

THE CASE FOR FOUR PERCENT INFLATION

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ABSTRACT

Many central banks target an inflation rate near two percent. This essay argues that policymakers would do better to target four percent inflation. A four percent target would ease the constraints on monetary policy arising from the zero bound on interest rates, with the result that economic downturns would be less severe. This benefit would come at minimal cost, because four percent inflation does not harm an economy significantly.

A central bank does not perfectly control the short-run behavior of inflation, but it does control inflation in the long run. Policymakers can choose a target for the inflation rate and keep inflation close to this level on average. What is the optimal inflation target? This is a classic question in monetary economics.

No economic research has convincingly determined the optimal inflation rate. Yet many central banks have chosen a common policy: an inflation target near two percent. These central banks include the Federal Reserve (which calls two-percent inflation a “longer-run goal”), the European Central Bank (which aims for inflation rates “below, but close to, 2%”), and most other central banks in advanced economies.

This essay argues that a two percent inflation target is too low. It is not clear what target is ideal, but four percent is a reasonable guess, in part because the United States has lived comfortably with that inflation rate in the past. If central banks raised their inflation targets from two to four percent, the economic benefits would exceed the costs.

The primary reason to raise inflation targets is to ease the zero-bound problem, the constraint on monetary policy arising from the fact that nominal interest rates cannot be negative. A higher inflation target raises the long-run levels of nominal rates, allowing larger decreases in rates before the zero bound becomes binding. This flexibility makes it easier for a central bank to restore full employment when an economic slump occurs.

In the United States, a four percent inflation target would have dampened the Great Recession of 2008-09, when interest rates hit the zero bound. Looking ahead, four percent inflation would keep interest rates away from zero during future recessions. I argue that the benefits to the economy would be substantial, based partly on the behavior of interest rates during past recessions.

In contrast, the costs of four percent inflation are small. Neither history nor evidence from

research suggests that an economy's efficiency is significantly lower with four percent inflation than with two percent.

A number of economists have suggested a four percent inflation target, notably Blanchard et al (2010). Yet the idea is widely unpopular among monetary economists, and it is anathema to central bankers. According to Bernanke (2010a), the Federal Open Market Committee unanimously opposes an increase in its inflation goal, which "would likely entail much greater costs than benefits."

If one believes that four percent inflation is desirable, the strong opposition to this policy is a puzzle. In addition to advocating the policy, this essay explores the sources of opposition. In my view, theoretical research has underestimated the danger of low inflation arising from the zero-bound problem. In addition, policymakers have an excessive aversion to inflation, a result of both economic theory and the experience of double-digit inflation in the 1970s.

I. THE BENEFIT FROM HIGHER INFLATION

Economists have made several arguments for raising inflation targets above two percent. Yet one argument stands out as compelling: a higher target would reduce the risk that interest rates hit zero.

The Zero-Bound Problem

Many central banks pursue countercyclical monetary policy. Typically, their instrument is a short-term interest rate: when a recession occurs and unemployment rises, policymakers cut the interest rate to boost aggregate demand. In the United States, the Federal Reserve has cut the federal funds rate substantially in every recession since World War II (Romer and Romer, 1994a). These actions spurred economic recoveries that usually reversed the increases in unemployment during recessions.

When a central bank seeks to increase aggregate demand, it faces a constraint: it cannot reduce

nominal interest rates below zero. This constraint arises from the existence of an asset, cash, with a guaranteed return of zero. A negative interest rate would mean that someone lends \$100 and receives less than \$100 in the future. Such a loan would never occur, because the lender could do better by putting cash in a safe deposit box.

The zero bound on interest rates can bind if an adverse event pushes the economy into a recession. The central bank can respond by lowering interest rates, but rates may fall all the way to zero before the economy has received sufficient stimulus. In this situation, an economic slump and high unemployment can drag on indefinitely, with the central bank unable to end it through further interest-rate cuts.

Keynes warned of this situation, which he called the “liquidity trap,” in his *General Theory* (1936). Yet for decades after Keynes wrote, economists considered the liquidity trap a theoretical idea that didn’t matter for practical monetary policy. The reason was that nominal interest rates were usually well above zero, even during recessions. When recessions occurred, central banks were able to cut rates by enough to restore full employment without hitting the zero bound.

This situation changed in the 1990s, starting in Japan. A collapse of bubbles in Japanese stock and housing prices produced a deep economic slump. In response, the Bank of Japan reduced its policy interest rate from 6% in 1992 to 0.1% in 1999--yet output remained depressed. At that point, Japan was in a liquidity trap. Interest rates stayed near zero until 2006, when a brief recovery began.

