Economic Viewpoint

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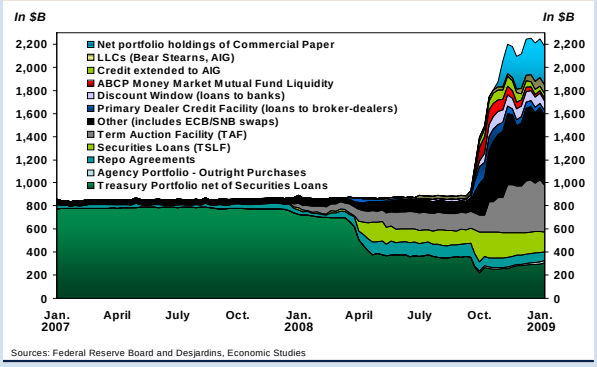
Is the Fed's rapidly expanding balance sheet an inflation threat?

Is a massive use of money printing possible?

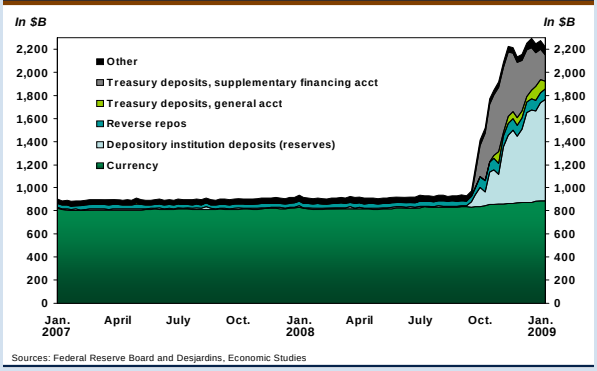
Over the last few months, the financial crisis has reached unprecedented proportions, driving governments and monetary authorities to do what had seemed unthinkable just a little while ago. In addition to having used up all of its leeway for easing interest rates, the Federal Reserve (Fed) has been prolific about developing tools and supplementary plans to try to hem in the ongoing crisis. Together, however, these interventions have made the Fed's balance sheet balloon—it has more than doubled to US$2,200B in just a few months (see graphs 1 and 2)—and this pace should be maintained in January and February as new measures costing US$700B are implemented . Some may find the situation worrisome—the general view is that, if the liquidity the Fed allocates to the financial system expands too steeply, this could result in substantial money creation, which, in turn, would lead to a higher inflation rate over the long term.

Graph 1 – Federal Reserve assets: Credit extended to financial institutions



Sources: Federal Reserve Board and Desjardins, Economic Studies

Graph 2 – Federal Reserve liabilities



Sources: Federal Reserve Board and Desjardins, Economic Studies

In this *Economic Viewpoint*, we show that the money supply is not about to explode, despite the astronomical expansion of the Fed's balance sheet. On the contrary, without the action taken, the money supply would even probably have contracted in the last few months, which would have heightened deflation risks. The reason is that financial institutions' tightening of credit conditions interferes with the normal money creation process and the amount of money available in the economy. Moreover, the Fed tries to limit monetary effects by using means other than creating money to finance its interventions. Among other things, it turned to selling its own assets and to a loan from the U.S Treasury. Much of the financing is now being handled using financial institutions' excess reserves, which are deposited with the central bank. Even if Fed's operations do increase these reserves and, in turn, the money base, inflationary pressure is still limited because of a smaller money multiplier.

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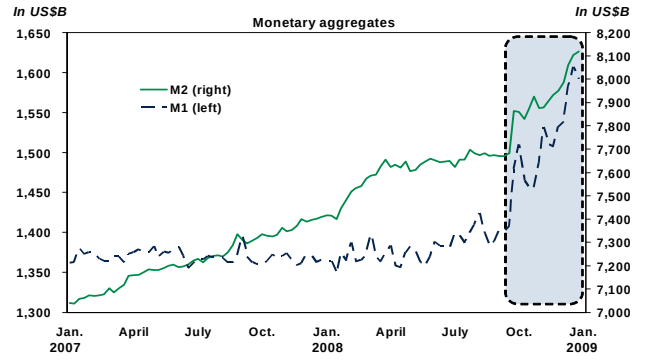
NOTE TO READERS: The letters **k**, **M** and **B** are used in texts and tables to refer to thousands, millions and billions respectively.

MONEY SUPPLY

Before getting to the heart of the matter, we should clarify an important concept: the money supply. The amount of money in an economy (money supply) is not limited to the amount of bank notes and coins that are in circulation. It includes all of the money—currency in circulation and electronic scrip (electronic cash transactions)—that could be used as a means of payment. To currency, therefore, we must add the value of amounts held as demand deposits. This definition corresponds to the M1 monetary aggregate. Other monetary aggregates with broader definitions can also be calculated, including the M2, which is the M1 plus savings deposits, some term deposits and money market deposit accounts for individuals.

