The Economics of Inflation Targeting: Negatively Sloped, Vertical, and Backward-Bending Phillips Curves

Abstract

This paper examines the economics of inflation targeting. It distinguishes between the technocratic case and the public policy case. The technocratic case rests on the technical merits of guiding monetary policy with inflation targets. The public policy case raises concerns that public choice incentives may bias downward the choice of numerical target. Inflation targeting is a desirable operating procedure regardless of whether the Phillips curve is negatively sloped, vertical, or backward bending. However, the shape of the Phillips curve influences the selection of the explicit target. Because of the danger of downward bias, public policy discourse should not be framed in terms of an explicit numerical inflation target.

Key words: Inflation targeting, backward bending Phillips curve, minimum unemployment rate of inflation.

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I Introduction

Recently, inflation targeting has been widely talked about as an economic policy. One reason for this headline attention is that Ben Bernanke, the new Chairman of the Federal Reserve, is an open supporter of inflation targeting. This has contributed to speculation that he may try and shift the Fed to explicitly adopt such targeting.[1]

The current paper examines the economic case for inflation targeting in different economic models. At the policy level, there are several different questions. First, is inflation targeting analytically sound economics? Second, what is the appropriate level of the target? Third, even if inflation targeting is analytically sound economics, is it an appropriate public policy frame for monetary policy?

II Framing the inflation targeting decision

The debate over inflation targeting raises a host of different issues that are shown in Figure 1. The first issue is to distinguish between the technocratic case for inflation targeting and the public policy case. The technocratic case focuses on inflation targeting as an operational procedure for guiding monetary policy, and it emphasizes the technical advantages of guiding policy in this fashion. The public policy case focuses on whether framing the policy problem in terms of inflation results in good policy outcomes.

An interesting feature is that inflation targeting can have technocratic merit, yet may be an undesirable public policy regime. In this case, the monetary authority may still use inflation targeting, but only as part of its internal technical operating procedure. For purposes of public discourse, it may be inappropriate to frame policy in terms of an

[1] As an academic, Bernanke expressed early support for inflation targeting (Bernanke et al., 1997; Bernanke et al., 1999). During his tenure as a Governor of the Federal Reserve, he continued to express support for such targeting. However, his definition has become more and more open, allowing greater policy flexibility and space to depart from an explicit numerical target at any moment (Bernanke, 2003).

explicit numerical inflation target because that can establish a dynamic bias toward too low an inflation target. Instead, policy should be framed in terms of a mandate that explicitly surfaces both inflation and unemployment concerns, thereby guarding against this bias. This issue of dynamic policy bias is discussed in detail in section IV.

Continuing with figure 1, the technocratic case for inflation targeting in turn rests on empirical justifications and theoretical justifications. Empirically based justifications emphasize empirical evidence supporting the claim that countries that adopt inflation targets have better economic performance records (see Mishkin and Posen, 1997). Theoretically based justifications rest on theoretical arguments in favor of inflation targeting. The current paper is exclusively concerned with the theoretical justification for inflation targeting.

Once the case for inflation targeting has been made, there follow questions about the appropriate choice of price index and numerical inflation target, whether policy should be conducted through rules or by discretion, and whether inflation targeting is sufficient for the conduct of monetary policy. In a U.S. context, the index choice concerns whether the Fed should target the consumer price index or the personal consumption expenditure deflator, or whether both of these price indexes are flawed because they fail to incorporate asset prices.[2] With regard to the choice of target, there is the question of what the numerical target should be. The current mainstream consensus is two percent inflation, but there are reasons to believe that a three percent target would

[2] The impact of asset prices on price indexes has been examined by Boyan et al.(2202), and the impact of asset prices on monetary policy has been examined by Goodhart and Hoffman (2001). Bernanke has argued for excluding asset prices from the measure of inflation (Bernanke and Gertler, 2000) on the grounds that the economic effects of asset prices are captured in the standard measure of inflation since these effects flow through the funnel of aggregate demand, in turn impacting economic activity and prices. The question of the adequacy of inflation targeting in the presence of asset price inflation is tackled in Palley (2003a).

yield superior employment outcomes (Akerlof et al., 2000). Additionally, there is a question of whether the inflation target should be "hard" or "soft". A "hard" target is one that is aimed for at every moment, whereas a "soft" target can be foregone in the short run if other policy objectives dominate.

A further issue of contention concerns whether inflation targeting should be conducted through rules or discretion. A rules-based approach would have monetary policy being set by an explicit policy rule. A discretion-based approach relies on the judgment of policymakers, and that judgment may include taking into consideration the policy suggested by putative policy rules.

These different possible policy stances toward inflation targeting can be illustrated concretely. The original Taylor (1993) rule can be identified with a rules/numerical/hard target approach to inflation targeting. Ben Bernanke (2003) can be identified with a discretion/ numerical/soft target approach. Alan Greenspan, the former Federal Reserve Chairman, can be identified with a discretion/non-numerical/soft target approach, expressed as a commitment to stable low inflation. The European Central Bank's (ECB) position was initially somewhat contradictory, emphasizing rules with a numerical soft target, but discretion now appears to have trumped rules.

Finally, there is the question of whether inflation targeting is sufficient for the conduct of monetary policy aimed at stabilizing the macro economy. The current consensus is that it is. Interest rate policy should be used to control the rate of growth of aggregate nominal demand with an eye to hitting the inflation target. According to this view there is one target, aggregate nominal demand growth, which calls for only one instrument. This view is espoused by Chairman Bernanke (2002), and it dismisses the

need to target asset prices on the grounds that their economic impact operates through the funnel of aggregate demand. An alternative view (Palley, 2003a) is that asset prices also need to be targeted, which calls for additional policy instruments.

