The costs and benefits of disinflation: a critique of the sacrifice ratio

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Reducing inflation is usually costly. Economists have tried to assess just how costly disinflation is by estimating sacrifice ratios. Sacrifice ratios typically measure the cumulative loss in output from some measure of trend output, per percentage point fall in inflation.

Studies estimating sacrifice ratios across a variety of countries, for various disinflation episodes, have attempted to identify factors associated with less costly disinflations. Some studies have found that the sacrifice ratio is reduced if the disinflation is rapid.

However, sacrifice ratios suffer from a number of limitations. First, they ignore the subsequent output benefits of a low inflation environment. Second, the impact of other policies on both output and inflation is not accounted for. And, third, the calculation of trend output and the dating of disinflation periods is inherently arbitrary.

Introduction

One of the major concerns of monetary policy is that the cost of bringing inflation down may be high in terms of unemployment and in output foregone. It is obvious why governments wish to reduce inflation in the first place, because inflation itself tends to contribute to a lower rate of economic growth and increase social inequity. The problem is a typical one in economics - disinflation tends to impose costs in the short-run, while the benefits from lower inflation are only reaped subsequently. Furthermore the losers may be concentrated (among those who become unemployed) and the subsequent benefits are unlikely to compensate them identically. There is thus likely to be some adverse popular reaction to disinflation, both at the time and subsequently. However, if the gains exceed the losses after discounting, the government could eventually redistribute sufficient of the gain to ensure full compensation.

Much of the discussion that characterises the previous literature on this topic gives a misleading picture because it concentrates on the costs of change and not on balancing these against the benefits that are ultimately achieved. In this paper we try to present a more balanced view. Our interest in doing so is obvious. New Zealand has been involved in a long standing fight against inflation. The early years from 1985 to 1991 covered a substantial prolonged disinflation from rates of over 15 percent a year to the current 0 to 2 percent range which is viewed as price stability (see Fig. 1). These years were also characterised by low economic growth and indeed recession in some cases (Fig. 1). Since then growth has picked up. There is a natural wish to assess whether the benefits yet exceed the costs and debate over whether the costs themselves might have been lower. It is too soon to answer these questions adequately. Therefore in this article we set out the factors that need to be taken into account and show with some initial estimates how necessary it is to have a full picture before making a final judgement.

The structure of the paper is as follows: after an initial section setting out how an assessment of the net benefit might be made, we move on to discussing what the costs of disinflation are and why disinflation is difficult to achieve. In this discussion we explore whether the credibility of the framework for monetary policy affects these costs. The second half of the paper then considers the practical difficulties of measurement and in particular explores the problem of handling the other factors, both deliberate policy and shocks which also affected the be-

1 We are grateful to a wide range of colleagues for comments including David Archer, Don Brash, Enzo Cassino, Tim Ng and Peter Nicholl, and to Mike Hutchison, University of California, Berkeley.

2 The objective of price stability is set out in the Reserve Bank of New Zealand Act, 1989, and transposed into the explicit target of a 0-2 percent increase in the rate of consumer price inflation (subject to a number of caveats listed in the Reserve Bank’s six-monthly Monetary Policy Statements) by the Policy Targets Agreement between the Governor and the Minister of Finance (Monetary Policy Statement, June 1993).
baviour of the economy over the period. We explore briefly whether the inflationary process is symmetric, before finally considering some of the available evidence for New Zealand and other developed countries.

I Balancing the costs and benefits and deciding the desirable speed of change

A major feature of traditional cost-benefit analysis in economics is that it allows us to take into account people's rate of time preference. A dollar gained some years in the future is valued less than a dollar spent now. As the costs and benefits have different time profiles it is necessary to discount them in order to weigh them against each other on a comparable basis. Clearly, the sooner one can stop incurring the costs and start reaping the benefits the better. Unfortunately the speed at which change is effected also affects its cost. In general, the faster the disinflation, the greater will be the short-run loss of output. However, since incurring costs can cause popular disenchentment, a long drawn out process may be reversed before it is completed. Countering this reverse subsequently will also add to the cost. There will thus be no simple universal answers about either the optimal speed of change or the balance of benefits. Empirical evidence may help, but that only reflects what actually happened. It does not tell us what would have happened had the authorities tried to speed up or slow down the process.

In the case of New Zealand the assessment of the full costs and benefits is problematic because although inflation was brought down firmly from double figures to the range 0 to 2 percent by the end of 1991, the period since then has been rather too short to form any clear view of the extent of the increase in the rate of growth (as is clear from Fig.1). Nevertheless the short-run results are very promising with economic growth averaging 4 percent in the three years to 1994Q3, compared with 1.4 percent over the previous 10 years. However, it is important not to exaggerate as growth exceeded 6 percent in 1994, well above the 3-4.5 percent sustainable growth rate that has been widely suggested. Our focus in this article is therefore largely on the costs of bringing inflation down, rather than on the complete cost and benefit calculation.

