Discussion

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For central banks pursuing disinflation, one of the dilemmas is how to sell the benefits of low average inflation rates, when the immediate costs of monetary contraction are only too apparent. This paper addresses what I believe to be exactly the right questions for a policymaker embarking upon a disinflation program: What are the costs? What are the benefits? And how do these compare?

Black, Coletti, and Monnier have produced a comprehensive and well-balanced approach to these measurement issues. The paper's main contribution is to introduce both costs and benefits within a consistent framework of comparison.

Let me first note that this is hardly a minor topic. The analysis in the paper requires drawing together what we know about the short-term macroeconomic response of the economy to monetary policy shocks, and comparing this information with our knowledge of the long-run effects of inflation using a variety of mechanisms. Given such a tall order, we could hardly expect this to be the last word on the subject. It is certainly, however, a valuable contribution to the debate.

The paper's logic is as follows. With nominal rigidities, even a perfectly credible disinflation is likely to cause output losses. There is a "sacrifice ratio" attached to reducing inflation. Conversely, a permanently lower anticipated rate of inflation will increase economic welfare by reducing the tax on money balances, eliminating the costly activities undertaken to avoid inflation, and alleviating the inefficiencies generated by the effects of inflation in a tax system that is not indexed for inflation. The

task is to measure adequately each side of the welfare calculation on a common basis. For this measurement, the authors formulate a welfare index, calculating the total lifetime utility of a representative consumer, with log utility, who experiences the consumption effects of a disinflation.

The costs of disinflation are calculated through simulations from the Bank of Canada's Quarterly Projection Model (QPM). These costs are temporary, although they may be very persistent if there are hysteretic effects of disinflation on the non-accelerating-inflation rate of unemployment (NAIRU). But they may be relatively large. In the base case, according to the welfare metric, the costs are 4 per cent. But if disinflation has hysteresis-type effects that lead to an increase in the NAIRU, this increases to 11 per cent.

Since the QPM (in its steady-state version) is superneutral with respect to inflation, the benefits of disinflation must be taken from the existing literature on the welfare costs of inflation. This is a huge body of literature, going back to Bailey (1956) and Friedman (1969), and as would be expected there is a large variance among the quantitative welfare estimates, which range from 0 to 400 per cent according to each author's welfare metric.

In comparing costs and benefits, this paper is very evenhanded, and the authors are reluctant to draw a definitive conclusion. But it is clear from its Figures 4, 5, and 6 that the welfare costs of disinflation seem to be outweighed by the benefits for most estimates of benefits taken from the literature, at least for the low level of the sacrifice ratio, and especially in the case where inflation distorts the tax system. In fact the main conclusion I take away from the paper is that the interaction of inflation with a non-indexed tax system makes it very desirable to reduce inflation, even if the short-run costs of doing so are quite high.

I begin with a discussion of the methodology of the cost-benefit analysis in the paper. I then turn to other elements in the calculation that are not included but that might be thought important in the evaluation disinflation programs.

Methodology

In comparing the costs and benefits of disinflation, the paper largely ignores transitional effects. It is important to integrate over the whole path when calculating the net welfare effects of changes in taxes. For instance, a fall in inflation in some of the models surveyed will stimulate an increase in productivity or in the long-term growth rate. But it may take some periods of high investment in order to take advantage of this. The calculations in the present paper take the steady-state (or long-term growth) effects of lower

inflation and the welfare gains are derived from this. Because the transitional effects are ignored in this paper, the welfare calculations reported here seem to overstate the benefits of lower inflation. A forthcoming paper by Love and Wen shows that transitional effects can be important in the calculation of the welfare benefits of inflation reduction. Of course, it was not really feasible to calculate transitional effects in this paper, given its methodology, since doing so requires a full structural model of both the short-run and the long-run effects of inflation.

The absence of a unifying model also raises a deeper question. Is it valid to compare the costs and benefits of disinflation that come from entirely different models with different structural assumptions? While it may be difficult to amend the QPM to allow for long-run effects of inflation, an alternative strategy would be to take a simple, dynamic general-equilibrium model of the type used for the welfare costs of inflation estimates, and to append some form of nominal rigidities to capture the short-run effects of disinflation. In fact there are examples in the literature that do this. Ireland (1995) examines the optimal path of disinflation under a model of staggered pricing, using a cash-in-advance model. King and Wolman (1996) construct a business-cycle model with price setting as in Calvo (1983) where money enters through a "shopping time" technology. The benefit of this complete approach is not simply that the costs and benefits of disinflation can be included within a single framework. One can also address many interesting auxiliary questions, such as the issues of the optimal pattern and speed of disinflation, or gradualism versus cold-turkey disinflation.