The current paper focuses on the theoretical justification for inflation targeting. The shape of the Phillips curve affects this justification, and the paper begins with a review of the case for inflation targeting with a negatively sloped neo-Keynesian Phillips curve. Thereafter, the paper examines the case of a vertical new classical Phillips curves, and that is followed by an examination of the case of a backward bending Phillips curve (Akerlof et al. 2000; Palley, 1998, 2003b). In a backward bending Phillips curve framework there is a minimum unemployment rate of inflation (MURI), and the paper argues for targeting that rate of inflation rather than targeting the minimum unemployment rate (MUR).

III The technocratic case for inflation targeting

One approach to justifying inflation targeting is empirical in nature, the argument being that countries that have adopted inflation targeting procedures have experienced superior macroeconomic performance (Mishkin and Posen, 1997; Bernanke et al., 1999). However, a problem with empirical justification is that the empirical record is constantly changing, and it also persistently begs the question whether it was inflation targeting or some other factor that was responsible for the good performance. For instance, paralleling an argument made by Posen (1993) about central bank independence, countries with good economic performances may adopt inflation targeting. These difficulties suggest a need for a theoretical justification.

III.1 Inflation targeting in the neo-Keynesian Phillips curve model

When it comes to theoretical justification of inflation targeting, the Phillips curve is central to the argument. That means the justification depends on the theoretical model of the Phillips curve that is used.

The original Phillips curve (Phillips, 1958) described a negatively sloped relationship between inflation and the unemployment rate, which was interpreted as offering policymakers a trade-off between higher inflation and a lower unemployment rate (Samuelson and Solow, 1960). What constitutes an optimal rate of inflation then requires the addition of a set of policy preferences defined over inflation and the unemployment rate. With higher inflation and higher unemployment both being economic "bads," this gives rise to a concave set of public policy indifference curves in unemployment rate - inflation space. An optimal inflation target (P^*) can then be determined by the tangency of the policymaker's indifference curves with the Phillips curve, as shown in Figure 2.[3]

There are a number of important features contained in Figure 2. First, public policy preferences over inflation and unemployment, as represented by policy indifference curves, are critical to the determination of the optimal inflation target. Second, the slope of the Phillips curve is critical in determining the exact tangency with the policymaker's indifference curves. Third, in a world of certainty selection of an inflation target (P^*) is identical to selection of a target unemployment rate (U^*).

[3] The original Phillips curve lacked inflation expectations. These can easily be added to the model, and as long as the coefficient of inflation expectations is less than unity, The Phillips curve will remain negatively sloped (Tobin, 1971). However, this introduces a distinction between the short-run Phillips curve which is flatter and along which actual inflation outcomes can differ from expected inflation, and the long-run Phillips curve which is steeper and along which actual inflation outcomes equal expected inflation. The optimal long-run inflation target is then determined by the tangency of the policy indifference curve with the long run Phillips curve.

However, if there is uncertainty about the location of the Phillips curve or if it is subject to random shifts then it is no longer the case that inflation and unemployment targets are the same. Such uncertainty can be termed "target uncertainty". In the presence of target uncertainty, an inflation target will tend to be associated with greater variability of unemployment rates, while an unemployment rate target will be associated with greater variability of inflation rates. Which target is preferable then depends on the relative costs and benefits of variability of the unemployment rate versus variability of the inflation rate.

Proposition 1. Whether an inflation target dominates an unemployment target in the neo-Keynesian model, or vice-versa, depends on the slope of the Phillips curve in the region of the optimal target. The steeper the Phillips curve, the more likely it is that an inflation target will dominate.

Suppose the monetary authority is uncertain about the exact location of the Phillips curve. Moreover, it has a loss function of the form $V([P - P^*]^2, [U - U^*]^2)$. If it picks an inflation target and the Phillips curve is locally steep and to the right of the authority's estimate, it incurs a loss of $V(0, [L_P]^2)$ compared with a loss of $V([L_U]^2, 0)$ under an unemployment target. Figure 3 shows the case of targeting with an uncertain Phillips curve, and it is drawn with a relatively Phillips curve. Consequently, the ratio $V(0, [L_P]^2)/V([L_U]^2, 0)$ is relatively small, favoring an inflation target. If the Phillips curve were flatter, the ratio $V(0, [L_P]^2)/ V([L_U]^2, 0)$ would be relatively large, favoring an unemployment target.

III.2 Inflation targeting in the NAIRU model

In the late 1960s, the neo-Keynesian Phillips curve was challenged by Friedman (1968) and Phelps (1968) who introduced the concept of the natural rate of unemployment - also widely referred to as the NAIRU or non-accelerating inflation rate of unemployment. NAIRU theory maintains that inflation has no real effects on labor

markets, in which outcomes are determined by the demand (marginal product of labor) for and supply (household preferences) of labor. Instead, expected inflation is fully incorporated in the nominal wage bargain, leaving equilibrium employment and unemployment unaffected. Consequently, there is no long run trade-off between inflation and unemployment, and the long run Phillips curve is vertical in inflation - unemployment space.

Proposition 2. If the NAIRU is subject to random shocks or if its location is uncertain, inflation targeting dominates targeting the rate of unemployment.

The logic behind proposition 2 is illustrated in Figure 5, which shows the NAIRU as moving in response to both positive and negative shocks. If the monetary authority targets the original NAIRU of U^*, it will tend to tighten if the NAIRU and unemployment fall below U*, thereby imposing excess unemployment and triggering costly disinflation. Conversely, unemployment targeting triggers costly accelerating inflation if the NAIRU rises as the monetary authority tries to hold the economy below the new NAIRU.

Contrastingly, if the monetary authority targets an inflation rate of P^*, policy is always driven in the right direction. When the NAIRU falls, inflation falls below target, and the monetary authority responds by expanding demand and moving the economy toward the new NAIRU. Conversely, when the NAIRU increases, inflation increases and the monetary authority responds by tightening and moving the economy toward the new NAIRU.