We can gain some comfort about the net benefit of disinflation from information emanating from wider international evidence. As King (1994), for example, illustrates, using plausible figures from Fischer (1994) and Ball (1993), the benefits would exceed the costs for a discount rate of 8 percent a year or less. Hence, if the

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3 The exact figures that Fischer (1994) suggests are that, on the basis of a cross section study of some eighty countries, a fall of 0.55 percentage points in the CPI is associated with a rise of 0.01 percent in the rate of growth of productivity, while Ball (1993) suggests from a sample of nine industrial countries that the cost of lowering GDP by 1 percentage point is 5.8 percent of GDP in one year. Lowering inflation by 0.55 percentage points therefore "costs" 3.2 percent of current GDP. A 0.01 percent increase in the rate of growth of GDP will outweigh this cost at discount rates up to 8 percent. These are only illustrations as they do not compare like with like. But the calculations do make the point that only small gains in the growth rate are required to offset large short-run costs. In fact, the example may underestimate the benefits to growth from low inflation as Fischer found a link to capital formation, in addition to the gain in productivity.
Figure 2

Short-term real interest rates

%

16
12
8
4
0

- - - Ex-ante real interest rate

Ex-post real interest rate

Note: Ex-ante rate uses National Bank survey year-ahead inflation expectations. Ex-post rate uses actual CPI excluding interest and GST.

partial figures available for New Zealand do not depart significantly from the experience elsewhere, we could anticipate that, whatever their detail, the overall result is likely to be clearly favourable.

However, this is a statement of stylised facts. Inflation has fallen and the growth rate appears to have risen. Until we have an explanation which disentangles monetary policy from the other contemporaneous causes of the disinflation and from the other impacts on GDP both during and after the period of disinflation we will be guilty of confusing association and causation. Sections VI to VIII of the article therefore explore the difficulty of making this separation and show how sensitive the results are to the assumptions made.

It is even more difficult to form an opinion on the relative costs of a rapid versus a gradual disinflation in the New Zealand case. Although it was the clear intention to bring inflation down rapidly from the outset, it took a long period of high real interest rates before inflation was finally eliminated rapidly in 1990 and 1991 (see Fig. 2)\(^4\). Although this time period may appear relatively long compared with the aspirations of many of the economies in transition in central and eastern Europe, most outside commentators regard the New Zealand disinflation as being rapid. This dichotomy serves to emphasise the problems of inertia that have to be overcome and the difficulties and costs of disinflating when inflation has become entrenched. These problems of inertia are dealt with in Section III.

It also appears clear that there are strong arguments for avoiding facing the problem if at all possible by not allowing inflation to rise in the first place. Monetary policy in New Zealand is firmly structured to endeavour to achieve this and has a clear framework to ensure stability of prices. If inflationary pressure is nipped in the bud then there is little need for disinflation. However, while the intuition is obvious, if we actually want to quantify the extent of the incentive avoid inflation, here too we have to compare the costs and benefits of the actions taken with the counter factual (or anti-monde) of allowing inflation to rise. There is always something inherently unsatisfactory about comparing the single experience with the hypothetical. The hypothetical can always be criticised as being unrealistic while there is a temptation to attribute the single experience, at least in part, to special factors that were present at the time\(^5\).

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\(^4\) Inflation fell in all but six of the 26 quarters between 1985Q2 and 1991Q4. From a forward looking point of view (using year-ahead inflation expectations from the National Bank's Business Outlook Survey), real 90 day interest rates show three periods of peak pressure during the disinflation (Fig. 1). However, looked at ex-post, disinflationary pressure is relaxed steadily as inflation falls after an initial fluctuation in 1985-6. Note that the estimated impact of GST is excluded from the inflation rate.

\(^5\) This is what distinguishes economics from the natural sciences, where experimentation enables one both to establish that the single experience is repeatable and to run the alternative hypotheses under exactly the same conditions as the original experience. It is a frustration we have to live with and one which accentuates the importance of the search for evidence from similar circumstances.
For benefits to outweigh the costs we do not even have to show that the growth rate is increased. It is sufficient that it be easier to raise inflation than to lower it. This asymmetry means that the costs of inflation reduction outweigh the gains from the prior easing of monetary policy that allowed inflation to rise in the first place. Losses incurred on the way down cannot so readily be reversed on the way up as, for example, experience is lost and some of the unemployed become demotivated. This therefore provides a clear argument that governments and indeed central banks should resist the temptation to try to get short-run gains from a 'temporary' easing of inflation control. Among the more important of the arguments against allowing a temporary rise lies the credibility of policy. It is a long and difficult process to establish the credibility for inflation control but an easy matter to lose it. Maintaining that credibility lies at the heart of the Reserve Bank's monetary policy. Section II of this article therefore reviews the arguments that have been advanced for assessing the relative costs of disinflation and Section III explores the role that credibility plays in them, while Section V considers the issue of asymmetry.

II What are the costs of disinflation?

