What Does Downward Nominal-Wage Rigidity Imply for Monetary Policy?

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Récemment, un article a suggéré une raison expliquant pourquoi il pourrait exister un compromis durable entre l'inflation et le chômage à de faibles taux d'inflation. Cela a incité certains économistes à recommander une augmentation du taux d'inflation au Canada. La logique sous-jacente à cette explication est la suivante: puisque les entreprises sont peu disposées à réduire les salaires nominaux, un certain niveau d'inflation peut être utilisé pour faciliter les réductions nécessaires dans les salaires réels. Cet article discute le lien entre la rigidité vers le bas des salaires nominaux et le chômage et considère quelques questions qui doivent être abordées en vue de déterminer si un changement à la politique monétaire canadienne est justifié.

A recent paper has suggested a reason why there might be a lasting trade-off between inflation and unemployment at low inflation rates. This has led some economists to recommend that Canada increase its inflation rate. The idea underlying this view is that, because firms are reluctant to cut workers' nominal wages, a moderate amount of inflation can be used to facilitate needed reductions in real wages. This paper discusses the link from downward nominal-wage rigidity to unemployment, and considers some of the issues that need to be addressed in order to determine whether a change in Canada's monetary policy is warranted.

INTRODUCTION

In the late 1980s, both Canada and the United States experienced moderate levels of inflation of around 3 to 5 percent, down from the relatively high levels both countries had experienced at the end of the previous decade. In the 1990s, Canada has followed a more aggressive policy toward inflation than the United States. Specifically, in February 1991 the governor of the Bank of Canada and the finance minister announced that Canada would seek to achieve "price stability." This objective was formalized in joint announcements by the governor and finance minister that the bank would exercise monetary policy in order to target inflation to be within a specified range. The current "joint statement on monetary policy objectives," which was announced in February 1998, specifies a target range for inflation of 1 to 3 percent through to the end of 2001.

Recently, Canada's policy has come under public attack from two prominent economists: Pierre Fortin (1996*a*) in an article in *The Globe and Mail* that drew on his presidential address to the Canadian Economics Association (Fortin 1996*b*), and Paul Krugman (1996) in an article in *The Economist*. Both economists believe that Canada should not be striving for so low a rate of inflation. Instead, they favour the approach taken by the Federal Reserve in the United States. The Federal Reserve does not have an explicit inflation target but it has maintained US inflation at around 3 percent. The US Congress has considered a bill (the *Economic Growth and Price Stability Act, 1995*) that would have given the Federal Reserve a similar mandate for low inflation as the Bank of Canada, but this bill has not been passed.

The debates in both countries over whether their central banks should strive to keep inflation at very low levels concerns the long-run and short-run relationships between inflation on the one hand and unemployment and output on the other. The nature of this relationship has been one of the most important questions in macroeconomics for several decades and one on which the view of the profession has evolved considerably over time in response to new research and the changing levels of inflation experienced in many countries. Currently, the mainstream view of the relationship between inflation, unemployment, and growth can be summarized as follows:

- 1. In the long run, there is no relationship between inflation and unemployment: maintaining low inflation does not result in a permanently higher unemployment rate.
- 2. In the long run, the maintenance of low and stable inflation generates benefits to productivity so that targeting low inflation will produce higher output over time.
- 3. In the short run there *is* a trade-off between inflation and unemployment, so inflation can normally only be reduced at the expense of a temporary increase in unemployment and a corresponding temporary decline in output (or at least a slowdown in output growth).

According to this view, the question of whether it is desirable to reduce inflation from moderate to

low levels, as Canada did at the start of this decade, depends on whether the long-run benefits of maintaining low and stable inflation outweigh the shortrun costs of the initial disinflation. There is a lot of debate among economists about the size of the longrun productivity benefits and hence much disagreement as to whether the net benefits of disinflation are positive (see, e.g., the range of estimates cited in Black et al. 1998). Because the mainstream view regards the costs of achieving low inflation as being transitional rather than permanent, however, it also suggests that once low and stable inflation is achieved the optimal policy is to maintain it at that level. Put another way, there is room within the mainstream view for a historical debate over whether Canada's policy of disinflation in the early 1990s was desirable, but, with Canada having already incurred the short-run transitional costs, both sides of that debate would regard it as desirable for Canada now to maintain inflation at its current low level and enjoy the long-run benefits.