One important issue that arises in these papers is that staggered pricing alone may not imply a sacrifice ratio at all. In Ireland's model, the process of credible disinflation actually generates a boom in the economy! A similar result is shown in Ball (1994a). This can happen because disinflation involves a reduction, not in the level of the money stock, but in the growth rate of money. If the announcement of disinflation is credible, forward-looking price setters may respond so much that the price level falls sufficiently to increase aggregate demand. This does not happen in the QPM because the degree of forward-looking behaviour in price setting is by construction kept relatively low. An assumed partial adjustment mechanism for prices is added to the price-setting equation in QPM in an attempt to describe a more empirically accurate response of output to money shocks. Perhaps we might think of this as in some way substituting for unmodelled credibility issues in the adjustment to changes in monetary policy. Ireland (1995) shows that if a reduction in the rate of monetary growth is not fully believed by the private sector, then it will cause a recession in the economy. To the extent that credibility of policy can be altered over time through

disinflation itself, this suggests that QPM may actually be overstating the short-run effects of disinflation. I discuss credibility again under "Other Issues," below.

Sticking within the framework of the paper, however, I am still somewhat dubious about the comparison of costs and benefits. I think one main problem here is an asymmetry of information between the two sides of the calculation. On the costs of disinflation, we have a good deal of precision. Economists mostly agree that tight money and high interest rates dampen the economy, although they may not know the precise reason. Figure 1 illustrates the evidence on the Canadian sacrifice ratio over the last 20 years. As is well known, a peak in the Bank Rate in 1981 and another in 1990 were each followed quite rapidly by a trough in the growth rate. More formal estimates of the sacrifice ratio (see Ball 1994b) indicate a fair degree of stability both across time within countries, and across countries.

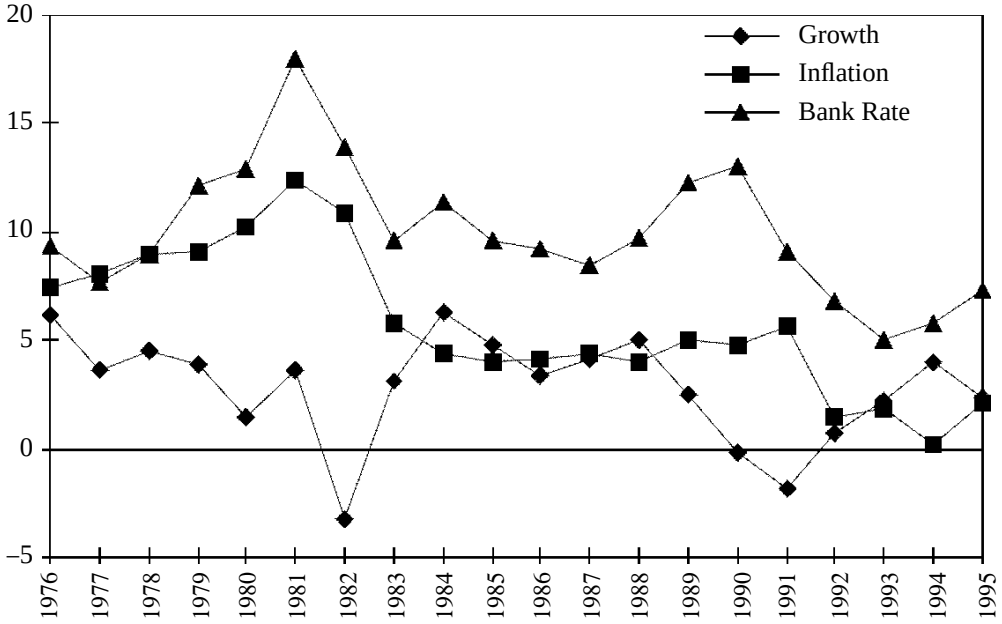
On the long-term effects of disinflation, I feel we have much less precise evidence. The main reason is the wide variability in the costs coming from the econometric estimates. The estimates from calibrated general-equilibrium models do vary somewhat depending on assumptions about technology, substitution elasticities, and fiscal constraints. But the dispersion in estimates in the authors' Table 6 is much less than that in their Tables 8 or 9. We really need some way to put confidence intervals around these numbers.

