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WHY ARE CENTRAL BANKS PURSUING LONG-RUN PRICE STABILITY?

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The question posed by the title of this paper has at least two interesting interpretations. The first is why long-run price stability is desirable. The second is what political economy arguments have led to the view that price stability should be the main or only policy goal for the central bank, even though there is a short-run tradeoff between output and inflation.

I shall take up these questions in turn, and also discuss what is and should be understood by (long-run) price stability. One thing central banks do not mean by price stability is stability of the average level of prices. Rather they mean reasonably low inflation, typically one to three percent per year.

This paper focuses on key issues that arise in considering the adoption of long-run price stability as the or a goal of monetary policy. Section I sets the background by discussing the allocative costs of inflation. I turn in Sections II and III to the Phillips curve and the growth-inflation tradeoffs, respectively. Section IV asks why governments nonetheless inflate. In Section V I discuss the optimal rate of inflation, suggesting that, for an industrialized country that has already attained single digit inflation, it is best to target a rate in the range of one to three percent. I then turn to political economy issues. Section VI presents evidence on the public's views of inflation. The paper concludes in Section VII, which examines the question of why price level stability is increasingly taking precedence as the main stated policy target for the central bank, despite the existence of a short-run Phillips tradeoff.

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I. The Costs of Inflation

The fundamental reason to pursue long-run price stability is that -- as has long been argued by central bankers and is increasingly accepted by academic economists -- inflation is economically and socially costly. A comprehensive listing of the economic costs of inflation is presented in Fischer and Modigliani (1978), Fischer (1981) and Fischer (1994), where it is emphasized that the costs of any given rate of inflation depend on the extent to which the institutional structure of the economy -- particularly the tax system and especially the taxation of capital -- has adapted to inflation. I will not go over these costs, some of which result from the greater uncertainty about inflation that is associated with higher rates of inflation, in any detail here, rather referring the reader to my earlier articles.²

The social costs have been less comprehensively catalogued and established, but these too contribute importantly to the public's dislike of high inflation.³ Opinion polls, which will be discussed below, leave no doubt that high inflation is politically unpopular, a view confirmed by the results of presidential elections in Argentina in 1995, Brazil in 1994, Peru in 1995, and Russia in 1996. And history confirms that high rates of inflation are both socially disruptive and in extremis associated with political and social disorder.

Most of the traditional calculations of the economic costs of inflation emphasize its allocative costs. Recently, Feldstein (1996) has presented detailed calculations of the economic costs of inflation in the United States implied by the interactions of existing capital income tax rules and inflation, and concluded that the annual welfare cost of an inflation rate of two percent rather than zero is a surprisingly large one percent of GDP.⁴ Most of this cost derives from the distortion of the intertemporal allocation of consumption caused by the inflation-induced reduction in the real rate of return on saving. The result depends on the non-indexation of capital income taxation. It is so recent, and the calculations so complicated, that it will take some time until the

² Fischer (1981), which provides partial equilibrium estimates of several components of the costs of inflation, includes estimates of the economic costs that arise from the greater uncertainty about inflation associated with higher inflation.

³ For recent cross-sectional evidence that inflation is associated with increased income inequality, see Bulir and Gulde (1995).

⁴ Feldstein assumes that the stated inflation rate exceeds the true rate by about two percent, so that the reduction in terms of the measured rate is from four percent to two percent.

significance of the result and its sensitivity to changes in assumptions can be established.^{5 6}

Feldstein also makes the point that, even if there is a short-run tradeoff between inflation and output, the appropriate calculation in deciding whether to reduce inflation requires weighing a one-time output loss against a permanent welfare gain, equal to the capitalized value of the annual welfare gain.⁷

The allocative costs of inflation discussed in this section are important. Most should manifest themselves in lower levels of consumption, income, or perhaps growth, at higher rates of inflation.⁸ But they could be outweighed by the Phillips curve relationship between inflation and unemployment, or perhaps by a positive relationship between inflation and growth. We examine those possibilities in turn.

II. The Phillips Curve

It is widely, though not universally, accepted that there is no long-run tradeoff between inflation and unemployment.⁹ Three points deserve

⁵ One reason for surprise at the magnitude of the cost is that the triangle rule of distortions suggests that an increase from zero to two percent inflation is unlikely to have a large cost. In the case of capital income taxation, an increase in inflation from zero to two percent worsens pre-existing distortions, and thus the intuition of the triangle rule is inappropriate; rather, as Feldstein points out, the costs are trapezoids.

⁶ There has been an upward trend in general equilibrium estimates of the costs of inflation. A useful review of earlier results is found in Dotsey and Ireland (1996). Their own calculations, which do not include inflation-induced tax distortions, are that the costs of a steady four percent inflation amount to about 0.4 percent of GDP. For an earlier general equilibrium estimate, see Cooley and Hansen (1991); see also the comment on this paper by Benabou (1991).

⁷ The effective discount rate he uses to capitalize the welfare gain is a little above three percent per annum.

⁸ English (1996) has shown that the share of resources devoted to financial transactions increases with the rate of inflation, which means that inflation tends to reduce output available for consumption or investment.

⁹ Fair (1996), working with data from 30 countries, finds that functional forms for price and wage equations that imply the possibility of a long-run Phillips curve tradeoff on the whole perform better than those implying no tradeoff, though he is cautious in drawing conclusions. Bullard and Keating (1995) find no long-run output-inflation tradeoff in a sample of 58 countries, except for some low inflation countries in their

further consideration: the existence of a short-run tradeoff; the possibility and implications of hysteresis; and the nature of the tradeoff at low inflation rates.

First, there is a short-run tradeoff between inflation and unemployment, equivalently between inflation and output. Two types of evidence are decisive: econometric studies in the United States and elsewhere establish the existence of the tradeoff;¹⁰ and every major central bank assumes the existence of the tradeoff in its policy decisions. Low unemployment and high capacity utilization lead to monetary policy tightening to prevent inflation; and monetary policy is eased during recessions to spur output, once inflation is thought unlikely to increase.^{11 12}

Second, there is the important question posed by the work of Blanchard and Summers (1986), of whether there is hysteresis in the behavior of unemployment, namely that the behavior of the unemployment rate is affected by the history of unemployment. Blanchard and Summers suggested that the unemployment rate in Europe followed a random walk, a result they attributed to the role of insiders in wage determination. More generally, the natural rate of unemployment might change, though not necessarily one-for-one, with the actual unemployment rate. In the United States, it certainly appears to be the case that economists' estimates of the natural rate are affected by the recent history of the actual rate. The following rule of thumb roughly describes economists' estimates of the non-accelerating-inflation rate of unemployment (NAIRU):

$$(1) \quad u^*_t = 5.0 + 0.3 (u_{t-1} - 5.0),$$

where u^*_t is the estimate of the NAIRU at time t , and u is the actual rate of unemployment. A similar rule could hold in Europe, where estimates of the structural rate of unemployment have kept rising along with the actual rate.

Equation (1) could describe the behavior of the actual NAIRU over time; alternatively, it is consistent with the true NAIRU being 5 percent. In this latter case, the equation might result from the natural caution of the economic adviser, unwilling to state at times of high unemployment that the margin of unused capacity is very large. Suppose that policymakers were willing to run expansionary policies as long as the actual rate was above the natural rate. Then, if the true NAIRU is 5 percent, equation (1)

sample, namely Austria, Germany, Finland and the United Kingdom.

¹⁰ See for instance the work of Robert Gordon, as summarized in his 1990 paper. See also Romer (1996).

¹¹ See Romer and Romer (1994).

¹² As will be argued below, the easing of monetary policy during a recession will be consistent with inflation targeting provided the economy is being disturbed by demand shocks.

could mislead policymakers into excess caution at times of high unemployment, and excess optimism at times of low unemployment.¹³

Third, the nature of the Phillips curve at very low inflation rates is central to the discussion of the target inflation rate. It has long been argued that a little inflation greases the wheels of the labor market,¹⁴ and more generally, that a little inflation eases needed adjustments of relative prices. The argument assumes that wage or price cuts are less likely than increases, equivalently that there is downward stickiness of nominal wages or prices.

