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ABSTRACT

It is often argued that the most important costs of inflation can be substantially mitigated by indexing reforms. Yet governments in moderate inflation countries have generally been very reluctant to promote institutional changes that would reduce the costs of inflation. Capital income continues to be taxed on a nominal basis, indexed bonds are a rarity, typical mortgage contracts keep nominal rather than real payments constant, and interest is not paid on required reserves.

This paper examines the welfare consequences of inflation mitigation measures in the context of dynamic consistency theories of the determination of the inflation rate. Our general conclusion is that recognizing the effects of inflation mitigation measures on the choice of the inflation rate substantially undercuts the welfare case in their favor. It is easy to construct examples in which such measures actually reduce welfare. The case for indexing measures is strongest in settings where governments already have strong anti-inflation reputations, cannot precisely control the inflation rate, and can offset the effects of unanticipated inflation without reducing the costs of anticipated inflation. Conversely, the case for inflation mitigation measures is weakest where governments lack strong reputations, can control the inflation rate, and where indexing makes it easier to live with anticipated inflation.

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Economists regularly advocate a variety of reforms including the indexation of tax brackets and transfer payment programs, the measurement of capital income on an inflation adjusted basis, the issuance of government indexed bonds, the introduction of new mortgage instruments, and the payment of interest on money, on the grounds that these policies reduce the costs of inflation. Indeed it is often argued that the most important costs of inflation are "almost entirely avoidable" (Fischer, 1981), because of the possibility of enacting these inflation-cost mitigating reforms.

Indexation is of course widespread in high inflation economies. But despite their experience of non-negligible inflation, most industrialized economies do relatively little to mitigate its adverse effects. Mortgages that keep real rather than nominal payments level are not observed, nor is the payment of interest on required reserves. Capital income continues to be measured and taxed on a nominal basis in all major countries. Only social security payments are effectively indexed in most countries; indexed government bonds are offered only in Britain. The absence of indexation is not an accident. Policies directed at mitigating the effects of inflation are often seriously put forward. For example, the original Reagan Administration proposal for tax reform called for the use of indexing in measuring capital income; and a transitional advisory team for the Administration recommended the issue of indexed bonds. Both proposals were quickly discarded.

The general reluctance of governments in moderate inflation countries to promote institutional changes that would reduce the costs of inflation calls for explanation. One set of explanations, favored by economists, ascribes the failure to index to the transitional costs of moving to, and the transactions costs of operating in, an indexed system. Policymakers by contrast most commonly advance some type of dynamic moral hazard

consideration in dismissing indexation. They argue that indexation ends up counterproductive as it promotes the inflation whose harmful effects it seeks to mitigate.

Former U.S. Federal Reserve Chairman Arthur Burns (1978, p148) advances both arguments: "This [indexation] is a counsel of despair. ... I doubt if there is any practical way of redesigning economic contracts to deal with this problem satisfactorily. In any event, if a nation with our traditions attempted to make it easy to live with inflation, rather than resist its corrosive influence, we would slowly but steadily lose the sense of discipline needed to pursue governmental policies with an eye to the permanent welfare of our people".

Evaluating the dynamic moral hazard argument, or more generally the desirability of inflation mitigation schemes, requires a theory of why governments pursue inflationary policies despite their apparent costs, and the general belief that permanently high levels of inflation do not yield benefits in terms of increased output. Recent work by Kydland and Prescott (1977) and Barro and Gordon (1983) has provided an interesting theory of inflation based on dynamic consistency considerations. Inflation arises because of the government's incentive to surprise the private sector with unexpected inflation and reap output benefits.

This paper considers the desirability of mitigating the costs of inflation in the context of these models of inflation determination. We reach two primary conclusions. First, recognizing that inflation is a choice variable which will be affected by changes directed at eliminating nominal institutions, substantially undercuts the case for inflation

mitigation measures by governments that have not established a firm anti-inflationary reputation. It is easy to construct examples in which the costs of the extra inflation that results from inflation palliation outweigh the direct benefits of the lower cost of a given inflation rate. Second, that foregoing indexation is to some extent a substitute for developing a reputation for pursuing anti-inflation policies. Nations with strong anti-inflationary reputations can more easily afford indexation policies than other nations without such reputations.

Section I lays out the basic argument in the context of the Barro-Gordon (1983) model of inflation determination. Section II considers how the government's incomplete control of the inflation rate and alternative representations of the inflation loss function affect the results. Section III examines issues relating to inflation mitigation and reputation. Section IV concludes by discussing some implications of the results and directions for extension.