In an ideal world it would be possible to disinflate without having any impact on the real economy. In practice, prices do not bear all the adjustment and frictions are to be found in various parts of the economy, including the way in which expectations are formed, in what are described as 'nominal and real rigidities' and in imperfections in the process of competition. We deal with these sources of friction in Section III. At this point, however, our concern is to identify what the costs to the real economy might be.

A common way to measure the costs of bringing inflation down is to estimate a 'sacrifice ratio', the amount of output foregone divided by the extent to which inflation has been brought down. A parallel measure is the extra unemployment incurred divided by the fall in inflation. Clearly, however, the computation of these ratios is no trivial matter. Inflation may fall over a period when output also falls (or at least output growth slows) but it is not clear how much of that change, if any, is due to the policy measures employed to achieve it. They may have been ineffective or even counter-productive and the principal cause of the disinflation may lie elsewhere. For example, a sharp fall in the world price of New Zealand's commodity exports will lower receipts with a contractionary impact on the economy as whole, lowering both prices and output compared to what they would have been. Our problem is to isolate the impact of the policy change on the economy and not just to look at the fall in inflation on the one hand and the deviation of output growth below its long term potential on the other.

In order to isolate the effect of a particular policy we need to construct an anti-monde or counter-factual which explains what would have happened to output in the absence of the disinflationary pressure. This is also no small task. Not only do we require a believable model of the workings of the economy, but we have to be able to identify all the other factors which affected the economy over the period and isolate the changes in behaviour due to them. Unfortunately, some of them may also be related to the decision to disinflate - there may have been complementary policy changes to assist those becoming unemployed, for example. In New Zealand's case, disinflationary monetary policy was only one of a whole raft of measures seeking to transform the structure and performance of the economy (Bollard and Buckle, 1987). It is therefore difficult to decide what the world without disinflation would have been like in order to compare it with the world with disinflation.

Inflation itself imposes costs in the sense that higher levels of inflation are also associated with lower rates of economic growth. Most of this evidence is quite recent and some of the results from cross-section data have been contradictory but it has long been known that higher inflation imposes costs on the level of output, simply because it is expensive to change prices, including what are described as 'menu costs' - costs of renegotiation, changing labels and lists, informing customers, etc. Indeed, inflation distorts and complicates all basic uses of money, whether as a medium of exchange, unit of account or store of value (Konieczny, 1994). Higher levels of inflation tend also to be associated with higher variances in inflation and hence cause further losses as people try to cover the risks involved.

There are thus two factors to be weighed up in assessing the costs of disinflation: bringing inflation down imposes costs but leaving it high also imposes costs. A moment's thought suggests that, while the short-run losses may be substantial they are temporary and will tend to stop after the disinflationary process ends, the benefits from low inflation will continue indefinitely. Indeed, if the gain is to the rate of growth and not just a lump sum gain, the benefit will get increasingly larger even if the growth effect is initially small in percentage terms. Only if disinflation itself were to damage the long-run growth potential would there be an offsetting effect in growth.

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7 Some of this literature violates the assumption of money neutrality in long-run equilibrium.
terms. This is not impossible. It was for example argued in the UK that the 1979 to 1982 deflation was so harsh that a large swath of manufacturing industry, related services and skills which could not readily be replaced. As a result it was argued (Rowthorn and Wells, 1987, for example) that the ability to innovate and grow was permanently damaged. However, this argument suffered somewhat in the face of the sustained growth in the second half of the 1980s. Even if there is no growth rate effect, output under higher inflation will tend to be lower at every point in time and hence, even in discounted terms, is likely to outweigh the short-run costs of disinflation.

It is not only the extent of the change in the real economy required but also the speed of the adjustment which affects its cost. Again there is a trade-off. The faster the disinflation, then the quicker one can start the recovery and reap the benefits. However, it would also appear that a rapid fall in inflation imposes higher costs than a slow one as it is more difficult to accommodate the adjustments involved. This inevitably involves writing off such costs (Chadha et al., 1992). A simple example occurs in the case of employment. With slow change it may not be necessary to make widespread redundancies. A firm may be able to rely on natural ‘wastage’ through retirement and resignation and may be able to retrain much of its work forces for new jobs in the growth sectors. With a sharp crisis, redundancies may be inevitable and workers laid off with the associated loss of skills. When recovery comes, training and recruitment costs will also be higher as unemployment can be demotivating.

Similarly, when plants have to be closed because of short-run pressures (although they may be viable in the long-run), equipment and machinery may be prematurely scrapped, thus reducing capacity for the subsequent upturn.

A major drawback therefore to the use of sacrifice ratios is that by looking at the short-run they inevitably reveal that there is a cost. If there were no longer-term gains, one would ask why it was worth bothering with disinflation at all. A full assessment needs to view the whole picture. In effect the sacrifice ratio measures the gross cost of disinflation. There should be net benefits in the longer-run, otherwise the policy cannot be justified, except in so far as lower income groups are particularly adversely affected by inflation and the policy is driven by concerns for equity. Secondly, to a large extent sacrifice ratios merely report the stylised facts, describing the fall in inflation and output without establishing the causation.