The result is a long-run Phillips curve that is vertical at high rates of inflation but that displays a tradeoff at lower rates of inflation, as the constraint on reductions in nominal wages increasingly bites.¹⁵ The empirical evidence is so far inconclusive. On the fact of downward wage inflexibility, survey evidence suggests that reductions in nominal wages in the United States are quite common.¹⁶ However, Akerlof, Dickens and Perry (1996) argue that much of the reported evidence on wage reductions results from response errors to survey questions. Chapple (1996) finds a concentration of wage changes at zero in New Zealand during the low inflation period 1988-1993.¹⁷ Less formal evidence provides some support for the notion of downward wage inflexibility: any academic economist old enough to have been chairperson of the department knows that giving a small nominal increase is disproportionately easier than no change or a wage cut.

At the aggregate level, the data do not speak clearly enough to establish the shape of the Phillips curve at low inflation rates.¹⁸ It must be, though, that downward wage or price inflexibility is a matter of

¹³ The caution in the exercise of countercyclical policy implied by formulation (1) would be warranted if there are not only level but also rate of change effects of unemployment on inflation in the short run, which were not otherwise taken into account.

¹⁴ This is the title of the recent paper by Card and Hyslop (1996).

¹⁵ This argument was presented by James Tobin (1972) in his Presidential Address to the American Economic Association, and has recently been developed further by Akerlof, Dickens and Perry (1996). See also Dreze (1992).

¹⁶ See for instance, Lebow, Stockton and Wascher (1995), and references therein.

¹⁷ I am grateful to Michael Sarel for this reference.

¹⁸ The work by Bullard and Keating (1995) and Fair (1996) referred to in footnote 8 contains hints of non-linearities, particularly in the finding by Bullard and Keating of a long-run tradeoff for Germany and Japan. But the possible non-linearity is not their central focus.

convention, rather than a structural feature of the economy. Money illusion is after all an illusion, one that is likely to yield eventually to the weight of the facts. Most likely, wages that are now inflexible downward would eventually become more flexible if the economy lived through a period of sustained low inflation and/or high unemployment. The logic of the vertical Phillips curve would eventually come to dominate. In the meantime there would be a short-run tradeoff, albeit one that could last a long time.

The evidence on how long it could take the economy to adjust to very low rates of inflation, to reset wage and price setting to an expected rate of inflation close to zero, is mixed. Recent United States experience has seen inflation at its lowest level in thirty years with an unemployment rate at the estimated NAIRU and below, hardly evidence of downward price or wage stickiness at recent inflation rates. The aggregate price level declined during the Great Depression of the late nineteenth century, creating political discontent but not protracted unemployment or low growth. The experience of the Great Depression of the 1930s in the United States likewise suggests a costly transition period: prices and wages did display downward flexibility, but not sufficient to prevent massive unemployment.

Recent European experience raises some prima facie concerns that the relevant adjustment period may be quite long. Figure 1 shows average unemployment rates in the industrialized countries corresponding to years of below and above average inflation during the period 1975-94. With the exceptions of Greece, Portugal and the United States, unemployment has been higher when inflation was lower. One explanation for this association is that the natural rate of unemployment in most countries has been significantly higher in the low inflation 1990s than in the higher inflation 1970s and 1980s.¹⁹ It is also possible though that the estimated increases in the natural rate of unemployment are consistent with the second interpretation of equation (1), and that in most countries it will take a long time for asymmetries of price and wage adjustment to be worn down.

III. Inflation and Growth

The simple correlation between growth and (the logarithm of one plus) the inflation rate over the period 1965-94 is negative (Figure 2) and statistically significant.²⁰ However the relationship is not very strong and its significance is sensitive to the inflation range considered. For

¹⁹ The result could also be due in part to the timing of the responses of unemployment and inflation to changes in monetary policy.

²⁰ Figure 2 includes data for 138 countries, from the World Economic Outlook database of the IMF. Aside from the exclusion of the transition countries and Afghanistan, the sample is the largest possible from among the different databases that were available.

the entire sample period, the correlation between inflation and growth is negative but insignificant for the sample of countries for which inflation averages less than 40 percent; for the sample for which inflation averages less than 10 percent, the correlation is negative and significant.²¹ The relationship is also negative and significant for the entire sample for time periods 1975-94 and 1985-94 respectively, and negative but not significant for the lower inflation rate samples during those subperiods.

The inflation-growth relationship has also been studied in cross-sectional growth regressions that include other variables.²² Despite their widespread use, some problems remain in the interpretation of such regressions. First, they rarely have a clear structural interpretation; rather they are searches for suggestive correlations. Second, Levine and Renelt (1992) showed that very few of the results established in such regressions are robust, and this holds true also for the inflation-growth relationship.

The inflation-growth relationship is stronger in regressions that control for other variables, including in some (Sarel, 1996) the initial level of income,²³ and in others (Judson and Orphanides, 1996) the rate of investment. The negative inflation-growth relationship is also stronger in panel regressions, such as those in Fischer (1993) and Judson and Orphanides (1996), which take account -- appropriately I believe -- of both time-series variation within each country as well as cross-country variations.²⁴ This implies that the time series inflation-growth relationship for individual countries is predominantly negative.²⁵

21 In each case the cutoff point is based on the average of the log of $(1+(\text{inflation}/100))$.

22 Recent work on this issue is presented in Barro (1995), Bruno and Easterly (1996), Fischer (1993), Judson and Orphanides (1996), and Sarel (1996).

23 This is probably because the high inflation countries had lower initial incomes, and would on that account have tended to grow more rapidly.

24 Fry, Goodhart and Almeida (1996, Chapter 2) report similar results with data from their 45-country Bank of England group.

25 A negative relationship would obtain if supply shocks predominated (leaving aside questions on the timing of responses of prices and output to a supply shock); this is consistent with the fact that the negative inflation-growth relationship is statistically stronger after 1974 than before. However, that cannot be the whole story, because the relationship is also negative, though not significant, in the earlier period. The weaker relationship in the earlier period may also reflect the smaller range of variation of the inflation rate, and the fact that data limitations mean there are fewer observations for that period.

There is however controversy about the nature of the relationship at low rates of inflation. Similar theoretical arguments to those that imply the long-run Phillips curve may not be vertical at low inflation rates could also imply that the growth-inflation relationship is positive at very low inflation rates -- because asymmetric price adjustments hamper the reallocations of resources necessary to produce growth. Thus a priori considerations suggest that a negative relationship could apply at high inflation rates and a positive or neutral relationship at very low rates. Several attempts have been made to examine this possibility, and to estimate a switching point if one exists.

The most striking results are reported by Bruno and Easterly (1996), who show that 40 percent annual inflation is a threshold above which a country is likely to go into a high inflation, low growth crisis. They show also that per capita growth is on average lower than the world average during the crisis period (defined as starting in the year in which the inflation rate first exceeds 40 percent), and then higher than the world average after stabilization to below 40 percent inflation. Results at a lower threshold are either insignificant, or very sensitive to the inclusion of particular observations. These results unambiguously establish that high inflation is bad for growth, and that stabilization to below 40 percent inflation is good for growth. They do not establish the nature of the partial (ceteris paribus) growth-inflation relationship at lower inflation rates, although the authors seem to suggest that there is no significant relationship.

There are several regression-based attempts to locate potential non-linearities in the inflation-growth relationship. Sarel (1996) finds a breakpoint in the relationship at about 8 percent inflation.²⁶ His estimates imply that the growth-inflation relationship is zero (or slightly positive) at lower inflation rates, and negative at higher rates. By allowing for the possible non-linearity, Sarel also obtains an increase in the estimated negative effect of (the logarithm of one plus) inflation on growth for high inflation rates.²⁷ Judson and Orphanides, the main goal of whose paper is to distinguish between the effects on growth of uncertainty about inflation versus the (logarithm of the) rate of inflation

²⁶ Sarel searches for a breakpoint by maximizing the goodness of fit of his regression.

