



Deflation: Economic Significance, Current Risk, and Policy Responses

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Summary

Despite the severity of the recent financial crisis and recession, the U.S. economy has so far avoided falling into a deflationary spiral. Since mid-2009, the economy has been on a path of economic recovery. However, the pace of economic growth during the recovery has been relatively slow, and major economic weaknesses persist. In this economic environment, the risk of deflation remains significant and could delay sustained economic recovery.

Deflation is a persistent decline in the overall level of prices. It is not unusual for prices to fall in a particular sector because of rising productivity, falling costs, or weak demand relative to the wider economy. In contrast, 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 several quarters. Such a continuous decline in the price level is more troublesome, because in a weak or contracting economy it can lead to a damaging self-reinforcing downward spiral of prices and economic activity.

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 coincided 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.

Deflation can dampen economic activity through several channels. First, a falling price level will *increase* the real (inflation adjusted) cost of inputs, raising the unit cost of production. Second, when nominal interest rates are low, as they are now, deflation could increase real interest rates, dampening 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 purchasing power.

The expectations of households and businesses about the future path of the price level will influence deflation's persistence and the difficulty of stabilizing the falling price level. The expectation of further deflation can create a self-reinforcing downward spiral that deepens and prolongs the fall of economic activity as households and businesses adjust their economic outlooks. To avoid that outcome, government would likely need to take policy actions that not only counter the current negative demand shock and constricted 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, government would need to convince economic agents to expect inflation rather than deflation.

Economic policy can in theory contain or mitigate the negative effects of a deflation caused by a negative demand shock. The conventional macroeconomic policy tools of monetary and fiscal policies could be used to support current aggregate spending and exert upward pressure on the price level. Also, greater use of the Federal Reserve's (Fed's) traditional role of "lender of last resort" can be used to reduce any deflation-induced constriction of the flow of credit that could be dampening spending by households and businesses.

Contents

Background	1
Deflation from a Negative Demand Shock Hurts Economic Activity	2
International Transmission of Deflation	4
The Role of Expectations	4
Deflation Caused by a Positive Supply Shock is More Benign	5
The Current Risk of Deflation in the United States	5
Aggregate Price Behavior	6
Size of Output Gap	7
Asset Price Behavior	7
Exchange Rate Behavior	8
Monetary Aggregates and Bank Reserves	8
Proximity to Zero Bound	9
Price Level Expectations of Investors	9
Overall Risk of Deflation	9
Policy Responses to Deflation	10
Macroeconomic Policy	10
Monetary Policy	10
The Fed as Lender of Last Resort	13
Fiscal Policy	14
Conclusion	15

Contacts

Author Contact Information	16
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Background

Despite the severity of the recent financial crisis and recession, the U.S. economy was able to avoid falling into an even more damaging deflationary spiral. Since mid-2009, the economy has been on a path of economic recovery. However, the pace of economic growth during the recovery has been relatively slow and major economic weaknesses persist. In this economic environment, the risk of deflation, albeit reduced from what it was during the previous period of economic contraction, remains significant and could be a potential threat to achieving sustained economic recovery.

Deflation is a decline in the overall level of prices. It is not 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%, computer prices over the same period fell nearly 76% because production costs steadily fell. Similarly, because of weak demand, the price of gasoline fell about 28% in 2009. 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 several quarters.

A continuous decline in the price level is more troublesome because in a weak or contracting economy it can lead to a damaging, self-reinforcing, downward spiral of prices and economic activity. Financial crises, in particular, tend to be deflationary because increased economic uncertainty increases the demand for cash (liquidity) by banks and financial institutions, constricting the flow of credit to households and businesses, and dampening their credit-supported spending. The slowing of current expenditure will exert downward pressure on the current price level. If current prices start to fall, households and businesses may come to *expect* the future price level to also fall. If the current price level is widely seen to be too high relative to the expected future price level, they are likely to postpone current purchases until prices fall further, leading to further slowing of current expenditure and current economic activity.¹ A self-reinforcing dynamic could be set in motion 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 the fall of economic activity needed to cause that change in expectations could be protracted and costly, involving large output losses and high rates of unemployment.²

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 gross domestic product (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

¹ The premium paid for current goods over 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.

