy frameworks) is forward-looking, given the lags in the effect of monetary policy on the real economy and inflation. Friedman (1959) and Blinder (1997) have highlighted the perils of a policy rule which fails to take account of the policy lags. Consequently, a rule which incorporates forward-looking variables can deliver superior outcomes. There are two alternatives in this regard.

¹⁰ See the discussion in Section 3.1 of de Brouwer and O'Regan (1997) for more detail.

A rule which incorporates other variables that affect the future path of output and inflation will improve the trade-off. For example, de Brouwer and O'Regan show that including the exchange rate and unit labour costs in the central bank's policy rule can reduce the variability of both output and inflation.

Alternatively, the policy rule can explicitly include forecast values of output and inflation. That is, the policy rule itself is forward-looking. Again, such a rule reduces the variability of both inflation and output. This occurs because the policy rule now takes direct account of the policy lags.

Batini and Haldane (1999) examine this last issue for the UK economy. They evaluate the performance of an inflation-forecast targeting rule. They show that such a rule is 'more efficient at minimising inflation and output variability than standard Taylor rule specifications, and [is] almost as efficient as fully optimal rules' (p. 5). In addition, an inflation-forecast targeting rule has a number of other desirable properties. Its simplicity implies that it is more robust than other policy rules to uncertainty about the structure of the economy and it is more easily monitored than other rules.

The other important issue that Batini and Haldane highlight is that the degree to which policy-makers care about output (the size of λ) affects the horizon of the inflation forecast. They confirm the theoretical result established by Ball (1997) and Svensson (1997b) that the greater the weight on output, the more gradually the policy-maker responds to deviations of the inflation forecast from the target value. In practical terms, this corresponds to a longer horizon on the inflation forecast in the policy rule.

In conclusion, the empirical literature has generally supported the conclusions of the theoretical literature. Namely, sizeable gains can be achieved in terms of output stability at the cost of only a small increase in inflation variability when a more flexible approach to inflation targeting is pursued. Secondly, because output is a major determinant of future inflation, placing a positive weight on output stabilisation in the central bank's reaction function will always improve inflation outcomes over a reaction function which responds only to inflation, regardless of whether a strict or a flexible inflation-targeting regime is being pursued.

5. Practice

This section addresses the issue of how the design of the inflation-targeting frameworks that have been adopted have dealt with output stabilisation. It does so, particularly focusing on the features of the Australian framework.

The formal statement of the Reserve Bank of Australia's inflation target is contained in the *Statement on the Conduct of Monetary Policy*,¹¹ signed jointly by the Treasurer and the Governor of the Reserve Bank. It defines the target as 'keeping underlying inflation between 2 and 3 per cent, on average, over the cycle', and goes on to note that 'this formulation allows for the natural short run variation in underlying inflation over the cycle while preserving a clearly identifiable benchmark performance over time'.

This statement highlights three aspects of an inflation-targeting framework that impact on the degree of output stabilisation: the use of a range or point target for inflation, the medium-term focus and the specification of an underlying measure of inflation.

The first aspect of an inflation-targeting framework that permits some degree of output stabilisation is the choice between a point target or a targeting band, and if a band is chosen, its width. Specifying a target band allows for the imperfect control of monetary policy over the inflation rate. Given the long and variable lags of monetary policy, and given the impossibility of perfectly forecasting future inflation, it is not possible to restrict the variability of inflation below some minimum level. As noted above, the estimates in Stevens and Debelle (1995) and Haldane and Salmon (1995) suggest that this level may be quite high. In addition to this irreducible variability in inflation, the specification of a wider bandwidth also allows directly for increased scope for output stabilisation.

However, the experience with inflation targeting to date suggests that inflation variability may be lower than in the past. Thus, the irreducible variability in inflation may be lower than these estimates, allowing the possibility that a target band could be specified that is both believable and attainable, without compromising the objective of output stabilisation.

¹¹ The Statement can be viewed on the RBA's web site: www.rba.gov.au.

The choice of bandwidth involves a trade-off between credibility and flexibility. A narrow band can be announced with hard edges which is breached occasionally, or the target can specify a wide band (or instead, only a point target), guaranteeing that the target is not breached but possibly undermining the overall credibility of the framework. A narrower band may be regarded as a stronger commitment to the inflation target.

In Australia's case, the specification of the target allows for increased flexibility. Effectively, the target specifies a 'thick point' for inflation. Initially this was perceived by some as weakness on the part of the Reserve Bank of Australia, particularly in comparison to other inflation-targeting countries. However, the experience of the past six years suggests that such concerns were misplaced.