III The difficulty of achieving change

1. Nominal and real rigidities

There are clear differences across countries in the difficulty of achieving change in price inflation. These are normally summarised under the headings of nominal and real stickiness. In the first case there are rigidities which make it difficult to change nominal prices (and wages). In such an economy inflation should have more difficulty emerging and disinflation should tend to result relatively easily. Indeed the staggered wage contracts models of Fischer (1977) and Taylor (1979,1980) show how a tightening of monetary policy need not incur a fall in output provided that expectations of prices incorporate its impact. However, if it is actually necessary to reduce some prices beyond what technological changes would suggest in order to stabilise the price level as a whole, then disinflation will be costly.

If there is considerable nominal stickiness in price formation then achieving disinflation should be easier in one sense as it is relatively difficult to change prices. However, countries with the greatest nominal stickiness are unlikely to have the high inflation in the first place. That aside, if price setters are reluctant to adjust prices in the face of pressures then the implication is that quantities adjust. (If prices remain high when demand falls then sales will fall.) However, nominal rigidities in practice do not appear to be an important cause of disinflation costs, at least not on their own. It is real rigidities through their interaction with nominal rigidities which lead to the main costs (Ball and Romer, 1990). In the case of real rigidities, relative prices are difficult to change. Thus for example if wage contracts include indexation for price changes it becomes very difficult to reduce real wages. That will only occur when the contracts are renegotiated or because the structure of employment changes.

Discussion in the literature has tended to focus on wages but the argument applies to all prices. The more reluctant the individual price setter is to adjust behaviour following a policy tightening, then the more difficult it is to disinflate. Thus the costs of disinflation are likely to be higher and the time taken longer for any given degree of disinflationary pressure.

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8 These models assume that firms set wages for a number of years (without escalator clauses). Hence this aspect of inflation can only be reduced in a series of steps. Once disinflationary pressure starts, existing wage levels are maintained until the next negotiation and then forward looking negotiators will adjust to the expected fall in inflation in setting the next contract. (Backward looking ones would incorporate a much smaller fall.)
2. Nominal rigidities

We have already noted that prices tend to be costly to alter. There is the simple list of costs involved in changing prices: relabelling, renegotiating, informing by mail or advertising. (It is well known for example that mortgage lenders change their lending rates at discrete intervals to try to reduce the costs of change. They can recoup a failure to raise rates early both by lowering slowly as well and by raising a little further than required to maintain margins.) There is however considerable debate over the size of these costs (labelled menu costs). Menu costs are generally thought to be relatively small9 but they are only one of a group of factors and they may nevertheless have substantial effects (Naish, 1994). Firms in imperfectly competitive markets do not change their prices independently. They tend to wait for the market leader, who in turn may use the pause to inflict damage on its less well resourced competitors. Contracts themselves, while they may permit renegotiation in the event of input price or exchange rate shocks, bind the parties for a period of time. Hence, even without a clear market leader, provided firms alter prices at staggered intervals in the light of competitors’ actions, adjustment will tend to be relatively slow10. An alternative way of summarising why firms may be reluctant to alter their prices is that profitability may be difficult to improve over a wide range of prices, hence movement within the range is not worthwhile11. Indeed if price rises tend to alienate customers there will be quite strong incentives not to change unless the payoff is clear.

3. Expectations and credibility

One way in which the impact of the sorts of rigidities we have described could be reduced is through the operation of expectations. The new classical economic framework gives the extreme case of costless adjustment through the mechanism of rational expectations. If the central bank announced that it was going to set monetary policy so that there was no scope for price inflation, then, if that announcement is credible, in this framework there would be immediate adjustment to the non-inflationary world. One example where this could happen is in a rigid monetarist framework where monetary growth could be set to the expected real growth in the economy, thus allowing no scope for prices to rise. The key feature is that the

9 See Carlton (1986) and Cecchetti (1986), for example.

10 It is only in markets, such as those for stocks, shares, commodities and produce, where the system is designed to enable price changes by one market maker to be rapidly emulated, that adjustment is close to instantaneous.

11 Akerlof and Yellen (1985).

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path and the main published forecasts\textsuperscript{12} could be explained by a rise in credibility.

\section*{IV The speed of adjustment and time consistency}

This issue of credibility leads us directly into one of the main reasons why one might prefer to disinflate rapidly. If a gradual approach to disinflation is to be followed, then to achieve credibility a government has to pre-commit its successors to continue the work as a number of elections will intervene. That in itself is not very believable. Single governments have enough difficulty in sticking with a policy which has adverse short-run effects. Credibility is more likely to be enhanced by taking harsh decisions. Hence the faster route is more likely to be effective and, in this sense, more credible to the public. In other words the probability of a policy success is greater with a rapid disinflation policy. If the pain of change has already been incurred, subsequent governments are far less likely to re impose it by letting inflation rise again.

