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Why We Should Fear Deflation

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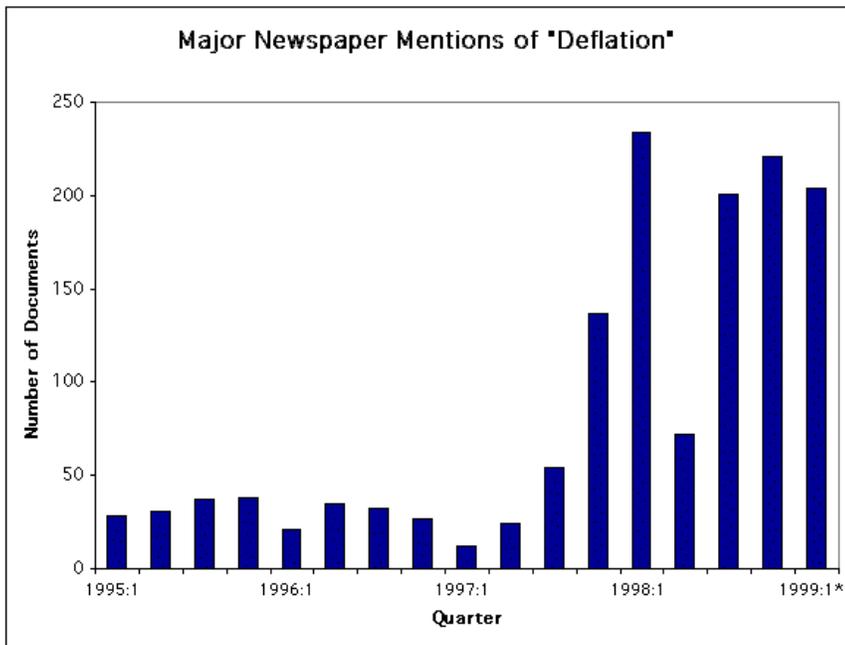
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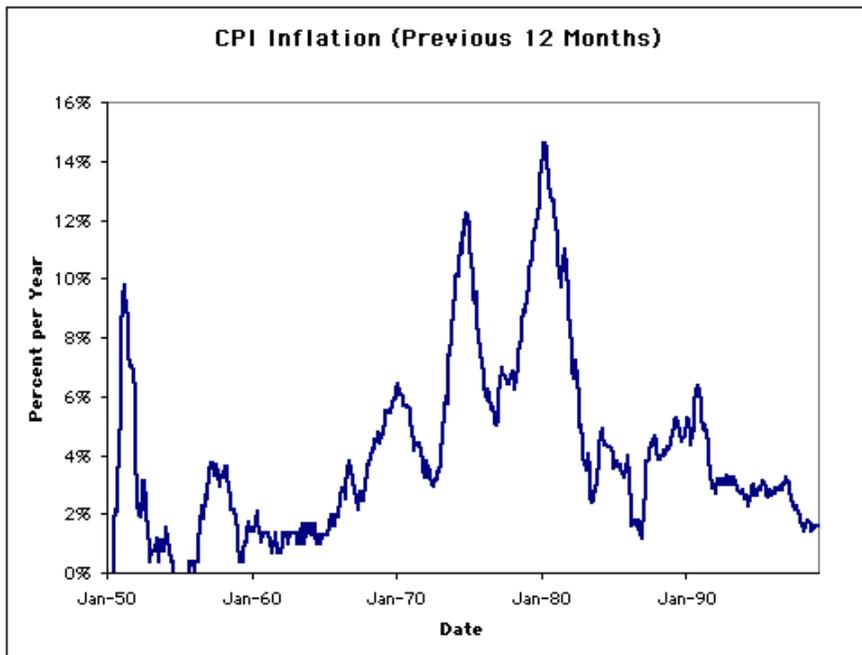
Post-meeting draft

Introduction

After more than sixty years, *deflation* has reappeared as something to worry about. In the past six months major newspapers printed 438 articles classified under the keyword "deflation"--compared to 36 such in the first half of 1997 and 10 such in the first half of 1990. For sixty years, ever since the middle years of the Great Depression, next to no one had worried about deflation. Next to no one had seen actual falls in the price level as even a remote possibility. Now people do.