I. The Basic Argument.

We follow Barro and Gordon (1983). Suppose that there is a short run Phillips curve

(1) $U = U^* - a.(\pi - \pi^e)$

where U is the unemployment rate, U* the natural rate of unemployment, π the inflation rate, and π^e the inflation rate expected at the beginning of the period.

The government is able to determine the actual inflation rate, π, which it sets to minimize the loss function

(2) $L = (U - kU^*)^2 + b\pi^2 , \quad k < 1$

This loss function is assumed to reflect the preferences of both government and society. The parameter b reflects the costs of inflation, while k determines the strength of the government's incentive to create unexpected inflation. Such an incentive will be present as long as k<1. Note also that (2) implies that it is actual as opposed to unexpected inflation that has welfare costs. We comment on the effects of distinguishing between the costs of actual and unexpected inflation below.

A myopic government that ignores the effects of its choice of inflation rate on expected inflation sets the inflation rate:

(3) $\pi = a[U^*(1-k) + a\,\pi^e]/(a^2 + b)$

implying when expectations are fulfilled with $\pi = \pi^e$

(4) $\pi = (a/b)\, U^*(1-k)$

At the fulfilled expectations equilibrium, the value of the loss function is

(5) $L' = [1 + (a^2/b)]$

Equations (4) and (5) imply that an increase in a both increases the inflation rate and reduces social welfare. With higher a, the Phillips curve is less steep, and the government is more tempted to try to create unanticipated inflation, which now gives a bigger bang in terms of lower unemployment per point of inflation. Accordingly, inflation has to rise to a higher level before the government is no longer tempted to try and create unexpected inflation.

A more striking result is that the value of the loss function (5) is decreasing in b. Since the parameter b measures the social cost of inflation, this implies that policy measures that reduce the marginal cost of inflation end up increasing the total cost of inflation to society. Inflation mitigation policies, although they reduce the costs associated with a given level of inflation, may end up making inflation more costly to society. With the quadratic cost function considered here, inflation protection is always counterproductive, because the extra inflation that results has costs that exceed the direct benefits of protecting against inflation.

Interpreting these results in terms of indexation, wage indexation reduces a (make the Phillips curve steeper) and thereby increases economic welfare. Other forms of indexation such as tax and social security indexation can be interpreted as reducing b, and thereby increasing the social costs of inflation. Another interpretation is that b can decline with result of the removal of controls on interest rates. Portfolio-holders move out of money into the now higher-yielding assets, b declines, the inflation tax becomes less distortionary, and in the new equilibrium the private sector becomes worse off.

The example in this section suggests that policymakers' suspicions about mitigating the costs of inflation may well be warranted. At any given level of inflation reducing the marginal cost of inflation improves welfare. However it may make things worse once the induced effects on policy and consequent adjustment of expectations is considered. Avoiding inflation mitigation measures is one way of committing, albeit imperfectly, to low

future inflation rates. In the example here, the reduced commitment to low inflation associated with inflation mitigation exceeds its direct benefits. Indeed, equation (5) implies that measures which artificially increased the costs of inflation as reflected in b would be desirable[1]. The next section explores the robustness of this conclusion.

II. Extensions

We consider here two extensions of the example in the previous section. First, we examine the implications of government's inability to perfectly control the inflation rate. Second, we explore alternatives to the quadratic inflation loss function that we have maintained so far. Both extensions demonstrate the unsurprising result that under circumstances, some forms of inflation mitigation will be desirable.

Imperfect Inflation Control

We have so far maintained the assumption that the government can precisely determine the rate of inflation; experience suggests otherwise. Suppose the actual rate of inflation, π equals $(\pi^*+\epsilon)$, where π^* is the intended rate of inflation, and ϵ is a random error term, with variance σ^2. Then if the government optimizes, the expected value of its loss function is:

$$(6) \qquad L' = U^{*2}(1-k)^2\ [1+(a^2/b)] + b\sigma^2$$

[1] Rogoff's argument (1986) that the appointment of conservative central bankers can improve economic welfare reflects this fact.