On the other hand, the harsher the impact, the greater the incentive for government to renege in order to maximise short-run electoral advantage. This is a typical example of the problems of \textquoteleft time inconsistency\textquoteright in macroeconomic management. It is likely therefore to be an empirical matter as to which of these factors is most important. New Zealand managed to achieve the change relatively rapidly but even in this case the pressures to renege were sometimes very considerable, when the social costs appeared high\textsuperscript{13}.

We have argued that the 1989 Reserve Bank Act adds to the credibility of monetary policy in New Zealand, first, because achieving a single target of price stability is feasible whereas meeting multiple targets is not and, second, because the independence given to the Bank in that achievement and its accountability for failure to succeed provide both the freedom from short-run political pressures and the incentives that are required. It is thus possible to have longer-run credibility and this change has been in part reflected by a fall in New Zealand's risk premium.

Credibility is thus enhanced, not just by following appropriate policies but by having a framework which makes change in those policies seem less likely. Fischer (1994) provides a helpful survey of the literature in this field.

One further feature of timing and the speed of adjustment has been widely discussed in the literature (Chadha \emph{et al}, 1992, for example) namely, the idea that having a clear preannounced path for disinflation gives people the opportunity to plan in advance. This is expected to make the change less costly. It allows for the fact that it takes time to change price structures or to restructure a business. In these circumstances a progressive disinflation might be able to occur nearer the pace that better businesses can adjust and hence reduce the output and employment loss. However, achieving that relative smooth adjustment entails that the announcement is not merely made but is widely believed. This therefore returns to the importance of credibility.

In New Zealand, monetary policy settings were designed to provide for a steady disinflation to the final target of 0 to 2 percent (which initially was to be achieved by December 1992). An indicative inflation track was announced, setting out the likely path for inflation over 1990 and 1991 (see the Reserve Bank's April 1990 \textit{Monetary Policy Statement}). While the indicative ranges were not formal targets, announcing targets imposed some discipline on the Bank by requiring reasonably steady progress to be made in lowering inflation. Credibility could also be gained as the Bank met the targets.

\section*{V Asymmetry}

The most obvious reason for resisting inflationary pressures and consequently an explanation of why disinflationary costs appear high is that the evidence suggests that economies respond asymmetrically to inflationary and disinflationary shocks of the same size. A given nominal shock will have a larger upward effect on prices than it does a downward effect. This might be thought to imply that people seem to be more prepared to raise prices than lower them but it appears that this is a feature of the aggregate economy rather than of individual price setters\textsuperscript{14}. Furthermore, it appears that the higher is the initial rate of inflation, the lower is the sacrifice ratio for any given amount of disinflation\textsuperscript{15}.

\textsuperscript{12} Econometric forecasts are primarily based on evidence from past behaviour. Although they may incorporate the impact of structural change, to some extent they are likely to fail to anticipate the full extent of any change in behavioural patterns. In this instance not only the Reserve Bank but Treasury and the NZ Institute of Economic Research underestimated the speed with which inflation would fall.

\textsuperscript{13} The evidence on credibility is mixed. A good survey is to be found in Blackburn and Christensen (1989) but Kremers (1989) shows that the costs of disinflation in the case of the Irish Republic were high despite credibility, while Christensen (1987) shows that they were low in Denmark despite low credibility.

\textsuperscript{14} See De Long and Summers (1988) and Caballero and Engel (1992) for evidence on asymmetry at the aggregate level and Blinder (1991) for failure to identify asymmetry in individual price setting in the US. Preliminary work at the Reserve Bank examining the New Zealand economy shows some limited asymmetry, even at the individual level.

\textsuperscript{15} The nearer one gets to price stability the harder it is to squeeze the last few drops of inflation out of the system. See Ball, Mankiw and Romer (1988) and Defina (1991), for example.
Perhaps the most important proviso is the worry about hysteresis and asymmetries in the growth process (Mayes (1986) *inter alia*). Hysteresis suggests that recovering growth is more difficult than slowing it in the first place. Entry into a new market is a long and complex process, designing and building new plants takes a considerable period of time, recruiting and training new staff is both somewhat hit and miss and expensive. For this reason firms tend to continue in current production for as long as possible, hoping that the difficulties will be short-lived and that they can ride them out without firing staff, leaving markets or scrapping capacity. The problem of hysteresis is best known in the case of the labour market where those becoming unemployed can rapidly lose their employability. They can become discouraged, their skills depreciate; it therefore becomes progressively more difficult for them to re-enter the labour force.

Again, there is a trade-off between the medium term disadvantages of hysteresis and the longer-run gains from the structural reform and reduction in inflation.

VI A basis for assessing the costs of disinflation

As was made clear earlier, it is not possible to assess the costs of disinflation without having some model of economic behaviour to base the analysis on. Simply observing changes in growth, unemployment and inflation is not adequate as it is the causal relation which matters. In what follows the contribution of monetary policy is teased out but it is not possible to isolate it effectively from the impact of other policies which were simultaneously having an impact.