Then the financial crisis of 2007-2008 struck the United States. The Federal Reserve reduced its target for the federal funds rate from 5.25% in August 2007 to a range of 0 to 0.25% in December 2008, and the target remains in that range in early 2013. Meanwhile, the unemployment rate rose from under 5% in 2007 to 10% in 2009, and it is still high--near 8%. The United States has been stuck in a liquidity trap for four years and counting.

As the U.S. recession spread around the world, many other central banks reduced interest rates to 1% or less, including the European Central Bank. With policymakers unable to cut rates much farther, unemployment rose in much of the world and stayed high. Some central banks, including the Fed and ECB, sought to stimulate their economies through “quantitative easing”: they expanded the monetary base through large purchases of securities. Generally, economists think these actions have nudged the American and European economies in the right direction. But the effects of quantitative easing have been far too weak to restore full employment.

In economies with near-zero interest rates, bad situations could easily turn worse. Another adverse shock might occur, arising, for example, from a new financial crisis in the U.S. or Europe. If this happens, the zero bound will prevent central banks from offsetting the shock, and unemployment will rise from its already high levels.

The Role of Inflation

The danger of hitting the zero interest-rate bound depends on the central bank’s choice of an inflation target. To see this point, suppose the economy starts in long run equilibrium. Let r^* be the long run level of the real interest rate, which is independent of monetary policy, and let π^* be the inflation target. The long run level of the nominal interest rate is $r^* + \pi^*$.

Now suppose an adverse shock pushes the economy into recession, and the central bank wants to respond by lowering interest rates. Since the nominal rate starts at $r^* + \pi^*$, the central bank can reduce this rate by $r^* + \pi^*$ before it hits zero. If $r^* = 2\%$ and $\pi^* = 2\%$, policymakers can reduce the nominal rate by up to four percentage points. If r^* is again 2% but π^* is 4%, the nominal rate can fall by six points. A higher inflation target implies that rates can fall by more, making it more likely that policymakers can restore full employment.

To see the same point in a slightly different way, consider the feasible levels of the real interest

rate. Since the nominal rate, i , cannot fall below zero, the real interest rate, $r=i-\pi$, cannot fall below $-\pi$. A higher inflation rate reduces this lower bound on the real interest rate, allowing greater monetary stimulus.

The history of inflation helps explain why the zero bound on interest rates did not constrain policy in the past. In many countries, the deepest recessions between 1945 and 2008 occurred during the 1970s and early 1980s. Inflation and nominal interest rates were high during that period, so central banks could cut rates drastically without approaching the zero bound. For example, during the U.S. recession of 1981-82, the Federal Reserve cut the nominal federal funds rate by 10 percentage points, from 19% to 9%.

In contrast, the Japanese slump of the 1990s and the Great Recession of 2008-2009 occurred during an era when central banks were targeting low inflation rates. Nominal interest rates were much lower when these recessions struck than they were in the 70s and 80s, so rates quickly hit zero as policymakers responded to the recessions.

How different would recent history have been with higher inflation targets? Suppose that the Federal Reserve's target during the 2000s was 4%, not 2%. Assume neutrality of the target away from the zero bound, meaning the state of the economy in 2008 would have been the same except that inflation and nominal interest rates were two percentage points higher. When the financial crisis exploded at the end of 2008, the Fed could have reduced interest rates by two points more than it actually did.

How would a larger interest-rate cut have affected the economy? Let us do a back-of-the-envelope calculation using a dynamic IS curve, as calibrated by Ball (1999):

$$y_t = -(1.0)r_{t-1} + (0.8)y_{t-1} ,$$

where y is the log of output, r is the real interest rate, and a time period is a year. Based on this

equation, if interest rates had been two points lower during 2009, output in 2010 would have been 2% higher. If rates stayed constant after that, the effect would have grown because of the lagged output term. The output gain for 2013 would be 5.9%, and the cumulative gain over 2010-2013 would be 16.4% of annual output. Assuming an Okun's Law coefficient of one half, the cumulative reduction in unemployment would be 8.2 percentage points.

II. FUTURE RISKS FROM THE ZERO BOUND

Recent history illustrates the costs of hitting the zero bound on interest rates, but this experience does not determine optimal policy going forward. The benefits of a higher inflation target depend on the likelihood of future zero-bound episodes. To gauge this risk, I first examine the historical behavior of U.S. interest rates, which suggests that the risk is substantial if central banks target two percent inflation. I then review theoretical research on the zero bound, which suggests smaller risks but is less credible than the historical evidence.

