Deflation: Economic Significance, Current Risk, and Policy Responses

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Summary

Deflation is a decline in the overall level of prices. It would not be unusual for prices to fall in a particular sector because of rising productivity, falling costs, or weak demand relative to the wider economy. Deflation occurs when price declines are so widespread and sustained that they cause a broad-based price index such as the Consumer Price Index (CPI) to decline for more than one or two quarters. Such a continuous decline in the price level is more troublesome because it can increase economic uncertainty, distort resource allocation, and cause economic output to fall and unemployment to rise. Japan's deflation in the 1990s is a recent example of the possible economic cost of a steadily falling price level. A more extreme example of deflation's malign effect on economic activity was the Great Depression of the 1930s.

However, there are also examples of relatively benign deflations when economic activity expanded despite a falling price level. For instance, from 1880 through 1896, the U.S. price level fell about 30%, but this was coincident with a period of strong economic growth. Whether a deflation is on balance malign or benign most often will hinge on whether the force generating the falling price level is collapsing aggregate demand or accelerating aggregate supply. Both forces exert downward pressure on the price level but have opposite effects on the level of economic activity.

There are several channels through which deflation can dampen economic activity. First, a falling price level will *increase the "real" cost of inputs*, raising the unit cost of production. Second, deflation will tend to *increase "real" interest rates*, causing a dampening of credit supported economic activity. Third, deflation will *increase the real debt burden* of businesses and households that already hold debt because they will be repaying the loan principal with dollars of rising real value.

Deflation can be transmitted across countries and magnify its adverse impact. This transfer is most likely to occur in a system of fixed international exchange rates such as under the Gold Standard in the 1920s and 1930s. Expectations about the future path of the price level are key to both the persistence and the cure of deflation. Measures can also be taken that are aimed directly at influencing investor expectations of future inflation.

Over the last year, the U.S. economy has received a substantial negative demand shock from the combined impact of the financial fallout of the bursting of the housing price bubble in 2006 and a cyclical downturn of the economy beginning in late 2007. What is the risk of deflation? Several indicators can be used to assess the risk of deflation: (1) measures of aggregate price behavior; (2) measures of the output gap; (3) measures of asset market prices; (4) measures of credit and monetary conditions; (5) the path of the exchange rate; (6) the proximity of nominal interest rates to the zero bound; and (7) estimates of investor expectations for future movement of the price level.

Economic policy can contain or mitigate the negative effects of a deflation caused by a negative demand shock. The government can take actions to support current aggregate spending that will exert sufficient upward pressure on the future price level. There are three classes of policy response to deflation. One, the conventional macroeconomic policy tools of monetary and fiscal policy; two, greater use of the Fed's traditional role of "lender of last resort"; and three, the use of "extraordinary measures" involving direct interventions into markets by the federal government.

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Background

Deflation is a decline in the overall level of prices. It would not be unusual for prices to fall in a particular sector because of rising productivity, falling costs, or weak demand relative to the wider economy. For example, although the overall price level of the U.S. economy from 1998 through 2008 increased about 34%, the price of computers over the same period fell nearly 76% due to steadily falling production costs. Similarly, due to weak demand the price of gasoline has fallen about 33% over the past six months. But such declines are rarely a problem for the overall economy, and do not constitute deflation. Deflation occurs when price declines are so widespread and sustained that they cause a broad-based price index such as the Consumer Price Index (CPI) to steadily decline for more than one or two quarters.

Such a continuous decline in the price level is more troublesome because it can increase economic uncertainty, distort resource allocation, and cause economic output to fall and unemployment to rise. Japan's deflation in the 1990s is a recent example of the possible economic cost of a steadily falling price level. From 1992 through 2001, Japan's price level fell 0.5 % per year on average and real GDP growth averaged only 1.0% per year. This compares to average growth rates for the Japanese economy of 4% to 5% in the 1970s and 1980s. A more pointed example of deflation's malign effect on economic activity was the experience of the United States in the Great Depression of the 1930s. From the 1929 stock market crash to the economy hitting bottom in1933, the price level fell about 25%, real GDP fell about 30%, and the unemployment rate increased from 4% to near 25%.

However, there are also examples of relatively benign deflations when economic activity expanded despite a falling price level. For instance, from 1880 through 1896, the U.S. price level fell about 30%, but this was coincident with a period of strong economic growth, with real GDP advancing 5.0% per year on average. More recently, China from 1998 through 2003 achieved particularly rapid economic growth along with a steadily falling price level.

Whether a deflation is on balance malign or benign most often will hinge on whether the force generating the falling price level is collapsing aggregate demand or accelerating aggregate supply. Both forces exert downward pressure on the price level but have opposite effects on the level of economic activity. The U.S. deflation in the late 19th century and that of China over the last decade occurred because aggregate supply was expanding faster than aggregate demand, exerting downward pressure on the price level but also causing output and employment to increase. Such positive supply side shocks typically emanate from technological innovation, rising productivity, or trade liberalization.