The post-Korean War 1950s and the early 1960s saw measured rates of inflation as low as those of today. Yet then people worried not about deflation but about inflation. Only in the late 1990s, not in the 1950s or 1960s, have inflation rates of two percent per year or less called forth fears of deflation.



Source: Bureau of Labor Statistics.

In the past, low inflation did not induce forth fears of *deflation* because observers believed that the institutions created by the Keynesian revolution had a bias toward inflation. Yet today this belief is gone, or at least greatly attenuated. What happened to the built-in bias toward inflation that past

economists believed was inherent in post-WWII institutions? I suspect that the institutional bias toward inflation was never as large as many economists believed, and that it has recently been reduced or eliminated by the growth of countervailing forces.

Given that deflation is back on the agenda, should it be feared? Perhaps we should not worry about deflation because the probability that it will come to pass is infinitesimal. Perhaps we should not worry about deflation because it is not especially damaging. If costs of inflation and deflation are roughly equal--if our social loss function is symmetric around zero as a function of the deviation from price stability--then there is more to fear from renewed inflation than from deflation, for the price level is still rising.

I tentatively conclude that there is reason to fear deflation. The probability of serious deflation or of events that do the same kind of damage to the economy that deflation does is low, but it is not zero. There is good reason to fear that our social loss function is asymmetric: that deflation does more macroeconomic damage than an equal and opposite amount of inflation.

The root reason to fear deflation is that the nominal interest rate is bounded below at zero. Significant deflation--even completely anticipated deflation--thus generates high real interest rates and large transfers of wealth from debtors to creditors. By contrast, significant *anticipated* inflation does not generate abnormally low real interest rates (although significant *unanticipated* inflation is associated with large transfers of wealth from creditors to debtors).

Deflation's high real interest rates depress investment, lower demand, and raise unemployment. Deflation's transfers of wealth from debtors to creditors diminish the economy's ability to keep the web of credit and financial intermediation functioning. Such disruption of the financial system puts additional downward pressure on investment, demand, and unemployment.

Thus it seems to me to be hard to argue that our social loss function is symmetric, and that deflation is not to be especially feared. It is easier to argue that the chances of deflation coming to pass are very low. Yet I suspect that they are not as low as we would like to believe, for the Federal Reserve's power to offset surprise downward shocks to the price level is low.

Inflationary Bias

From its beginning the Keynesian Revolution brought fears of inflation. Before the ink was dry on the copies of Keynes's *General Theory*, Jacob Viner already warned that:

...[i]n a world organized in accordance with Keynes' specifications there would be a constant race between the printing press and the business agents of the trade unions, with the problem of unemployment solved if the printing press could maintain a constant lead...

A quarter century later in his AEA presidential address Arthur Burns argued that Viner's fears had come true: that the post-World War II world was one of constant wage-push inflation.

Viner's and Burns's fears have been developed and sharpened by Finn Kydland and Edward Prescott, who pointed out that a benevolent central bank possessing discretion and the ability to induce unanticipated shifts in aggregate demand will be under great temptation to try to take advantage of any short-run Phillips curve boost employment and production. The rational expectations equilibrium will be dissipative: workers and managers will expect such actions from the central bank, and in equilibrium production and unemployment will be unaffected but inflation will be higher than desirable.

This Kydland-Prescott framework suggests two ways to counter this institutional bias towards inflation created by central bank possession of *discretion* and concern over *high unemployment*. First-- Kydland and Prescott's preference-- make sure central banks are bound by *rules* and do not possess *discretion*. Second--a line of thought associated with Ken Rogoff--appoint central bankers who are unconcerned high unemployment.