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 in 1933, the price level fell about 25%, real GDP fell about 30%, and the unemployment rate increased from 4% to near 25%.³

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 coincided 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, along with 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.

Congress actively participated in the policy responses to the recent financial crisis and recession and has an ongoing interest in macroeconomic conditions. Of current concern is the sustainability of the current economic recovery, and intertwined with that is concern about the lingering risk of deflation.

Deflation from a Negative Demand Shock Hurts Economic Activity⁴

Several channels exist 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

³ On Japan's deflation, see Adam Posen, "Deflationary Lessons: What Japanese Deflation Did and Did Not Do," *The International Economy*, Winter 2006; on the U.S. deflation during the Great Depression, see Christina D. Romer, "The Great Depression," *Journal of Economic Perspectives*, no.2, (1993) pp. 19-39; and for a broader historical perspective on deflation, see Michael D. Bordo and Andrew Filardo, *Deflation and Monetary Policy in a Historical Perspective: Remembering the Past or Being Condemned to Repeat It?* National Bureau of Economic Research, Working Paper 10833, October 2004.

⁴ 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.

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 input prices are, the larger the decline in output and employment will be.

Second, a negative demand shock deflation will tend to *increase “real” interest rates*, dampening 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 proportionately 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 interest 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, with the nominal rate at zero, the real interest rate on a loan will equal the expected rate of deflation. For example, 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%.

For this reason, even though the nominal cost of borrowing is zero, a deflation can raise the real cost of borrowing to prohibitive levels, 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. The burden rises as the price level falls because debtors will be repaying the loan principal with dollars of rising real value.⁵ With deflation induced by a negative demand shock, 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.

Furthermore, 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 tends to further impede aggregate spending and dampens economic

⁵ 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.

activity. During the Great Depression, thousands of banks failed, causing a major reduction in the flow of credit needed to support much economic activity.

International Transmission of Deflation

Deflation can be transmitted across national boundaries in order 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, whereas gold outflows tended to decrease the deficit country's money supply and reduce its price level. The change in relative prices of foreign and domestic goods 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 competitiveness 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 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.

International transmission of deflation is less likely within a regime of flexible exchange rates, as used by the United States and most major economies today, because it allows independent policy action. However, China, with an essentially fixed exchange rate, did transmit its recent deflation caused by a positive supply shock to its trade partners. This transmission was accomplished through lower export prices that caused some slowing of inflation in these economies. However, because imports from China are a relatively small fraction of total spending, and because of the stimulus to total spending generated by the improved terms of trade, the overall deflationary impact in the United States and other advanced economies tended to be modest.⁶

The Role of Expectations

Economic agents' expectations about the future path of the price level will influence deflation's persistence and the difficulty of stopping it. The expectation of further deflation can create a self-reinforcing downward spiral that deepens and prolongs the fall of economic activity as households and businesses adjust their economic outlooks. To avoid that outcome, government would likely need to take policy actions that not only counter the current negative demand shock

⁶ 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.



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and constricted 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, government would need to convince economic agents to expect inflation rather than deflation.

Deflation Caused by a Positive Supply Shock is More Benign

Unlike negative demand shocks, positive supply shocks have positive effects that increase the level of output, offsetting the negative effects of the 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. Also, 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.

In addition, 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.