On the evidence from cross-country regressions, we should be very dubious, in my opinion. The estimated negative relationship between inflation and growth is pretty much all coming from a small number of countries with very high inflation. In Figures 2a–2d I show raw data on average inflation rates and average growth rates from various subcategories of data taken from the World Bank data base. For all countries taken together, there is a negative relationship between inflation and growth, but it is clearly driven by outliers. For OECD countries, and for EU countries, the relationship is positive. Both Barro (1996) and Bruno and Easterly (1996) find that, at inflation rates below a certain threshold (20 per cent in Barro's case, and 40 per cent for Bruno and Easterly), there is no significant relationship between inflation and growth in the data.

I would be inclined to discard the econometric estimates entirely. In that case we are really comparing like with like, since then both costs and benefits come from calibrated models. Black, Coletti, and Monnier do indeed acknowledge this in their "box and whisker" comparisons in Figures 4, 5, and 6, where the estimates from the econometric studies are not included.

Figure 1

Canadian Sacrifice Ratio



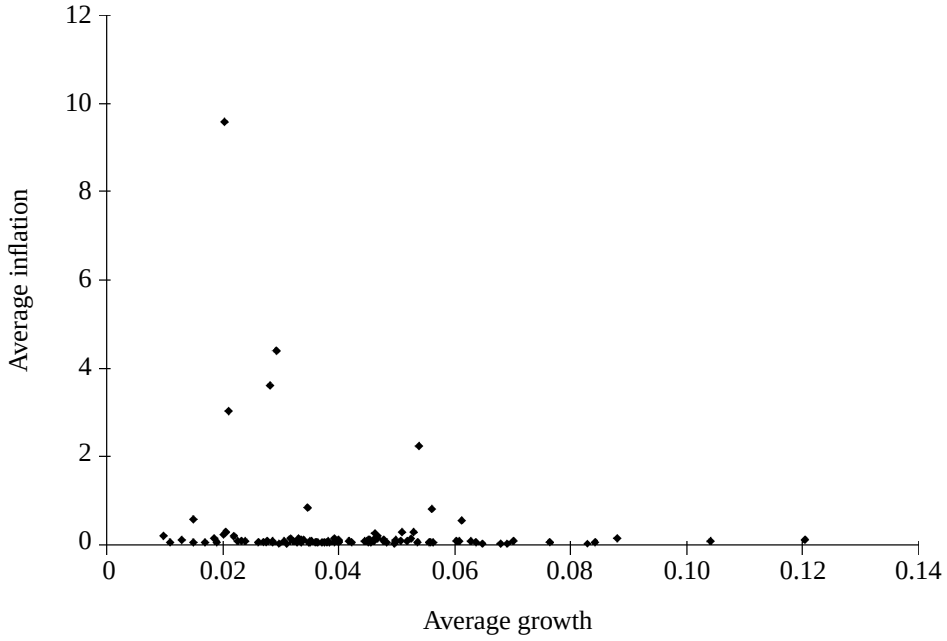
Source: Statistics Canada, CANSIM.

Other Issues

Since the seminal work of Sargent in the early 1980s, the credibility of policy has been central to the discussion of the impact of monetary contraction. Credibility effects are absent in this paper—understandably so, since there is no simple way to model the dynamics of credibility within a quantitative general-equilibrium framework. Nevertheless, the impact of policy on credibility may be one of the major benefits of a successful disinflation. By establishing full credibility with the private sector, the monetary authority can maintain a low average inflation rate without repeated costly contractionary responses to inflationary shocks. Moreover, an added benefit of credibility of the overall policy stance is the ability to use monetary policy actively to offset shocks, without building up inflationary expectations. A related issue is the role of inflation targets in establishing credibility. The formal modelling of these questions is not yet at a stage where it could be quantified with the degree of precision used in this paper. Yet casual observation of the language of monetary authorities seems to indicate that credibility is valued highly. Witness the current discussion in Europe over the entry to European economic and monetary union.