Now the government can consider setting the optimal level of inflation mitigation, choosing that level of b which minimizes L'. It is given by:

(7) $$b^* = a[1/\sigma^2]^{1/2}$$

The optimum level of inflation mitigation trades off the adverse effect of mitigation on the government's intended level of inflation, against the costs of accidental inflation. As the variance of uncontrolled inflation increases, the optimal b decreases, or equivalently, the optimal degree of inflation cost mitigation (including some forms of indexing) rises. By contrast, as k decreases, the benefits for the government of trying to create unanticipated inflation increase, and "dynamic inconsistency inflation", becomes more important and the optimal degree of inflation mitigation diminishes[2]

Uncertain, or more accurately, uncontrollable, inflation thus provides one rationale for inflation protection. Note though that the argument of this section implicitly assumes that the uncontrollable inflation is caused by a demand shock since output expands with the uncontrollable inflation). However, some inflationary episodes, for instance those following the oil price shocks in 1973 and 1980 are a result of unforeseen supply shocks. It is well known that indexation makes dynamic adjustment to supply shocks more difficult. This tends to weaken the argument in favor of indexation as a means of mitigating the costs of uncontrollable inflation.

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[2] The intuition behind this result should be clear. In a world where all accidents were caused by willful speeding, a policy of installing daggers in steering wheels could actually promote safety. If some accidents occur naturally, this is a much less attractive strategy.

The loss function L( ) in equation (2) penalizes only the actual level of inflation. Alternatively the loss function can penalize both the actual level of inflation and unanticipated inflation. Losses from unanticipated inflation might for example include the social welfare loss from the capricious redistributions associated with unexpected inflation, or the increases in uncertainty created by large deviations of actual from expected inflation.

In this case we can generalize the loss function to

(8) $LL = (U - kU^*)^2 + b\,\pi^2 + c\,(\pi - \pi^e)^2$

We assume as earlier that the inflation rate equals $(\pi^*+\epsilon)$, where π^* is the intended inflation rate. It should be clear that the inclusion of the extra term has no effect on the equilibrium inflation rate, π^* that the government aims for. Nor does it have any effect on the calculation of the optimal b in equation (7), assuming that b and c are independent.

If b and c can be manipulated separately, then in the presence of uncontrollable inflation, equation (8) implies that social welfare is improved by reducing c as much as possible. To the extent that indexation measures can be found that protect only against unanticipated or uncontrolled inflation, without affecting the costs of anticipated inflation, welfare will be enhanced. An example of such a measure might be the indexation of Social Security benefits. On the other hand, policies affecting b, the costs of actual inflation not unanticipated inflation might include the measurement of capital income on a real rather than a nominal basis, the removal of controls on interest rates, or the introduction of tilted mortgages.

Alternative Loss Functions

A first generalization of the loss function employed so far would involve allowing for the possibility that the optimal inflation rate is non-zero. Rewriting the inflation cost function in terms of the deviation of inflation from its optimal level $\pi-\pi^{**}$, does not alter the conclusions of our analysis at all[3].

A second and more significant generalization of our analysis would involve relaxing our assumption that the costs of inflation are quadratic in the inflation rate. While quadratic costs can be justified if inflation causes Harberger triangles, more general formulations are plausible as well. Suppose that instead of (2) there is an additively separable[4] loss function,

(15) $\quad H = V(U - kU^*) + bW(\pi)$

The marginal costs of both unemployment and inflation are assumed to be positive and increasing, and we assume that indexation has no consequence when the inflation rate is 0. That is:

$$V' > 0,\ W' > 0,\ V'' > 0,\ W'' > 0,\ \ W(0)=0$$

The coefficient b represents the effects of changes in the extent of inflation mitigation on utility: b falls as mitigation increases. We

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[3] In this case the equilibrium inflation rate rises by π^{**} relative to its level in (4) and the value of the loss function is exactly the same as in (5).

[4] Since we will be showing that the effects of a change in b are ambiguous even when the utility function is separable, there seem to be no further insights to be gained by using a non-separable function.

therefore concentrate on the effects of a change in b on the inflation rate and on welfare.

The first order condition for the optimal rate of inflation is

(16) $aV'(U^*(1-k)) = bW'(\pi)$

An increase in b thus results in a lower rate of inflation

(17) $(d\pi/db) = -(W'/bW'') < 0$

The effects of a change in b on welfare may be calculated from:

(18) $(dH/db) = W(\pi) + b.W'(\pi)\ (d\pi/db)$

$= W(\pi) - (W'(\pi)^2/W''(\pi))$

Whether or not increases in b reduce welfare depends on the relationship between total and marginal utility, since

(19) $(dH/db) = (W(\pi)^2/W''(\pi))[d(W'(\pi)/W(\pi))/d\pi]$

The effects may be of either sign. In the quadratic loss function case examined in Section I, dH/db is negative, so that an increase in the costs of inflation or reduction in indexation increases welfare. That result holds as long as the elasticity of the marginal cost of inflation with respect to its level is less than the elasticity of the total cost of inflation with respect to the inflation rate.[5]