The key idea behind the *sacrifice ratio* is that it reflects the deliberate trade-off between inflation and output (unemployment). In other words it is the degree to which demand has to be reduced to achieve a given reduction in inflation. Any simultaneous supply shocks or indeed systematic supply-side changes should be stripped out of the calculation. This is easier said than done. Ball (1994b) attempts this by smoothing out the inflation series over the period of disinflation and estimating trend output as an extrapolation of output from its value when trend inflation was at its peak to four quarters after the trough. These are argued to be points on the trend - the first because inflation is not accelerating at the peak and the second because output typically takes a little while to recover after the bottom of the cycle. In the absence of disinflation, output is hypothesised to have a constant rate of growth. The cost of disinflation is the sum of discrepancies from the trend.

It is easy to list the potential drawbacks to this approach. Perhaps the most important drawback is that it assumes a return to the same trend — disinflation does not worsen or improve the long-run prospect. This particular conclusion stems from the models which Ball is using which have the property that monetary policy has no effect on long-run growth. Given the evidence cited from Fischer (1994) *inter alia* this seems unduly pessimistic. However it is not clear that a return to a higher trend would alter the computation of the *gross* costs of disinflation, as they could legitimately be compared with what could have happened otherwise had the trend been followed through-out. The *net* costs however will be completely different as the gap between the old and new long-run growth rates will steadily offset and then outweigh the original cost of disinflation. Indeed it is not even necessary to improve the rate of growth to get this favourable result. Simply a permanent increase in the level of GDP over what it would otherwise have been will be sufficient at any reasonable discount rate. The method of choice over both when the impact of the disinflation is deemed to begin and when it ends can be also be questioned. We therefore explore these calculations in some detail for the case of New Zealand, starting from the data that Ball uses and augmenting it with information that has become available since then.

However, before undertaking that work it is important to appreciate the other factors that were impinging upon the costs of disinflation and the rigidities in the economy over the same period.

VII Structural factors

The structure of the economy and the rules by which it operates are crucial in determining both the speed of response and the costs of disinflation. It is these characteristics which provide much of the nominal and real rigidities in the economy. Structural factors cover a wide range of economic behaviour. The most obvious type of feature which would have an immediate effect on the inflation process is indexation agreements. If individual prices are indexed on the general rate of inflation then inflationary shocks percolate rapidly through to the whole economy and make it a very persistent process. However, once inflation can be slowed in some sectors then indexation transmits that decrease rapidly to other sectors. Second,
if prices are set for long periods of time, it takes longer for a change to pass through the economy. This, however, relates to the level of prices. Long-term contracts make disinflation easier to this extent. But, to get stable prices when general inflation has been reduced to low levels, some individual prices will have to fall (while others rise) and long-term contracts inhibit that development.

The costs of disinflation are thus affected markedly not just by the structure of the economy but also by the manner in which that structure changes as disinflationary pressures increase. Removing rigidities has been a characteristic of the New Zealand economy over the last decade and this endogeneity — that disinflation itself encourages the reduction in rigidity — provides a further complication to the evaluation of sacrifice ratios and the degree to which the cost is attributed to the appropriate causes.

It is normally thought that there are two main structural inhibitions to the flexible behaviour of prices. The first is the internal regulatory or institutional structure. Where there is considerable monopoly power then prices can be raised without much concern for the consequences, provided that demand is inelastic. This applies to a large range of goods and services provided by utilities, transport and communications and public services. Ironically, this same ability to control the market may actually aid disinflation if those organisations can be influenced by the government. Since most are usually publicly owned, the government may be able to easily influence pricing behaviour in those organisations, to promote price flexibility. However, there may be no real gain if public subsidies offset any lose in profitability. In this case the inflationary pressure remains unless there are compensating reductions in expenditure (or increases in taxation) elsewhere.

However, as we noted earlier it is not necessary to go to the extreme of monopoly to have rigidities. As long as competition is imperfect, as it is in most markets, rigidities will be introduced.

A second major difficulty often lies in the labour market, where strong trade unions may have the power to prevent an erosion of real wages and hence a downward spiral of lower nominal price and wage rises. Indeed their ability to negotiate nominal wage increases may even increase real wages. Union power naturally tends to be strongest in long established industries and this frequently includes those with a strong monopoly element, where it is rather easier to pass the wage increase on in prices.

New Zealand has quite deliberately avoided the administered route to inflation control, preferring to see many publicly owned organisations either become private sector companies or at least state owned enterprises operating to commercial criteria with consequent increases in efficiency. Price controls and subsidies have been withdrawn. At the same time it has sought to reduce the barriers to competition, whether externally through lowering tariffs or internally through removing barriers to entry. The Commerce Commission, set up by the Commerce Act of 1986, exists to try to ensure that anti-competitive behaviour is avoided. The response to disinflationary pressure and increased competition has come through a combination of a fall in real wages and an increase in efficiency, which has tended to involve substantial reductions in employment. The cost ascribed to disinflation thus varies depending upon whether an output or unemployment measure is used.