Historical Evidence on Interest Rates

The financial crisis of 2007-2009 was an unusual event, and it produced an unusually deep recession. As a result, many economists believe that this experience does not justify a higher inflation target. Mishkin (2011), for example, argues:

Although this [the zero bound] has surely been a major problem in this recent episode, it must be remembered that episodes like this do not come very often. Indeed, we have not experienced a negative shock to the economy of this magnitude for over seventy years. If shocks of this magnitude are rare, then the benefits to a higher inflation target will not be very large because the benefits will only be available infrequently.

In my view, Mishkin understates the risk of the zero bound. An economy with 2% inflation is likely to hit the bound far more often than once per seventy years. Several aspects of history support this prediction.

First, if we look beyond the United States, the crisis of 2007-09 is not unique in recent history. A completely separate financial crisis pushed Japan to the zero bound in 1997. It was only around 1990 that central banks began to target inflation rates of 2% or less. The two largest economies that adopted this policy both hit the zero bound within twenty years.

Second, in these two episodes, the distortions of monetary policy were severe. The shocks to the economy were more than large enough to push interest rates to zero. Smaller shocks would have been sufficient for the zero bound to bind.

Rudebusch (2009) illustrates the severity of the zero-bound constraint in the United States. He finds that the Taylor rule that fits monetary policy before 2008 implies a federal funds rate of -5% in 2009. This suggests that interest rates were 500 basis points above the level needed to restore full employment. A smaller shock might have pushed the Taylor-rule interest rate to -2% or -3%, negative enough to imply substantial costs from the zero bound.

More generally, U.S. history suggests that the zero bound is dangerous. Interest rates would likely have hit zero during previous recessions if the Fed were targeting 2% inflation. We can see this point with the help of Table 1, which presents key statistics for each of the eight recessions since 1960. The Table lists the core inflation rate at the start of each recession (defined as the percentage change in the CPI less food and energy from twelve months before); the highest level of unemployment reached during the recession and the following recovery; and the lowest levels reached by the nominal and real federal funds rates.

We can divide the recessions in Table 1 into two groups:

Recessions with Low Initial Inflation Three recessions began with the inflation rate between two and three percent. These episodes provide the most direct evidence on the zero-bound problem at low inflation rates. One of the three is the Great Recession of 2008-09, when the federal funds

rate hit the zero bound. The other two are the first recession in the Table, which occurred in 1960-61, and the last one before the Great Recession, in 2001.

In addition to low inflation, the recessions of 1960-61 and 2001 have two noteworthy features. First, they were mild recessions: their unemployment peaks of 7.1% and 6.3% are two of the three lowest in the Table. Second, the federal funds rate did not hit the zero bound, but it came close. The nominal funds rate fell to 1.2% following the 1960-61 recession, and 1.0% following the 2001 recession. In the latter case, when the funds rate reached 1.0% in 2003, many economists thought it might fall farther if the economy remained weak.

Let us compare the severe recession of 2008-09 to the mild recessions of 1960-61 and 2001. Rudebusch argues that the optimal federal funds rate, ignoring the zero bound, fell to -5% during the severe recession. The mild recessions reduced the federal funds rate to about +1%. Comparing these cases, it seems likely that a recession of average severity would push the optimal rate below zero--that the zero bound would bind in a typical recession starting at 2% inflation.

Recessions with High Initial Inflation In five of the eight recessions since 1960, inflation began above 4%. With high initial inflation, nominal interest rates never approached the zero bound. For these cases, we would like to know what would have happened if inflation had been 2% when the recessions began. We can get an idea by examining *real* interest rates during the five episodes.

As discussed above, we can interpret the lower bound on interest rates as a bound of $-\pi$ on the real rate. If π is 2% at the start of a recession, the bound on the real rate is -2% at that point. However, the recession is likely to push inflation down somewhat. In the three recessions that actually started with 2-3% inflation, the inflation rate fell to about 1% before the economy recovered. History suggests, therefore, that initial inflation of 2% will produce a bound of -1% on the real interest rate.