It is this aspect of the mainstream view that Krugman and Fortin challenge. Drawing on a recent paper by Akerlof, Dickens and Perry (1996), they suggest that, contrary to the conventional wisdom of point 1 above, there is a long-run negative relationship between inflation and unemployment so that low inflation can only be achieved at the expense of permanently higher unemployment and lower output.¹

Akerlof, Dickens and Perry (hereafter, ADP) have formally modelled an idea that has often been conjectured by macroeconomists, most famously by James Tobin (1972) in his 1971 presidential address to the American Economic Association. This idea is based on the assumption that, for psychological reasons, workers are very reluctant to accept cuts to their nominal wages but will accept real-wage cuts that arise if inflation erodes the value of a given nominal wage. In Tobin's view, the maintenance of high levels of employment will often require cuts in the real wages of workers in some sectors of the economy. His argument is that "downward nominalwage rigidity" implies that these cuts are easier to achieve when inflation is moderate than when it is low. As a result, there will be a permanent trade-off between inflation and unemployment.

The idea that downward nominal-wage rigidity is a pervasive feature of labour markets is controversial. Some economists feel that it implies that workers do not realize the effect that inflation has in reducing the real value of their wages and so can be induced by inflation into accepting real-wage cuts that they would not otherwise accept. Studies that have looked for evidence of downward nominalwage rigidity, moreover, have produced inconclusive results. This perhaps explains why Tobin's view of a trade-off between inflation and unemployment at low rates of inflation has not been widely accepted by macroeconomists.

ADP's paper therefore represents a major challenge to the profession. ADP provide evidence casting doubt on the validity of previous studies that have found little empirical support for downward nominal-wage rigidity. They then develop Tobin's intuition further by building a model to show how downward nominal-wage rigidity might generate a negative long-run relationship between inflation and unemployment.

Although ADP provide reasons for being cautious in accepting some of the evidence against downward nominal-wage rigidity, the evidence in favour is also not conclusive. At this stage, it is still unclear whether such rigidity is a pervasive feature of the US or Canadian economies and much work is likely to be done on this question in the next few years. Even if downward nominal-wage rigidity is shown to be prevalent in Canada, however, it does not automatically follow that it would be desirable for Canada to increase its rate of inflation: there are many other important steps in ADP's analysis and each of these needs to be considered carefully in the public debate over what Canada's inflation target should be.

This paper details these key steps in ADP's analysis and discusses some of the theoretical and empirical issues surrounding each one. Because the case for targeting moderate rather than low inflation due to downward nominal-wage rigidity has been put persuasively by ADP and Fortin, the emphasis in this paper is on arguments on the other side of this policy debate. The primary objective of the paper, however, is not to reach a particular conclusion but rather to highlight some of the assumptions underlying Fortin's and Krugman's critique of Canadian monetary policy, and thus to stimulate debate on this issue.

The next section contains a brief summary of the model used by ADP and lists the four main steps linking downward nominal-wage rigidity to a policy conclusion in favour of higher inflation. The sections following then consider each of these steps in turn. The final section discusses some of the policy conclusions for Canada from ADP's analysis.

THE AKERLOF, DICKENS AND PERRY MODEL

ADP describe an economy that is constantly subject to changes that have different effects across firms. In economics jargon, firms are subject to "heterogeneous shocks." At any time there are always some firms receiving "positive shocks" (meaning that their profitability is rising and they are seeking to expand) and other firms receiving "negative shocks" (their profitability is falling, leading them to contract). Examples of such shocks are changes in tastes that shift demand from some products to others, the discovery of new production processes that lower production costs in particular industries, and changing exposure to competition from foreign firms.

Now imagine that wages in this economy are not set in a competitive labour market but by wage bargaining between workers and firms. This has two effects. The first is that it generates unemployment as a permanent phenomenon in the economy. ADP assume that firms have conventional downwardsloping demand curves for labour. The bargaining power of workers keeps wages higher than would be the case in a competitive labour market, thus pushing firms up their labour-demand curves and so restricting the number of jobs in the economy. The second effect of wage bargaining is that the wage paid in any firm will be related to its profitability. Thus, the wages paid to workers in highprofit firms will be higher than those paid to equivalent workers in low-profit firms.