Inflation targeting therefore uses economic signals that move policy in the correct direction when the NAIRU shifts, whereas unemployment (real) targeting uses signals that move policy in the wrong direction. Shifts of the NAIRU can be viewed as supply shocks, and inflation targeting responds better than unemployment targeting to such

shocks. With regard to demand shocks, both inflation targeting and unemployment targeting respond appropriately. A positive demand shock raises inflation and lowers unemployment, and both forms of targeting generate signals for monetary tightening. Both also generate signals for monetary easing in face of negative demand shocks.

The above observation points to an important asymmetry between inflation targets and unemployment (real) targets. To hit the NAIRU using an unemployment target, the monetary authority must know the NAIRU, which is unobservable. However, any inflation target is consistent with hitting the NAIRU because there is no unique inflation rate associated with the NAIRU.

In addition to the above argument, publicly announced inflation targeting can also help reduce endogenous variability of output and employment around a given NAIRU. This is because a commitment to inflation targeting can remove policy uncertainty, helping lock down future price level expectations that facilitate agents' economic planning and contracting. This increased certainty about the future price level can help reduce price level forecast errors and misperceptions, which cause fluctuations of output. This speaks to having highly transparent rules and operating procedures governing inflation targeting.[4]

Proposition 3. The standard NAIRU model has difficulty explaining what the specific inflation target should be.

Whereas the NAIRU model can support a case for inflation targeting, it has greater difficulty explaining what that target should be. If inflation is not an argument of the

[4] New classical economists sometimes appear to confuse the case for inflation targeting with the case for central bank independence. Barro and Gordon (1983) have argued for central bank independence on the grounds that central banks have an incentive to cheat on the public and pursue high inflation policies. Palley (1996) shows that this argument is an artifact of the assumptions about policymaker preferences. Moreover, independence does not solve the problem, and may just replace one bias with another. Dealing with central bank policy bias calls for transparent, accountable central banks with an explicit policy. That is a separable question from whether the explicit policy should be an inflation target.

public policymakers preference function, then the policymaker's indifference contours are vertical lines. The optimum policy outcome then lies at the NAIRU, but any rate of inflation or deflation is in principle optimal.

If there are costs to lowering inflation, because output must be sacrificed and unemployment increased to lower inflation expectations (the so-called sacrifice ratio), then it will be optimal to target the existing rate of inflation. This is because all points on the long run Phillips curve are equally desirable, so that there are no welfare gains to lowering the inflation rate. Indeed, doing so involves a welfare loss since the economy must incur the sacrifice costs involved with disinflation.

Proposition 4. Adding a policy preference function defined over inflation and unemployment suggests policymakers should target zero inflation.

One possible resolution of this indeterminacy is to incorporate a standard public policy preference function that includes as arguments both the absolute rate of price change (inflation and deflation) and the unemployment rate. Maximizing such a preference function subject to the constraint of the NAIRU then leads to the conclusion that the monetary authority should aim for price level stability (zero inflation). Formally, the policy program is

(1) $\underset{P}{\text{Min}}\ V = V(P^2, [U - U^*]^2)$ subject to $U = U^*$ $\quad V_1 < 0\ V_{11} < 0,\ V_2 > 0,\ V_{22} < 0.$

where P = inflation rate, U = unemployment rate, U^* = NAIRU. This solution is shown in Figure 5.

If there is an initial positive inflation rate and there are costs to disinflation, it will be optimal to disinflate gradually, balancing the present value of sacrifice costs against the present value of the welfare gains from moving closer to at the optimum. If the sacrifice costs are large and the additional welfare gains from price stability are small,

then this disinflation may be very gradual. If the reverse holds, the monetary authority may disinflate rapidly.

Proposition 5. The NAIRU model can generate a positive inflation target by incorporating a zero-floor to the nominal interest rate.

The standard NAIRU model suggests that central banks that accept the NAIRU model should target zero inflation (price level stability). In fact, no central bank does this or argues for this. Instead, central banks talk of the need for stable low inflation, with two percent being a widely canvassed target. Such a target cannot be justified in the standard NAIRU model in which inflation and deflation are symmetric, and in which neither inflation nor deflation impact the equilibrium level of real output.

To get a non-zero inflation target there is need to amend the model to take account of the effects of the zero-floor to the nominal interest rate. Combined with aggregate demand (AD) uncertainty. Such uncertainty may be the result of (i) surprise AD shocks that the monetary authority is unaware of, or (ii) "instrument uncertainty" whereby the monetary authority does not know with certainty the impact of its policy instruments on AD. Under these conditions there can be a case for a non-zero inflation target. The economic logic is as follows.

Owing to the existence of money, which yields liquidity services and provides an alternative to bonds as a store of value, the nominal interest rate on bonds cannot fall below zero, which is the nominal yield on money. The existence of this floor means that deflation raises the real interest rate and reduces employment and output. The microeconomic logic is that a higher real interest rate reduces the demand for capital, lowering the marginal product of labor and labor demand, thereby increasing unemployment. Given this institutional setting, the Phillips curve becomes positively

sloped in the region with deflation. Figure 6 shows the effect of including a zero nominal interest rate floor in the NAIRU model. Now, the Philips curve is kinked at zero inflation, and unemployment increases with deflation because the real interest rate rises with deflation.

Given an unemployment cost to deflation, central banks will now have an incentive to actively avoid deflation. This is because deflation is more costly than inflation. Steady state inflation imposes only an inflation cost. Steady state deflation imposes both a deflation cost and an unemployment cost.