Further, the problems for the financial sector caused by deflation increasing real debt burdens are offset by increased real income. The deterioration of financial institutions' balance sheets caused by falling collateral values is minimized as productivity increases lift the expectations for current and future earnings, which tends to preserve or improve the value of 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 an offsetting 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.⁷

The Current Risk of Deflation in the United States

In 2008 and 2009, the U.S. economy received a substantial negative demand shock from the combined impact of the financial fallout from the bursting of the housing price bubble in 2006 and a sharp cyclical downturn of the economy beginning in late 2007 that continued through mid-2009. Despite the severity of the contraction of economic activity, an exacerbating deflationary spiral was avoided at that time. As measured by the CPI, the price level declined about 2.0% between July 2008 and July 2009. Economic recovery appears to have begun in the last half of 2009 and has continued into 2010. With the return of economic growth, the price level stabilized and began to rise again, up about 1.0% through the first quarter of 2010. However, through June 2010 the CPI has fallen slightly. For this reason, and because the pace of economic growth during

⁷ 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).

the recovery has been relatively slow and economic weakness persists in many parts of the economy, there continue to be concerns about the sustainability of the recovery and the onset of deflation.⁸

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.⁹

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. However, prior to an outright fall of the price index, there is likely to be a prolonged deceleration in the measured rate of inflation. Also, the CPI and other aggregate price indexes are for a number of reasons likely to have an average annual upward bias in the range of 0.5 to 1.0 percentage points.¹⁰ Therefore, measured inflation of less than 1 percentage point makes it likely that the economy is actually experiencing either zero inflation or mild deflation.¹¹

Reflecting the severity of the recent recession, the CPI declined from mid-2008 through mid-2009, but with the pickup in economic activity in the second half of 2009, the CPI increased through early 2010. Recently, however, the CPI's rate of increase has slowed significantly. For the 12 months ending in June 2010, the "headline" CPI increased 1.1%, down from 2.0% in May 2010 and 2.7% in January 2010. Over the six months through June 2010, however, this index declined 0.1%. The "core" CPI, which excludes often volatile food and energy prices, tells a similar story. For the 12 months ending in June 2010, the core inflation rate is 0.9%—the lowest rate of increase in 44 years. Over the six months through June 2010, the core inflation rate has decelerated further to an average annual rate of 0.4%.

In recent years, the CPI and the "core" CPI has typically increased at an annual rate of around 2.5%. The recent deceleration of these indexes represents a break from that pattern and, given the index's upward bias, could be evidence of incipient deflation; but this behavior has occurred for too short a time period for a definitive 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. The PPI for the 12 months ending in June 2010 increased 2.7%, down from 5.1% in May and 6.1% in March. For the

⁸ See, for example, Paul Krugman, "The Feckless Fed," *New York Times*, July 11, 2010, at <http://www.nytimes.com/2010/07/12/opinion/12krugman.html>; and John H. Makin, "The Rising Risk of Deflation," *American Enterprise Institute Outlooks*, July 7, 2010, at <http://www.aei.org/outlook/100971>.

⁹ 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.

¹⁰ See CRS Report RL30074, *The Consumer Price Index: A Brief Overview*, by Brian W. Cashell.

¹¹ 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.

12 months ending June 2010, the “core” PPI for finished goods, which excludes food and energy prices, increased a more modest 1.0%; but the index has been increasing at near that rate for the previous six months and does not reveal a pattern of either growing upward or downward pressure on producer prices.

Size of Output Gap

The Congressional Budget Office (CBO) estimates that when the economy bottomed out in mid-2009, the output gap (the difference between the level of output produced if the economy’s resources were fully employed and the actual level of GDP) was 7.0% and indicated the presence of substantial economic slack.¹² The economic recovery that has occurred since then has narrowed the output gap to an estimated 6.0%. Despite this improvement, a substantial degree of economic slack remains, and it may continue to exert sizable downward pressure on the price level. Moreover, it will continue to do so if weak near-term economic growth leads to little or no narrowing of the output gap. Nevertheless, the estimated current output gap is much smaller than what accompanied the deflation during the Great Depression.

Asset Price Behavior

Because deflation reduces the value of collateral held by lenders and raises the real cost of borrowing faced by borrowers, the demand and, in turn, the price of many classes of assets may fall along with goods prices. Most asset prices fell sharply during the economic collapse of 2008 and 2009. House prices fell particularly sharply and house prices are still falling, continuing to have an adverse effect on the balance sheets of households and banks, and dampening the recovery of aggregate spending. In contrast, the stock and bond prices have rebounded. The Dow Jones Industrial Average stock index had plunged to near 6500 in March 2009 but has risen to over 10,000 since then.