In contrast, Japan's recent deflation and the U.S. deflation in the 1930s occurred because of shortfalls of aggregate demand, exerting downward pressure on the price level, but also reducing output and employment. Such a negative demand shock could be caused by a severe cyclical downturn, the bursting of an asset price bubble, or overly tight macroeconomic policies.

With a sharp negative demand shock economic agents come to see the current price level to be too high relative to the expected future price level, inducing them to postpone current purchases until prices fall further, leading to a slowing of current expenditure and current economic

activity.[1] The slowing of current expenditure will tend to decrease the current price level, but once current prices start to fall the *expected* future price level may also fall, setting in motion a self-reinforcing dynamic that will amplify the decline of prices and output. The economy may ultimately reach a point at which the current price level has fallen sufficiently (i.e., sufficient deflation has occurred) relative to the expected future price level to boost current spending. But this fall could be a protracted and very disruptive process.[2]

How Deflation From a Negative Demand Shock Hurts Economic Activity[3]

There are several channels through which deflation generated by a negative demand shock can dampen economic activity. First, if nominal prices of inputs, particularly wages, tend to fall slowly, a falling price level will *increase the "real" cost of inputs*, raising the unit cost of production. The combination of falling product prices and rising production costs narrows profit margins and causes firms to reduce production and employment. The degree of inflexibility of nominal input prices will determine the size of this dampening effect caused by deflation—the more inflexible are input prices the larger will be the decline in output and employment.

Second, a negative demand shock deflation will tend to *increase "real" interest rates*, causing a dampening of credit supported economic activity such as business investment, consumer durables, education, and housing. To understand this adverse process, it is necessary to recognize that "nominal" interest rates, the rate the lender charges the borrower, most often reflect two components: a real return to saving and an adjustment for the expected change in the price level. The nominal interest rate measures the cost of a loan in dollars, whereas the real interest rate measures the cost in terms of actual purchasing power. Therefore, if the nominal interest rate is 5% and there is the expectation of a 3% inflation, then the real interest rate is 2%. If there were an increase in the expected rate of inflation, the nominal rate would tend to rise accordingly to preserve purchasing power, and leave the real interest rate unchanged. Moreover, there is no upper bound to nominal interest rates in response to a rising rate of inflation.

In contrast, with deflation, nominal rates would tend to fall and if the expected rate of deflation is equal to or greater than the real interest rate the nominal rate would fall to zero. However, the nominal interest rate will not fall below zero because lenders would not accept a negative interest rate on a loan when they could instead just hold cash. For borrowers, however, the real interest rate on a loan will equal the expected rate of deflation. If the rate of deflation is 5%, then the real cost of funds borrowed at a zero nominal interest rate would be 5%. If the expectation of deflation rises to 10% then the real cost of borrowing rises to 10%.

[1] The price of current goods in terms of future goods indicates the rate at which economic agents are willing to give up future goods in order to consume more in the current period and is equivalent to the real interest rate. This relationship implies that in these circumstances the real interest rate can be too high even if the nominal rate is near zero.

[2] A lower relative price of current goods to future goods could also be achieved through an increase in the expected price of future goods. However, expectations of future prices may be slow to change unless actively influenced by current or announced future economic policy actions.

[3] Deflation generated on the demand or supply side of the economy tends to dampen economic activity. The difference in overall effect, whether benign or malign, depends on whether the associated impact on output generates offsets to that dampening. The increase in output caused by a positive supply shock generates forces to offset the dampening effect of deflation. The decrease in output caused by a negative demand shock does not generate these offsetting forces.

For this reason, even though the nominal cost of borrowing is zero, a deflation can raise the real cost of borrowing to a prohibitive level, causing decreases in credit supported spending by businesses and households that lead economic activity to slow further. For example, nominal interest rates declined to near zero over the course of the economic decline from 1929 to 1933 but because of the rapidly falling price level real interest rates increased sharply, and accordingly interest sensitive spending by businesses and households plummeted.

Third, a negative demand shock deflation will *increase the real debt burden* of businesses and households that already hold debt because they will be repaying the loan principal with dollars of rising real value.[4] With negative demand shock induced deflation it is unlikely that the debtor's rising debt burden would be offset by an increased capacity (increased profits or increased wages) to service the debt. Moreover, if the deflation is accompanied by falling asset prices, the real losses of debtors will not be the gains of creditors because the collateral held by lenders likely will also be losing value. In an environment of rising debt burdens and falling collateral value, delinquencies, defaults, and bankruptcies will increase, causing a deterioration of the balance sheets of banks and other financial institutions.

Lenders will find it increasingly difficult to distinguish between good and bad risk, possibly leading them to raise finance charges and cut back on the volume of lending, perhaps to the point of "disintermediation" at which funds stop flowing through the financial system. A reduction in the flow of credit will also tend to slow aggregate spending and dampen economic activity. In the Great Depression, thousands of banks would fail and cause a major reduction in the flow of credit needed to support much economic activity.