As a result of heterogeneous shocks and wage bargaining, there will be a considerable variation across firms in any year in how much the wage paid at each firm has increased from the previous year. Real wages will increase most at firms that have experienced the largest positive shocks to their profitability. More important, even if there is general growth in the economy so that most firms face positive shocks, there will always be some firms where negative shocks lead to a reduction in real wages. The constant churning in the economy implied by heterogeneous shocks will also show up in employment, with job creation at expanding firms and job destruction at contracting firms.

Now imagine that the economy faces downward nominal-wage rigidity: that is, for some reason the bargaining process that determines wages at each firm will place a wage floor at the current nominal wage so that no worker ever receives a nominal wage cut. With moderate levels of inflation, this will not impose a constraint on the economy since the real wage at any firm can be reduced simply by freezing the nominal wage and letting inflation erode its real value. When inflation is low, however, downward nominal-wage rigidity restricts the extent to which the real wage can fall. As a result, some of the firms that have suffered negative shocks will not be able to lower their real wages by as much as they would have if inflation were at moderate levels; instead, they will reduce their employment by more than they would have.

This is the source of the negative long-run relationship between inflation and unemployment in ADP's model. It does not require that downward nominal-wage rigidity be absolute in the sense that nominal wages can *never* fall. All that is needed is that it be easier to some extent to reduce real wages by inflation than by cutting nominal wages directly.

The description of the economy as being one continuously subjected to heterogeneous shocks is certainly an accurate description of the Canadian and US economies. It is also true that there is variation across firms in the rate of wage increases in any one year, and that there are very high levels of job creation and destruction in both economies each year.² There are other aspects of the ADP model, however, for which the empirical basis is less clear. In particular, their analysis that low inflation is undesirable depends on each one of the following four propositions: (i) nominal wages are downwardly rigid; (ii) as a result, low inflation produces aggregate real wages that are higher than they would be if inflation were higher;³ (iii) these higher aggregate real wages lead to an increase in unemployment; and (iv) the welfare cost of this higher unemployment outweighs other benefits of low inflation. Before concluding that Canada should increase the range within which it targets inflation, each of these four steps needs to be justified. The remainder of this paper considers some of the theoretical and empirical issues surrounding each of the four. The main issue considered in this paper is not whether downward nominal-wage rigidity is pervasive in the economy, but rather the implications for monetary policy if it is. We therefore concentrate on steps (ii) to (iv). First, however, it will be useful to summarize the existing evidence for downward nominal-wage rigidity.

DOWNWARD NOMINAL WAGE RIGIDITY

The debate in Canada concerning the extent of downward nominal-wage rigidity has concentrated mainly on an analysis of histograms of wage changes such as those shown in Figure 1. This figure shows the distributions over two four-year periods of nominal-wage changes in Canadian private-sector, collective-bargaining contracts. In each graph, the





1 (a) Moderate Inflation Period: 1984-1987 (937 settlements)





Notes: Data represents private sector, unionized, contracts at employers with at least 500 employees. The percentage wage increase is measured as the average annual increase over the lifetime of the contract.

Source: Human Resources Development Canada.

horizontal axis shows the percentage increase in nominal wages and the vertical axis shows the percentage of all contracts with that increase. Figure 1(a) shows the distribution of nominal-wage settlements in the moderate-inflation period of 1984-87 during which time inflation in the consumer price index (CPI) ranged from 3.8 percent to 4.4 percent. Figure 1(b) shows the period 1992-95, an equivalent stage in the business cycle as the earlier period but one in which inflation was low, with CPI inflation ranging from 0.2 to 2.1 percent.