The pattern of economic policymaking in the 1990s suggests that both of these ways of modifying institutions to diminish inflationary bias have been adopted. The U.S.'s central bank today appears to follow the *rule* (in the sense of Blinder (1998) although perhaps not in the sense of Kydland and Prescott (1977)) of giving first and highest priority to attaining near price stability. The past decade has seen the flowering of a common culture of central banking in which control of inflation comes first, and always taking the long view is applauded. And some central bankers at least appear to have been appointed with an eye toward their relative lack of concern with--or disbelief in their power to affect--the level of unemployment. The result is a situation in which long-time inflation hawks criticize the European Central Bank for pursuing overly-tight monetary policy, and in which the ECB president announces--with euro-zone inflation approaching one percent per year and euro-zone unemployment approaching ten percent per year-- that the ECB "will act, should the need arise, to prevent either inflationary or deflationary pressures..."

Thus it appears that attempts to reform institutions to eliminate inflationary bias have been successful, or perhaps that the bias toward inflation seen in the 1960s and 1970s was not so much the result (as Kydland and Prescott theorized) of the game-theoretic structure of the interaction between central bankers and the economy or (as Burns theorized) of the absence of fear of high cyclical unemployment, but instead the result of painful misjudgments about the structure of the economy and the slope of long-run Phillips curves that were corrected after the 1970s.

Why We Should Fear Deflation: Economic History

In the early 1920s most economists treated "inflation" and "deflation" as symmetric

...evils to be shunned. The individualistic capitalism of today, precisely because it entrusts savings to the individual investor and production to the individual employer, *presumes* a stable measuring rod of value, and cannot be efficient--perhaps cannot survive--without one.

Deflation was dangerous because entrepreneurs were necessarily long real and short nominal assets:

...the business world as a whole must always be in a position where it stands to gain by a rise... and to lose by a fall in prices.... [The] *regime* of money-contract forces the world always to carry a big speculative position [long real assets], and if it is reluctant to carry this position the productive process must be slackened.... The *fact* of falling prices injures *entrepreneurs*; consequently the *fear* of falling prices causes them to protect themselves by curtailing their operations; yet it is upon the aggregate of their individual estimations of the risk, and their willingness to run the risk, that the activity of production and of employment mainly depends...

The fact of falling prices bankrupted entrepreneurs. The fear of falling prices led them to unwind their positions, close down productive operations, and reduce output and employment.

The coming of the Great Depression, however, shifted economists' focus away from balanced fears of inflation and deflation and to the conclusion that deflation was deeply dangerous, and to be avoided at all costs. Economists' analyses of the root causes of the Great Depression were (and continue to be) widely divergent. Nevertheless, almost every analyst of the Great Depression placed general deflation--and the chain of financial and real bankruptcies that it caused--at or

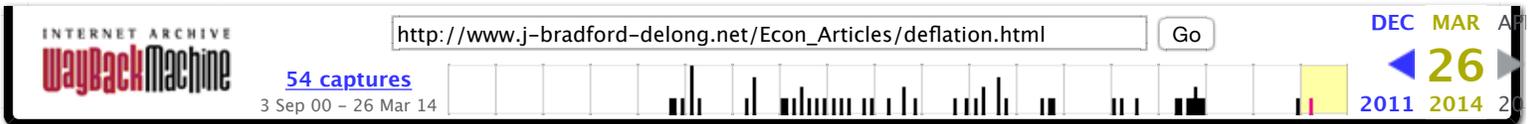
near the heart of the worst macroeconomic disaster the world has ever seen.

Each analysis focused on a different channel. Irving Fisher stressed that past deflation meant bankruptcy or near-bankruptcy for leveraged operating companies and nearly all financial institutions. Friedman and Schwartz stressed the harm inflicted by deflation on banks' balance sheets by reducing the nominal value of collateral and diminishing debtors' ability to service loans: resulting financial-sector bankruptcies led to sharp rises in reserves-to-deposits and currency-to-deposits ratios, lowering the money stock and aggregate demand in the absence of adequate Federal Reserve response. Peter Temin focused on rising risk premia on corporate debt over 1929-1933: deflation-driven corporate balance sheet deterioration increased risk and drove a wedge between low short-term interest rates on safe assets like government bonds and high long-term interest rates on corporate debt.