The collapse of the housing and stock markets in 2008 and 2009 substantially decreased household net worth, which had, by the end of 2009, fallen \$10 trillion below its level in 2007.¹³ This large fall in net worth pushed the household debt burden to what may be an unsustainable level, especially if interest rates rise. With house prices likely to remain weak, repairing household balance sheets will probably require a large diversion of current income from consumption spending to debt reduction for several more years, tending to weaken aggregate demand and slow economic growth.¹⁴ Past asset price deflation has left the economy impaired, but a broad asset price deflation that often accompanies deflation is currently not occurring.

¹² Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2010 to 2020*, January 2010, at http://www.cbo.gov/ftpdocs/110xx/doc11014/01-28-Testimony_Senate.pdf. Note that real time output gap estimates and forecasts are notoriously inaccurate.

¹³ Board of Governors of the Federal Reserve System, “Flow of Funds Accounts,” Table B.100, June 2010, at <http://www.federalreserve.gov/releases/z1/Current/z1r-5.pdf>.

¹⁴ See Evan Tanner and Yassar Abdih, “Rebuilding U.S. Wealth,” *Finance & Development*, IMF, December 2009.

Exchange Rate Behavior

An appreciating dollar will decrease the domestic price of imported goods and services and exert downward pressure on the price level in the process. As the financial crisis and recession intensified during the last half of 2008 and the first quarter of 2009, the dollar appreciated as foreign investors increased their demand for relatively safe dollar-denominated assets, particularly U.S. Treasury securities. As the crisis subsided and the global economy seemed to be staging an economic recovery, the increased demand for dollar assets abated and the dollar depreciated during the remainder of 2009.

Over the first six months of 2010, the dollar changed direction and appreciated about 5.0%. Whether because of the recent sovereign debt problems in the euro area or out of concern for the sustainability of the global economic recovery, the demand for low-risk dollar assets has strengthened again, exerting upward pressure on the dollar. Given the normal lags, this appreciation is not likely to have exerted much downward pressure on U.S. prices so far. However, should a global “flight to quality” keep the demand for U.S. Treasury securities strong, the deflationary impact of an appreciating dollar on the level of prices in the United States may become more evident.

Monetary Aggregates and Bank Reserves

In an economic crisis, with weakening balance sheets and rising uncertainty about the economic future, households will hold larger cash balances rather than spend and 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. During the Great Depression, the Fed passively allowed the money supply to contract as a result of households’ and businesses’ actions to increase liquidity. As the money supply fell, so did the price level, intensifying the economic collapse already underway.

Beginning in mid-2008, the Fed took aggressive steps to keep the money supply from contracting by boosting currency and bank reserves. Measures of the money stock increased substantially over the next year. For the 12 months ending in June 2009, the money stock measure M2 increased 9.2%.¹⁵ (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.) However, for the 12 months ending in June 2010, M2 has increased only 1.8%. This slower rate of growth in M2 could be the result of higher demand for cash balances by households and a diminished willingness of banks to use reserves for lending to businesses and households. (Bank lending is the principal way the economy creates money.) The persistence of such a low rate of money supply growth could be deflationary.

¹⁵ Board of Governors of the Federal Reserve System, Statistical Release H.6, Table 1, <http://www.federalreserve.gov/releases/h6/hist/h6hist1.pdf>. The measure M2 is composed of currency in circulation, checkable deposits, and saving deposits.

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%, close to the zero bound for nominal interest rates. If nominal interest rates are at or near zero, deflation will increase real interest rates and dampen interest-sensitive spending which adds to the deflationary momentum. Also, at this point, the Fed's normal means of countering weak aggregate spending, namely adjusting nominal interest rates downward, is not operational. Although being at the zero bound itself does not raise the risk of deflation, it creates an economic environment in which the negative effects of deflation on economic activity can be sharply amplified.