International Transmission of Deflation

Deflation can be transmitted across countries to magnify its adverse impact. This transfer is most likely to occur in a system of fixed international exchange rates such as under the Gold Standard that prevailed in the 1920s and 1930s. Under that system, trade imbalances caused international gold flows, gold outflows from countries with trade deficits and gold inflows to countries with trade surpluses. Gold inflows tended to increase the surplus country's money supply and raise its price level, while gold outflows tended to decrease the deficit country's money supply and reduce its price level. The change in relative prices would then work to correct the trade imbalance and stop the flow of gold.

To ensure that this adjustment was timely and orderly, central banks would intervene. With a gold outflow, a finite gold stock, and the need to forestall even the suspicion of having to devalue its currency, the deficit country would most often be under greater pressure to intervene. The intervention would entail the central bank of the deficit country reducing the money supply and raising interest rates to slow the economy, push down the price level, and improve the competiveness of domestic goods.

This adjustment process would prove to be very costly in the 1930s. The deflation that accompanied the sharp contraction of the U.S. economy at that time made American goods ever more attractive to foreigners, whereas falling income reduced U.S. demand for foreign products. Gold flows out of other countries toward the United States intensified. To stem the gold outflows

[4] Conversely, any recipient of a fixed nominal payment, such as a defined benefit pension, would have the purchasing power of that payment increased by deflation.

foreign central banks reduced their money supplies and raised interest rates, slowing their economies. Maintaining the gold standard had forced other countries to deflate and reduce output along with the United States.

Such international transmission is less likely within a regime of flexible exchange rates, as used by most major economies today, that allows independent policy action. However, China, with an essentially fixed exchange rate, did transmit its recent deflation caused by a positive supply shock to other countries through lower export prices, causing some slowing of inflation in the economies of its trade partners. However, because imports are a relatively small fraction of total spending and because of the stimulus to total spending generated by the increase in real income caused by the improved terms of trade, the overall deflationary impact in the United States and other advanced economies tended to be modest. Had China let its exchange rate appreciate, the deflation in China might of been more severe. [5]

The Role of Expectations

Expectations about the future path of the price level will be key to both the persistence and the cure of deflation. As an expectation of further deflation gets built into the system, it can create a self-reinforcing downward spiral leading to a deep and prolonged economic slump. To avoid that outcome, government would likely need to take policy actions that not only counter the negative demand shock and restore the normal flow of credit to the economy, but also create the expectation among economic agents that the future price level will be higher than the current price level. In other words, create the expectation of inflation rather than deflation.

Why Deflation Caused by a Positive Supply Shock is More Benign

Unlike negative demand shocks, positive supply shocks generate increases in the level of output that offset the negative effects of deflation. For example, a productivity induced deflation does not reduce profit margins because the decline in output prices is countered by a productivity induced decline in the per unit cost of production. In addition, workers benefit from the productivity increase because it boosts their marginal product, tending to increase their real wage. Nominal wage increases are contained because the increase in the real wage comes through the falling price level.

Further, increased productivity tends to increase real interest rates, which provides an offset to the downward pressure on nominal interest rates, and helps to prevent nominal rates from hitting the zero bound.

Also, the problems for the financial sector caused by deflation raising real debt burdens is offset by increased real income, and the deterioration of financial institutions' balance sheets caused by falling collateral values is minimized because the increase in productivity also increases the expectation for current and future earnings which tends to preserve or improve the value of

[5] See Steven B. Kamin, Mario Marazzi, and John W. Schindler. *Is China "Exporting Deflation"?*, Board of Governors of the Federal Reserve System, International Finance Discussion Paper Number 791, January 2004.

collateral. These offsets may not be complete across all sectors of the economy and the tendency of deflation to favor lenders over borrowers may still cause some redistribution of income.

Conceptually, deflation generated by a positive supply shock could be prevented by an increase in the money supply sufficient to accelerate nominal spending and exert a measured degree of upward pressure on the price level. In the 19th century, under the Gold Standard, a relatively fixed supply of gold often constrained countries from expanding their money supplies to counteract deflation.[6]

The Current Risk of Deflation in the United States

Over the last year, the U.S. economy has received a substantial negative demand shock from the combined impact of the financial fallout of the 2006 bursting of the housing price bubble and a cyclical downturn of the economy beginning in late 2007. What is the risk that the associated decrease in aggregate spending will lead to deflation? Several indicators can be used to assess the risk of deflation: (1) measures of aggregate price behavior; (2) measures of the output gap; (3) measures of asset market prices; (4) measures of credit and monetary conditions; (5) the path of the exchange rate; (6) the proximity of nominal interest rates to the zero bound; and (7) estimates of investor expectations for future movement of the price level. Consider the recent behavior of each class of indicator.[7]

Aggregate Price Behavior

A steady fall of the aggregate price level as evidenced by movement in the CPI or the Producer Price Index (PPI) is the clearest and most direct indicator of disinflationary pressure in the economy. Be mindful that the CPI and other aggregate price indexes for a number of reasons likely have an upward bias in the range of 0.5 to 1.0 percentage points.[8] Therefore, measured inflation of less than 1 percentage point makes it likely that the economy is actually experiencing either zero inflation or mild deflation.[9]

In each of the past three months of 2008, the "headline" CPI fell, down 1.0% in October, 1.7% in November, and 0.7% in December. However, this fall is largely a reflection of energy prices coming down from their mid-year peak. The "core" CPI, that excludes often volatile food and energy prices, tells a somewhat different story. It was essentially unchanged over the last three months of 2008, recording changes of -0.1%, 0.0%, and 0.0% respectively. In recent years, this index has typically increased in a range from 0.1% to 0.2% per month. The year-end weakening in this index represents a break from that pattern, and given the index's upward bias, could be

[6] For further discussion of benign deflation see, David Beckworth, "Aggregate Supply-Driven Deflation and Its Implications for Macroeconomic Stability", *Cato Journal, vol. 28,* (Fall 2008).