Barry Eichengreen wrote of the fear that countries would depreciate their currencies, and how this fear forced country after country to adopt deflationary policies to reduce the price level and shrink the money supply. Charles Kindleberger wrote of how currency depreciation exerted deflationary pressures: a small country that reduced the value of its currency discovered that its businesses and banks had borrowed abroad *in gold*, and could no longer service their debts. Christina Romer argued that even those who were not heavily long equities found it advisable to cut back on spending and increase liquidity margins in the aftermath of the 1929 stock market crash.

All of these channels share common features. First is that nominal interest rates cannot fall below zero. Hence banks could not respond to anticipated deflation by paying negative interest on deposits: if they could, then the key banking-crisis channel that Friedman and Schwartz see as the principal cause of the Great Depression would have been much weaker. Businesses could not rewrite their debt contracts *ex post* to diminish the effect of falling demand and prices on their balance sheets: if they could, then the wedge between Treasury and corporate interest rates that Peter Temin focuses on would have been much smaller. Exchange rate depreciation did not, in 1931 any more than in 1997, carry with it a writing-down of the hard money or hard currency debts that domestic firms owed to foreign nationals: if it had, then the channel that Kindleberger notes would have been much weaker. The increases in uncertainty and falls in consumer wealth that Romer focuses on would have had only trivial effects on purchases of durable commodities had not consumers feared that in the future they might want to have very liquid balance sheets of their own.

Second is a common focus on financial fragility: the belief that the interruption of the chain of financial intermediation has



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the work), of operating companies (as in Keynes's or Fisher's stories of entrepreneurs unhedged against price level declines), of banks themselves (as in Temin, in which the deterioration of bank debtors' balance sheets does the work), of companies with foreign liabilities (as in Kindleberger), or of consumers who no longer dare to be short in nominal terms to finance their purchases of durable assets (as in Romer).

In all of these channels sharp deterioration in debtor balance sheets leads to desires on the part of both debtors and creditors to unwind their positions and boost their liquidity, and to sharp reductions in business investment and consumer spending.

Economists do not have satisfactory theories of why borrowers choose to borrow and lenders choose to lend in unstable units of account, or of why demand is so sensitive to credit-market disruptions. Economic theory tells us that debt contracts are good ways to reduce the principal-agent problems that arise when investors confront entrepreneurs and managers who have vastly greater knowledge of a firm's circumstances and opportunities. Economic theory tells us that when borrowers' balance sheets are impaired such debt contracts no longer work. But there is no theoretical reason why such contracts should be written in potentially unstable units of account, or why they should not condition on observed macroeconomic variables.

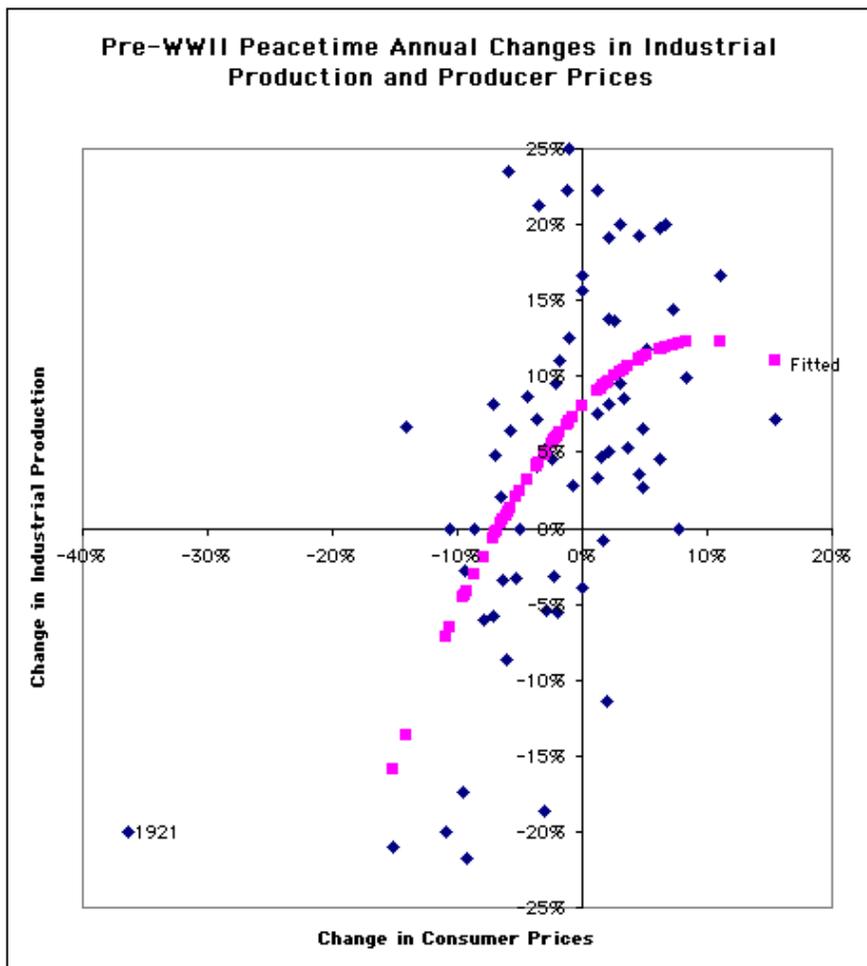
Nevertheless, debtors borrow and creditors lend in nominal terms--whether consumers financing purchases of durables, banks taking deposits from households, real estate developers pledging land and property as collateral, or companies borrowing from banks. Such debt contracts interpret nominal deflation and the consequent difficulty in servicing or repaying the loan as a signal that the debtor has failed to properly manage their enterprises, and hence that the enterprise needs to be restructured or liquidated.