If there were no nominal-wage rigidity in the Canadian economy, we might expect the second graph to look just like the first except shifted to the left to reflect the fact that nominal-wage increases are lower when inflation is lower. If, on the other hand, there is pervasive downward nominal-wage rigidity, then we would expect to see the left part of the distribution pulled to the centre with a large spike at zero as firms impose wage freezes rather than small cuts in nominal wages. In fact, neither is the case. The distribution is shifted to the left and there is an increase in the spike at zero (7.5 percent of the wage settlements in the first graph and 11.7 percent in the second involve no change).⁴ There is little evidence, however, that this spike results from truncation of the distribution at zero: indeed, the right side of the distribution is pulled to the centre by about as much as the left side.⁵ This reduction in the variation of wage changes is consistent with the literature on the effects of inflation which suggests that reducing the average level of inflation also reduces variability in relative prices by removing a lot of the uncertainty associated with inflation (see e.g., Golub 1993). Also, the Canadian economy has been subjected to a number of changes in recent years other than the move to low inflation, such as the phasing-in of free trade and the efforts of both federal and provincial governments to deal with their fiscal deficits, so it is not surprising that the two distributions should look different. The key thing about the comparison between Figures 1(a) and 1(b), however, is that the difference does not appear to be attributable to downward nominal-wage rigidity. It is probably fair to say that, although the wagechange data in Canada do not provide strong evidence in favour of downward nominal-wage rigidity, neither do they provide a convincing rebuttal of the hypothesis. It is important, therefore, for economists to take the possibility of downward nominalwage rigidity seriously and to consider what its implications would be for monetary policy.

The Link between Inflation and Aggregate Real Wages

The Tobin/ADP intuition rests on the idea that inflation can bring a decrease in aggregate real wages by reducing the importance of downward nominalwage rigidity. Even if downward nominal-wage rigidity is pervasive in the economy, however, it does not automatically follow that inflation can be used to bring about a reduction in aggregate real wages. This depends on how the institutions which determine wages respond to changes in the inflation rate in the presence of downward nominal-wage rigidity.

It will be useful here to distinguish between what we will term "constrained" and "unconstrained" firms. Recall that firms in ADP's model are continually being hit by shocks with the result that, in the absence of downward nominal-wage rigidity, the bargaining process produces increases in the real wage at some firms and decreases at others. Following ADP, we will use the term "notional" wage to describe the wage that would be the result of the bargaining if there were no nominal rigidity. If inflation is low, there will be some firms at which the reduction in notional real wages could only be achieved by a nominal-wage reduction. In the presence of downward nominal-wage rigidity, these firms are constrained in the sense that they cannot reduce real wages by as much as they would if inflation were higher. Unconstrained firms are those for which the notional wage has increased or at least fallen by less than the rate of inflation. Each of these firms can bring about the required change in its notional wage without cutting its nominal wage.

Clearly, if a firm cannot reduce its real wage when inflation is low but would do so if inflation were higher, then higher inflation will lower the real wage at that firm. That is, increasing inflation will lower real wages at firms that are constrained by downward nominal-wage rigidity. It may also be the case, however, that increasing inflation *increases* real wages at unconstrained firms.

To see why this might be so, consider a firm that has been hit by a negative shock but which is constrained by downward nominal-wage rigidity. Obviously, the higher is the wage that the firm has previously paid, the higher must be its wage in the new contract; at any constrained firm, the current wage is determined by the wage that was set the last time the firm was unconstrained. Consider, then, the bargaining process at unconstrained firms. In an environment of low inflation and downward nominalwage rigidity, the wage that is bargained at an unconstrained firm will not only affect the wage that is paid for the duration of the current contract, but it has the potential to affect the wage in future contracts as well due to the possibility of the firm becoming constrained. In general, the greater is the probability of a firm being constrained by downward nominal-wage rigidity in the future, the greater will be the expected value to a worker and the expected cost to a firm of any particular wage negotiated in the current period.

One might expect workers and firms to take this possibility into account when determining the size of the initial wage increase. Specifically, if the wagesetting process is determined by workers and firms who are forward looking, then the real wage level at unconstrained firms should be lower than would be the case if wages were fully flexible. Furthermore, since downward nominal-wage rigidity imposes less inflexibility on firms when inflation is higher, the real wages at unconstrained firms would be positively related to inflation: that is, higher inflation would lead to higher real wages at unconstrained firms.