If aggregate demand is variable, central banks will therefore want to create space for lowering the real interest rate in the event of large demand shocks. This space can be created by having positive inflation. Recall, that the real interest rate is defined as

(2) $r = i - P$

where r = real interest rate, i = short term nominal interest rate, and P = inflation rate. If the inflation rate is zero, then the monetary authority cannot achieve a negative real interest rate owing to the zero-floor on the nominal interest rate. However, if the inflation rate is positive (e.g. three percent), then the monetary authority can push the real interest rate as low as minus three percent by setting the nominal interest rate equal to zero.

Given standard preferences defined over the rate of price change and the unemployment rate, the monetary authority will want to avoid the zone of deflation. But more than that, it will want an inflation cushion that provides space for the monetary authority to set negative real interest rates. This is because negative real rates may be needed to combat negative aggregate demand shocks and speed return to the natural rate of unemployment. Consequently, the optimal inflation target will be non-zero.

Proposition 6. Given a nominal interest rate floor, the inflation target will depend on the costs of permanent inflation and the magnitude and frequency of negative aggregate demand shocks.

How much space (i.e. how high the inflation target should be) is desirable will depend on (a) the costs of permanent inflation, and (b) the magnitude and frequency of demand shocks. In effect, the monetary authority will balance the net present value of the costs of permanent inflation against the expected net present benefit of being able to counter negative demand shocks with negative real interest rates and thereby speed return to the NAIRU.

This trade-off can be understood in terms of an insurance metaphor. The costs of permanent inflation constitute the insurance premium that is paid to insure against the losses associated with negative nominal demand shocks that generate deflationary conditions. If negative demand shocks are frequent and large, there is a larger benefit to being able to set negative real interest rates and the inflation target will tend to be higher. Likewise, if the costs of permanent inflation are small, this too will tend to encourage having a higher inflation target.

III.3 Inflation targeting in a backward-bending Phillips curve model

Akerloff et al. (2002) and Palley (1998, 2003b) have presented backward-bending models of the Phillips curve. The basic logic of these models derives from Tobin's (1972) insight that when there is downward nominal wage rigidity, inflation can help grease the wheels of labor market adjustment by facilitating relative wage and price adjustment in sectors with unemployment.[5] A backward bending Phillips curve emerges if workers in

[5] Tobin's insight has been formalized in models by Palley (1994) and Akerlof et al. (1996).

sectors with unemployment start to display downward real wage resistance once inflation passes a threshold level.[6]

The microeconomic logic is as follows:

(i) Labor exchange is characterized by conflict and moral hazard, and workers resist wage reductions imposed from within the employment relationship for fear that firms are trying to cheat them. However, workers are willing to accept some real wage reduction imposed from outside the employment relationship via adjustment of the general price level since this is outside the control of firms.

(ii) However, workers resist excessively fast inflation-driven real wage reductions. Thus, as inflation increases, more and more workers in sectors with unemployment demand nominal wage increases to match inflation.

(iii) Consequently, inflation gradually starts to lose its labor market "grease" property as nominal wages rise in sectors with unemployment, matching inflation and neutralizing the job creation impact of nominal demand growth.

(iv) When this type of wage setting behavior is placed in a multi-sector economy in which some sectors have unemployment and others are at full employment, it generates a backward bending Phillips curve.

(v) Initially, nominal demand growth causes inflation in full employment sectors, and creates jobs in sectors with unemployment where nominal wages are fixed. Faster nominal demand growth generates faster inflation in full

[6] Palley (1994, 2003b) argues that inflation has a grease effect because it can avoid the labor exchange moral hazard problem associated with internally sponsored nominal wage cuts. Akerlof et al (1996, 2000) rely on money illusion and near-rationality to generate inflation grease effects.

employment sectors, and in some sectors with modest unemployment workers start indexing their wages, eliminating the grease effect in those sectors.

(vi) As inflation increases, workers in more and more sectors with unemployment start resisting real wage reductions, progressively eroding the grease effect. At this stage the Phillips curve bends back because adding more grease (nominal demand growth that causes inflation) is more than offset by decreased lubricity (indexing of nominal wages to inflation).

(vii) Eventually inflation is pushed to a high enough level that all workers are indexing, and the Phillips curve becomes vertical.

Figure 7 illustrates the backward bending Phillips curve. The turning point of the curve can be labeled the minimum unemployment rate of inflation (MURI), and it represents the point where the overall labor market grease effect of inflation is greatest.

The slope of the Phillips curve and its inflexion point depend on how rapidly workers start to display real wage resistance. If they do so even when inflation is low, the Phillips curve will be steep and will tend to bend back at a relatively low rate of inflation and high rate of unemployment. If real wage resistance only develops slowly, the Phillips curve will be flatter and will bend back at a higher rate of inflation and lower rate of unemployment.

The slope of the curve is also affected by the distribution of unemployment across sectors. If unemployment is widely distributed, then the slope will be flatter since nominal demand growth will produce jobs in most sectors and price increases in a few. If unemployment is concentrated in a few sectors, the slope will be steep and nominal

demand growth will produce inflation in most of the economy, and a few jobs in those sectors with unemployment.

Proposition 7. In a backward bending Phillips curve model, if the monetary authority's preferences include only unemployment it should seek to minimize the rate of unemployment.

Within the MURI model inflation is neither an economic good nor an economic bad. Instead, it is a "quasi-instrument" that can be used to reduce unemployment if managed appropriately. Given this, if the monetary authority's goal is minimum unemployment and maximum sustainable output, then inflation is set to reach this goal rather than itself being a goal of policy. Under such a specification, policy indifference curves are vertical lines in unemployment rate – inflation rate space. Welfare is maximized at the point of tangency of the Phillips curve and the indifference lines, which occurs at the inflexion point of the Phillips curve.[7]

Proposition 8. Policy should use an inflation target equal to the MURI rather than directly targeting the minimum unemployment rate (MUR).