Figure 2a

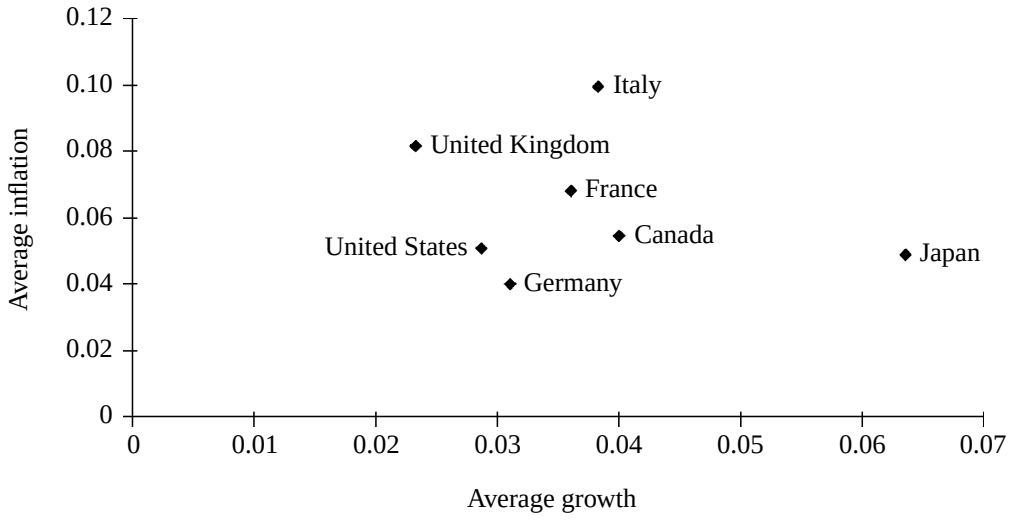
Inflation and Growth, All Countries, 1961-91



Source: World Bank data base.

Figure 2b

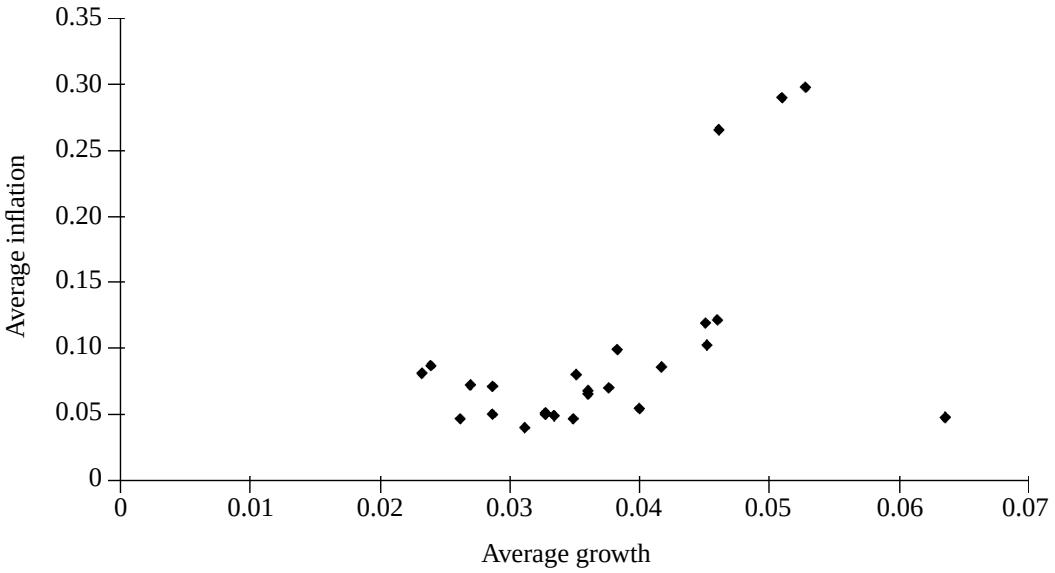
Inflation and Growth, G-7 Countries



Source: World Bank data base.