Another way of looking at this idea is to note that the wage floor of downward nominal-wage rigidity provides workers with some insurance against the effect of negative shocks to their firm. That is, it is a form of implicit contract that guarantees that real wages will fall by an amount no greater than the rate of inflation. But wage bargaining requires that, for a given degree of bargaining power, any benefit received in one way will be traded-off against something else. For instance, one sometimes sees union contracts in which wage increases are forgone in return for guarantees of job security. In the case of downward nominal-wage rigidity, the lower is the rate of inflation, the greater is the insurance against real-wage reductions in the future, and so the greater should be the premium in the form of lower real wages at unconstrained firms.⁶

This argument is based on the assumption that firms and workers are "forward looking." It is important to qualify what this means. To say that the bargainers are forward looking does not mean that they have perfect foresight. Rather, it simply means that over time the bargaining process would adjust to the fact that increasing inflation has increased firm profitability on average at the expense of real wages and conversely for decreases in inflation.

Some sense of the importance of forward-looking behaviour in this context is provided by Lavoie (1997), who has calibrated the ADP model to Canadian data and then replicated the Canadian policy of the early 1990s in reducing inflation from 4 to 2 percent. When agents are not forward looking, Lavoie's model estimates that that policy would have resulted in a permanent increase in unemployment of 0.5 of a percentage point. When agents are assumed to be forward looking, however, the model estimates that the rate of unemployment would be unchanged, although it does suggest a small impact on unemployment if inflation were to be reduced further to 1 percent.

It is interesting to interpret the wage-settlements data of Figure 1 in the context of forward-looking behaviour. Recall that the notable thing about the comparison between Figures 1(a) and 1(b) was the fact that the reduction in inflation was associated with a reduction in the variance of wage increases on both sides of the median. This is consistent with the idea that wage increases in unconstrained firms are reduced when inflation is low to provide a buffer against the possible constraint of downward nominal-wage rigidity at some time in the future. As we noted earlier, this general reduction in the variance of wage changes is consistent with theories about the effect of low inflation in reducing uncertainty. To the extent that these data are indicative of downward nominal-wage rigidity, however, they also suggest the presence of forward-looking behaviour in wage setting. That is, although there is more than one interpretation of the wage-settlement data in Figure 1, it is difficult to infer from them that low inflation has led to aggregate real-wage increases in Canada being higher in recent years than they would have been with moderate inflation.

The Link between Real Wages and Unemployment

The third step in the Tobin/ADP framework is that those firms who are constrained by downward nominal-wage rigidity will respond by reducing employment by more than they would have in the absence of that constraint. This assumes a negative relationship between employment and real wages.

Most economists would agree with the proposition that if something outside a firm's control permanently pushes up its real wage without a corresponding increase in labour productivity then the firm will eventually respond by reducing the number of workers it employs. Note, however, that downward nominal-wage rigidity is a short-run phenomenon. Even with low inflation such as Canada has had in recent years, the combination of some inflation and increases in labour productivity implies that nominal wages do increase on average from year to year. For instance, in Canada over the five years since low inflation was achieved in 1992, inflation in the CPI averaged 1.4 percent per year, but wage inflation (as measured by the fixed-weighted index of average hourly earnings) averaged 2.4 percent per year. This means that Canadian firms will have been able to bring about a reduction in their wages relative to those of other firms of 2.4 percent each year, just by holding nominal wages constant. Over the space of two or three years, this allows for a considerable amount of relative wage variability, even in the presence of downward nominal-wage rigidity. Such rigidity will only affect a firm until the combined effect of inflation and productivity improvements remove the constraint. The question to be addressed in this section is whether the higher real wages created by downward nominal-wage rigidity will reduce employment at constrained firms during that initial period.

In the ADP framework, the combination of low inflation and downward nominal-wage rigidity causes a *permanent* increase in the level of aggregate real wages, but this arises because there are always some firms in a period of short-run adjustment. For there to be a negative link between the higher aggregate real wages thus generated and employment, it is necessary that the *immediate* response of constrained firms to the higher real wages be a reduction in employment.