These changes have not all happened at once. Increasing the flexibility in the labour market came sometime through the process, taking full effect with the implementation of the Employment Contracts Act in 1991. This therefore reinforced the last stages of the disinflationary process, which also may have assisted its unexpected speed. Some of the steps in removing the rigidities in the operation of the labour market, with improved means of job seeking, a better incentive structure and greater opportunities for training are still in progress, as exemplified by the Employment Task Force, whose report has just been published. Even then implementation will take a number of years. New Zealand is not of course alone in facing these problems, which run right across the OECD, as set out in OECD (1994), for example.

The approach to increasing flexibility through removing external barriers is likely to have more impact on New Zealand than on some other economies as it is small and as such is likely to have less scope for competition among domestic suppliers which are also of a sufficient scale to

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18 This question of distinguishing changing the level of prices from changing the rate of inflation confuses a number of contributions to the literature. The question of whether prices are sticky downwards is not necessarily relevant at all if the concern is simply for them not to rise so fast.

19 In financial services, for example, barriers to operation across sectoral boundaries were removed enabling the sorts of 'Allfinans' which characterise other economies (Harper and Karacaoglu, 1987).

20 It is often argued (see Bollard and Mayes (1993)), for example, that in an ideal world the most resistant - inflexible - markets should be tackled first. The labour market usually falls into that category. It is particularly important in this regard to recognise that flexibility is not just a euphemism for being prepared to accept real wage reductions but a requirement for the ability to change jobs rapidly and efficiently. Such changes do not require people to lose their jobs; they can often be redeployed within the same organisation but it does put major pressure on skills and training on the one hand and the ready operation of the mechanisms for changing employment on the other.
be efficient. There is already more competition in many sectors of the New Zealand economy that in many other much larger countries, with two main domestic airlines for example, and even the Post Office monopoly currently before Parliament.

VIII Evidence from various countries\textsuperscript{21}

Ball’s (1994b) study suggests that most disinflations have sacrifice ratios of between 0 and 2 and at the top extreme the ratio can be as high as 4 in West Germany during 1973-8\textsuperscript{22}(see Table 1). The cost for New Zealand appears to be at the lower end of the scale at around 1/2. Unfortunately it does not include the final squeezing of inflation out of the system. New Zealand’s most recent two disinflations shown in the 1980s (1980-3, 1986-8) are notable for their below average figures (Table 2). Ball himself admits that his estimates may be subject to some downward bias (p.166).

According to Ball, nominal wage rigidity clearly does increase the sacrifice which has to be paid. Hence the reduction in rigidity in New Zealand in recent years will have helped reduce the sacrifice and indeed by distributing the cost towards those remaining in employment it will have reduced the unemployment cost. Openness of the economy on the other hand does not appear to have an impact. This rather surprising result is countered by the finding in Romer (1993) that open economies do tend to have lower inflation rates and that opening economies may have lowered inflation. The lack of impact of openness does not seem very convincing and is probably the result of the inclusion of very large economies like the US in the calculation. It is clearly the case in New Zealand that the reduction in tariffs led to significant price falls in some instances and was a material contribution to the fall in inflation.

The relationship between the initial level of inflation and the sacrifice on the one hand, and between incomes policies and the sacrifice on the other are also found to be weak by Ball’s study. However, it does appear that the costs of disinflation for a disinflation of any given number of percentage points tends to increase the nearer the end point gets to zero. In other words squeezing the last few points of inflation out is relatively expensive compared with changes at higher levels of inflation.

Simulations from the IMF (Chadha et al. 1992) suggest that credibility plays an important role in reducing the costs of disinflation by impacting on expectations, while announcing the intention beforehand also enables price setters to adjust more readily. By the same token however, their calculations contradict the Ball (1994b) finding as a somewhat slower reduction in inflation gives price setters time to change without incurring such a big write-off of sunk costs. This therefore argues against extreme speed but the need for credibility argues against slow adjustment. Since these results are illustrative this does not help us decide quite where in the spectrum the optimum policy might fall. One might argue that the emphasis should be placed on market assessments of credibility through interest rates. It therefore appears from this somewhat inconclusive basis that it will be the political economy considerations which dominate and that therefore following the more rapid route stands the greater chance of success and hence the lower overall cost than a series of failed gradual approaches.

There are, however, some important nagging doubts that prolonged disinflations may drag output permanently below the long-run path it might otherwise have had. Models which can achieve this result therefore have multiple equilibria.

We have already noted in the New Zealand case that the disinflation coincided with a period of structural change designed to improve the long-run rate of growth. Hence a constant rate of growth may be inappropriate. Secondly, that change itself was a contribution to the rise in unemployment over the period.