On the other hand, the New Zealand experience suggests that breaches of the inflation-targeting band may also not be that costly. In March 1996, inflation rose above the upper edge of the target band (which was then 2 per cent). This triggered a review by the Reserve Bank Board to determine whether the Governor had performed his duties satisfactorily. They concluded that he had and the Governor retained his position. There was no obvious loss of credibility in the conduct of New Zealand monetary policy, either in the eyes of the public or of financial markets.

A second aspect of the framework which allows for output stabilisation is the policy horizon. The more medium term the target, the longer the timeframe over which the central bank can return inflation to the target, and the greater weight it can give to output stabilisation. Again this raises the trade-off between credibility and flexibility discussed above. If the policy horizon is too long, the central bank may have trouble convincing the public that it is committed to returning inflation to its targeted rate in the event of a deviation from target.

The medium-term nature of Australia's inflation target has allowed for consideration to be given to output stabilisation. A good example of this is the monetary policy response to the Asian crisis, which is discussed in the next section.

Thirdly, the definition of the price index used as the target increases the scope for output stabilisation. Most inflation-targeting countries focus on an underlying or core inflation measure as (at least) their operational target for inflation. This serves to exclude the first-round effects of non-monetary determinants of inflation. In New Zealand, this has taken the form of pre-specified 'caveats' which define certain events, such as natural disasters and indirect tax changes, the effects of which can be excluded from the calculation of the target inflation rate.

The failure to exclude such occurrences would increase the variability of output. For example, consider an increase in indirect taxes on goods and services which leads to an increase in their prices, raising inflation above the target range. By focusing on the underlying inflation rate, the central bank would not try to offset the first-round effect of the price rises by causing a contraction in activity. Rather, it would tolerate the increase but seek only to ensure that inflation expectations did not rise as a result.

In late 1998, the inflation target in Australia was respecified in terms of the published (headline) CPI inflation rather than the underlying inflation rate, reflecting the removal of mortgage interest charges from the CPI by the Australian Bureau of Statistics. Nevertheless, the Reserve Bank will still analyse underlying measures of inflation to determine the overall trend in inflation. Over the medium term, the underlying measures of inflation move together with the headline measure. In this respect, a medium-term horizon for the inflation target and the use of underlying measures of inflation are somewhat substitutable.

Finally, the experience of all the inflation-targeting countries has demonstrated that the central bank needs to communicate clearly with the public the reasons for its policy actions. Greater public understanding about what the central bank is doing and why, will help to increase policy credibility, particularly in the event of some deviation from the target. As mentioned above, greater credibility can improve the variability trade-off by ensuring that inflation expectations do not adjust rapidly to inflation shocks. The advantage of a clearly articulated inflation target is that it provides a framework with which the central bank can explain its actions.

6. Three Episodes in Australia's Experience with Inflation Targeting¹²

The Australian inflation-targeting framework, since its inception in 1993, has always been a flexible rather than a strict targeting framework. It has explicitly acknowledged that there is more than one objective for policy, and it recognises the trade-off between output and inflation variability. However, the medium-term nature of the target provides a framework with which to resolve the short-term conflicts which sometimes arise between the policy objectives. This can be illustrated by the conduct of monetary policy in three episodes since the introduction of the inflation target.