It will be useful here to distinguish between two types of unemployment. "Demand-constrained" unemployment is the situation where there are simply fewer jobs available than there are workers seeking to fill them. "Frictional unemployment" results from the fact that workers differ widely in both their skills and experience and in their preferences over what characteristics other than the wage they desire in a job, while jobs differ widely in both the skills required of the worker and in their characteristics. With such heterogeneity, there is a time-consuming process of finding matches between a worker and a firm so that each has the attributes desired of the other. This may be particularly true in times of structural change when there may be a mismatch between skills currently possessed by workers and those required for the jobs in new industries. Thus, even if there are as many jobs in total as there are workers seeking them, there will at any time be a stock of unemployed workers and vacant jobs still seeking mutually desirable matches.

In ADP's model, *all* unemployment is demand constrained due to excessive real wages. In other words, unemployment could be reduced to zero in their model by a general cut in wages. In real-world labour markets, however, we do see the simultaneous existence of large numbers of unemployed workers and large numbers of job vacancies, so frictional unemployment is clearly playing at least some role.

The key point here is that total employment depends not only on the number of job slots created by firms, but also on the proportion of those slots that are vacant. Employment can be increased either by increasing the number of job slots or by reducing the vacancy rate. Although an increase in the real wage at any firm is likely to result in that firm's reducing the number of job slots that it seeks to fill, it may also increase the willingness of workers to accept jobs and reduce their inclination to quit, thus reducing the vacancy rate. In labour markets where worker turnover is high, the vacancy effect is likely to dominate in the short run. This is because workers whose expected tenure at a particular firm is low will only care about wages in the short run whereas firms who have invested in plant and equipment will have a longer-term perspective. As a result, workers are much more likely to respond to short-run changes in wages than are firms.

With these two opposing effects of a temporary wage increase on the number of job slots and the proportion of those slots that are filled, the effect of downward nominal-wage rigidity on overall employment is theoretically ambiguous. To make a full assessment of the effects of low inflation, therefore, it is not sufficient to look at distributions of wage changes for evidence of downward rigidity: one must also look for evidence on how that rigidity has affected employment.

BENEFITS OF LOW INFLATION

Tobin and ADP have identified one potential cost to low inflation operating through downward nominalwage rigidity, and ADP's model is designed to address this particular issue. The Tobin effect, however, is just one of many possible effects of low inflation. As noted in the introduction, the mainstream view is that there are benefits in the long run to maintaining low and stable inflation. The mechanisms through which low inflation is presumed to generate these benefits are different from the mechanisms of downward nominal-wage rigidity through which ADP suggest low inflation could produce long-run costs. As Howitt (1996) points out, there is no reason why both sets of mechanisms could not be operating simultaneously in the economy, producing both costs and benefits. In order to conclude that it would be desirable to increase the rate of inflation in Canada, one would need to show that the costs outweigh the benefits.

The range of possible benefits and costs of inflation are well surveyed by Summers (1991), Konieczny (1994) and Howitt (1996). It is beyond the scope of this paper to consider this literature in detail. There is one potential benefit of low inflation, however, that arises from a possible psychological effect of inflation that is directly relevant to the question of downward nominal-wage rigidity and so worth discussing here.

This effect concerns the direct irritation cost that inflation imposes on people. Although economists may disagree about the long-term costs of inflation, there is less disagreement in the broader population: surveys show that distaste for inflation is greater among the general public than it is among economists. (See, e.g., Shiller 1996.) If inflation is disliked by people in the economy, then maintaining low inflation is desirable not simply as a means to an end but as an end in itself. Of course, the results of such surveys need to be viewed with caution; without knowing the exact context assumed by those being surveyed when giving their responses, it is difficult to draw strong policy conclusions from such evidence. The dislike of inflation expressed by people in these surveys may simply be due to an asymmetry in the way they view wage and price increases, attributing any increase in wages to their own talents or good fortune and blaming inflation for the increase in prices of the goods that they purchase.