[7] For further discussion of evaluating the risk of deflation see, "Deflation: Determinants, Risks, and Policy Options—Findings of an Interdepartmental Task Force", International Monetary Fund, April 30, 2003.

[8] See CRS Report RL30074, *The Consumer Price Index: A Brief Overview*, by Brian W. Cashell.

[9] The CPI and the PPI do not measure price change for a comparable set of items. The PPI includes price changes for producers durable equipment, which are not covered by the CPI. The CPI includes services that are not reflected in the PPI and it also measures the price of imports which are not measured by the PPI. The source for CPI and PPI data and related information is the U.S. Department of Labor, Bureau of Labor Statistics.

evidence of incipient deflation, but this behavior has occurred over too short a time period for a reliable conclusion to be drawn.

Producer prices, the revenue received by the goods producer, often anticipate changes in consumer prices and can provide an earlier view of any impending deflation. Like the CPI, the PPI decreased significantly in the final three months of 2008, with declines of 2.7%, 2.5%, and 1.9%. However, in January and February 2009, the PPI increased 0.8% and 1.0%, respectively. Also, removing the effect of volatile food and energy prices from the PPI, observe that the core PPI increased in every month of 2008, giving no evidence of any sustained broad-based fall in producer prices.

Given that the economy has been in recession for over a year, some short-term weakening of prices might be expected, but the recent decline in the CPI appears more substantial than in recent recessions. Nevertheless, by this same point in the 1929-1933 economic collapse, the CPI had fallen more than 10% and left little doubt that a severe deflation was occurring.

Size of Output Gap

The Congressional Budget Office estimates that, without any further changes in fiscal policy, the current recession, which began in December 2007, will likely be the longest and deepest since WWII. The output gap, the difference between the level of output produced if the economy's resources were fully-employed (potential GDP) and the actual level of GDP, will average an estimated 6.8% in 2009 and 2010—amounting to lost output of about $1 trillion in each year.[10] During 2008, the unemployment rate increased by more than 2 percentage points, exceeding 8% currently, and is projected to rise to 9% in 2009. Such a substantial degree of economic weakness can be expected to exert sizable downward pressure on the price level, and arguably raises the risk of deflation. Nevertheless, the estimated current output gap is much smaller than what occurred during the Great Depression.

Asset Price Behavior

Most asset prices have fallen significantly in recent months, leaving little doubt that an "asset price deflation" is occurring. House prices have been falling since 2007 and are down about 20% on average, and are expected to fall further in 2009. Equity prices, as measured by the S&P 500 index, fell nearly 7% in 2008. However, some sub-categories of stock have experienced much larger price decreases. For example, industrial stocks fell 12.7% and financial stocks fell 28%.

The fall of asset prices has caused a major reduction in household wealth. The Federal Reserve estimates that since the third quarter of 2007 through the end of 2008, household net worth fell by more than $12 trillion, inducing a substantial weakening of consumer spending.[11] Falling asset prices have also caused a large deterioration of the balance sheets of financial institutions, generating a major financial crisis that has caused access to credit to fall precipitously and the cost of credit to rise sharply. From the third quarter of 2007 through the end of 2008, net credit market borrowing and lending decreased $2.4 trillion, or nearly 46%. Despite more than $1.0

[10] Congressional Budget Office, The Budget and Economic Outlook:Fiscal Years 2009 to 2019, January 2009. Note that real time output gap estimates and forecasts are notoriously inaccurate.

[11] Board of Governors of the Federal Reserve System. *Flow of Funds Accounts, Table B.100.*

trillion of liquidity injections by the Federal Reserve, the interest rates that affect household and business spending either stayed flat or increased. In response, aggregate spending has slowed sharply, exerting more downward pressure on the price level. Nevertheless, while an asset price deflation will often accompany a deflation, by itself it is not evidence of deflation.[12]

Exchange Rate Behavior

The dollar exchange rate depreciated about 30% from 2002 through 2007, increasing the dollar price of imports and exerting upward pressure on the price level in the process. In 2008, however, the dollar appreciated about 6%, but given the normal lags, this appreciation is not likely to have exerted much downward pressure on prices so far. If a global "flight to quality," amidst the global economic slowdown, keeps the demand for U.S. Treasury securities strong, the dollar will likely continue to rise and exert more downward pressure on the price level.