For the five recessions that started with inflation above 4%, we can gauge the relevance of a real-interest-rate bound by examining the lowest value reached by the real rate during the recession and subsequent recovery. These minimum values are shown in the final column of Table 1. In two cases--the recessions of 1973-75 and 1980--the real rate fell below -4%. A lower bound of -1% would have severely distorted monetary policy in these episodes. For the recession of 1969-70, the minimum real rate was -2.3%, so again a lower bound of -1% would have been problematic. For the recession of 1990-91, the minimum real rate was -0.6%; this episode would have been a near-miss with a lower bound of -1%. Only in one case, the recession of 1981-82, was the minimum real rate above zero.

To summarize, the past behavior of interest rates suggests that, with a two percent inflation target, the lower bound on interest rates is likely to constrain monetary policy in a large fraction of recessions. Sometimes the bound will keep interest rates several points above the optimal level. Given the frequency of recessions--eight in a period of 50 years--it appears that a two percent inflation target has large costs.

Theoretical Research

A growing literature seeks to quantify the risks of hitting the zero bound. Many authors analyze this issue in small “New Keynesian” models of the economy, or simulate larger versions of the models. Generally, this work concludes that the zero-bound problem is *not* serious enough to justify four percent inflation. Some papers, such as Schmidt-Grohe and Uribe (2011), find that interest rates will rarely hit zero if the inflation target is two percent. Others, such as Reifschneider and Williams (2000) and Coibion et al (2012), find that zero-bound episodes occur with some frequency, but the

welfare costs are small.¹

I am dubious of these results because they conflict with the historical evidence on the zero bound. In addition, the results depend on the forward-looking IS and Phillips curves of New Keynesian models. Many economists doubt that these equations are reliable tools for policy analysis, because they do not capture the inertia in real-world inflation and output (e.g. Mankiw, 2001; Rudd and Whelan, 2006; Barnes et al., 2011).²

More specifically, one can solve forward the New Keynesian model to determine output as a function all future interest rates, and inflation as a function of future output levels. [**]Typically, even if the current interest rate is zero, firms expect that the zero bound will cease to bind at some point in the future, and policy will ease to bring the economy back to long run equilibrium. In the model, this expectation raises output and inflation immediately, reducing the impact of the zero bound. In reality, it is questionable that expected future policies have such strong effects.

Some economists acknowledge that the zero bound is a significant problem with a two percent inflation target, but still reject the solution of four percent inflation. Instead, they advocate a different policy: a target for the price level (Eggertsson and Woodford, 2003; Coiboin et al., 2012). This policy produces low inflation on average, but inflation rises temporarily if a zero-bound

¹ Williams (2009) finds that the costs of zero-bound episodes can be substantial with a two percent inflation target. In his model, however, this result is not robust: it depends on assumptions of a high level of macroeconomic volatility and a low value of the neutral real interest rate (see Woodford, 2009).

² Some analyses of the zero bound use inflation specifications with greater inertia than the New Keynesian Phillips curve, yet these specifications still do not fit the data. Reifschneider and Williams, for example, describe their inflation equation as a mix of the New Keynesian model and the Fuhrer-Moore (1995) model. As discussed by Mankiw (2000), neither of these models captures the degree of inertia in real-world inflation.

episode has pushed the price level below its long run path. In this regime, if the nominal interest rate hits zero, then expected inflation rises, which reduces the real interest rate and boosts the economy out of a slump.

As Woodford (2009) emphasizes, the success of this policy depends on whether it “can actually be made credible to the public, so that inflation expectations are affected in the desired way.” During a period of lower-than-average inflation, the central bank must convince people that higher inflation is coming. Will that work?

It is difficult to predict the effects of price-level targeting, because central banks have not tried this policy. We have not seen what happens if policymakers promise to raise inflation significantly. We *have*, however, seen promises of *lower* inflation. Policymakers in many countries announced disinflations during the 1980s and 1990s, often seeking credibility by adopting explicit inflation targets or strengthening central bank independence. The goal was to reduce expected inflation, which would allow actual inflation to fall without large costs in output and employment.

Generally, these efforts to shift expectations did not succeed. Inflation fell, but only because monetary contractions caused deep recessions. Expected inflation only fell after actual inflation fell, not when policymakers made announcements. Countries with explicit inflation targets did not achieve lower sacrifice ratios--output losses per unit of inflation reduction--than other countries (Bernanke et al., 1999). Countries with highly independent central banks had *higher* sacrifice ratios (DeBelle and Fischer, 1994).

In these episodes, it was generally clear that central banks had the ability to reduce inflation if they were determined to do so, by raising interest rates. Yet disinflation announcements had little effect on expectations. The promises of higher inflation that Woodford envisions might be even less effective, because policymakers may not have the tools to raise inflation at zero interest rates.