But examples can be constructed where inflation mitigation increases welfare. Suppose

$$W(p) = \exp(a\pi) + \pi - 1, \qquad a > 0$$

This example has positive and increasing marginal costs of inflation, and in addition $W(0) = 0$. But

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[5] This will be true for any cost function of the form $W=\pi^X$ but not for all polynomial functions of π, as we note below.

$$(dH/db) = (sgn)\ \{(\exp a\pi)(a2(\pi-1) - 2a) - 1\}$$

where (sgn) means "of the same sign as".

In this example dH/db is negative for low rates of inflation and positive for high rates of inflation. Thus increased indexation would worsen welfare at low rates of inflation and improve it at high rates of inflation. The former result is a general proposition. Given the restrictions on the $W(\pi)$ function, that it equal zero at zero inflation and have a positive derivative, it is impossible to produce a function such that indexation improves welfare at rates of inflation close to zero[6]

The results in this section suggest that as a general proposition low inflation countries where the government can closely control the inflation rate will find inflation mitigation counterproductive, but that the situation is more ambiguous for high inflation countries. This seems to conform reasonably well with observed patterns of government behavior.

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[6] More precisely, the restrictions imposed imply that (dH/db) is positive at a zero inflation rate; to see this, examine equation (11) and note that the first term is zero for $p=0$, while the second term is negative. But it is possible to produce a W(p) function such that dH/db starts out negative, becomes positive, and then reverts to being negative. One example is

$$W(\pi) = a\pi + b\pi^x$$

where a is small, b is large, and x is large.

III. Commitment and Inflation Mitigation Policies

In the model of Section I, foregoing inflation cost mitigation is desirable because it helps to avoid the dynamic consistency problem that otherwise gives rise to inflation. However, alternative less costly commitment strategies may be available to the government. Perhaps the most extensively analyzed is efforts by the monetary authority to develop a reputation for being inflation averse. Here we examine the desirability of inflation mitigation arrangements in models where the government seeks to develop a reputation for pursuing low inflation policies.

Reputation

Barro and Gordon (1983b) treat the case where policymakers are able to develop a reputation for inflation aversion because of their knowledge that if they "cheat" and inflate more than the public expects they will be punished by an expectation of higher inflation in subsequent periods. Barro and Gordon explore one of the many possible equilibria in which the government is punished for cheating by an increase in expected inflation for one period. They make the assumption that if policymakers cheat expected inflation reverts to the level that would be anticipated if policymakers and the public were playing a one shot game. The equilibrium inflation rate is then the lowest rate at which it will not pay policymakers to deviate and inflate more than the public expects, because of the subsequent penalty in terms of higher expected inflation.

Suppose that the government now minimizes an infinite horizon loss function:

(20) $M_t = \Sigma_0^{\infty} L_{t+i}/(1+\delta)^i$

We assume that if the government fails to produce the expected inflation rate this period, the private sector expects the discretionary inflation rate next period. If the government produces the expected inflation rate this period, it is expected to do so again next period. As before, the discretionary inflation rate is given by:

$\pi_d = (a/b)\ U^*(1-k)$

We begin by considering whether a zero inflation rate can be sustained as an equilibrium. If the government has established credibility to the point where a zero inflation rate is anticipated, it can gain, at least in the short run by creating unexpected inflation, and reducing unemployment. With zero expected inflation, (3) implies that government's short run optimal strategy is to set:

(21) $\pi = aU^*(1-k)/(a^2+b)$

The temptation for the government to "cheat" and inflate is given by the difference between the loss associated with (21) and the loss associated with following the anticipated zero inflation strategy. That is:

(22) Temptation $= L_p - L_c = L_p(a^2/b/(1+a^2/b)$

where L_p is the loss when the rate of inflation is expected to be and is in fact equal to 0, and L_c is the smaller loss that results when the government cheats.

The punishment faced by the government if it cheats, is the increase in inflation expectations to their one period discretionary level. Since the

punishment occurs one period after the gain from increasing the inflation rate, it has to be discounted. Thus the government's gain from cheating starting in a zero inflation equilibrium is:

(23) Gain-Temptation-Loss/(1+d)

$$-(a^2/b)L_p[(\delta-a^2/b)/[(1+\delta)(1+a^2/b)]$$

The zero inflation equilibrium is sustainable only if $\delta<a^2/b$, a condition that is more likely to be satisfied if inflation mitigation provisions are put in place and b is small.