Monetary Aggregates and Bank Reserves

In the current economic downturn, unlike during the Great Depression, the Fed has not allowed the money supply to contract. With weakening balance sheets financial institutions will attempt to increase liquidity and accumulate excess reserves rather than lend. This shift in behavior tends to decrease the money supply and exert more downward pressure on economic activity and prices. All measures of the money stock increased substantially during 2008. For the 12 months ending in February 2009, the money stock measures M1 and M2 have increased 13.7% and 9.8% respectively.[13] Also, unlike in the Great Depression, the Fed has aggressively assumed the role of "lender of last resort" and injected nearly $1 trillion of liquidity into the banking system, avoiding the 8000 bank failures that occurred during the deflation of the 1930s.

Proximity to Zero-Bound

The federal funds rate, the short-term interest rate the Fed targets to implement monetary policy, is currently between 0% and 0.25%, near or very close to the zero bound for nominal interest rates. At the zero bound for nominal interest rates, deflation can sharply increase real interest rates. Also, at this point the Fed's normal means of countering this rise, namely adjusting nominal interest rates downward, is not operational.

Price Level Expectations of Investors

An estimate of whether investors in long-term securities are expecting inflation or deflation can usually be gleaned from the relationship between Treasury securities and inflation indexed bonds. The yield on the latter has sometimes been used as a proxy for the real interest rate. Therefore, if the nominal rate on the Treasury security is higher than the inflation indexed rate, investors are thought to be expecting inflation as measured by the premium of the nominal rate over the

[12] For further discussion of asset price deflation and economic activity see, CRS Report R40007, *Financial Market Turmoil and U.S. Macroeconomic Performance*, by Craig K. Elwell.

[13] Board of Governors of the Federal Reserve System. Statistical Release H.6, Table 1.

inflation indexed rate. On the other hand, if the nominal rate is below the inflation indexed rate then investors are expecting deflation.[14]

Through mid-2008, nominal yields and inflation indexed yields both declined with the nominal yield remaining about 2 percentage points above the inflation adjusted yield. However, in the final months of 2008, their paths diverged with the inflation adjusted yield rising and moving above the nominal yield. Such a change in their paths could be the result of particularly high liquidity premium for the inflation adjusted securities which have a smaller trading volume than Treasury securities or changing risk premiums for the two securities, but it could also be an indicator of investors changing their expectations about the future path of prices from inflation to deflation. More recently, the nominal and inflation indexed yields have converged to about the same level, suggesting that investors have moderated their expectation of deflation.

Overall Risk of Deflation?

Taken together, these several indicators suggest that the risk of deflation has likely risen in recent months. Of particular significance is the coincidence of a large output gap, continuing asset price deflation, and the nominal federal funds rate being at the zero bound. So far, however, broad based price indexes do not reveal the price level to be falling.

Policy Responses to Deflation

How can economic policy contain or mitigate the potentially large negative economy-wide effects of a deflation caused by a negative demand shock? The simple answer is that the government can take actions to support current aggregate spending. This may exert sufficient upward pressure on the future price level to make economic agents expect future prices to be higher than current prices. That change in expectations will induce a shift in spending towards current goods and away from future goods.

There are three general classes of policy response to be applied, separately or in combination, as the severity of the deflation problem warrants. These are, first, the macroeconomic policy tools of monetary and fiscal policy; second, greater use of the Fed's traditional role of "lender of last resort;" and third, the use of "extraordinary measures" involving direct interventions into markets by the federal government. All of these policy tools have been used in response to the recent turmoil in financial markets and the economy's slide into recession. Thus whether there is deflation, a policy program is already being implemented that would counter deflationary risks.

Macroeconomic Policy

Monetary Policy

Monetary policy is the Fed's standard and most frequently used tool to exert broad-based influence on credit conditions and economic activity so as to achieve full employment and price

[14] For further discussion of this indicator see, Peter Hordahl, "Disentangling the Drivers of Recent Shifts in Break-Even Inflation Rates," ***Bank of International Settlements Quarterly Review***, March 2009.

stability. U.S. monetary policy is implemented by targeting (raising or lowering) the short-term federal funds rate, a market-determined interest rate that banks charge each other for short-term loans. The targeting of the federal funds rate is accomplished with open market operations whereby the Fed buys or sells Treasury securities for cash to increase or decrease liquidity in the financial markets thereby increasing or decreasing real borrowing costs, and consequently increasing or decreasing investment (and other credit sensitive) spending.

To fight deflation, the Fed would apply a stimulative monetary policy, with the Fed entering the federal funds market, making open-market purchases of Treasury securities from banks in exchange for cash. The infusion of cash increases the reserves (liquidity) of the banking system, exerting downward pressure on interest rates. The effect on interest rates is likely to be reflected quickly and most fully on short-term interest rates and then, hopefully, spread to longer-term interest rates.

Beginning in September 2007, in response to continuing evidence that "disruptions in financial markets" could have adverse effects on the wider economy, the Fed aggressively applied successive injections of monetary stimulus, as it purchased securities for cash and pushed down the federal funds rate from 5.25% to its current level of 0.25%. In addition, over the final six months of 2008 the money stock (as measured by M1) increased rapidly, up over 15%.