OPPOSITION TO HIGHER INFLATION

To justify a four percent inflation target, we must weigh the benefits of this policy against the costs. Many central bankers believe that inflation, even at modest levels, is highly undesirable. Ottmar Issing, the first Chief Economist at the ECB, called inflation “a betrayal of the people” (Issing, 2000). Yet policymakers’ aversion to moderate inflation is unwarranted.

Are There Costs?

Economists have pointed out many adverse effects of inflation. Mishkin (2011) gives a typical list: distortions in cash holdings; overinvestment in the financial sector; greater uncertainty about relative prices and the aggregate price level; distortions of the tax system; redistributions of wealth; and difficulties in financial planning.

But how large are these effects? An empirical literature, motivated largely by the experience of the 1970s, has tried to measure some of the costs of inflation. Papers such as Fischer (1981), for example, examine inefficiencies arising from relative-price variability. This research has not produced a compelling case that inflation is harmful. As Krugman (1997) remarks, “one of the dirty little secrets of economic analysis is that even though inflation is universally regarded as a terrible scourge, efforts to measure its costs come up with embarrassingly small numbers.”

Krugman is talking about research on the double-digit inflation of the 1970s. Since it is difficult to identify costs of inflation at that level, few empirical studies have even tried to find costs of single-digit inflation.

A number of cross-country studies ask whether inflation affects economic growth. A common finding is that inflation rates above some threshold reduce growth, but lower levels of inflation are neutral. Estimates of the threshold vary considerably, from 8% (Sarel, 1995) to 40% (Bruno and Easterly, 1996), but 4% is clearly below the threshold.

Is 4% Inflation Destabilizing?

Some central bankers acknowledge that 4% inflation does not greatly harm the economy. Why then do they oppose an increase from 2% to 4%? Some argue that a decision to accept 4% inflation may actually cause inflation to rise *above* 4%, or at least create expectations of that outcome.

In rejecting a 4% inflation target, Bernanke (2010a) asserts that “inflation would be higher and probably more volatile under such a policy” and “inflation expectations would also likely become significantly less stable.” According to Bernanke (2010b):

The Federal Reserve, over a long period of time, has established a great deal of credibility in terms of keeping inflation low, around 2%... If we were to go to 4% and say we’re going to 4%, we would risk a lot of that hard-won credibility, because folks would say, well, if we go to 4%, why not go to 6%? It’d be very difficult to tie down expectations at 4%.

Similar arguments appear in Woodford (2010) and Mishkin (2011). Mishkin says:

If it were no more difficult to stabilize inflation at a 4% level than at a 2% level, then the case for raising the inflation target to 4% would be much stronger. However, the history of the inflation process suggests that this is not the case.

If inflation rises to 4%, Mishkin contends,

the public is likely to believe that price stability is no longer a credible goal of the central bank and then the question arises, “if a 4% level of inflation is OK, then why not 6%, or 8%, and so on.” We have seen that when inflation rises above the 3% level, it tends to keep on rising.

We might call this view the addictive theory of inflation. Like an alcoholic’s first drink, 4% inflation may not do great harm by itself, but it is the first step in a dangerous and uncontrollable process.

The rationale for this view is not clear. In other contexts, Bernanke and Mishkin argue that a central bank should determine its optimal policy, explain this policy to the public, and carry it out. We have learned from recent experience that 4% inflation is better than 2%, because of the zero-bound problem. Why can’t policymakers explain this, raise inflation to 4%, and keep it there?

Mishkin points to the 1960s, when inflation rose to 4% and the Fed let it keep rising, but why must policymakers repeat that mistake?

An increase in a central bank's inflation target might involve a transitional period of learning, during which inflation uncertainty is greater than usual. But nobody has demonstrated that this transition would harm the economy significantly. Indeed, opponents of 4% inflation have not tried very hard to make that case; they simply dismiss the idea with the casual arguments that I have quoted.

History does *not* suggest that it would be “difficult to tie down expectations” if inflation rises modestly. Inflation expectations, as measured by surveys, have generally followed actual inflation with a lag. They followed inflation up during the 1960s and 70s, and after that they followed inflation down. If inflation rises to 4%, it seems unlikely that expectations will overshoot this level, as suggested by Bernanke and Mishkin

Understanding the Attitudes of Policymakers

Central bankers have not always found 4% inflation unacceptable. Under Chairman Paul Volcker, the Federal Reserve ended the double-digit inflation of the 1970s, but it allowed the inflation rate to settle at about 4% from 1985 through 1988. This experience is often called the “conquest” of inflation (e.g. Sargent, 1999). Once inflation reached 4%, Volcker and his colleagues did not try to reduce it further. The Fed only tightened policy at the end of 1988, when inflation started rising again (Romer and Romer, 1994b).