The nature of the difficulties in the methodology are immediately apparent when we apply it to New Zealand’s last disinflation. Using Ball’s method for quarterly data, we can obtain a sacrifice ratio of 3.2 for the period 1986Q1 to 1992Q4. Over that period, trend inflation declined from 13.3 percent to 1.1 percent. The GDP series used is seasonally adjusted production-based GDP while all inflation calculations are based on the CPI excluding the impact of GST. There are a number of alternative assumptions one could make. If it is assumed that output is not back at trend until six quarters following the trough in trend inflation, the calculations can change considerably. For the 1986 to 1992 disinflation, the sacrifice ratio increases to 8.5 percent (because output increased substantially over the two quarters now included in the calculations). If output is assumed to be back at trend in only two quarters, the ratio is 7.6. Varying the definition of trend inflation can also change the results. If instead of trend inflation the actual inflation rate is used, the most recent disinflation period is 1990Q2 to 1992Q1. Inflation falls from 5.7 percent to 0.8 percent, and the sacrifice ratio is 4.7. The ‘misery index’ on the other hand

\textsuperscript{21} The choice of countries is largely determined by those which other researchers have elected to analyse for their own purposes. However, they constitute most of the OECD countries.

\textsuperscript{22} The figure shown in Table 1 relates to the average of all periods considered by Ball.
(rate of inflation plus the rate of unemployment) fell from 17.0 in 1986Q1 to 11.7 by 1992Q4 and has fallen to 10.3 at the latest count (1994Q4).

These sacrifice ratios lie at the top end of the experience covered by Ball, although the drop in inflation and the lowness of the endpoint are also at the extremes of the experience he reports. It is therefore not possible to draw the conclusions that either disinflation was particularly costly for New Zealand or that in New Zealand's case tolerating inflation would have been more beneficial.

The major drawback, however, is that this analysis only reports on the result. Inflation fell and output was lower over the period compared with trend. We have no means of ascribing this to monetary policy rather than to any other combination of government policies and external events. In general therefore the sacrifice ratio and the misery index report stylised facts and do not tell us the costs of a deliberate reduction in inflation.

The complementary stylised fact in this instance is that we have emerged earlier and more rapidly from recession than the other OECD countries following the disinflationary period. It is open to debate how much of it is due to inflation control, how much to the other structural changes and how much to other exogenous shocks.

**IX Concluding remarks**

It is thus clear that the calculation of sacrifice ratios is fraught with difficulty. It is very difficult to disentangle the impact of policies deliberately designed to achieve disinflation from parallel policies for different purposes, including structural change, and from the result of exogenous shocks. When these items work together as in the case of New Zealand's most recent disinflation then the sacrifice ratio can be towards the low end of the range.

Second, sacrifice ratios have been traditionally viewed as short-run concepts, just looking at the cost of the period of disinflation. However, the policies are intended to be of net benefit. The appropriate calculation would therefore also take into account the subsequent gains. Since these will be in the form of an improvement in the rate of underlying growth, this increasing benefit will tend to offset the once and for all cost quite rapidly even allowing for discounting the benefit according to the rate of time preference. New Zealand has had such a subsequent increase in its rate of growth. In due course it may be possible to decide how much of this was ascribable to squeezing inflation out of the system rather than to other aspects of the process of reform.

Credibility of the central bank tends to help reduce the sacrifice ratio through its influence on price expectations, when reducing inflation initially. When inflation is already low, further disinsulations may require more substantial sacrifices, even if credibility has been established. But, a clear statement of how inflationary pressures are to be tackled, made in advance, should help businesses anticipate the behaviour of the economy and adjust with less cost. This is particularly the case when the central bank has already demonstrated a commitment to disinflation. All this goes to emphasise the first conclusion from the analysis, that the balance of benefits from inflation and costs of disinflation are such that, having got inflation down there is a very strong case for not letting it rise again.

**Table 1**

<table>
<thead>
<tr>
<th>Country</th>
<th>Quarterly data</th>
<th>Annual data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Austria</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>1.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Denmark</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>0.8</td>
<td>0.2</td>
</tr>
<tr>
<td>West Germany</td>
<td>2.9</td>
<td>2.5</td>
</tr>
<tr>
<td>Irish Republic</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>Japan</td>
<td>0.9</td>
<td>-0.2</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>0.5</td>
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</tr>
<tr>
<td>Switzerland</td>
<td>1.6</td>
<td>0.9</td>
</tr>
<tr>
<td>UK</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
<td>US</td>
<td>2.4</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Source: Ball (1994b)

Gaps indicate no information available.

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23 Indeed it would be sensible to discount both costs and benefits as is standard practice in the literature (a point made by Cecchetti (1994)).

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### Table 2

**Estimated sacrifice ratios for New Zealand**

<table>
<thead>
<tr>
<th>Episode</th>
<th>Sacrifice ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971-2</td>
<td>0.5</td>
</tr>
<tr>
<td>1975-8</td>
<td>1.3</td>
</tr>
<tr>
<td>1980-3</td>
<td>0.2</td>
</tr>
<tr>
<td>1986-8</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Source: Ball (1994b)

### References