The Liquidity Trap, Monetary Policy at the Zero Bound, and Inflation Targeting

However, the stimulative effects of a much lower federal funds rate to the wider economy can be substantially muted in a time of economic crisis and long-term interest rates may not fall. This lack of a stimulative effect occurs because banks, lacking the needed degree of "confidence," are content to increase their reserves and liquidity, but not increase their lending activity and keep an adequate flow of credit (liquidity) moving to support spending in the non-financial sectors. The phrase often used to describe this lack of effect on real economic activity is that monetary policy can not get "traction."

In the economic literature, the extreme form of this phenomenon is called a "liquidity trap," a situation where the financial system's seemingly limitless appetite for short-term liquidity keeps the economy stuck in a sub-optimal equilibrium of slow economic growth that monetary policy (alone) cannot push it out of. At this extreme, monetary policy's attempt to move the economy is likened to "pushing on a string." Also, with deflation it is possible that nominal interest rates have fallen all the way to the zero bound, preventing the Fed from using normal operating procedures to apply the degree of monetary stimulus needed to stimulate aggregate spending and counter deflation.

However, there are alternative means that the Fed could employ to provide stimulus in this situation.[15] First, the Fed could try to *change financial market interest rate expectations*. The current interest rate on long-term assets depends on the entire expected future path of short-term interest rates, including the zero rate for the federal funds rate. If the central bank can persuade the public that it will hold down the short-term rate for longer than had been expected, interest

[15] See Governor Ben S. Bernanke, *Deflation: Making Sure it Doesn't Happen Here*, Remarks Before the National Economists Club, Washington D.C., November 21, 2002 and James Bullard, E*ffective Monetary Policy in a Low Interest Rate Environment*, The Henry B. Thornton Lecture, Cass Business School, London, March 24, 2009.

rates across the whole term-structure should also fall, stimulating spending. Such an outcome would hinge on whether the Fed's policy commitments are taken as credible by the public.

Second, the Fed could *alter the composition of its balance sheet*. The Fed's asset holdings are primarily of Treasury securities of different maturities ranging from 1 month to 30 years, but because its targeted interest rate for the conduct of monetary policy has been the short-term federal funds rate it has relatively large holdings of short-term securities. (The average maturity of its assets is typically around one year.) If the Fed were to shift the composition of its balance sheet toward long-term assets by selling short-term treasuries and buying long-term treasuries, it could possibly lower long-term yields to provide stimulus to economic activity. Prior to 1951, the Fed actively managed the yields on government debt including long-term bond yields. This earlier ability may give credence to the efficacy of this alternative procedure for conducting monetary policy. [16]

A third option for implementing monetary policy at the "zero bound" is to *expand the size of the Fed's balance sheet***.** This, of course, is the conventional means of conducting a stimulative monetary policy of buying securities to increase the supply of reserves in the banking system. The policy focus, however, is shifted from the price of reserves (interest rates) to the quantity of reserves. This process of increasing reserves above the level consistent with keeping the policy interest rate at zero was used by Japan during its financial crisis of the 1990s and is often called "quantitative easing."[17]

At the zero bound for nominal interest rates and ensnared in a liquidity trap, combating deflation may require the Fed to shift its operating procedure for conducting monetary policy from targeting interest rates to targeting the inflation rate. With inflation targeting, the Fed announces a *target path for the price level*. For a policy of inflation targeting to be successful the Fed must convince the markets that it is credible by vigorously and transparently pursuing policies that are consistent with reaching the inflation target. In effect, the cure for deflation is a credible promise of future inflation. The minutes of a recent meeting of the Fed's "open market committee" seem to suggest that the Fed has begun a policy of inflation targeting.[18]

Nevertheless, operation of monetary policy at the zero bound for the federal funds rate would be a passage through poorly charted waters. There remains substantial uncertainty about how well the alternative operating procedures might work, particularly given the important role often volatile

[16] For this process to work, however, investors must treat Treasury securities of different maturities as imperfect substitutes, otherwise an increase in the supply of short-term securities coupled with a like-size decrease in the supply of long-term securities in public hands would not cause a significant decrease in long-term interest rates. The evidence is limited, but it would tend to indicate that the public sees only a small degree of imperfect substitutability between short-term and long-term Treasury securities, raising doubt about the efficacy of altering the composition of the Fed's balance sheet to generate a stimulative monetary policy.

[17] Quantitative easing is thought to affect real economic activity through three channels. First, it induces a shift in investor portfolios away from cash and toward other financial assets, so it would tend to push up asset prices and push down yields. Second, by altering investor expectations about the future path of the federal funds rate by demonstrating a willingness to keep reserves high, it could (as already discussed above) induce a decrease in interest rates. Third, quantitative easing could generate a stimulative fiscal effect as the swapping of non-interest bearing currency and reserves for interest bearing Treasury debt leads to a reduction of the current and future interest cost of the federal government and a lowering of the associated tax burden on the public.