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 inflation-indexed rate. On the other hand, if the nominal rate is below the inflation-indexed rate, then investors are expecting deflation.¹⁶

In January of 2010, the nominal yield on a five-year Treasury bond was about 2.5% and the yield on a five-year, inflation-indexed Treasury bond was about 0.4%, giving a difference of 2.1%. In July of 2010, the nominal yield on the five-year Treasury bond had fallen to about 1.8% and the yield on the inflation-indexed, five-year Treasury bond had fallen slightly to about 0.3%, giving a difference of 1.5%. By this indicator, the market's expectation of future inflation has fallen but has not turned negative as it would if there were a general expectation of deflation.¹⁷

Overall Risk of Deflation

Collectively, these several indicators suggest a continuing risk of deflation, but they do not give conclusive evidence that the price level is currently falling. Of particular significance for elevating the risk of deflation is the persistence of a large output gap, below normal growth of the money supply, and the nominal federal funds rate being at the zero bound. So far, however, broad-based price indexes show a deceleration of inflation but do not reveal the presence of deflation. Recently, estimates of inflation expectations have moderated, but they still remain positive.

¹⁶ 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, available at http://www.bis.org/publ/qtrpdf/r_qt0903.pdf.

¹⁷ Data on Treasury bond yields is available at Board of Governors of the Federal Reserve System, "Federal Reserve Statistical Release H.15," August 2010, at <http://www.federalreserve.gov/releases/h15/data.htm>.

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. Increased current spending that exerts upward pressure on the price level is a counterforce to a negative demand shock. If these policies also induce economic agents to expect future prices to be higher than current prices, they are likely to shift their spending toward current goods and away from future goods.

There are two general classes of policy responses to be applied, separately or in combination, as the severity of the deflation problem warrants. The first class of policies comprises the standard macroeconomic policy tools of monetary and fiscal policy. The second class is greater use of the Fed's traditional role of "lender of last resort." All of these policy tools were used in response to the recent turmoil in financial markets and the economy's slide into recession. Arguably those policy measures, in addition to supporting economic activity, forestalled deflationary momentum during this period of economic contraction.¹⁸ Further actions of this type could be used to counter any further weakening of economic activity and any further deflation threat.

Macroeconomic Policy

Monetary Policy

Monetary policy is the Fed's standard and most frequently used tool to exert broad-based influence on credit conditions, economic activity, and the price level. 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, which influences real borrowing costs and may subsequently influence credit-sensitive spending by households and businesses.

To fight deflation, the Fed could exert upward pressure on the price level by applying a stimulative monetary policy. The Fed achieves this stimulus by entering the federal funds market and 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 possibly 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%.

¹⁸ On the effect of recent macroeconomic policy, see Alan S. Blinder and Mark Zandi, "How the Great Recession was Brought to an End," July 27, 2010, at <http://www.economy.com/mark-zandi/documents/End-of-Great-Recession.pdf>.

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

The stimulative effects of a much lower federal funds rate to the wider economy can be substantially muted in a time of economic crisis when the demand for liquidity increases sharply. This lack of a stimulative effect occurs because banks, lacking the needed degree of confidence, are content to increase their reserves and liquidity, rather than increasing their lending activity and keeping an adequate flow of credit (liquidity) moving to support spending in the non-financial sectors. The phrase often used to describe monetary stimulus's lack of effect on real economic activity in times of financial crisis is that monetary policy is "unable to get traction."¹⁹

Also, if the nominal federal funds rate has fallen all the way to the "zero bound," as it currently has, the Fed is prevented from using normal operating procedures of targeting interest rates to apply the degree of monetary stimulus needed to increase aggregate spending and counter deflation.