Support for 2% inflation started to grow during the 1990s. Starting with Canada and New Zealand, many central banks adopted targets near 2% and pushed inflation to that level. In other countries, declines in inflation were partly accidental. In the United States, for example, inflation drifted down as a side-effect of recessions in 1990-91 and 2001. Once inflation reached 2%,

however, policymakers decided to lock in that rate for the long run.

Why do today's central bankers oppose 4% inflation when Paul Volcker did not? The answer is *not* that research has identified new costs of inflation. Instead, policymakers have developed an aversion to inflation that is out of proportion to its true costs. There are two reasons.

One is the tendency for policymakers to fight the last war. The high inflation of the 1970s was a scarring experience that has dominated the thinking of central bankers since then. Before the crisis of 2008, the 1970s were considered the worst monetary-policy disaster since World War II. Policymakers believed that their most important job was to prevent another inflationary episode: nobody wanted to be remembered for reversing Volcker's conquest. This mind-set has led policymakers to exaggerate the dangers of inflation.

It is instructive to compare the monetary policy of recent decades to the 1960s and 70s. DeLong (1997) describes how "the shadow cast by the Great Depression" influenced the Federal Reserve in the earlier period. The memory of high unemployment made policymakers fearful of any action that might slow the economy, with the result that they let inflation accelerate. Since then the pendulum has swung the other way, with double-digit inflation replacing the Depression as the nightmare that central banks are determined not to repeat.

The second factor that has influenced central bankers is theoretical research by academics. Kydland and Prescott (1977) convinced economists that central banks face a dynamic consistency problem that produces excessive inflation. Rogoff (1985) convinced economists that this problem is mitigated if policymakers are highly inflation-averse--more averse, even, than is justified by the true costs of inflation. As Bernanke (2004) has described, the Kydland-Prescott and Rogoff papers provide an intellectual justification for hawkish monetary policy.

IV. CONCLUSION

A worldwide consensus holds that the optimal inflation rate is about 2%. The central banks of most advanced economies target inflation near that level. Some emerging economies have higher targets, but typically their central banks have a long-term goal of reducing the targets.

This essay argues that central banks would do better to target 4% inflation. Raising the inflation target from 2% would ease the constraints on monetary policy arising from the zero bound on interest rates, with the result that economic downturns would be less severe. This important benefit would come at minimal cost, because 4% inflation does not harm an economy significantly.

Raising inflation targets might have additional benefits. For example, a 4% target might reduce the effects of downward nominal wage rigidity on employment (Akerlof et al., 2000). I have stressed the benefit of easing the zero-bound problem because it is so clear-cut, and because it is sufficient by itself to justify a 4% target.

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Table-1 Recessions and Interest Rates

| Recession | Inflation Rate at Start | Maximum Unemployment Rate | Minimum Federal Funds Rate | |
|-------------------|-------------------------|---------------------------|----------------------------|--------------------|
| | | | Nominal | Real |
| 1960:4 - 1961:2 | 2.00 | 7.10 (1961:05) | 1.17 (1961:07) | -0.14 (1961:07) |
| 1969:12 - 1970:11 | 5.91 | 6.10 (1970:12) | 3.29 (1972:02) | -2.31 (1971:02) |
| 1973:11 - 1975:3 | 4.73 | 9.00 (1975:05) | 4.61 (1977:01) | -5.80 (1975:03) |
| 1980:1 - 1980:7 | 11.97 | 7.80 (1980:07) | 9.03 (1980:07) | -4.13 (1980:06) |
| 1981:7 - 1982:11 | 11.14 | 10.80 (1982:11) | 5.85 (1986:10) | 1.71 (1986:09) |
| 1990:7 - 1991:3 | 5.11 | 7.80 (1992:06) | 2.92 (1992:12) | -0.55 (1993:02) |
| 2001:3 - 2001:11 | 2.61 | 6.30 (2003:06) | 0.98 (2003:12) | -0.96 (2001:12) |
| 2007:12 - 2009:6 | 2.44 | 10.00 (2009:10) | 0.07 (2011:07) | -2.19 (2012:01) |