²⁷ The use of the logarithm of inflation is essentially equivalent to using the continuously compounded rate of inflation. This makes a large difference at high inflation rates. When the continuously compounded rate rises from 0.5% per day to 1% per day, the annual rate rises from 517% to 3680%. Cagan's definition of hyperinflation as 50% per month corresponds to a daily rate of 1.3%, and an annual rate of 11,740%.

include two breakpoints, at 10 percent and at 40 percent. They find an insignificant but positive relationship at rates below 10 percent, and significant negative relationships at higher rates.²⁸

These results leave little doubt that double digit inflation is bad for growth. However they leave the nature of the relationship at lower inflation rates uncertain. The simple correlations for inflation rates below 10 percent are all negative in the large sample used in Figure 2, but the coefficient on inflation in multiple regressions is sometimes positive at low inflation rates; the simple correlation is significant but the partial relationship insignificant. In Figure 3, for the period 1975-94, growth rates during very low inflation periods (less than 3 percent) are compared with growth rates during the entire period, for those industrialized countries that experienced a period of at least three years of inflation below 3 percent. Growth rates are higher during the low inflation periods for nine countries, and lower in five. Figure 3 points, but weakly, to a negative growth-inflation relationship at very low inflation rates, but these results could also be a result of the cyclical timing of inflation and recovery.

Some work has been done for the industrialized countries seeking to identify potential effects of inflation on productivity growth.²⁹ Higher inflation is associated with lower productivity growth, though cyclical timing relationships or the presence of supply shocks may also play a role.

The overall conclusion must be that it is not possible at this stage to draw any firm conclusion on the relationship between inflation and growth at the very low inflation rates current in the G-7, though there is little evidence for a significant positive association between inflation and growth even at very low inflation rates. The data leave open the possibility that there is a negative relationship between growth and inflation at rates of inflation as low as one to three percent. Or, there may be no significant relationship when inflation is as low as one to three percent. Even less is known about the relationship between inflation and growth at negative inflation rates.

²⁸ Negative but insignificant coefficients were found for all three inflation ranges in Fischer (1993).

²⁹ Fischer (1993) shows that inflation reduces growth through two channels, lower investment, and lower productivity growth. Rudebusch and Wilcox (1994) examined the inflation-productivity growth relationship for the United States and several other industrialized countries.

IV. Why Do Governments Inflate?

The classic analysis of the costs and benefits of inflation focuses on seigniorage, the revenue obtained by the government from the creation of money.³⁰ The revenue motive should be understood as applying not only to the direct creation of high-powered money, but also more broadly to the entire process of credit creation. Governments often seek to circumvent budget constraints by using both public and private financial institutions for quasi-fiscal purposes. In addition, some of the financial benefits of high inflation accrue to the private banking and financial system, which typically flourishes in an inflationary environment -- and has painfully to contract when stabilization eventually comes.

The rate of inflation that can be justified by seigniorage depends on the efficiency of other methods of raising revenue. A government with a pressing need for revenue, for instance a newly established government in a transition economy, or a wartime government, may well be justified in producing double digit inflation. Seigniorage is relatively unimportant in most industrialized countries, about 0.5 percent or less of GDP, and would not justify an appreciable rate of inflation.

Although the traditional analysis emphasizes the domestic demand for high-powered money, globalization means that central banks now have to take foreign competition into account in calculating the revenue likely to accrue from seigniorage. In recent years the Federal Reserve System has earned over \$10 billion a year by exporting dollar bills, an amount that would be lower if the Fed had been less successful at controlling inflation (Judson and Porter, 1996).

In addition to the revenue motive, governments inflate because the short-and long-run tradeoffs between inflation and output differ in ways that make inflation costly to stop and almost always tempting to start. An essential element in this tension is captured by the dynamic inconsistency model of inflation developed by Barro and Gordon (1983). These models provide the basis for modern theories of credibility and central bank independence that allow economists to analyze modern central banking in terms used by central bankers themselves.³¹

The essential insight in these models is that, given a low inflation rate and the short-run tradeoff between inflation and output, a government that would prefer output to be above the natural rate is tempted to exploit the tradeoff by running an expansionary monetary policy. Policy is thus subject to an inflationary bias. In equilibrium, private agents will understand the temptation that faces the government, and will adjust their expectations of inflation upward: inflation rises to a level at which its

³⁰ Fischer (1994) contains a more comprehensive discussion of the reasons for inflation.

³¹ See Persson and Tabellini (1994) for a collection of articles that develop this approach.

marginal cost, given that it is expected, is high enough to prevent the government from attempting to increase output by seeking an even higher rate of inflation. As a result, the country ends up with no gain in output but with an inflation rate that is higher than socially optimal -- unless it can find some institutional device, such as an independent central bank, that enables it to avoid self-defeating temptation.

V. The Optimal Rate of Inflation

The discussion so far points to the desirability of targeting single digit inflation, but leaves open the question of where in that range to aim. In this section I discuss the optimal long-run rate of inflation for an industrialized country that has already attained single digit inflation.³²

The analytic arguments reviewed in the first section suggest that inflation is costly, and that the optimal rate of inflation is very low, or perhaps even negative.³³ The Phillips curve evidence of Section II shows no signs of a long-run tradeoff except at very low inflation rates and is thus fully consistent with targeting very low inflation -- although the slowness with which wage and price stickiness adjusts to lower inflation could make it optimal to approach the target slowly. The growth-inflation evidence of Section III show essentially no relationship between growth and inflation in the higher single-digit range, and thus is also consistent with targeting low inflation.

The question then is how low to aim, and particularly why not to aim for the best, zero inflation -- or even better, price stability, or perhaps better yet, deflation? Several factors argue for a target measured inflation rate above zero. The first is the revenue motive. However this is unlikely to justify significant rates of inflation. For instance, in the United States, where the monetary base is 6 percent of GDP, an extra one percent of inflation would generate less than 0.05 percent of GDP in

³² Several readers have raised the question of the optimal strategy that should be followed in reducing inflation to the single digit range by a government that has stabilized from high inflation but is currently stuck in a moderate double digit inflation (Dornbusch and Fischer, 1993). This is not the place for discussing that issue, beyond noting my conviction that in light of the allocative and growth costs of inflation, it is a mistake under these circumstances to try to live with inflation, and that it is necessary to direct policies purposefully at lowering inflation.

³³ In a theoretical article, Friedman (1969) showed that it is optimal under certain circumstances to drive the nominal interest rate to zero, to satiate individuals with cash balances. In the Friedman approach, this means that the inflation rate should be equal to minus the real return on capital. The optimality of the Friedman rule shows surprising theoretical resiliency even though it holds little attraction as a practical policy prescription. See Chari, Christiano and Kehoe (1996).

revenue. (Admittedly, this sounds more impressive in absolute terms, more than \$3 billion.) The second is the possibility discussed above, that the long-run Phillips curve is not vertical at low inflation rates. While the evidence is not decisive, the experiment of pushing to very low rates hardly seems worth trying,³⁴ particularly since in an economy averaging zero inflation, the inflation rate would have to be negative for a significant amount of the time.

The third and most important factor is the difficulty for monetary policy posed by the lower bound of zero on the nominal interest rate that arises because cash carries a zero nominal interest rate (Summers, 1991). If the expected inflation rate is zero, then it is very difficult for monetary policy to engineer a negative short-run real interest rate.³⁵ Such a rate may be needed during recessions -- and the need would likely be compounded by the inflation rate's being below zero at such a time, thus increasing the lower bound on the real interest rate. The argument here is that inflation greases the wheels of monetary policy. The serious constraints placed on monetary policy in a zero inflation or deflationary environment have recently been evident in Japan. They constitute an important reason to target a low positive rate of inflation rather than zero.

The fourth reason to target a low positive rate of inflation is that the true rate of inflation is below the measured rate. Estimates of the bias in the United States range from below 1 percent per annum to close to 2 percent; estimates for Canada and the United Kingdom are around 0.5 percent per year.³⁶ Germany has recently corrected its measure of inflation to reduce the bias. The impact of this bias on the optimal target rate of inflation is not self-evident if money illusion matters for real resource allocation. It is clear though that if the bias is understood in the capital markets, then the need to keep open the possibility of negative real interest rates would argue for a higher target measured rate of inflation.