However, there are alternative strategies that the Fed could employ to provide stimulus in this situation.²⁰ 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 to near zero for longer than had been expected, interest 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. In this circumstance, however, some economists argue that it is also possible for economic agents to see a policy of keeping short-term nominal interest rates near zero for an extended period not as stimulative, but alternatively as a commitment to a passive policy response, and they come to expect the persistence of deflation and no decrease of nominal long-term interest rates.²¹

A likely example of this tactic was the Fed's August 10, 2010, policy statement in which it said that economic conditions warrant keeping the federal funds rate near zero for an extended period. This statement was a turnabout from a few months earlier when the Fed was discussing when and how it might gradually raise interest rates as the economic recovery proceeded.²²

Second, the Fed could *alter the composition of its balance sheet*, shifting from liquid short-term, low-risk assets toward less liquid long-term assets or other riskier assets. This policy is sometimes called "qualitative easing." Historically, the Fed's asset holdings have been primarily

¹⁹ In the economic literature, the extreme form of this increased demand for liquidity 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."

²⁰ See Governor Ben S. Bernanke, *Deflation: Making Sure it Doesn't Happen Here*, remarks Before the National Economists Club, Washington DC, November 21, 2002, and James Bullard, *Effective Monetary Policy in a Low Interest Rate Environment*, The Henry B. Thornton Lecture, Cass Business School, London, March 24, 2009.

²¹ See James Bullard (President of the Federal Reserve Bank of St. Louis), "Seven Faces of The Peril," *Federal Reserve Bank of St. Louis Review*, September- October Issue, at <http://research.stlouisfed.org/econ/bullard/pdf/SevenFacesFinalJul28.pdf>.

²² See Board of Governors of the Federal Reserve System, "FOMC Statement," press release, August 10, 2010, at <http://www.federalreserve.gov/newsevents/press/monetary/20100810a.htm>.

of Treasury securities of different maturities ranging from one 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. If the Fed shifts the composition of its balance sheet toward long-term assets by selling short-term treasuries and buying long-term treasuries or other long-term assets, such as asset-backed securities, 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.²³

Since the financial crisis and recession of 2008 and 2009, the composition of the Fed's balance sheet has shifted from consisting of 100% Treasury securities to having nearly two-thirds of it holdings in agency-related securities.²⁴ In addition, the average maturity of the Fed's investment portfolio has increased from 3½ years to nearly 7 years.²⁵

A third option for implementing monetary policy at the zero bound is to *expand the size of the Fed's balance sheet*, by increasing its monetary liabilities. This policy is often called "quantitative easing." It is equivalent to 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.²⁶

In response to the recent financial crisis and recession, the Fed undertook a huge increase in the size of its balance sheet, increasing its holdings of assets (and liabilities) from about \$900 billion in late 2007 to about \$2.3 trillion in mid-2010.²⁷

When at the zero bound for nominal interest rates and faced with a sharp economy-wide demand for liquidity, combating weak aggregate spending and incipient deflation may also 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.

²³ 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.

²⁴ These are securities issued by various government-sponsored enterprises (GSEs).

²⁵ See Ben S. Bernanke, Semiannual Monetary Policy Report to the Congress, July 21, 2010, at <http://www.federalreserve.gov/newsevents/testimony/bernanke20100721a.pdf>.

²⁶ 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.

²⁷ See Board of Governors of the Federal Reserve System, H.4.1. Release, "Factors Influencing Reserve Balances," August 2010, at <http://www.federalreserve.gov/releases/h41/hist/h41hist1.pdf>.

The minutes of an early 2009 meeting of the Fed's Open Market Committee indicate that the Fed would begin to make available to the public the committee's long-term projections for important macroeconomic variables, including the rate of inflation. This action could be interpreted as the Fed initiating a policy of inflation targeting.²⁸

Nevertheless, operation of monetary policy at the zero bound for the federal funds rate is a passage through poorly charted waters. There remains substantial uncertainty about how well the alternative operating procedures worked during the recent crisis and recession. However, the Great Depression gives support to the belief that monetary policy can be an effective counterforce to deflation even when the demand for liquidity is high and nominal interest rates are at the zero bound. 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 1934. 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 spent 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 1934.²⁹

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. With this action the Fed is engaging in another form of qualitative easing, changing the composition of its balance sheet, in this case shifting its holdings from less risky assets toward more risky assets. The borrowers are financial institutions with assets exceeding liabilities; however, because their debts tend to be short-term and liquid while their assets are

²⁸ 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.