Both the MURI and the MUR are unobservable variables. If the authority sets the inflation target incorrectly (above or below the MURI), it bears unnecessary unemployment costs that are fairly symmetric. However, if it targets the MUR, the costs of missing the target are not symmetric and are far larger if it sets the MUR too low. In this case, the monetary authority will keep raising nominal demand growth in an attempt to reach its estimate of the MUR. However, because this estimate is too low and infeasible, inflation will accelerate and the economy will move to a much higher rate of unemployment.

[7] If policy preferences include inflation, then the optimal target will lie on the negatively sloped portion of the backward bending Phillips curve to the right of the MURI.

Additionally, the Phillips curve is itself subject to unobserved shifts to the left and right owing to changing patterns of wage behavior. These shifts are illustrated in Figure 8. If the monetary authority targets its estimate of the MURI, it continues to hit its ultimate goal. However, if it targets its estimate of the MUR, it will be prone to large errors when the Phillips curve shifts horizontally.

These horizontal shifts may also be accompanied by vertical shifts, but the employment cost associated with MURI targeting will be relatively small because the Phillips curve is relatively vertical in this region, causing little employment (horizontal) loss. In sum, horizontal shifts of the Phillips curve are very costly for MUR targeting, but have no cost for MURI targeting. Vertical shifts have no costs for MUR targeting, but have only small costs for MURI targeting. This pattern suggests targeting the MURI.[8]

Proposition 9. As real wage resistance decreases, the monetary authority should raise its MURI target.

The slope of the Phillips curve depends on the speed with which real wage resistance sets in within the economy. If there is widespread real wage resistance, then the Phillips curve will be relatively steep and higher inflation will buy little reduction in unemployment. However, if resistance is weak, then higher inflation will buy a greater reduction in unemployment because wages and prices will remain unchanged in sectors with unemployment so that faster nominal demand growth generates more employment. Consequently, the Phillips curve will be flatter and the MUR will decrease.

[8] If inflation is an argument of the policy preference function, then the optimal inflation – unemployment rate combination is determined by the tangency of the Phillips curve and the policy indifference curve. Given standard preferences, this tangency will lie below the MURI. The above arguments favoring inflation targeting will still hold in that unemployment rate targeting is very costly with regard to hoizontal shifts of the Phillips curve, and there are also large asymmetric costs if the monetary authority pushes for too low an unemployment rate.

Reduced wage resistance means that the monetary authority can push for lower rates of unemployment, and it also means that the Phillips curve will bend back at a higher inflation rate because workers do not start to undo the inflation's grease effect (by demanding matching nominal wage increases) until inflation is higher. This is relevant for the U.S. economy today, with former Federal Reserve Chairman Alan Greenspan (1999) having openly commented about workers' heightened sense of job insecurity tamping down real wages..

IV Conclusion: public policy considerations

Inflation targeting is a controversial matter. This paper has examined the theoretical case for inflation targeting, and provided analytical arguments why inflation targeting is likely to dominate targeting a specific unemployment rate.

Opting for inflation targeting is just the first step in the policy debate. Still unresolved is the question of what the inflation target should be. Most economists talk of a two percent target, but there are good reasons to believe this is too low. First, it leaves only limited space for the Federal Reserve to reduce real interest rates. Second, empirical evidence suggests that the U.S. has experienced lowest rates of unemployment when inflation has been in the 3 – 5 percent range. Akerlof et al. (2000) present empirical evidence that the Phillips curve may even bend back at around seven percent inflation.

Even after opting for inflation targeting and choosing an inflation target, there remains the question of whether inflation targeting is a sufficient policy in the presence of asset price inflation. There are strong grounds for believing it is not as it targets excesses in product markets, but ignores costly excesses in asset markets. Asset markets should

therefore be an additional target of policy, and dealing with them calls for additional policy instruments.

Though there are good technocratic reasons for using inflation targeting procedures, there are also profound public policy problems. The nature of the economy is contested. Some economists believe in the NAIRU, while others believe there exists a Phillips curve that provides a permanent trade-off between inflation and unemployment. In both case, there can be significant costs from setting too low an inflation target. In the NAIRU model with nominal interest rate floors too low an inflation target can result in costly deflation. In the neo-Keynesian Phillips curve model it can result in permanent output losses resulting from excessive unemployment.

The essence of the public policy choice problem is that an explicit numerical inflation target regime will tend to bias the choice of target downward, resulting in sub-optimal policy. The reasoning is as follows. Choosing an optimal inflation target involves weighing the costs of inflation against the benefits (smaller output and unemployment losses) of slightly higher inflation. However, if the public policy discussion is framed exclusively in terms of a two versus three percent inflation target, the choice will naturally tend to be biased downward because inflation is a "bad" so that two percent *prima facie* dominates three percent.

This likelihood of bias suggests that the Fed not adopt a formal explicit numerical inflation target, and that it instead retain the current dual mandate public policy discourse frame. That frame obliges it to explicitly surface its thinking about both inflation and unemployment. At the same time, the Fed is till free to use an inflation target framework in its internal technical deliberations about the conduct of monetary policy.

Finally, the current consensus at the Fed seems to be for an informal non-explicit two percent inflation target. A MURI model suggests that this target can be challenged as too low, and a case can be made for a higher target that would yield real benefits in the form of lower unemployment. For instance, if the Federal Reserve were to adopt a three percent inflation target, this would make for a significantly more expansionary monetary stance, adding approximately $125 billion dollars of nominal demand per annum at current prices. This could push the unemployment rate toward four percent, the Humphrey – Hawkins Act (1978) definition of full employment.