The explanation for the puzzling result that indexation solidifies a commitment to zero inflation is that it is the fear of punishment that keeps the government from producing unexpected inflation. Since indexation makes the discretionary equilibrium worse, as we saw in Section I, it raises the punishment for deviating from the zero inflation equilibrium.

Perhaps the more realistic case to consider is where reputational considerations enable the government to have lower inflation rates than would otherwise be sustainable, but where they are not strong enough to permit attainment of the first best. In this case $\delta>a^2/b$. Let L_r denote the loss when the government is expected to and does produce a positive inflation rate π_r that is less than π_d. The loss in this case is:

(24) $L_r=[U^*(1-k)]^2 + b(\pi_r)^2$

Consider again a government that is tempted to cheat. Its temptation is given by:

(25) Temptation-L_r $-\{[U^*(1-k)-a\pi_o-\pi_r^e]^2 +\pi_o^2\}$

where π_o is the inflation rate given (3), when expected inflation is π_r and the expression in brackets is the loss when the government acts opportunistically given a low inflation expectation.

If the government cheats, the loss that occurs in the succeeding period is:

(26) $\text{Loss}=b(\pi_d^2-\pi_r^2)$

The equilibrium inflation rate π_r can be solved for by equating the temptation to cheat in (25) to the present value of the loss in (26): This is the lowest inflation rate at which the government is not tempted to produce surprise inflation. It is given by the solution to:

(27) $\pi_r=\lambda(1-k)U^*$

$$b^2\lambda^2[2+\delta+a^2/b] - 2ab(1+\delta) + a^2 = 0$$

Real solutions to this pair of equations exist only if $\delta a^2/b<1$, that is if the government is not too impatient. Otherwise the government is unable to establish any sort of reputation, and goes to the one period discretionary solution. In the interesting case, where a reputation can be established, but zero inflation cannot be attained, the consistent inflation rate is between 0 and π_d.

Inspection of (27) reveals that b and λ enter the same way so that an increase in b is offset by an equal proportionate change in λ and hence in the consistent inflation rate. Equivalently the elasticity of λ with respect to b is minus one. Thus an increase in inflation mitigation which reduces b, increases the equilibrium inflation rate. Since the welfare loss from inflation in each period is given by $b\pi_r^2$, it follows that increases in b reduce the total cost of inflation, a result paralleling our discussion in Section I.

To summarize our results on reputation, the lower is b, the more likely it is that the government can sustain a zero inflation rate. But, if we

take the basic case to be one where the government cannot sustain zero inflation, then allowing for reputational effects does not alter our earlier conclusion, that with perfectly controllable inflation and a quadratic loss function, inflation mitigation promotes inflation and reduces welfare.

Loosely speaking our results imply that a government with an exemplary reputation as an inflation fighter can allow indexing without fear of adverse consequences, and may even strengthen its reputation by so doing. But any government without a sufficiently strong reputation may worsen welfare if it adopts measures to mitigate the costs of inflation.

Signalling.

Reputation effects of a different kind may also work against inflation mitigation measures. Introducing inflation mitigation measures may affect the public's perception of the monetary authority's perception of inflation. If the public believes the government has a lower b, it may then expect a higher inflation rate, reducing the benefits to the government of maintaining a zero inflation equilibrium. In a model in which the government has to signal its type to the private sector, for instance Persson and van Wijnbergen (1988), the introduction of indexation may persuade the private sector that the government has decided to move to a higher inflation equilibrium.

Perhaps the most plausible way of thinking about this issue is to assume that the public is unsure about whether actual policymakers believe that an increase in expected inflation yields benefits in the form of

reduced unemployment as argued by Tobin (1972), or some form of desirable redistribution as argued by Greider (1987). Policymakers who believed that inflation had desirable side effects would want to run higher rates of inflation than those who thought it did not have any benefits. They would therefore have a greater incentive to mitigate the distortions created by inflation. Decisions to adopt inflation mitigation strategies might then be interpreted by the private sector as signalling an intention on the part of the government to pursue inflationist policies.