It is possible, however, that consumers' dislike of inflation represents something real: namely that inflation increases the psychic costs of decision making. One of the roles of money is to serve as a "unit of account"; that is, rather than prices and wages being quoted in terms of other goods they are expressed in terms of the monetary unit. This greatly simplifies decision making, as it means that consumers can simply compare the value they expect to get from a good to the value they place on the dollars that would be required to pay for the good. Since the value of money comes in the goods and services it can purchase, the usefulness of using money as a unit of account depends on the consumer having a reasonable sense of the value of a given amount of money in terms of its purchasing power. If inflation keeps reducing the real value of money, the consumer loses this "nominal anchor" against which all prices can be compared. Any travelling consumer who is always converting local prices back into the home currency before deciding whether to make a purchase certainly appreciates the value of a nominal anchor.

The increased complexity involved in making economic choices when the unit of account constantly loses its value may impose costs beyond the irritation that it causes: it may also reduce the quality of decision making as consumers fail to take into account the effect of the changing value of the currency in which all prices are expressed. Such an effect on decisions is termed "money illusion." A classic example of this concerns saving for retirement. When inflation is positive, part of the nominal interest that people receive on their saving is simply making up for the reduced real value of the money they have saved. If savers tend to view the interest they receive in terms of its dollar value rather than in terms of the goods and services that the interest earning can buy once they have calculated how many nominal dollars are required to preserve the buying power of the principal, they are likely to overestimate the real value of the interest they are receiving. This might well induce them to save less than is needed to sustain a particular standard of living in their retirement. Even a small overestimate of the real interest rate could lead to a substantial error when summed over the 30 or more years of retirement saving.

Economists tend to be uncomfortable with arguments that appeal to psychological effects such as money illusion or dependence on a nominal anchor, since almost anything can be explained in terms of unobservable psychological motivations. Perhaps for this reason, the literature on the costs and benefits of low inflation has tended to ignore or downplay such psychological arguments. The Tobin/ADP framework, however, rests on a psychological premise: that workers view nominal-wage reductions when inflation is very low as being somehow different from an equivalent real-wage reduction brought about purely by inflation.

One view is that downward nominal-wage rigidity is a form of money illusion; that is, inflation induces some workers into accepting real-wage reductions to which they would not otherwise agree. It might seem strange that a policy that had an effect by inducing people into making decisions they would not otherwise make could be beneficial. The benefit from mistakes in ADP's model arises because the wage-rigidity argument against low inflation assumes that the interests of a single worker are opposite to those of the economy overall. Specifically, any worker would like the highest real wage he or she could obtain, conditional on retaining employment, whereas the Tobin/ADP framework is predicated on the notion that it would be good for the economy to lower aggregate real wages. Inflation is then considered desirable as it somehow induces workers into accepting these socially desirable lower real wages.

Although there are many examples of so-called "negative externalities" where what is good for the decision-making agent is bad for the economy, the majority of economic decisions do not have this effect. The main reason for letting private markets be the dominant institution for organizing a modern economy is the belief that the well-being of people is best served by letting them make their own decisions about which goods they wish to purchase, which skills they wish to acquire, and so on, based on each individual's own information about his or her own preferences and aspirations. If inflation can induce people into making desirable mistakes when individually desirable actions are socially costly, it can just as easily induce them into making socially costly mistakes when the interests of the individual and society are not opposed, as with the above example of saving for retirement. To the extent that downward nominal-wage rigidity is evidence of money illusion, then, it may actually strengthen the argument in favour of low inflation.

Downward nominal-wage rigidity need not imply that people are *fooled* by inflation so much as that they use the nominal anchor of money to help them make decisions on what goods to buy and sell, rather than seeing everything in terms of relative prices. Again, however, this suggests a benefit to low inflation by preserving the nominal anchor that consumers appear to value.

Whatever the reason for it, if downward nominal-wage rigidity is pervasive in the economy, then its existence suggests that there is an important psychological difference between low and moderate inflation. Accordingly, along with spurring interest in the mechanisms outlined in the preceding sections by which low inflation may impose costs on the economy, downward nominal-wage rigidity also forces economists to take the psychological arguments in favour of low inflation more seriously than they have been wont to do.