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Figure 1. The inflation targeting decision tree

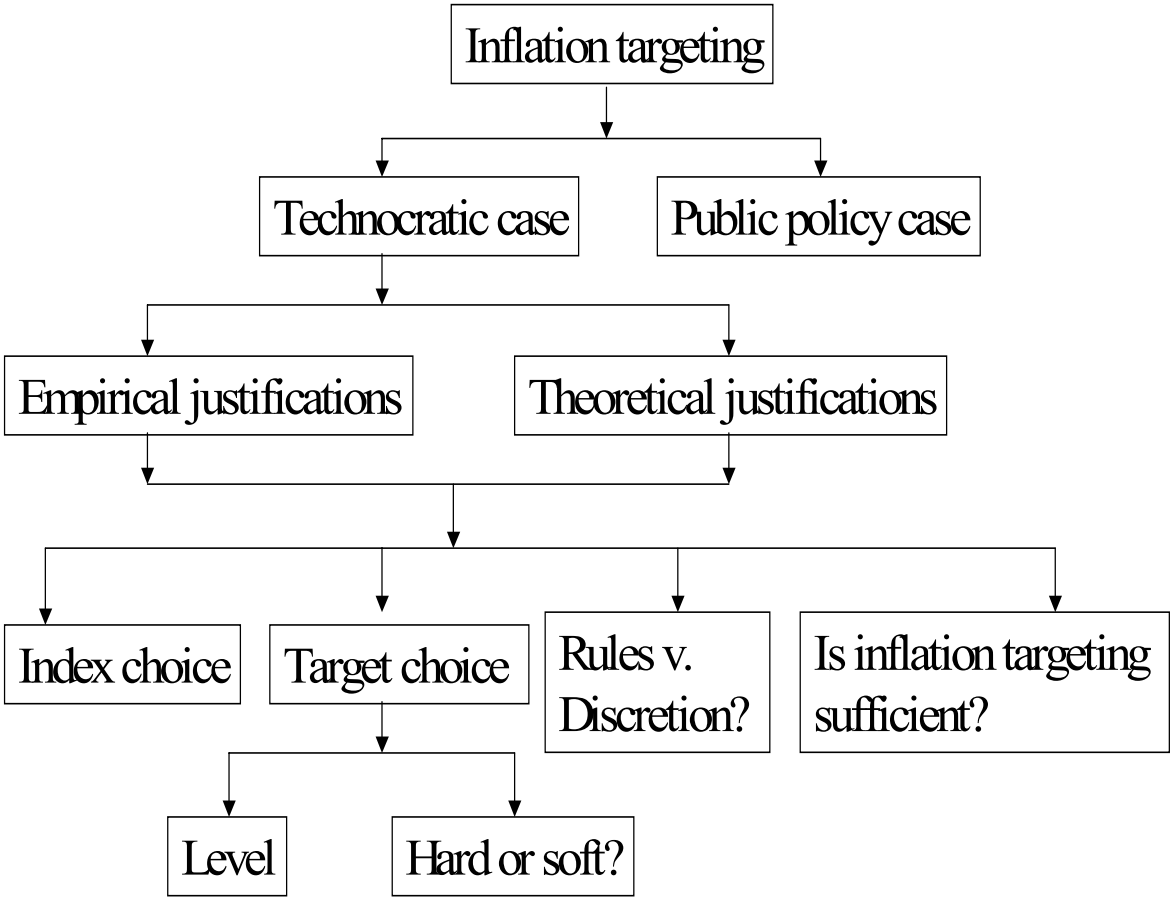

Figure 2. Inflation targeting with a certain Neo-Keynesian Phillips Curve.

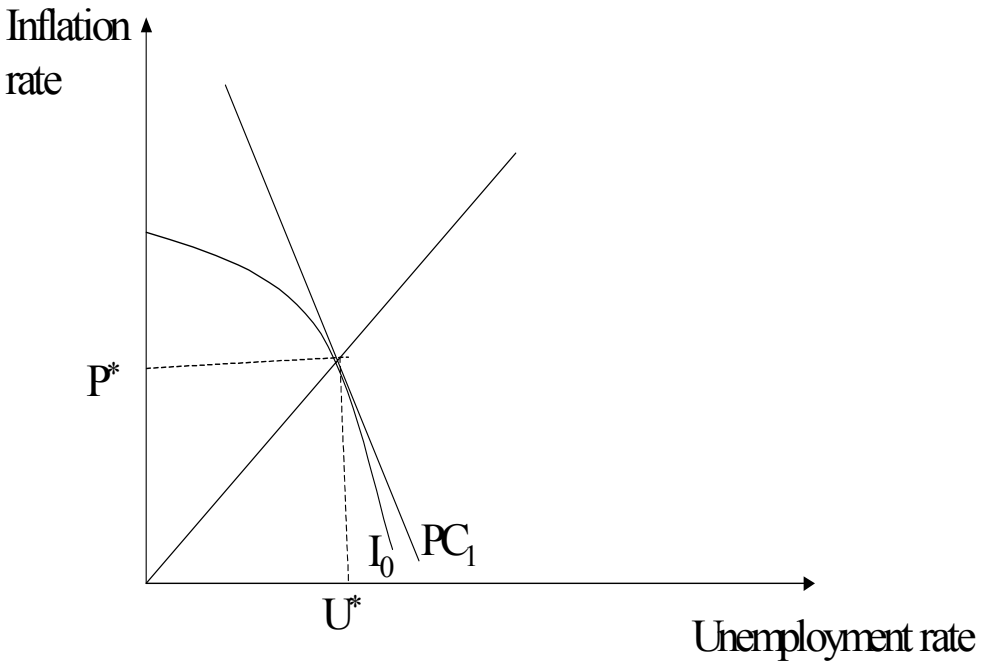

Figure 3. Inflation targeting with an uncertain Neo-Keynesian Phillips Curve.