Political Considerations

In commenting on Barro and Gordon (1983b), John Taylor raises an important question about dynamic consistency approaches to the analysis of inflation: "In other well recognized time inconsistency situations society seems to have found ways to institute the optimal policy. For example patent laws are not repealed each year to prevent holders of patents from creating monopolist inefficiencies. ... It is difficult to see why the zero inflation policy would not be adopted in such a [Barro-Gordon] world." One explanation for governments' success in solving the patent problem, and its failure in other areas such as the frequent payment of ransom to kidnappers, is their tendency to respond to concentrated intense interests, rather than more diffuse groups. The small group of patent holders can prevent expropriation of their patents, but the diffuse group of potential future kidnap victims cannot prevent the payment of ransom on behalf of today's highly visible victims.

This line of argument suggests that certain forms of inflation mitigation such as measures that protect Social Security benefits from being eroded by increased inflation, or that prevent inflation from causing sharp increases in business tax burdens, may significantly increase equilibrium inflation rates and reduce welfare by eliminating important sources of political opposition to inflation. On the other hand, measures like the use of inflation accounting or the issuance of indexed bonds, that do not undercut important anti-inflation lobbies may have less pronounced inflation enhancing effects.

The reputation, signalling, and political considerations considered here all suggest that inflation mitigation policies may well lead to increases in inflation and potentially to reductions in welfare. There is however an important contrast between these results and the ones in the preceding section. There we argued in the context of one-shot game models that indexation was least likely to be attractive at low rates of inflation. Our analysis here suggests that successful development of a reputation can substitute for foregoing inflation mitigation. To the extent that some nations enjoy low inflation, because their anti-inflation reputations are secure, there is an incentive to index, particularly if the rate of inflation cannot be accurately controlled.

IV. Conclusions.

Our main conclusion is that governments whose ability to maintain low rates of inflation is uncertain may end up by increasing inflation and

reducing welfare if they attempt to reduce the costs of actual inflation. Measures which reduce the cost of anticipated inflation, or undercut opposition to it are particularly likely to be pernicious. Governments with impeccable anti-inflationary credentials have little reason to fear indexation, and some reason to favor it, particularly if they cannot control the inflation rate precisely. Of course, at very low rates of inflation, the transaction costs associated with the introduction and use of indexation may weight against doing so.

The analysis raises a number of questions that could usefully be explored in further work. First, are our conclusions empirically valid? One implication of the approach would seem to be that the extent of indexation is U-shaped in relation to the inflation rate: governments with a reputation allow indexation; governments without a reputation with high b have medium inflation; and governments without a reputation and low b have high inflation and much indexation. The descending portion of the U probably does not exist in practice, but that may be because of the costs of indexation. It is certainly true that indexation and inflation mitigation measures are much more common in high than in medium inflation countries. But it is difficult to think of a model in which this would not be true.

If a government can commit to not mitigating inflation, why can't it commit to keeping the inflation rate low? Probably the answer lies in the different structure of monetary and inflation mitigation policies. A commitment to not index government debt is credible, since if nominal bonds are issued, there would be no incentive to index them ex-post. Similarly, tax rules cannot be changed ex-post to reflect distortions in measured income caused by inflation. More generally, the fact that monetary policies are

subject to continuous alteration, whereas fiscal institutions can only be adjusted intermittently allows greater commitment with respect to these institutions.

What about private sector inflation mitigation efforts? To the extent that these efforts are dependent on government determined regulatory rules, the preceding analysis applies. Recognizing private sector responses to inflation raises an interesting and perhaps empirically relevant possibility of an inflationary shock setting off a spiral. If the private sector can adapt to inflation it is plausible that the cost of any given inflation rate depends negatively on the highest previous inflation rate. (For example, the introduction of money market funds in the early 1970s in the US surely reduced the costs of the subsequent inflation.) A reduction in the cost of inflation raises the equilibrium rate of inflation, further reducing the cost of subsequent inflation, and so the inflation rate may ratchet upwards.[7] Stopping private indexation arrangements may be a way of avoiding such a spiral.

Are the principles behind this analysis more general? Our analysis brings to mind suggestions like those of Friedman and Buchanan, that distortionary taxes are better than non-distortionary ones because they will lead to less government spending and Peltzman's (1976) discussion of how automobile safety regulation can have perverse effects. The general

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[7] In an earlier version of this paper we have worked out the dynamics of such a process, finding that depending on parameter values, inflation may either reach a steady state or else continue rising without bound. In practice, at some high inflation rate where monetary exchange becomes extremely costly, other mechanisms come into action to stabilize the inflation rate.

principle seems to be that in the presence of distortions, policies that would represent Pareto improvements if behavior were unchanged by their implementation, may be undesirable once their incentive effects are recognized. Thus, a better tax system may lead to more wasteful spending, better cars to more speeding, and better inflation protection to more inflation.

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