These arguments point to a target inflation rate in the one to three percent range; more specifically, they suggest that inflation should be targeted at about two percent, to stay within a range of one to three percent per annum. This is in practice what most central banks mean by price stability; it is also a target that most G-7 central banks have already attained.

³⁴ This evaluation could change if prices began to show more downward flexibility after a prolonged period of very low inflation.

³⁵ For simplicity we do not take into account the possibility that the inconvenience of carrying large sums of cash could allow the nominal interest rate on large denomination instruments to be slightly negative.

³⁶ Cunningham (1996) develops estimates of the size of the bias in the United Kingdom, and compares his results with those for Canada and the United States.

It is necessary to specify a range because the inflation rate is not totally controllable.³⁷ The width of the target band would vary across economies depending on their structure, especially the variance of the exogenous shocks that hit the economy. The lower bound would be taken as seriously as the upper bound.

Two other issues need to be considered in this section: price level versus inflation targeting; and the potential use of indexation to mitigate the costs of inflation. The literal meaning of price stability is the stability of the average price level, not low inflation. There is a clear rhetorical benefit to the goal of absolute price stability, the view that central banks should aim to maintain the average level of prices constant over long periods, as in nineteenth century Britain, where the price level in 1914 was at the level it had been ninety years earlier. The rhetoric typically continues by pointing to the desirability of fostering long-term nominal contracts, for instance the issue of one-hundred year nominal bonds. There have recently been some issues of such bonds, but it is not clear what special benefits result. Most of their value in any case derives from the earlier parts of their existence. To the extent that the intention is to ensure that individuals have a safe asset in which to save over the long term, the same effect can be obtained by issuing indexed bonds, as several governments are now doing or planning to do.

More generally, it could be desirable to target a price level path rather than the inflation rate. Figure 4 shows the difference. With a price level target, the central bank is always aiming to return to the original path, so that above average inflation would on average be followed by below average inflation. With inflation targeting, past failures to hit the inflation target are treated as bygones, and the price level is likely to deviate increasingly from the path it was initially expected to take. (This is known in another context as base drift.) Price level targeting provides greater certainty about the level of prices in the distant future, and thus encourages long-term nominal targeting. However, it puts greater strains on monetary policy, requiring variations in the inflation rate to reverse the effects of previous shocks. Theoretically the choice must depend on the optimal sharing of the burden of shocks among those differentially affected by inflation.

A particular difficulty arises with price level targeting if the goal is for price level constancy or a very gently rising price path. In these cases, the expected rate of inflation would often have to be negative. This would exacerbate the difficulties of monetary policy, if a low or negative real interest rate were needed to deal with recessions.

³⁷ This issue has been explored for Australia by Debelle and Stevens (1995).

Pending a fuller analytic answer, it is advisable not to be too ambitious, and therefore to target a low inflation rate rather than a path for the price level.³⁸

We turn finally in this section to indexation. Many of the most clearly identified economic costs of inflation would disappear if the tax system were properly indexed. Why not then comprehensively index the economy, and live with moderate inflation? The answers are clear. In the first instance, comprehensive indexation is difficult and extremely cumbersome:³⁹ understanding of the convenience of nominal calculations is reinforced by the observation that in high and hyper-inflations, countries tend to use a foreign currency as numeraire and increasingly as medium of exchange, rather than to index. Second, inflations do not happen out of a clear blue sky. Whatever the reasons for the inflation, the introduction of indexation would be likely to raise the equilibrium inflation rate. The new higher inflation indexed equilibrium could be worse than the unindexed equilibrium (Fischer and Summers, 1989). If indexation were introduced gradually, the result could be a process of rising inflation.⁴⁰ These conclusive objections to comprehensive indexation do not, however, necessarily mean that all indexation is bad; in particular, there remains a good case for the government to issue indexed bonds.

VI. Public Opinion and Inflation

Alan Greenspan has defined price stability as a situation in which economic agents do not take account of inflation in making their decisions. Periodic alarms in the capital markets when the economy expands too fast reveal that we are not yet there. But sustained low inflation has had a remarkable impact on people's concerns about inflation.

The Gallup Organization has since the end of World War II conducted polls that ask Americans what is the most important problem facing the nation. (There was also one poll with this question in 1939.) Figure 5 shows the percentage of respondents answering inflation and unemployment respectively, with actual values of the inflation and unemployment rates

³⁸ Svensson (1996) claims that price level targeting may also produce a more stable inflation rate. In his comments at the conference Lars Svensson indicated that the result holds under for certain specifications of the Phillips curve. See also Kiley (1996).

³⁹ As argued by Martin Feldstein at the conference, indexing capital income taxation to ensure neutrality to inflation becomes even more complicated as the sophistication of financial instruments increases.

⁴⁰ My views on the role of indexation are heavily influenced by the experiences of Brazil and Israel, countries which were held out in the 1970s as examples of the benefits of indexation and living with inflation. Inflation in each rose over time, until a growth and/or balance of payments crisis occurred, and a successful stabilization was eventually carried out.

plotted on the chart. The answers are of course affected by the other national problems on respondents' minds.

For over a decade, from 1972 to 1982,⁴¹ between 30 and 80 percent of the respondents regarded inflation as the most serious problem facing the country, this despite the ongoing Vietnam War at the beginning of that period, and the Cold War during the entire period. During that period the extent to which people regarded inflation as the most serious problem was highly correlated with the actual inflation rate. However the concern about inflation disappeared rapidly once the inflation rate dropped below 5 percent; inflation has not been a serious issue in the polls since 1986. The lower panel shows that concern about unemployment tracks the actual unemployment rate closely, but that unemployment has never passed the 50 percent mark in the poll.⁴²

Figure 6 shows some results from an international poll, taken in March/April 1995, that asked a similar question. Unfortunately, people were asked to name two to three problems rather than one; in addition the inflation question refers to "inflation and high prices" as the problem. Inflation was not a matter of great concern in any of the industrialized countries, though it is clear that concern about inflation is high, relative to the actual inflation rate, in Japan, Germany, Belgium and Canada. The concern about inflation and high prices was for obvious reasons much higher in some of the non-industrialized countries (lower panel), including Russia and Ukraine. China and Singapore both stand out for very high concerns over inflation, despite their relatively low inflation rates.

Figure 7 shows that unemployment and recession generally worried respondents in industrialized countries to a much greater extent than inflation, with the anxieties of the Swiss and Japanese standing out relative to their actual experience of unemployment. Unemployment data for non-industrialized countries are sparse, but it is interesting that there was less relative concern about unemployment than inflation in the five transition economies for which data are shown in the lower panel -- no doubt reflecting the very high inflation of the time, and the still relatively low levels of unemployment despite the deep recessions in several of those countries.

⁴¹ Fischer and Huizinga (1982) examined the determinants of responses to the opinion polls, on both a time series and cross-sectional basis. Shiller (1996) has undertaken polls in the United States, Germany and Brazil seeking to clarify how people think about inflation.

⁴² Former President Ford is supposed to have said that inflation is a more important problem than unemployment because it affects everyone.

VII. Should Long-Run Price Stability Be the Only Goal of Monetary Policy?

There are many good reasons for a country to prefer a low inflation rate, and no great damage is done to the language by describing low inflation as price stability. Central banks should therefore be targeting price stability as a major goal of monetary policy.

There is a great deal of confusion though about whether price stability should be the main or the only goal of monetary policy. Central bankers have a tendency to say that price stability should be the only goal of monetary policy, and to shrink from the point that monetary policy also affects output in the short run. That is not hard to understand, for explicit recognition of the powers of countercyclical monetary policy encourages political pressures to use that policy, with the attendant risk that inflation will rise.⁴³ But it is also problematic and destructive of credibility to deny the obvious, as well as to undertake countercyclical policies while denying doing so.

The statement that long-run price stability is the sole goal of monetary policy is probably best understood as an attempt to deal with some of the logical and political difficulties raised by the existence of the short-run tradeoff. Policymakers do two things by emphasizing the long-run: they allow themselves a little leeway for short-term countercyclical policy; and they remind proponents of short-term expansionary policies that the short- and long-run consequences of monetary expansion differ.