CONCLUSION

An important policy debate in many countries concerns whether it would be desirable to reduce inflation to low levels and then direct monetary policy to maintaining low and stable inflation. The conventional wisdom in macroeconomics is that there are long-run benefits to an economy from being in a position of maintaining low rather than moderate or high inflation, but that there are short-run costs from effecting the transition to low inflation from higher levels. Countries experiencing moderate or high rates of inflation have to decide whether the long-run benefits of low and stable inflation outweigh the short-run costs of the initial disinflation. For a country like Canada which has already achieved low and stable inflation, however, the short-run costs have already been incurred and so the obvious policy conclusion is to continue the lowinflation policy and enjoy the long-run benefits.

ADP present a major challenge to this conventional wisdom, as they suggest reasons why there may be a long-run trade-off between inflation and unemployment. In their view, the costs of maintaining low inflation are not transitional but ongoing. The policy conclusion for Canada from their analysis would be that the Bank of Canada should reverse its current monetary policy and seek to target higher rates of inflation than the mid-point of the current range of 1 to 3 percent, as advocated by Fortin (1996a, b).

At this stage, however, ADP's proposition about long-run costs of low inflation due to downward nominal-wage rigidity is very much a conjecture. There remains uncertainty as to whether downward nominal-wage rigidity is and will continue to be a significant constraint on wage setting, whether that downward nominal-wage rigidity leads to higher unemployment, and whether the costs of that increased unemployment outweigh other benefits of low inflation. A number of studies have sought to check the empirical importance of downward nominal-wage rigidity but the other key steps in ADP's analysis also need to receive careful attention. Moreover, even if each of the steps in ADP's analysis can be empirically verified, it does not automatically follow that it would be desirable for Canada to re-inflate. One also has to ask if there are alternative policies that could deal with the labourmarket phenomenon driving ADP's results. ADP's conclusions are predicated on the assumption that unemployment is caused by excessive aggregate real wages and that, because of downward nominal-wage rigidity, inflation is a policy tool that can be used to reduce aggregate real wages. This raises the obvious question: If it is considered desirable to reduce aggregate real wages, are there alternative policies that could be used to bring that about?

In summary, most economists would agree that at least part of the sluggish performance of the Canadian economy in the last six years can be attributed to the transitional costs of reducing inflation to its current low levels. Before accepting the proposition that Canada should now re-inflate, thus guaranteeing that those short-run costs have been incurred for no benefit, it is important that each of the steps in ADP's analysis be carefully examined, along with possible alternative policy responses. The aim of this paper has been to stimulate debate along these lines.

Notes

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¹Throughout this paper, the term "low inflation" is used to refer to rates of between 0 percent and 3 percent, and "moderate inflation" for rates of around 3 percent to 5 percent.

²ADP cite evidence showing similar variation in wage changes across firms in Canada and the United States. Davis, Haltiwanger and Schuh (1996) cite two studies from the United States and two from Canada showing that over 10 percent of all jobs in the two countries are created and a similar number destroyed over the course of a year.

³The term "real wage" needs to be qualified here. At the level of an individual firm, the real wage is usually defined as the wage relative to the overall level of prices. When talking about aggregate wages, which refer to some index of average wages across the entire economy, what matters most for the analysis in this paper is the general level of wages relative to the amount of spending power in the economy ("aggregate demand"). Accordingly, we use the term "aggregate real wage" in this paper to refer to this ratio of aggregate nominal wages to aggregate demand.

⁴The size of this spike has been the source of some dispute in the Canadian debate about nominal-wage rigidity, as it depends on what contracts are included in the data and the exact definition of a wage change. For a discussion of these alternative definitions, see Crawford and Harrison (1998) and the accompanying discussant comments by Fortin.

⁵Formally, the root mean-squared deviation of wage changes from the median for changes below the median fell from 2.37 to 1.53 and the root mean-squared deviation for changes above the median fell from 1.78 to 1.35. This represents a fall of 35 percent and 24 percent respectively. The larger reduction in variance below the median, however, is due entirely to the two outlier observations in the first period, which clearly are not the result of downward nominal rigidity. When these two observations are removed from the sample, the root mean-squared deviations of changes below and above the median fell by 23 percent and 24 percent, respectively.

⁶Note that, although this argument is couched in the language of insurance, it does not require that workers be risk averse: a guarantee that the nominal wage will not fall provides a benefit to workers, no matter what their attitude to risk.

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