This confusion of nominal deflation with entrepreneurial failure is what makes a deflation such a dangerous exercise.

How dangerous? We do not know. We do not know how financially-fragile the U.S. economy is today, either in the sense of how vulnerable financial-sector and non-financial-sector entrepreneurial net worth is to deflation or how much reduction in aggregate demand would be caused by impaired financial-sector and non-financial-sector balance sheets. The U.S. economy has not experienced deflation since World War II. We know that economic historians blame debt-deflation and

financial-fragility channels for the greatness of the Great Depression. We have no reliable evidence on the strength of these channels today.

The (relatively poor) data on aggregate movements in production and prices before World War II can be used to support the claim that the association of price changes and output changes is non-linear, with larger falls in prices associated with proportionately greater falls in output. A simple regression of peacetime annual changes in industrial production on the change and the squared change in the wholesale price index is certainly not inconsistent with the existence of a powerful non-linear deflation channel--as long as the World War I years are excluded, and as long as 1920-1921 is excluded as well.



Source: NBER Macro History database.

There is sound reason for the exclusion of the 1920-21 data point as an outlier. Coming immediately after the World War I inflation, the 1920-21 deflation came before businesses and financial institutions had had sufficient opportunity to

rebalance their portfolios and readjust their degrees of leverage. Thus financial and non-financial balance sheets were unusually strong, and financial and non-financial net worth were unusually high in 1920-1921. The economy was thus less vulnerable to the channels through which deflation reduces production: the fact that 1920-1921 does not fit the correlations found in the rest of the data can be read as evidence for, not evidence against, the importance of debt-deflation channels back before World War II.

But an economist willing to try hard enough can always find sound reason for excluding an influential and inconvenient observation.