The current situation, in which central bankers emphasize their long-term responsibilities and downplay or deny the possibilities for countercyclical policies while undertaking them, is untidy but preferable to a situation in which actions would match words as they fail to pursue countercyclical policies. But there should be a way to do better.

Inflation targeting is that way.⁴⁴ Once there is an explicit numerical inflation target for monetary policy, and a transparent framework for making policy and holding policymakers accountable for their actions, it is not possible to overlook the potential inflationary consequences of monetary expansion undertaken for short-term countercyclical purposes. Nor, if the inflation target is taken seriously, is it possible to miss the beginnings of a process in which inflation creeps up from cycle to cycle, as it did in many of the industrialized countries from the 1950s through the 1980s.

Targeting inflation does not have to mean targeting only inflation. Countercyclical monetary policy should be allowed to work. For the most

⁴³ This could be interpreted as a shift from a low inflation equilibrium to the bad Barro-Gordon equilibrium.

⁴⁴ Green (1996) discusses some of the difficulties and advantages of the inflation targeting framework, which requires the exercise of judgment by the central bank.

part -- in dealing with demand shocks -- the monetary policies implied by inflation targeting are consistent with countercyclical policies. It is necessary in the case of supply shocks to find a mechanism that will permit a temporary deviation of inflation from target. Such mechanisms can be and have been designed in countries that have adopted inflation targets, for instance by targeting an underlying inflation rate, or by making allowances for changes in the terms of trade.

As to whether price stability should be the primary target of monetary policy, language very close to that used in the statutes of the new European Central Bank captures the right nuances: long-run price stability should be the primary goal of the central bank, with the promotion of full employment and growth being permitted to the extent that they do not conflict with the primary goal.

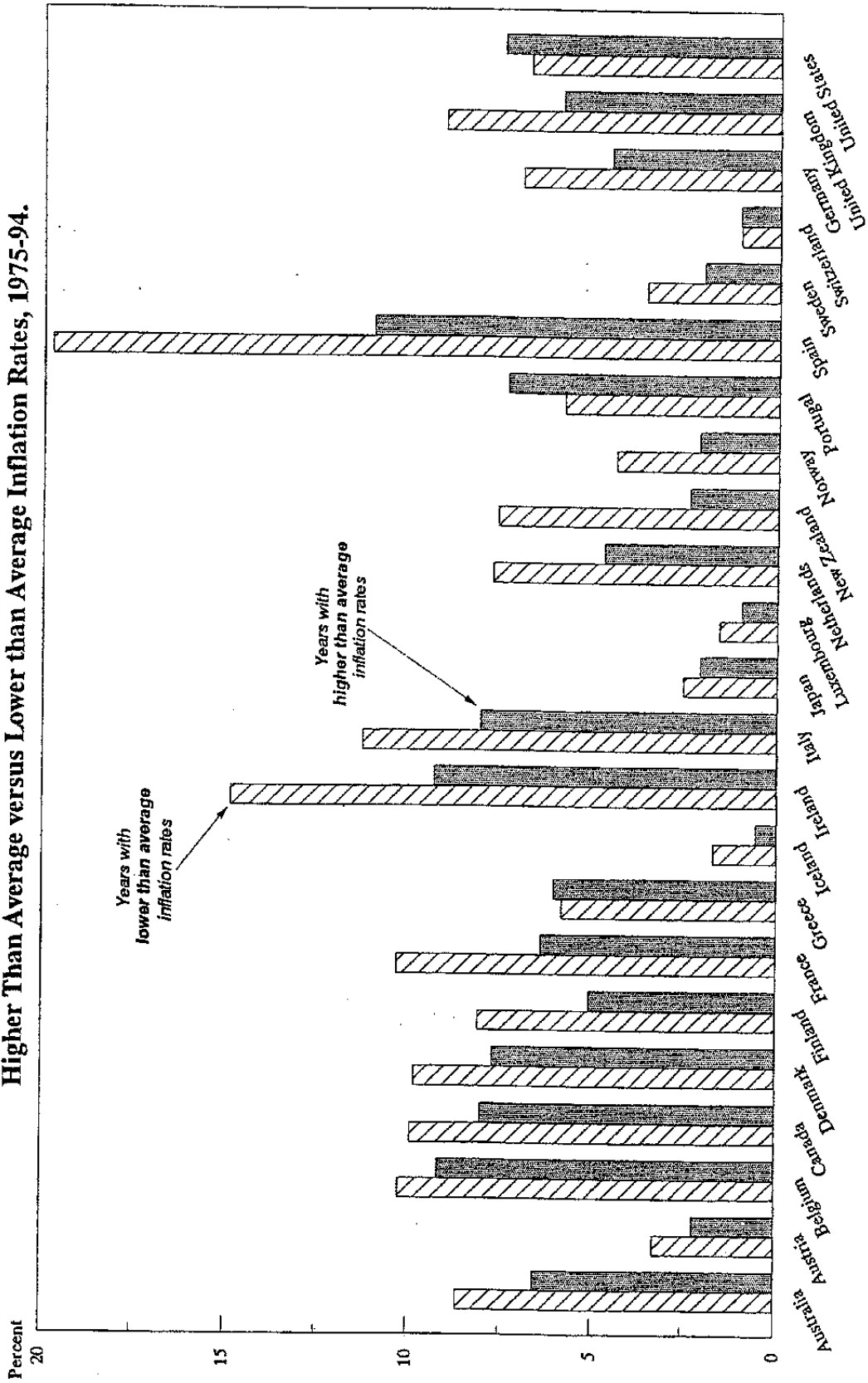
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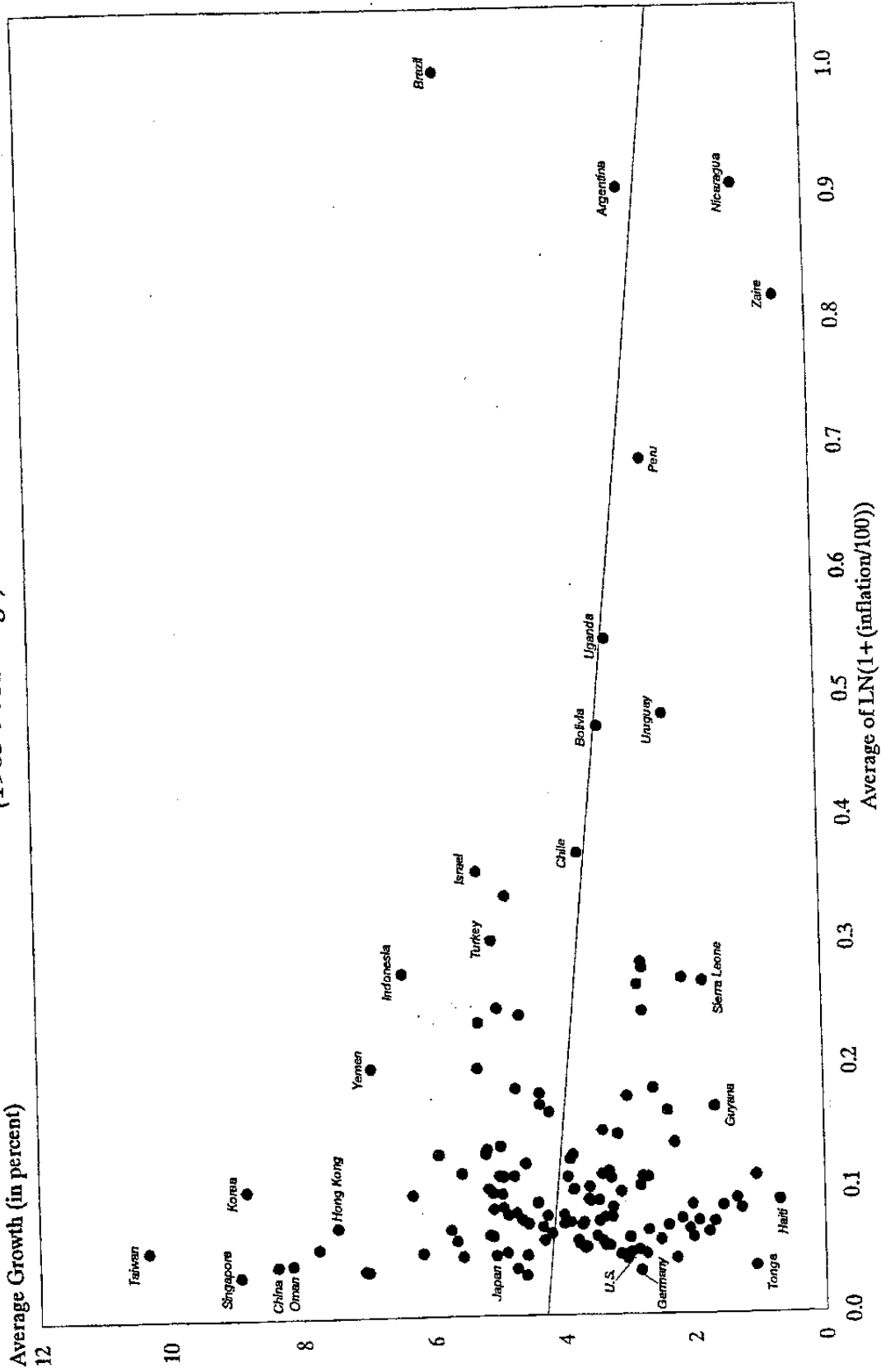
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**Figure 1. Industrial Countries:
Comparison of Average Unemployment Rates During Years with
Higher Than Average versus Lower than Average Inflation Rates, 1975-94.**