[18] See the speech by Fed Chairman Ben Bernanke, "Federal Reserve Policies to Ease Credit and Their Implications for the Fed's Balance Sheet" at the National Press Club Luncheon on February 18, 2009. On the policy of inflation targeting see, CRS Report 98-16, *Should the Federal Reserve Adopt an Inflation Target?*, by Marc Labonte.

investor expectations would play in the alternative procedure's ability to stimulate economic activity.

However, the Great Depression gives support to the belief that monetary policy can be an effective counter force to deflation. In 1933, President Franklin Roosevelt temporarily took the United States off the gold standard and freed the Fed from having to maintain high interest rates to maintain the dollar's fixed parity to gold. The dollar depreciated by about 40% over the course of 1933 and 1944. The devaluation would allow the United States to expand the money supply by about 42% between 1933 and 1937 without concern for the impact on gold flows or the exchange rate.

This monetary expansion, however, was implemented by the U.S. Treasury, not by the Federal Reserve. Under the gold standard, the Treasury was allowed to issue gold certificates, in proportion to the gold stock, that were interchangeable with Federal Reserve notes. The devaluation directly increased the nominal value of the existing U.S. stock of gold. In addition, the devaluation induced a large inflow of gold through its effects on the trade balance and the attractiveness of dollar assets. (Rising political tensions in Europe would also contribute to the attractiveness of dollar assets.) The Treasury issued gold certificates equal to the rising value of the gold stock and deposited them with the Fed. As the government spend them, they were converted into Federal Reserve notes, increasing the monetary base.

Despite nominal interest rates being at the zero bound, credit became more readily available and real interest rates were reduced, stimulating interest rate sensitive components of aggregate spending. In addition, the large monetary expansion arguably changed expectations from deflation to inflation, making prospective borrowers more confident that their debt service burden would not be increasing. In response, the economy grew strongly and brought a relatively quick end to deflation. Consumer prices moved from a decrease of 5% in 1933 to an increase of 3.5% in 1934.[19]

Fiscal Policy

Fiscal policy can support aggregate spending through an increase in the budget deficit via lower taxes and increased government spending (including both changes in discretionary spending and changes in the automatic stabilizers). A policy of fiscal stimulus would involve tax cuts or spending increases (or some combination of the two). Unlike monetary policy, which transmits its impact to economic activity indirectly through financial markets, fiscal policy has a relatively direct impact on economic activity. Increased government spending is a direct addition to aggregate spending.

A tax cut is less direct because it must first pass through household income before it boosts spending, and there is always the possibility that all or part of the tax cut is saved rather than spent by households. In addition to its effect on aggregate spending, fiscal stimulus may have an indirect positive effect on the condition of financial institutions' balance sheets as the salutary

[19] For further discussion of the role of monetary policy during the great depression, see Christina D. Romer, "What Ended the Great Depression?, *NBER Working Papers Series, No. 3829*, September 1991; Barry Eichengreen and Jeffrey Sachs, "Exchange Rates and Economic Recovery in the 1930s," *Journal of Economic History*, 45 (December 1985); and Milton Friedman and Anna J. Schwartz, *A Monetary History of the United States, 1867-1960*, Princeton: Princeton University Press, 1963.

effect on economic activity also exerts upward pressure on asset prices. To be most effective, fiscal policy initiatives would occur in conjunction with a stimulative monetary policy and any other measures (discussed below) needed to unclog the flow of credit.

Fiscal stimulus was not used to counter the collapse of the U.S. economy from 1929 to 1933. Fiscal policy became more stimulative from 1933 onward, but the degree of fiscal stimulus was modest relative to the economy's massive output gap. The output gap for the U.S. economy in the 1930s was as large as 42% of GDP, whereas the magnitude of fiscal stimulus applied during this period never exceeded 3% of GDP.[20]

In response to the current economic troubles, the U.S. government is applying a significant degree of fiscal stimulus, involving increases in government spending on infrastructure, health and education, unemployment assistance, as well as tax cuts and sizable transfers to the states. Relative to the size of the output gap, the degree of stimulus is far larger than in the 1930s. The amount of the stimulus package is tallied at $787 billion, or equivalent to 5.6% of GDP. This magnitude of stimulus compares to the current estimate of the U.S. output gap of nearly 7% of GDP.[21]

The Fed as Lender of Last Resort

In the role of "lender of last resort," the Fed offers credit to solvent but temporarily illiquid financial institutions. These are financial institutions that are solvent because the value of their assets exceeds the value of their liabilities, but because their debts tend to be short-term and liquid while their assets are long-term and illiquid, they need the ability to raise short-term funds to meet short-term debt obligations. The expectation is that with reliable access to short-term liquidity, financial institutions will be more willing and able to lend to each other and to the non-financial sectors of the economy.

The Fed's "discount window" is its facility for making loans to financial institutions with short-term liquidity problems and the "discount rate" is the interest rate charged for these loans. Financial institutions are often reluctant to use the discount window out of concern that financial market participants will draw a negative inference about their financial condition if their borrowing from the Fed becomes known.