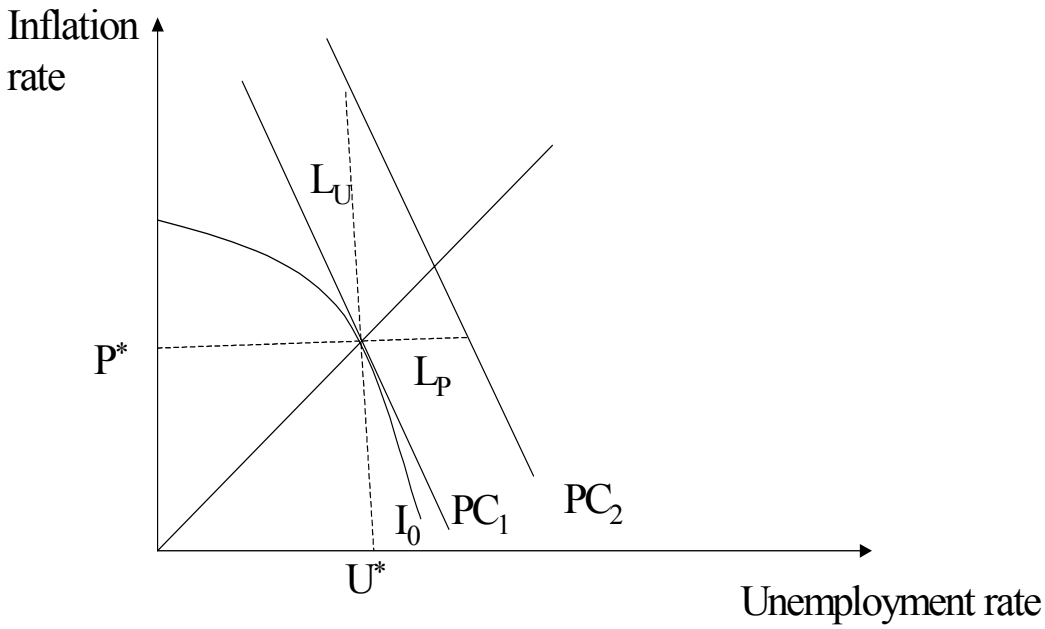

Figure 4. Inflation and unemployment targeting with an uncertain NAIRU

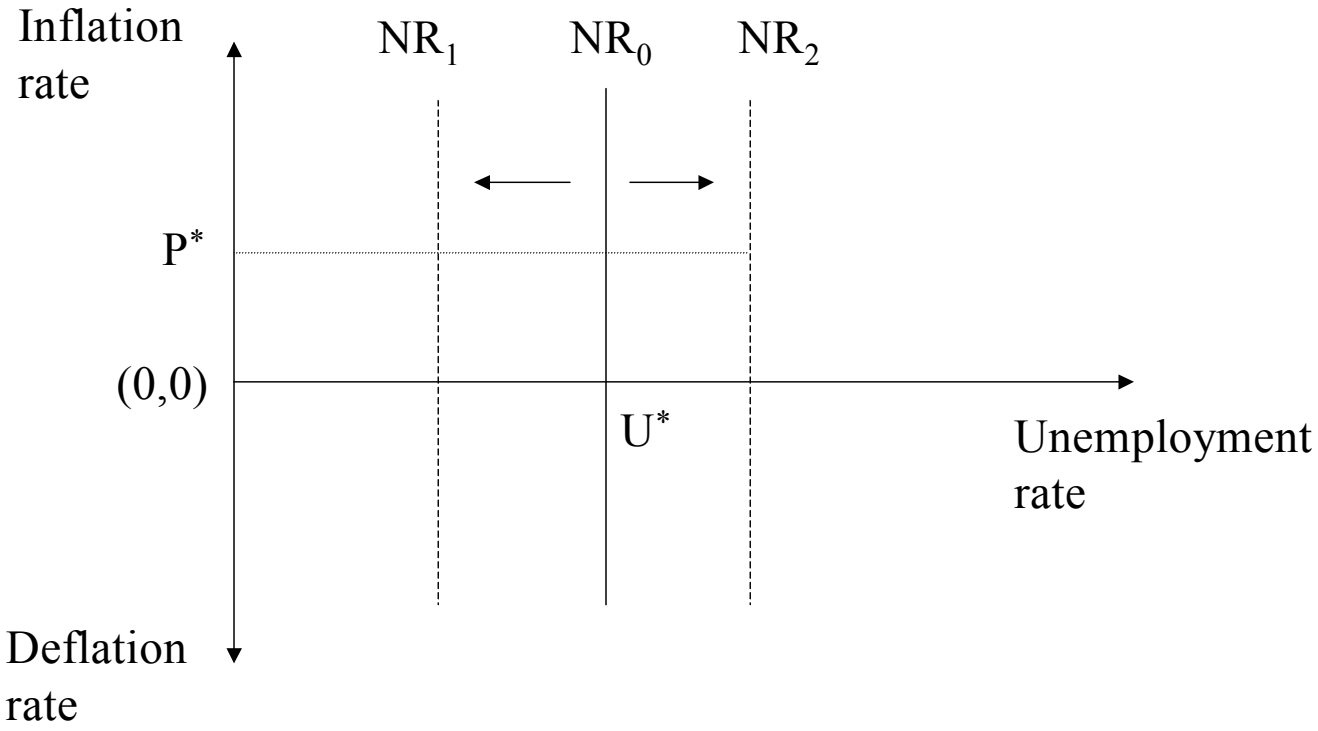

Figure 5. The selection of an optimal inflation target in a NAIRU model.