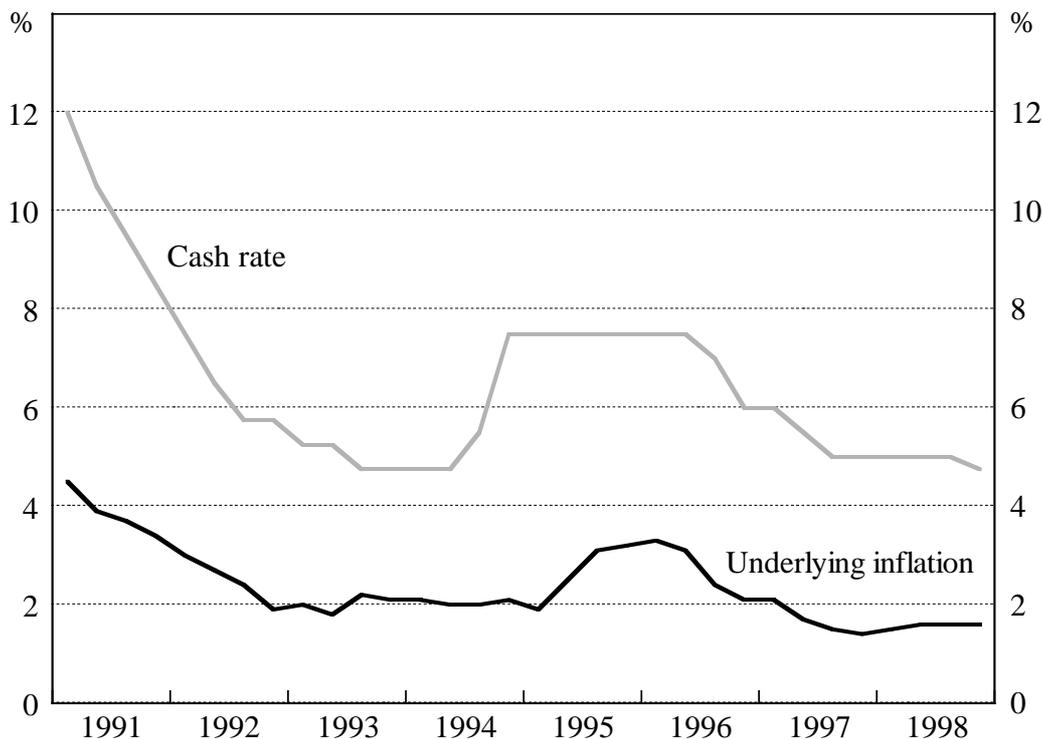
6.1 Tightening in 1994

By the middle of 1994, it was clear that economic growth had accelerated strongly since 1993 and that the labour market had tightened appreciably. However, there had not been any acceleration in inflation. Indeed, inflation did not pick up until the middle of 1995. Nevertheless, the forward-looking nature of the inflation-targeting framework suggested that a policy response was necessary. Consequently, short-term interest rates were increased by 275 basis points by the end of 1994.¹³

Thus, the rise in interest rates occurred ahead of any increase in actual inflation. The emphasis in the policy statements which accompanied the three interest rate increases was on the need to control inflation to ensure sustainable longer-term growth. The statements also stressed the forward-looking nature of the policy action. In the event, inflation did actually increase. However, the extent of the increase in inflation was limited by the earlier increases in interest rates, demonstrating the advantages of forward-looking policy.

¹² This draws on Stevens (1999).

¹³ The instrument of monetary policy in Australia is the cash rate, the interest rate on overnight loans made between institutions in the money market.

Figure 4: Inflation and Monetary Policy

6.2 Easing in 1996

By 1996, it was clear that the peak in inflation had been reached at a rate slightly above 3 per cent and that inflation was likely to fall reasonably quickly over the policy horizon. Policy was eased in July 1996, despite the fact that underlying inflation at the time was 3.1 per cent (and thus marginally above the target). Again, the forward-looking nature of the inflation target dictated that an easing in the stance of policy was required.

Both these episodes illustrate the way in which demand shocks are handled under an inflation-targeting regime. Pre-emptive policy actions were required to return output to potential and thereby, inflation to its target value. In this case, the goals of inflation and output stabilisation were generally in accord. Waiting until inflation had actually risen would have necessitated a larger policy response in the long run, thereby increasing the variability of both inflation and output.

In either case, more stringent policy action could have been taken to ensure that inflation was returned to the target more quickly. In the first episode, the inflation rate was expected to rise above 3 per cent, as it eventually did. Tighter monetary

policy than was actually implemented could have been adopted to ensure that this did not eventuate. The resultant exchange rate appreciation would have further increased the disinflationary impetus. However, the more flexible approach to inflation targeting resulted in a more moderate policy response. Given that inflation was forecast to fall back below 3 per cent within the policy horizon (which in Australia is estimated to be somewhere between eighteen months and two years), no further policy response was seen as necessary. This allowed for reduced volatility in output.

Similarly in the second episode, although inflation was forecast to fall below 2 per cent in the short run, in the medium term, it was expected to rise back above 2 per cent. Again, policy was not eased further and the path of output was consequently smoother.

The second episode also raises the issue of the symmetry of an inflation target. Prospective breaches of the targeting band on the downside should be responded to as vigorously as prospective breaches on the upside. This also serves to reduce the variability in output.

6.3 Response to Asian Crisis

This episode dates from the onset of the Asian crisis in the middle of 1997. At that time, the Australian economy was growing relatively quickly, although underlying inflation was only 1.6 per cent. Australia's strong dependence on east Asia as an export market implied that a downturn in growth was likely as export demand contracted sharply. Furthermore, the relatively fast pace of growth in Australia compared with its trading partners meant that a widening in the current account deficit was in prospect. Reflecting these concerns and concerns about the region more generally, the Australian dollar depreciated by around 20 per cent against the major currencies.

In the past, such a conjuncture would have given rise to fears of an increase in inflation expectations and inflation, and would have generated expectations of a sharp tightening in the stance of monetary policy. While a tightening in monetary policy was considered as a possible policy response, in the end, it was not considered necessary because policy-makers judged that the inflation target was

not in jeopardy. The depreciation in the exchange rate was expected to lead to some increase in inflation, but not a persistent overshooting of the target. (In the event, the expected passthrough of the exchange rate depreciation has not yet materialised.) The expected decline in output growth argued against a tightening in policy. Consequently, interest rates remain unchanged until late 1998, when they were lowered by 25 basis points. The Bank's media release at the time of this easing stated: 'the continuing good inflation performance, and the economy's capacity to grow without generating additional inflationary pressure, mean that it is appropriate to offer some additional support to growth through the adoption of a more accommodative monetary policy stance'.