In the last few months, the growth of some monetary aggregates has accelerated, but this is not necessarily directly connected with the Fed's interventions (graph 3). A change of preference for more liquid investment vehicles that are included in the M1 or M2 may make it look this way. Moreover, during times of crisis and low interest rate periods, it is normal to see stronger demand for more liquid forms of money for reasons such as hoarding by investors. The recent evolution of the M1 and M2 aggregates should therefore not have a significant impact on the economy and inflation.

Graph 3 – Other factors than the Fed's actions may explain the recent M1 and M2 growth



Sources: Federal Reserve and Desjardins, Economic Studies

MONEY CREATION AND CENTRAL BANK INVOLVEMENT

Money creation is a complex process; contrary to what some may think, it is financial institutions that generate most money creation, not the central bank. The central bank only controls the amount of liquidity it allocates to the financial system. Other than that, the system itself handles it! More specifically, money is created every time a financial institution extends new loans. A substantial portion of such loans end up resulting in new deposits, which can be used to extend new loans, and so on. When the central bank increases the liquidity in the financial system using funds it can create itself, it increases the financial resources that can fuel this chain of events (see box 1 at page 3).

A few decades ago, the amount of liquidity that central banks injected into the economy depended on the money growth that was desired, based on the economic situation. However, history has shown us that it is easier and more effective to target an interest rate. Central banks must make sure there is enough liquidity for the effective rate to be at the desired level. To increase the amount of liquidity, central banks can buy up securities on the open market or extend loans. The reverse operations help to reduce the amount of liquidity.

THE CREDIT CRISIS REQUIRES SUPPORT FOR THE MONEY SUPPLY

Because the bulk of the money is created through lending, a credit crisis is a major risk for eroding it, which has consequences for the economy. If we simply look at the quantity theory of money (see box 2 at page 4), a reduction in the money supply usually goes with a period of deflation, not counting all of the destabilizing impacts this can have on the economy.

To support the money supply, the Fed can use an interest rate cut combined with a sufficient increase in liquidity, which usually makes it possible to increase the number of loans and deposits in the economy. However, this tactic is not enough in a context in which the problem is not necessarily a shortage of liquidity, but rather a lack of confidence on the part of financial institutions, which refuse to lend money to each other or to their clients. As a result, some institutions struggle to meet their obligations and limit new lending, while others opt to hang onto their surplus funds rather than taking the risk of lending.

Under these conditions, it became necessary to resort to other types of measures. Through various programs, the Fed played its role as a lender of last resort to the hilt, extending the required liquidity to struggling institutions.

However, all of these actions are not free of concerns. The amount of funds extended to the financial system has more than doubled in a year; this, according to some, could lead to too much expansion by the money supply and, eventually, inflation.

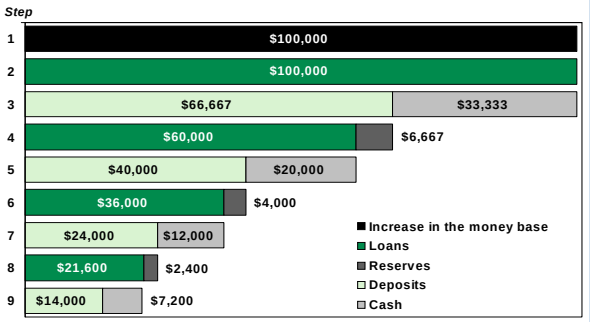
NEUTRAL IMPACT ON INFLATION

Unwinding these operations could constitute a sizeable challenge for monetary authorities over the longer term. In the immediate future, however, the fact is that these interventions do not risk creating more inflation. On one hand, certain methods used by the Fed to expand its balance sheet limit monetary growth. After having financed its action by selling its own assets, the Fed resorted to a loan from the U.S. Treasury and took advantage of excess reserves the financial institutions were not using. On the other, the credit crisis has

Box 1
Money creation: An example with numbers

Assume that, in step 1, the central bank buys $100,000 in securities from a financial institution. The latter now has $100,000 in excess reserves and can offer $100,000 in new loans (step 2). Two thirds of these loans take the form of deposits with other financial institutions; one third remains outside the financial institutions as cash (step 3).[3] In step 3, there is a $100,000 increase in the money supply, i.e. $66,667 in new deposits and $33,333 in cash. However, the creation of new money does not stop there: As deposits have increased, financial institutions can do more lending. In step 4, they lend $60,000, assuming that they hold 10% of the deposits back as a reserve. This process repeats itself several times, so that, in the end, the total of the new reserves (which corresponds to 10% of the deposits) and cash would be $100,000 (increase in the money base), and the quantity of money would have increased by $250,000 (graphs A and B).