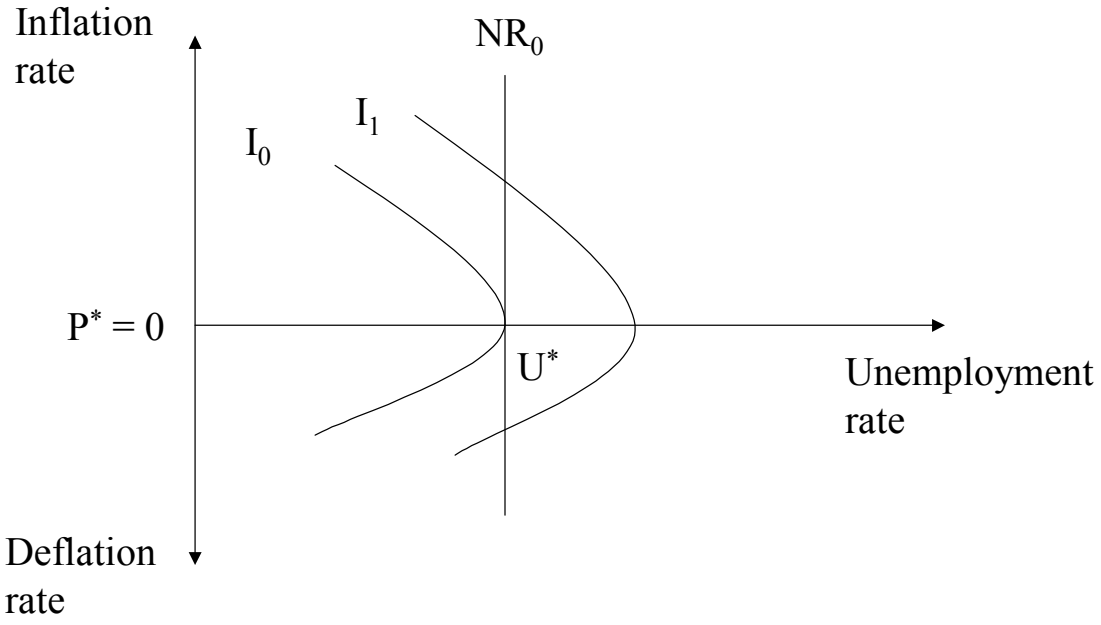

Figure 6. The effect of a nominal interest rate floor on the NAIRU model.

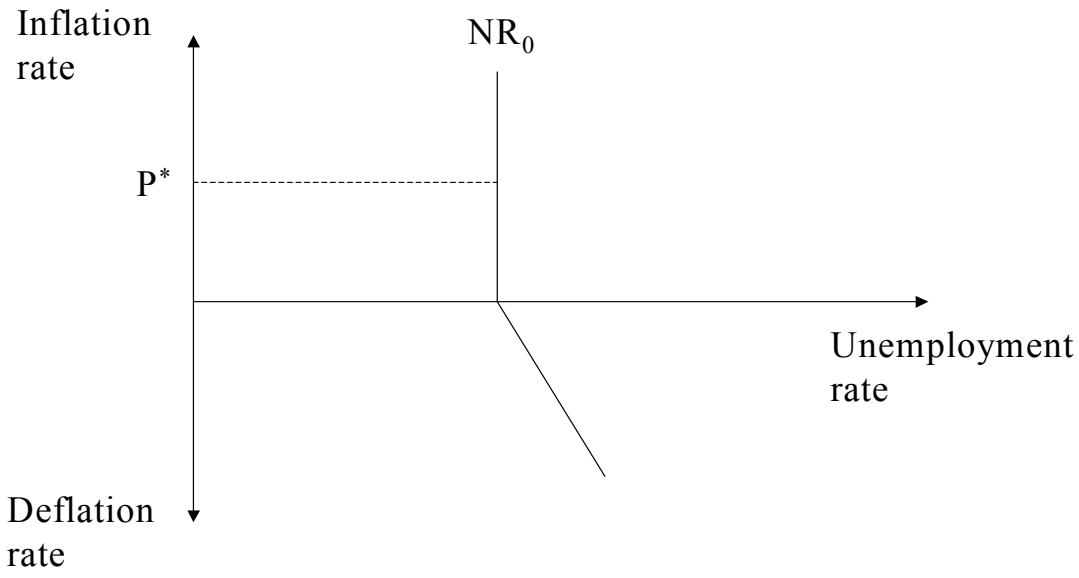

Figure 7. The backward bending Phillips curve.

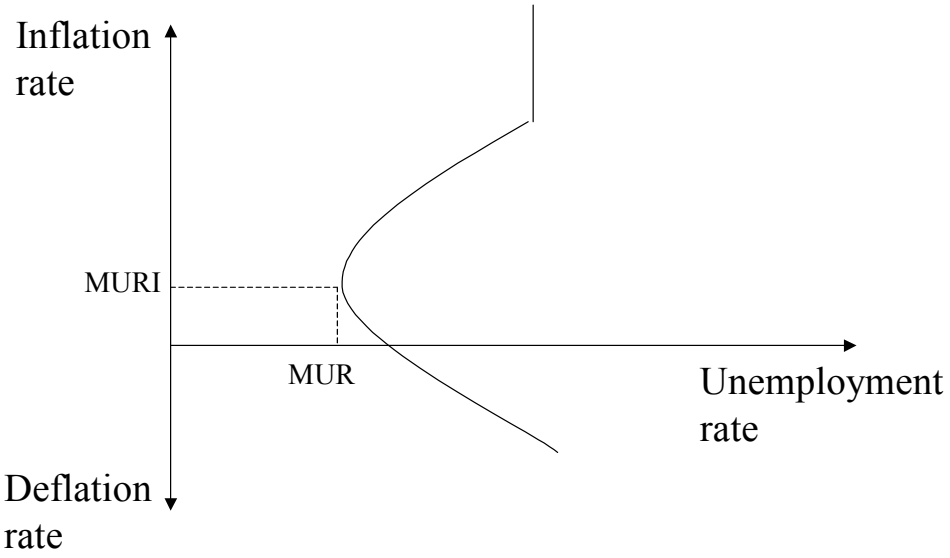

Figure 8. MURI targeting with a shifting MUR.