Figure 2c

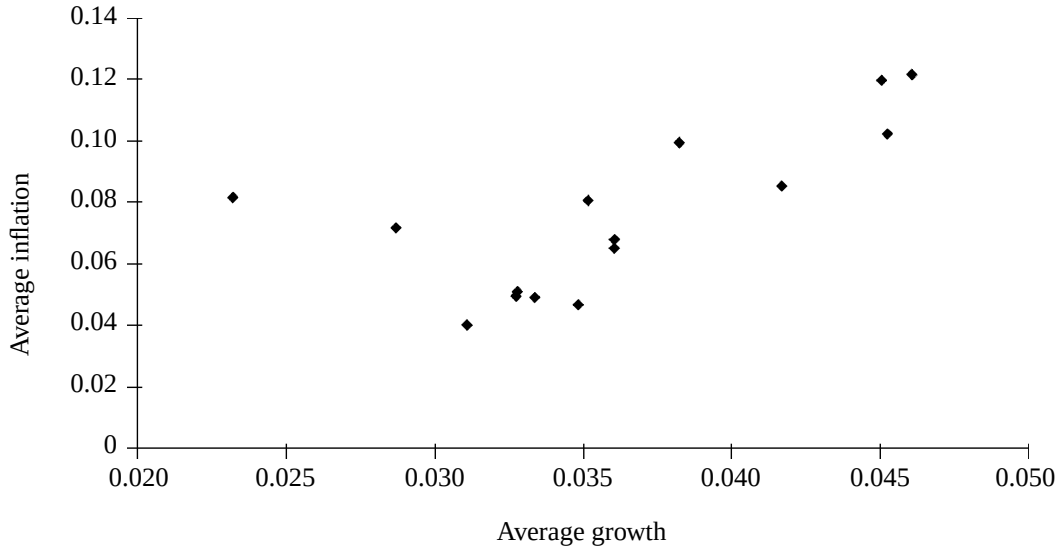
Inflation and Growth, OECD Countries, 1961-91



Source: World Bank data base.

Figure 2d

Inflation and Growth, EU-15 Countries, 1961-91



Source: World Bank data base.

Low average inflation rates are also likely to imply low variability of inflation. To the extent that inflation variance distorts economic decisions and misallocates resources, this may be a substantial additional benefit of reducing inflation. None of the papers discussed in Section 3 really deals with inflation variability but, again, this might end up being at least as important as some of the more traditional mechanisms through which inflation reduces welfare.

Another omission in the approach followed in the present paper is the distributional effects of disinflation. We know that a recession that reduces aggregate consumption by 2 per cent does not reduce the consumption of the representative agent by 2 per cent. Rather the pain is heavily concentrated on some groups, such as the unemployed. Likewise, high real interest rates affect young debtors more heavily than others. Such considerations could have an important impact on the welfare conclusions drawn in Subsection 2.4, where government debt responds to disinflation. For a full welfare analysis, distributional issues would need to be brought into play. The use of general-equilibrium models with heterogeneous agents may affect the kind of answers that we get in the present paper.

In summary, this paper covers a lot of ground, but many unanswered questions remain about the cost-benefit analysis of inflation control.

The fact that the steady-state QPM does not contain money means that Black et al. cannot carry out a full welfare analysis of disinflation using the Bank's own model. Because of this, the current paper is still at a halfway mark. Nevertheless, the authors have done an excellent job of making the case for a low-inflation policy within the constraints they faced. I look forward to seeing them do the complete analysis in a future version of the QPM.

References

Bailey, M. J. 1956. "The Welfare Cost of Inflationary Finance." *Journal of Political Economy* 64 (April): 93-110.

Ball, L. 1994a. "Credible Disinflation with Staggered Price-Setting." *American Economic Review* 84 (March): 282-89.

———. 1994b. "What Determines the Sacrifice Ratio?" In *Monetary Policy*, edited by N. G. Mankiw, 155-82. Chicago: University of Chicago Press.

Calvo, G. A. 1983. "Staggered Prices in a Utility-Maximizing Framework." *Journal of Monetary Economics* 12 (September): 383-98.

Barro, R. J. 1996. "Inflation and Growth." *Federal Reserve Bank of St. Louis Review* 78 (May–June): 153-69.

Bruno, M., and W. Easterly. 1996. "Inflation and Growth: In Search of a Stable Relationship." *Federal Reserve Bank of St. Louis Review* 78 (May–June): 139-46.

Friedman, M. 1969. "The Optimum Quantity of Money." In *The Optimum Quantity of Money and Other Essays*, 1-50. Chicago: Aldine Publishing.

Ireland, P. N. 1995. "Optimal Disinflationary Paths." *Journal of Economic Dynamics and Control* 19 (November): 1429-48.

King, R. G., and A. L. Wolman. 1996. "Inflation Targeting in a St. Louis Model of the 21st Century." NBER Working Paper No. 5507. National Bureau of Economic Research, Cambridge, Mass.

Love, D., and J.-F. Wen. "Inflation, Welfare, and the Time-Costs of Transacting." *Canadian Journal of Economics*. Forthcoming.