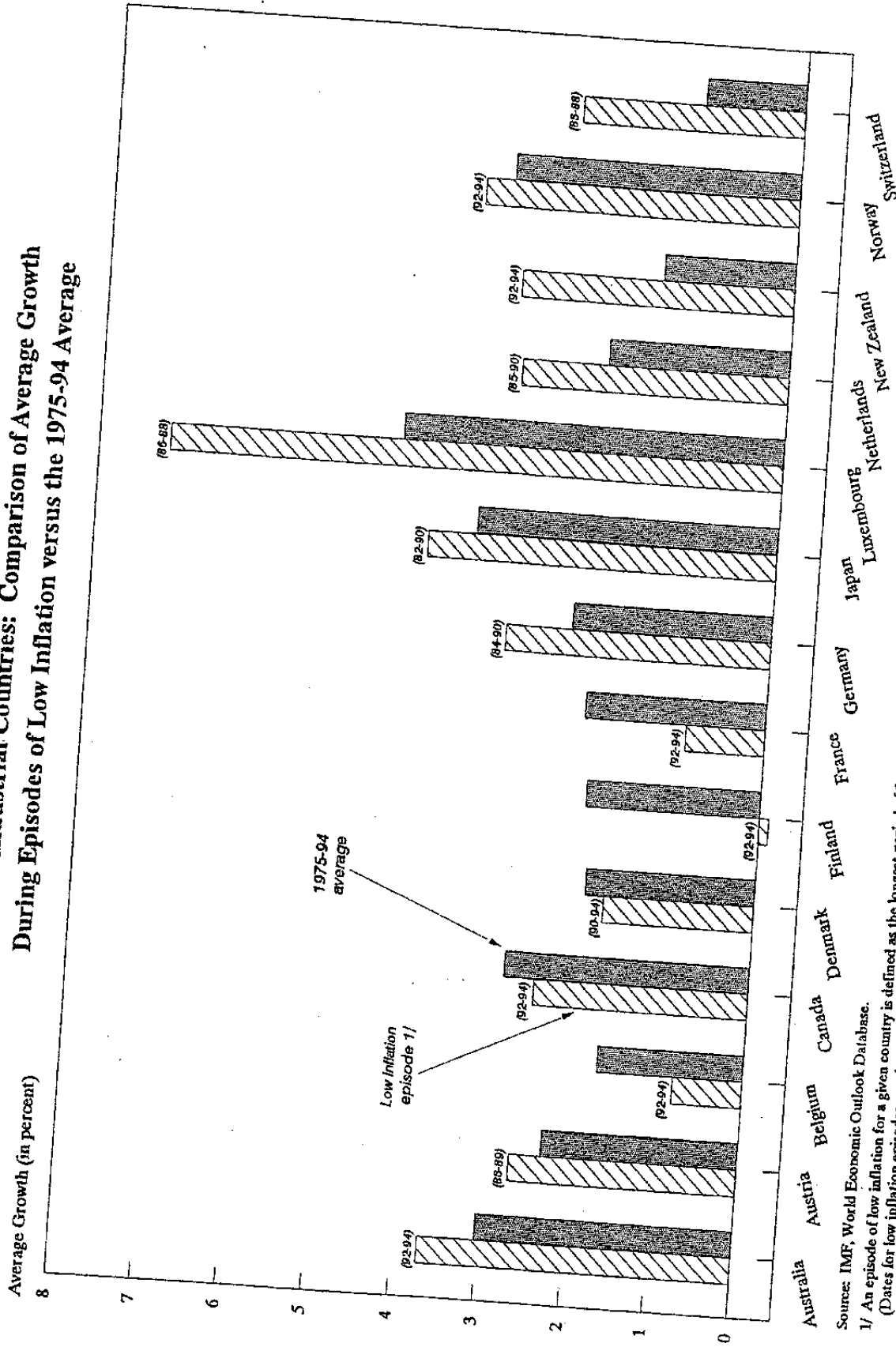
Sources: IMF, International Financial Statistics and OECD, Analytical Database.

Figure 2. Growth and Inflation 1/
(1965-94 Average)



Source: IMF, World Economic Outlook Database.
1/ Slope of regression line is -1.905 with a T-statistic of -2.098.

Figure 3: Industrial Countries: Comparison of Average Growth During Episodes of Low Inflation versus the 1975-94 Average



Source: IMF, World Economic Outlook Database.

1/ An episode of low inflation for a given country is defined as the longest period of 3 or more consecutive years of low inflation (less than 3 percent) from 1975 to 1994. (Dates for low inflation episodes are shown in parenthesis).