In response to the current asset price deflation that has greatly deteriorated the balance sheet of banks and other financial institutions, the Fed has taken a number of steps to make the use of the discount window more attractive. It has broadened the group of eligible participants, it has extended the term of loans, and it has lowered the discount rate. [22] Maintaining market confidence in the financial sector also involves ensuring that any exit of firms from the sector occurs in an

[20] For further examination of fiscal policy during the Great Depression see E. Cary Brown, "Fiscal Policy in the Thirties: A Reappraisal," *American Economic Review*, 46 (December 1956).

[21] For further discussion current fiscal policy, see CRS Report R40104, *Economic Stimulus: Issues and Policies*, by Jane G. Gravelle, Thomas L. Hungerford, and Marc Labonte.

[22] Enhancements to the Fed's lender of last resort function have included the creation of the Primary Dealer Credit Facility which opened the discount window to non-member financial institutions, the Term Auction Facility to make loans to member banks based on a broader range of collateral, and the Term Securities Lending Facility to lend Treasury securities in exchange for some asset backed securities. The Fed has also entered into asset swaps with the European Central Bank and several other foreign central banks to increase dollar liquidity in foreign financial markets.

orderly way by facilitating loans to purchase troubled financial institutions. One of the reasons for the severity of the economic collapse and deflation from 1929 to 1933 was the Feds failure to aggressively undertake lender of last resort actions, allowing thousands of banks to fail and causing a contraction of the money supply.

The Fed's enhanced discount window initiatives have pumped a large volume of liquidity into the U.S. financial system. For the two-month period ending October 1, 2008, the Fed increased system-wide reserve funds by more than $800 billion, increasing total reserve funds to more than $1.5 trillion. For comparison, reserve funds increased only about $27 billion over the 12 months ending June 2008.

The Fed's ability to continue pursuing large lender of last resort activities may eventually be constrained by the changing risk profile of the central bank's balance sheet. Its recent "lender of last resort" initiatives have meant that the Fed has exchanged a sizeable portion of its holdings of low-risk Treasury securities for high-risk collateral. Although the Fed is able to hedge some of this risk, the average level of risk carried in the Fed's total asset holdings has increased.[23]

Extraordinary Measures (Large Scale Intervention)

When a deflation is accompanied by severe asset price deflation that has caused a large and widespread deterioration of the balance sheets of financial institutions and raised the level of uncertainty about risk to the point of stopping the flow of credit, the more conventional policy initiatives alone may not be enough to get credit flowing and stimulate spending. Bolder measures may be called for.

The prospect of a collapse of the entire financial system, with large negative repercussions on the wider economy, may prompt the federal government to initiate a massive intervention into the financial system to restore confidence and resume the flow of credit.

A central objective of such an intervention is to counter asset price deflation by increasing demand relative to supply for risky assets in order to stabilize their price. Arguably, the government can by these actions target, as it does the federal funds rate, the price of risk in the economy. Stabilizing the price of risk may reduce the incentive of financial institutions to hoard liquidity and induce them to return to their conventional role of borrowing short-term and lending long-term, and begin to pass a larger flow of liquidity to the non-financial sectors to support credit dependent spending and offset deflationary pressures.

In general, there are at least two ways to stop the price of risky assets from falling. First, the Treasury can reduce the supply of risky assets by buying them or guaranteeing them (a guarantee reduces the supply because it transforms a risky asset into a not risky asset). Second, the Treasury can recapitalize the financial system either through inducing it to capitalize itself through debt equity swaps or through the government taking some level of equity position in troubled financial institutions. With recapitalization, the demand for risky assets is expected to recover, exerting upward pressure on asset prices.

[23] For further discussion of recent policy actions by the Fed, see CRS Report RL34427, *Financial Turmoil: Federal Reserve Policy Responses*, by Marc Labonte.

Within this general framework, decisions must be made about what assets to buy or guarantee. In addition, decisions will be made about what price to pay for the troubled assets. The Treasury could either buy at "market price," to protect taxpayers, or it could buy at "above market price," to provide recapitalization of the assisted institution, conferring a significant benefit to that institution but none to many others.[24]

Conclusion

Deflation generated by a negative demand shock can be disruptive and costly, particularly if it gets built into price expectations that can magnify the negative impulse and increase the economic costs. The United States experience during the Great Depression and that of Japan in the 1990s gives strong testimony of this.

A variety of indicators suggest that the risk of deflation in the United States has risen over the last year. The combination of a large output gap, ongoing asset price deflation, and nominal interest rates at the zero bound have elevated that risk. Nevertheless, there is no evidence, so far, that a broad-based and sustained decrease in the price level is occurring.

Moreover, the policy responses that would counter deflation are the same policies the U.S. government has initiated in response to the recent turmoil in financial markets and spreading economic weakness from recession. All are measures aimed at directly or indirectly increasing aggregate demand to boost economic activity, but they will also work to shift consumer and business expectations from deflation to inflation and exert the upward pressure on the price level needed to counter any deflationary forces that may arise.

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[24] For further discussion of recent interventions in financial markets, see CRS Report RL34730, *Troubled Asset Relief Program: Legislation and Treasury Implementation*, by Baird Webel and Edward V. Murphy.