Graph A – Money creation process



Source: Desjardins, Economic Studies

Graph B – Total increase in the money supply depending on the current phase

Step	Deposits	Cash	Money
1	-	-	-
2	-	-	-
3	$66,667	$33,333	$100,000
4	$66,667	$33,333	$100,000
5	$106,667	$53,333	$160,000
6	$106,667	$53,333	$160,000
7	$130,667	$65,333	$196,000
8	$130,667	$65,333$	$196,000
9	$145,067	$72,533	$217,600
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n*	$166,667	$83,333	$250,000

* Corresponds to last hypothetical step of the money creation process.
Source: Desjardins, Economic Studies

* Economic agents keep money in the form of deposits or in the form of cash. In this example, we assume that the cash drain (proportion of money kept in cash) is equal to 33.3%.

a destructive impact on the money supply, which gives authorities some leeway. The Fed can inject as much liquidity as it wants by buying up securities with newly created money, which could constitute a real inflation risk in a normal economic and financial environment. But, because of the crisis, the increase in excess reserves is not followed by a proportional increase in the money supply.

FINANCING BY SELLING ASSETS

The first method the Fed used to finance itself without running to the printing press was selling its own assets. The Fed has substantial holdings in Treasuries, which are highly sought after. The funds raised by selling assets are used to finance various assistance measures that in turn involve buying other assets. In 2007, the Fed had an average of US$778B in Treasuries on its balance sheet. At the beginning of October, it only held US$221B, down 71.6% (graph 4), a tangible limit for the Fed. All in all, this method of financing does not translate into an increase in the funds allocated to the financial system: it boils down to asset substitution.[1]

FINANCING VIA A U.S. TREASURY LOAN

Seeing its holdings of Treasuries decline, the Fed turned to the government for fresh funds at the end of September. Through the Supplementary Financing Program (SFP), the Treasury put debt securities on the market and channelled the funds raised to the central bank. This source of financing totalled as much as US$560B in November but, since then, the Fed has succeeded in substantially reducing the use of public funds (graph 5).

[1] See the *Economic Viewpoint*, "The Fed's policy of injecting liquidities – is it really expansionist and inflationist?", April 14, 2008.

Box 2
Quantity theory of money

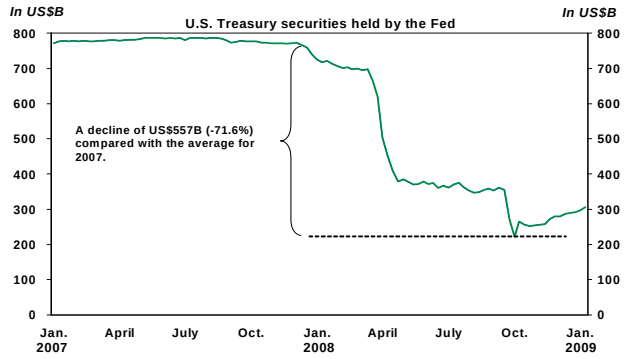
The quantity theory of money describes the long-term connection between the money supply and price levels. According to the theory, a change in the quantity of money must be offset by a change in prices. Money's quantity equation helps depict this relationship.

$$M \times V = P \times Y$$

Where
M = the quantity of money,
V = the velocity of money's circulation (number of times a single unit of money is used to purchase a good or service during a year),
P = the price level and
Y = yearly production.

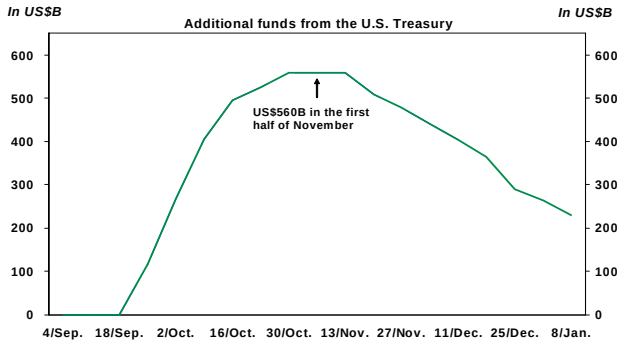
In the original equation, Y was replaced by the number of transactions, T, but, given that it is easier to measure total production levels than the number of transactions, this form of the equation is more common. The equation's equality consists in saying that the total spent must be equal to the value of the goods and services produced. This equation shows that, if one of the variables changes, one or more variables must adjust to maintain the equality. In theory, a drop in production or increase in the velocity of money could offset monetary contraction. However, in practice, it is impossible to intervene directly in money's velocity; assuming that, on average, the output level is at potential, any change in the quantity of money can, in the end, only be offset by a price adjustment.