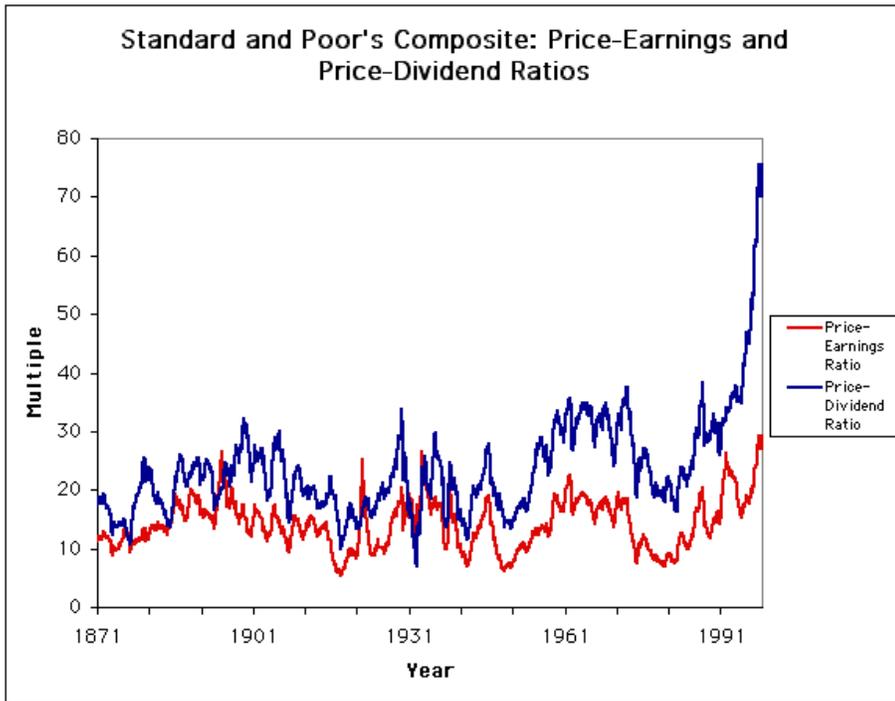
Moreover, these (relatively poor) pre-World War II data on industrial production and wholesale price index changes are of doubtful relevance for the U.S. economy today. And we lack data and convincing theory needed to identify how much of the correlation between changes in prices and changes in industrial production back before World War II reflects movements along an aggregate supply curve and not any destructive consequences of deflation.

Why We Should Fear Deflation: Present Vulnerability

Alternative Channels that Impair Balance Sheets

If the danger of deflation springs from its effect on net worth and depends on the degree of financial fragility in the economy, then economies may well have more to fear than declines in broad goods-and-services price indices alone. If securities and real estate holdings have been pledged as collateral for debt contracts, then large-scale asset price declines also trigger the confusion of macroeconomic events with entrepreneurial failure that makes deflation feared.

Is the United States today potentially vulnerable to large-scale asset price declines in this way? In real estate no. In the stock market yes. Perhaps fundamental patterns of equity valuation have truly changed, as investors have recognized that the equity premium over the past century was much too large--in which case stock prices have reached a permanent and high plateau. But it seems more likely that there are substantial risks of stock market declines on the order of fifty percent back to Campbell-Shiller fundamentals.



Source: Robert Shiller (1987), *Market Volatility*.

A second source of potential deflation-like pressure--seen during Sweden's exchange rate crisis of 1992, during Mexico's exchange rate crisis of 1994-5, during the East Asian crises of 1997, as well as in Great Depression-era events like the Austrian financial crises of 1931--arises out of large-scale foreign-currency borrowing by banks, companies, and governments in countries whose exchange rates then sharply depreciate.

Exchange rate depreciation is a standard reaction to a sudden fall in foreign demand for a country's goods and services exports (on the current account) or property (on the capital account). When demand for a private business's products falls, the business cuts its prices. When demand for a country's products falls, a natural reaction is for the country to cut its prices, and the most way to accomplish this is through exchange rate depreciation.

But if governments, banks, and non-financial corporations have borrowed abroad in hard currencies, depreciation writes up the home-currency value of their debts and impairs their balance sheets in the same fashion as conventional goods-and-services price index deflation.

We know that other countries certainly have been vulnerable to this form of financial market disruption. Is the U.S. vulnerable? Not today. U.S. gross external obligations of \$7 trillion or so are overwhelmingly equity or dollar-denominated investments. But will they still be dollar-denominated come the end of the year 2000, when they will amount to perhaps \$9

trillion, and when these gross obligations are part of a net investment position of more than -\$2 trillion?

The Limits of Monetary Policy

Moreover, even a pure commodity price deflation may not be as unlikely as we hope.

How adept is monetary policy at controlling the price level? The answer has always been--or at least since Milton Friedman stated that monetary policy works with "long and variable lags"--"not very." Power and precision are two different things.