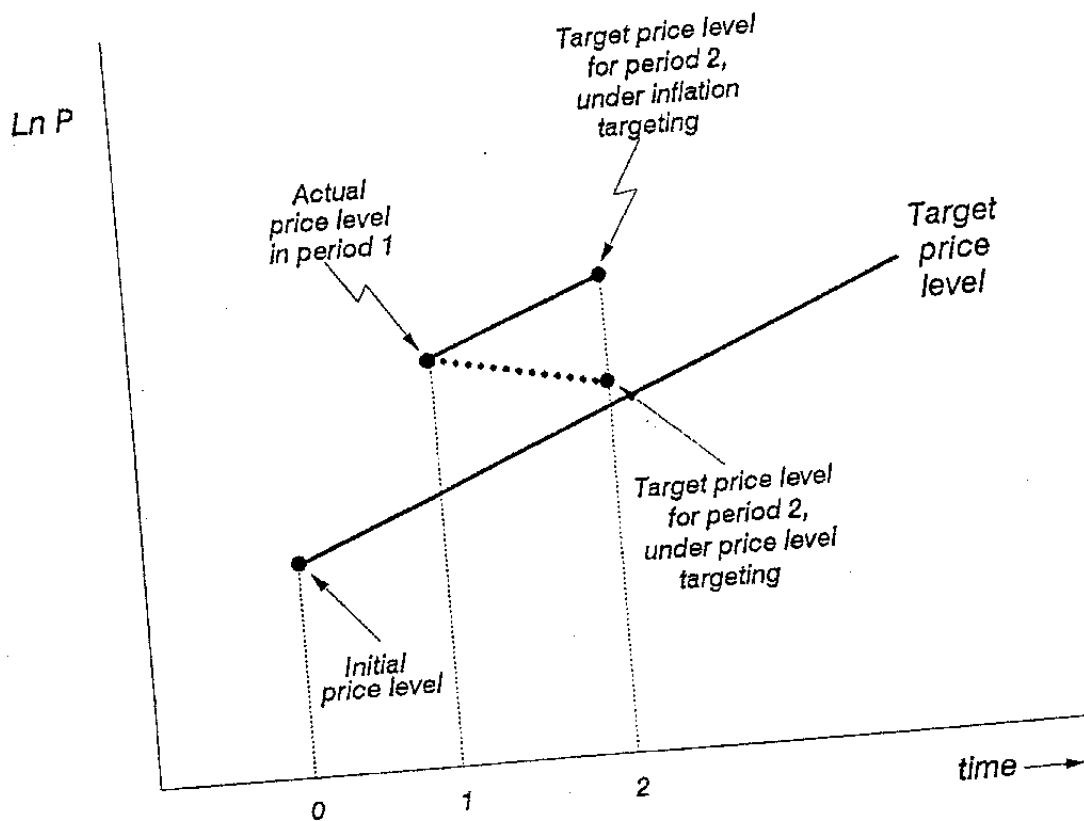
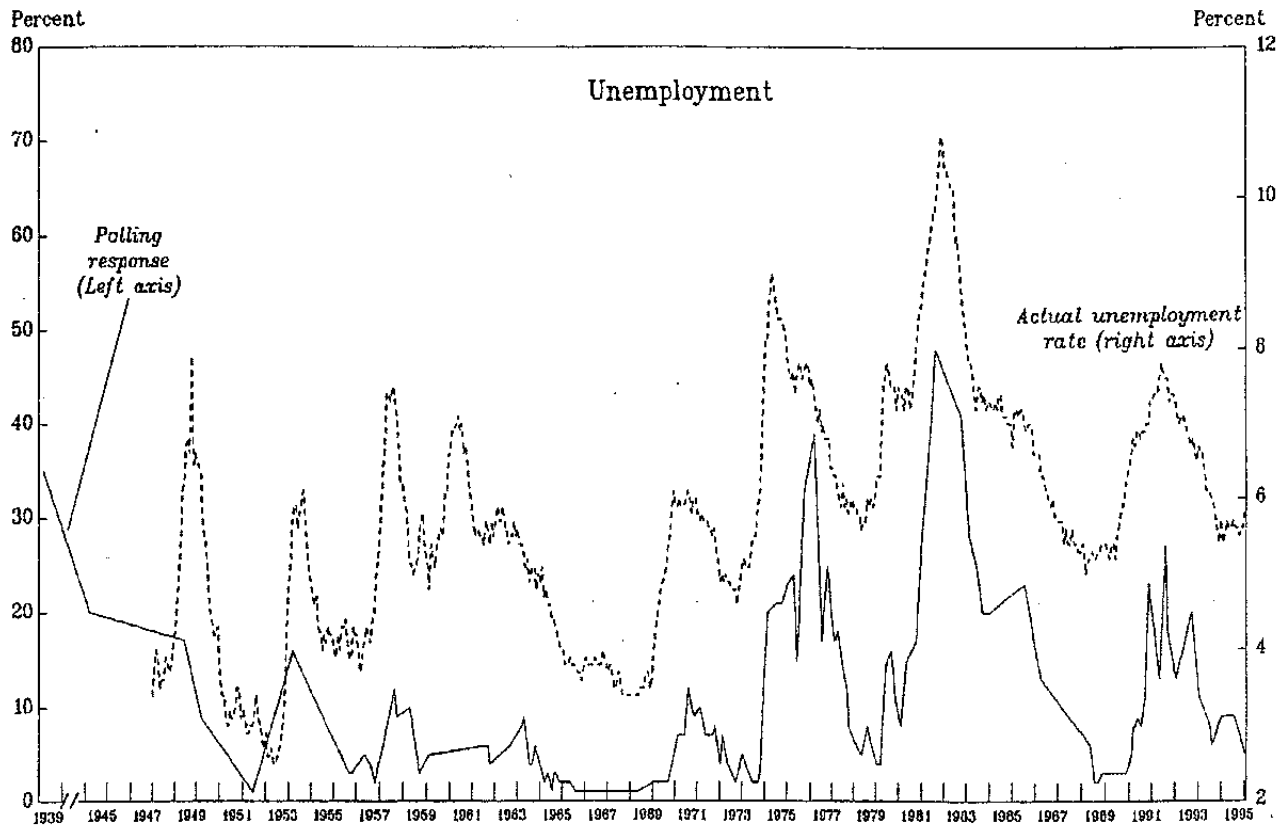
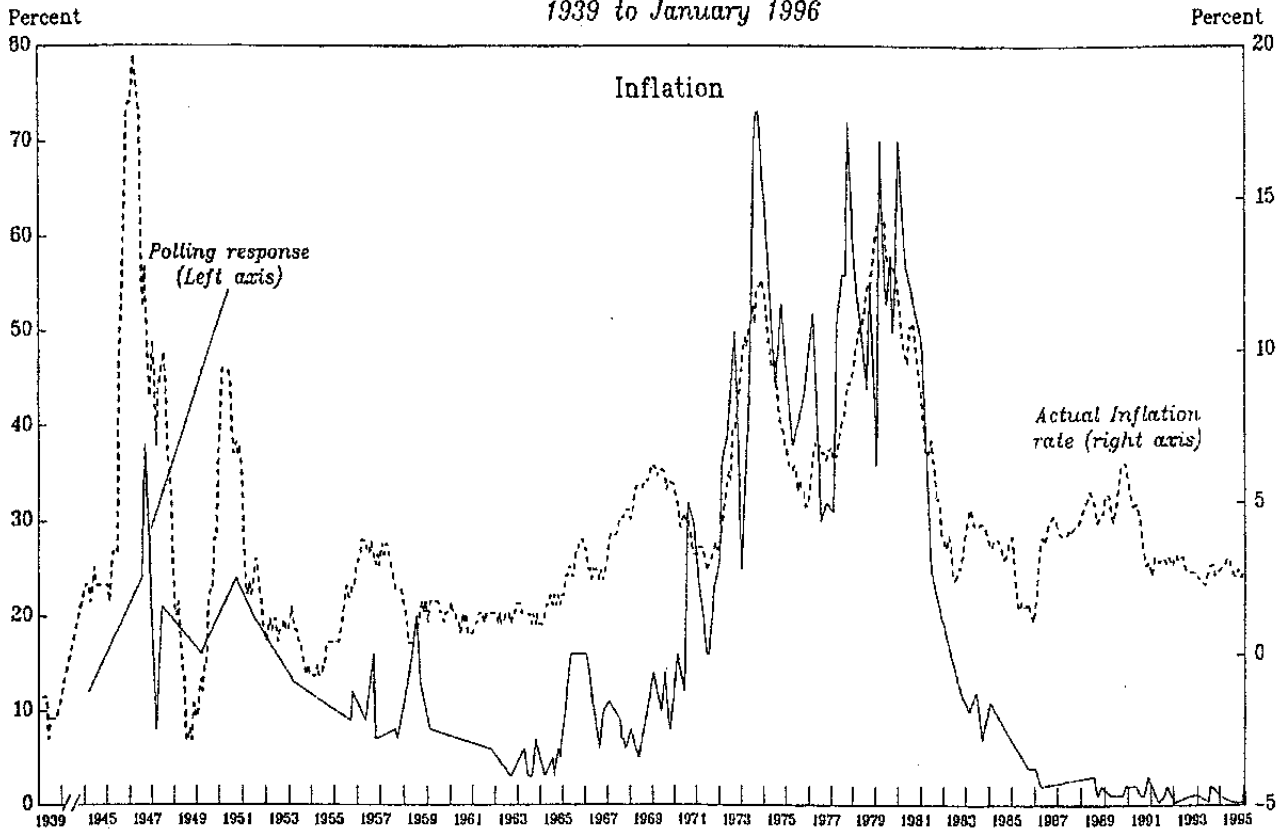