²⁹ For further discussion of the role of monetary policy during the Great Depression, see Christina D. Romer, *What Ended the Great Depression?*, National Bureau of Economic Research, Working Paper 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).

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; 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 recent financial crisis and recession, the Fed greatly expanded its lender-of-last-resort role, creating new lending programs to better channel needed liquidity to the financial system and induce greater confidence among lenders. These actions were a means to get credit flowing to the wider economy. To bolster the liquidity of the financial system, during 2008 and 2009, the Fed took a variety of actions that more than doubled reserve bank credit by injecting nearly \$1.5 trillion of new reserves into the financial system.³⁰

One of the reasons for the severity of the economic collapse and deflation from 1929 to 1933 was the Fed's 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 current ability to pursue further large lender-of-last-resort activities to counter deflation may 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.³¹

Fiscal Policy

Fiscal policy can support aggregate spending and exert upward pressure on the price level through an increase in the budget deficit. 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 demand.

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 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 needed to relieve a restricted flow of credit.

Fiscal stimulus was not used to counter the deflation and collapse the U.S. economy from 1929 to 1933. Fiscal policy became more stimulative from 1933 onward, but the degree of fiscal stimulus

³⁰ See CRS Report RL34427, *Financial Turmoil: Federal Reserve Policy Responses*, by Marc Labonte.

³¹ For further discussion of recent policy actions by the Fed, see CRS Report RL34427, *Financial Turmoil: Federal Reserve Policy Responses*, by Marc Labonte.

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.³²

In response to the financial crisis and recession, several fiscal measures were enacted. Congress passed and then-President Bush enacted the Economic Stimulus Act of 2008 (P.L. 110-185). This act was a \$120 billion package that provided tax rebates to households and accelerated depreciation rules for businesses. Subsequently, Congress passed and President Obama enacted the American Recovery and Reinvestment Act of 2009 (P.L. 111-5). This was a \$787 billion package with \$286 billion of tax cuts and \$501 billion of spending increases that were projected to add fiscal stimulus equivalent to about 2% of GDP in 2009 and 2.5% of GDP in 2010.³³ On July 22, 2010, the Unemployment Compensation Extension Act of 2010 (P.L. 111-205) was enacted.

Presently, there is a policy debate over whether added short-term fiscal stimulus should be used to assure sustained economic recovery and to counter incipient deflation. Proponents argue that if the pace of private spending proves insufficient to keep the economy expanding and the price level from falling, further stimulus by monetary and fiscal policies may be warranted. On the other hand, opponents maintain that the associated government borrowing would add to an already large accumulation of government debt, with the consequence of slower future economic growth. It is true that for an economy operating close to potential output, government borrowing to finance budget deficits will in theory draw down the pool of national saving, crowding out private capital investment and slowing long-term growth. However, the U.S. economy, currently with a large output gap and high unemployment, is operating well short of capacity and the risk of such crowding out occurring and damaging future economic growth is arguably low.

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 experience of the United States during the Great Depression and that of Japan since the 1990s gives strong testimony of this.

Several indicators suggest that the risk of deflation in the United States continues despite the end of the economic contraction and the beginning of economic recovery. The Consumer Price Index shows that the inflation rate is low and decelerating, a large output gap persists, money supply growth has slowed, and nominal short-term interest rates continue to be at the zero bound. Together these factors suggest a continuing significant risk of deflation. Nevertheless, there is no direct evidence, so far, that a broad-based and sustained decrease in the price level is occurring.

Mainstream economic theory argues that monetary and fiscal stimulus are the macroeconomic policies needed to fight deflation. All are measures aimed at directly or indirectly increasing aggregate demand to boost economic activity, but they will also work in theory to shift consumer

³² 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).

³³ See CRS Report R40104, *Economic Stimulus: Issues and Policies*, by Jane G. Gravelle, Thomas L. Hungerford, and Marc Labonte.

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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