The inflation-targeting regime provided the framework in which to consider the impact of the Asian crisis on the Australian economy and the appropriate policy reaction. The flexibility inherent in the specification of the targeting framework allowed for strong consideration to be given to output stabilisation since the inflation outlook remained consistent with the medium-term target. In addition, the policy credibility that had built up since the adoption of the inflation-targeting regime also allowed the Reserve Bank greater flexibility in its policy response.

A less flexible approach to inflation targeting would have aimed to ensure that there was no possibility of even a temporary overshooting of the target. The tighter policy would have exacerbated the contractionary external shock and as events have subsequently unfolded, would likely have led to a substantial undershooting of the inflation target.

Finally, the following table prepared by Ray Brooks at the IMF summarises Australia's experience over the past six years with inflation targeting. The table shows that the inflation-targeting regime has been associated with a markedly improved inflation performance: the average level of inflation and its variability have decreased substantially. However, this has not come at the expense of slower or more variable output growth, indeed, growth has been higher and output variability, lower.

The table also shows that this outcome was not unique to Australia. The other inflation-targeting countries, as a group, have experienced lower inflation and higher output growth, and lower variability of both inflation and output, since they

have adopted an inflation-targeting framework for monetary policy. While the reduction in inflation has been common to all industrial countries in the 1990s, the improved output performance and lower output variability has not.

Table 1: Inflation and Growth

	Per cent			
	Annual inflation ⁽¹⁾		Real GDP growth	
	Mean	Standard deviation	Mean	Standard deviation
Australia				
1980–92	7.2	2.4	2.8	2.8
1993–97	2.2	0.6	3.9	1.1
Other inflation-targeting countries				
1980 to adoption of targets ⁽²⁾	7.8	3.5	2.1	2.6
Adoption of targets to 1997	2.3	1.1	2.5	2.1
Large non-inflation-targeting countries ⁽³⁾				
1980–89	6.0	3.7	2.5	1.8
1990–97	2.9	1.2	2.1	2.2
Small non-inflation-targeting countries ⁽⁴⁾				
1980–89	13.9	6.5	2.7	2.7
1990–97	4.6	2.3	2.8	1.9

Notes: (1) Headline consumer price inflation for all countries except Australia (the underlying CPI), New Zealand (the CPI excluding credit services) and the United Kingdom (the Retail Price Index, excluding mortgage interest rates). Inflation rates are calculated as the year-on-year change in the quarterly index.

(2) Dates used for adoption of targets are: Canada, 1991; Finland, 1993; New Zealand, 1990; Spain, 1994; Sweden, 1993; and the United Kingdom, 1992.

(3) France, Germany, Italy, Japan and the United States.

(4) Belgium, Denmark, Greece, Iceland, Ireland, Luxembourg, Norway and Portugal.

Source: Brooks (1998), p. 91.

7. Conclusion

Inflation targeting has sometimes been criticised for being ‘inflation only’ targeting and ignoring output considerations. This paper has argued that such criticism is misplaced. From a theoretical perspective, even if a ‘strict’ inflation target is adopted, output considerations are still important because of the critical role that output plays in determining future inflation. The central bank will still have output in its reaction function. Rather, the argument would be better

conducted in terms of the weight that should be placed on output stabilisation in the central bank's objective function; that is, how flexible the inflation-targeting regime should be.

The countries that have pursued inflation targets have adopted flexible regimes. This has been illustrated in the Australian case in the response of monetary policy in three episodes over its history of inflation targeting. Similar episodes have occurred in the other inflation-targeting countries.

The decision to pursue a more flexible approach reflects the shape of the inflation/output variability trade-off in most countries. Generally it is the case that, starting from a position of strict inflation targeting, one can adopt a more flexible approach without dramatically increasing inflation variability while simultaneously benefiting from large reductions in output variability.

The design of the inflation-targeting framework also affects the degree of output stabilisation that can be achieved. The use of an underlying or core measure of the inflation rate, the adoption of measures to enhance credibility including transparent and frequent communication with the public, and the choice of the policy horizon all affect the trade-off available to the policy-maker. Such issues however, introduce a trade-off between flexibility and credibility. Too flexible a regime may undermine the public's confidence in the regime as a whole. Too rigid a regime may result in an unnecessarily large amount of output variability. However, in deciding on the appropriate degree of flexibility to adopt, consideration must be given to establishing credibility early to allow greater flexibility in the longer run.

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