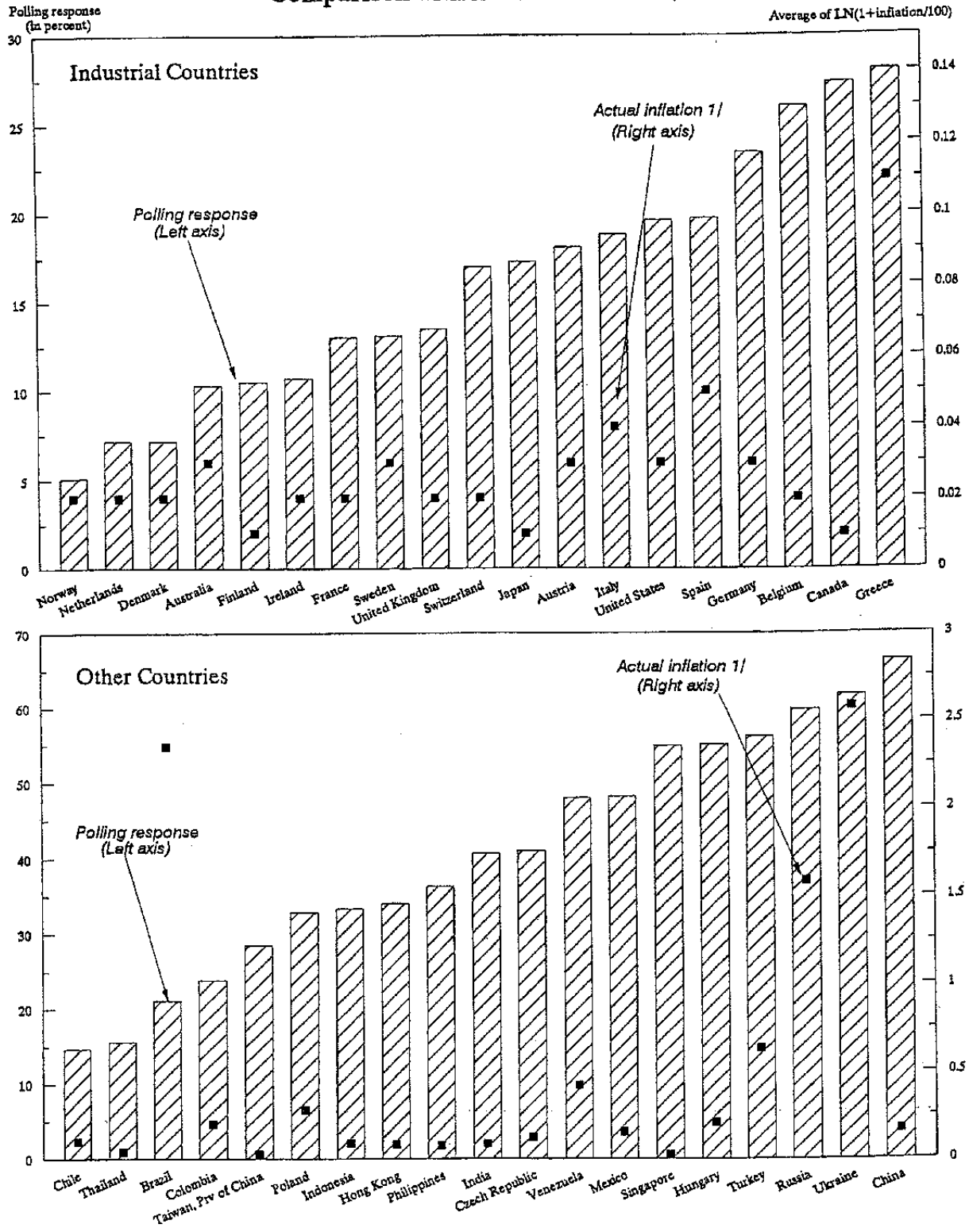
Figure 4. Inflation versus Price Level Targeting

Figure 5. United States:
Inflation, Unemployment as Nation's Most Important Problem
Comparison with Actual
1939 to January 1996



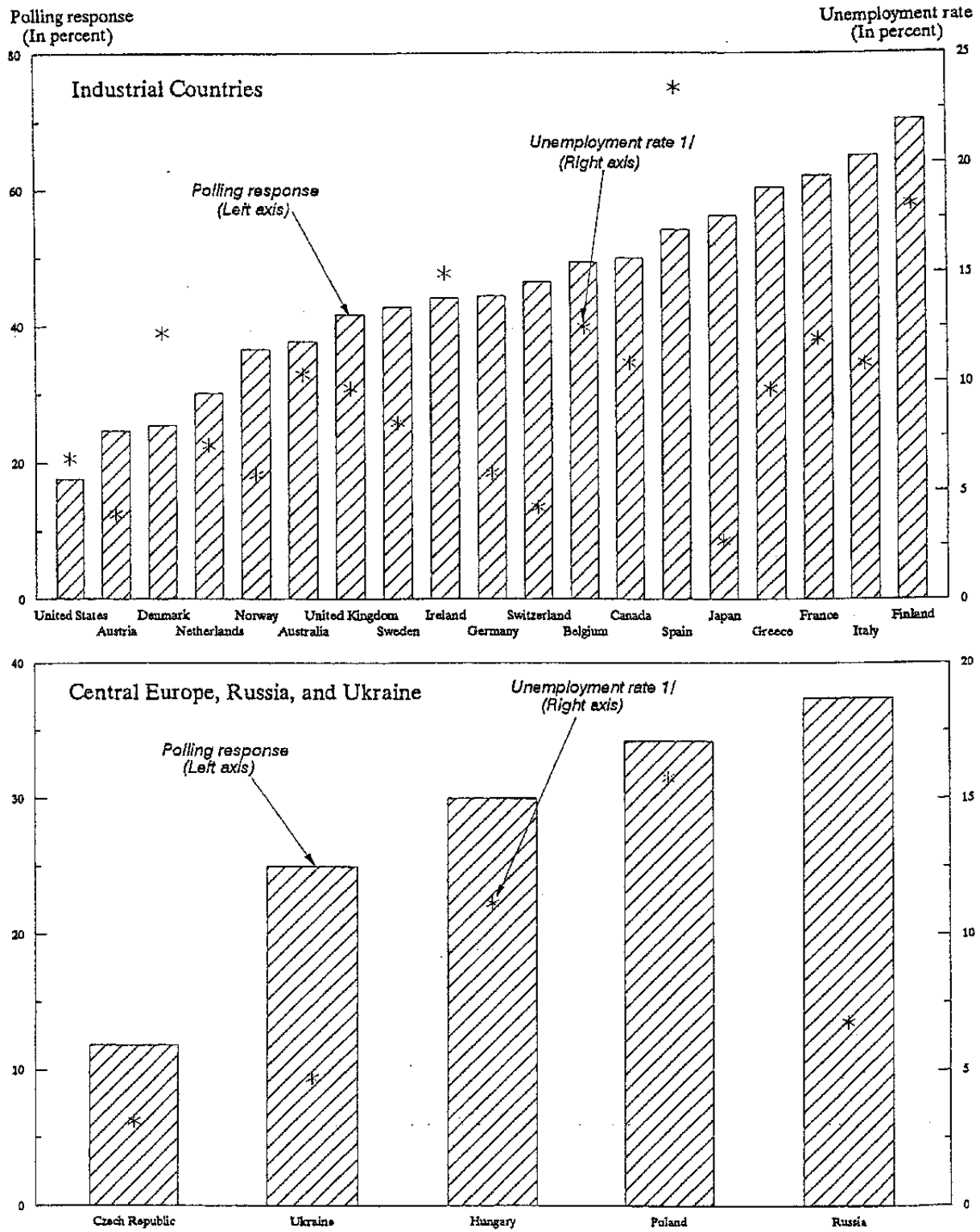
Sources: Gallup Organization; University of Connecticut, Roper Center POLL database, and The WEFA Group INTLINE Database.

**Figure 6. Inflation/High Prices as One of People's Top Concerns
Comparison with Actual Inflation 1/**



Sources: Roper Starch World Wide Inc., INRA 50th Anniversary Global Survey, March/April, 1995; and IMF, International Financial Statistics.
1/ 1993-95 average of LN(1+inflation/100).

**Figure 7. Unemployment/Recession as One of People's Top Concerns
Comparison with Actual Unemployment Rate 1/**



Sources: Roper World Wide, Inc. INRA 50th Anniversary Global Survey, March/April, 1995; OECD Analytical Database; and IMF staff estimates.
1/ 1993-94 average for industrial countries; 1993-95 average for Central Europe, Russia, and Ukraine.