Modern estimates of the impact of monetary policy shocks on production, employment, and the price level continue bear out this assessment. Authors like Christiano, Eichenbaum, and Evans are very pleased that they find substantial agreement on the qualitative impact of changes in monetary policy (as measured by the short-term interest rates that the Federal Reserve actually controls) "in the sense that inference is robust across a large subset of the identification schemes that have been considered in the literature." But the confidence intervals surrounding their point estimates are large. Moreover the time delay in the effect of a change in monetary policy is large as well: not until some eight quarters after the initial interest rate shock has the impact of a change in interest rates had anything near its long-run effect on the rate of inflation (or deflation). According to Christiano, Eichenbaum, and Evans, a one percentage point upward shift in the federal funds rate is associated with a less than one tenth of one percent decrease in the annual rate of inflation even ten quarters out.

Monetary policy remains the tool of choice for stabilization policy. The lags associated with Presidential and Congressional changes in spending plans and tax rates are even longer and more variable than the lags associated with monetary policy. But in the United States today monetary policy has no appreciable effect on the rate of price change for a year and a half after its implementation, and has nothing close to its full long-run effect on the rate of price change until two and a half years have passed. Moreover, there are important policy recognition and policy formulation lags as well in the making of monetary policy. The FOMC's reliable information flow is at least one quarter in the past. The FOMC is a committee that moves by consensus guided by its chair, and committees that move by consensus rarely act quickly.

How Large Are Price Level Shocks?

If we today could reliably and precisely forecast what the price level would be two and a half years hence, the long and variable lags associated with monetary policy would not be worrisome. But we cannot do so. In the years since 1950 the standard deviation of the price level two and a half years hence is 6.6%. A little of this variation can be attributed to systematic policy. Conditioning on the level of CPI inflation today accounts for less than a third of the two and a half-year-ahead variance in the price level, and reduces the standard error of the price level two and a half years out to only 5.5%. Conditioning on both inflation and unemployment reduces the standard error of the price to only 5.4%. And conditioning on inflation, unemployment, and current nominal interest rates reduces the standard error only to 4.8%.

The most significant improvement in forecasting comes from conditioning on the identity of the Federal Reserve Chair, which reduces the standard error to 3.8%. But fitting a step function to any process will improve the fit. I see little in the views and characters of Arthur Burns and Alan Greenspan that would lead the replacement of the first by the second to generate an immediate nine percent fall in one's estimate of the price level two and a half years out. It strains credulity to believe in a +26 percent effect on the price level from any chair, even G. William Miller.

TABLE 1: STANDARD DEVIATION OF 30-MONTH-AHEAD PRICE LEVEL CHANGES

Standard Deviation and Conditioning Variables

6.6%: --None--

5.5%: 12-mo inflation rate

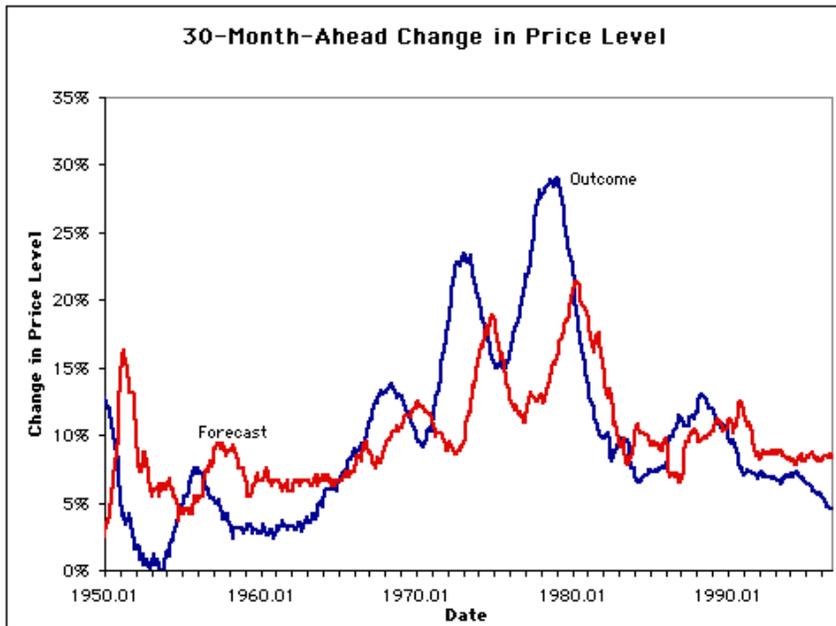
5.4%: 12-mo inflation rate, capacity utilization rate

5.3%: 12-mo inflation rate, unemployment rate

4.8%: 12-mo inflation rate, unemployment rate, federal funds rate

4.8%: 12-mo inflation rate, unemployment rate, federal funds rate, 10-yr Treasury rate

3.8%: 12-mo inflation rate, unemployment rate, identity of Federal Reserve chair



Nevertheless, even a 3.8% standard deviation tells us that--if the normal distribution applies appropriate--that there is once chance in twenty that the price level two and a half years hence will be more than seven and a half percent higher or lower than we forecast. At current rates of inflation, an unanticipated fall in the price level of more than five percent before the Federal Reserve can react seems to be an event that would happen once every forty years. Is this a high risk of a serious deflation? No, but it is large enough to be worrisome.

Reasons for Confidence

Is such instability enough to make a debt-deflation spiral set in motion by unanticipated commodity price declines a serious threat? Probably not.

First, it may well be that it takes a bigger economic shock to induce a certain amount of deflation than it takes to induce the same amount of accelerating inflation or of disinflation. If so, calculations of price-level variability from an era of accelerating inflation and disinflation are unreliable guides to the potential for deflation. It takes a much greater contractionary impulse to cause deflation than to cause disinflation.

Second, a large chunk of the post-1960 variance in changes in the rate of inflation comes from the relatively narrow period of the turbulent 1970s. The years between 1971 and 1983 inclusive--one third of the sample--account for ninety percent of the squared deviations of CPI inflation around its mean.

Since 1984 the standard deviation of two-and-a-half year ahead changes in CPI inflation is only a third the full-sample standard deviation. Perhaps episodes of variability like the 1970s oil shocks and the breakdown of confidence in the Federal Reserve's commitment to price stability will not happen again because of increasing levels of knowledge about how to make monetary policy.

It is easy to make such arguments in the United States, where monetary policy makers have been skillful and astonishingly lucky over the past decade. It is, however, harder to make this argument from policy making competence elsewhere in the world. In Japan producer prices are 5% lower than they were a year ago, and over the past three months have fallen at a rate of 10% per year. Estimates of the output gap relative to potential in Japan today range between 8 and 25 percent of current GDP. In the euro zone inflation is less than one percent per year, and unemployment approaches ten percent. These macroeconomic problems are different from those of the 1970s. They are not less serious. And they do not appear to be consistent with greatly increased skill in the making of monetary policy.

Conclusion

Our ability to forecast and control the price level at a time horizon that corresponds to the effective range of monetary policy is low. Our policy instruments are powerful, but they are imprecise and are subject to long and variable lags. Moreover, other sets of circumstances than general goods-and-services price declines alone could set in motion the economic processes that we fear from deflation.

Thus there seems to be reason to fear deflation.

But there is no reason--at least not yet--to be very afraid. The institutional structures of our labor market provide us with insurance against debt-deflation as in the argument of Akerlof, Dickens, and Perry (1996)--although note that this insurance comes at a substantial price: in their model the natural rate of unemployment rises substantially as the inflation rate hits zero. The relatively high price level variability of the 1970s may truly be a thing of the past, not a thing to fear in the future.

But if the volatility of the 1970s does come again, and if deflation is not much harder to cause than disinflation, and given that monetary policy is an imprecise instrument that works with long and variable lags, what then? If your loss function is asymmetric--if moderate deflation is much more damaging than moderate inflation--and if the variance of

outcomes around targets is large, then the conclusion is obvious: good monetary policy should aim for a rate of price level change consistently on the high side of zero.

After all, in a still-impooverished world, it is worse to provoke unemployment than to disappoint the rentier.

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