Graphique 4 – The Fed initially sold off assets to finance its actions



Sources: Federal Reserve Board and Desjardins, Economic Studies

Graph 5 – The U.S. Treasury had to provide the Fed with additional funds



Sources: Federal Reserve Board and Desjardins, Economic Studies

These operations mean greater debt loads for the U.S. Treasury. If this was not so, the situation would be akin to the money creation that occurs in some countries that are grappling with major financing problems. In such countries, the government issues debt, but the central bank buys up the newly issued securities with freshly minted money. The amounts raised by issuing debt constitute additional liquidity for the financial system, which translates into an uncontrolled increase in the money supply and higher inflation. This is not what is happening in the United States—it is the market, not the Fed, that is financing the government's debt.

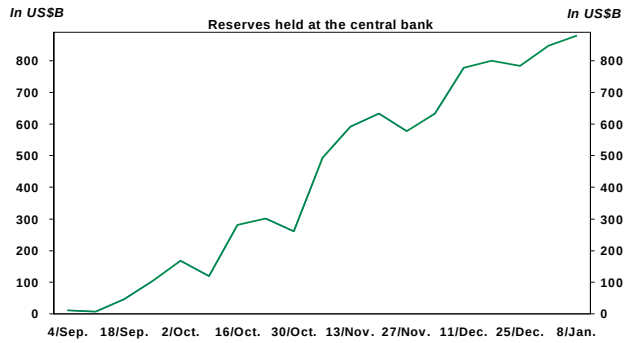
FINANCING THROUGH FINANCIAL INSTITUTIONS' EXCESS RESERVES

At the beginning of October, the approval of the TARP (Troubled Assets Relief Program) gave the Fed the green light to set up an interest paying deposit facility. The measure's prime objective was to keep the expansion of credit to the financial system from driving the effective federal funds rate too far away from its target due to excess liquidity in the market. Moreover, when this deposit facility's interest rate is higher than the market rate, institutions coping with a surplus have an incentive to deposit it with the central bank as excess

reserves, enabling the Fed to obtain additional funds. As with the financing from the Treasury, the use of excess reserves has the result of increasing the Fed's assets and liabilities. Currently, over US$800B of reserves are included in the Fed's liabilities (graph 6). It is likely that, before being deposited with the central bank, a part of this amount was not allocated to lending and helped to paralyze the credit market. By re-injecting these funds into the system through its various programs, the Fed is offsetting that deficiency. However, the increase in reserves is also due to liquidity injections by the Fed. For example, when buying commercial paper, it can pay the owner directly with newly created money, which can remain at the central bank in the form of deposits.

> *"It is worth noting that, as a nation's central bank, the Fed can issue as much currency and bank reserves as required to finance these asset purchases and restore functioning to these markets."*
>
> Janet L. Yellen, President and Chief Executive Officer
> Federal Reserve Bank of San Francisco
> January 4, 2009

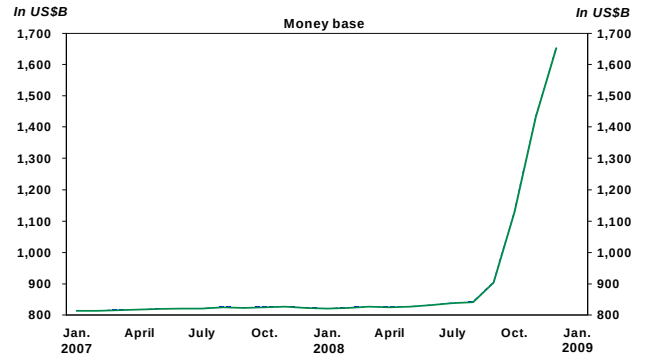
Graph 6 – The creation of a deposit facility resulted in increasing the reserves held at the Fed



Sources: Federal Reserve Board and Desjardins, Economic Studies

In any regard, in the current context, we should not worry about the creation of new funds by the Fed. It is true that the increase in reserves means a jump in the monetary base (graph 7), often seen as a precursor to an expansion of the money supply. The money base corresponds to currency in circulation plus financial institutions' deposits at the central bank. Normally, banks' excess reserves are used to make new loans, which results in increasing the money supply. The current situation is somewhat different, however. Financial institutions do not want to make as many loans as they once did, preferring to keep more in reserve. This change in behaviour has a big effect on the money creation process, by reducing the money multiplier (see box 3). Under these circumstances, watching the money base explode is not a concern, as it helps generate a much smaller amount of money in the financial system.

Graph 7 – Increase in the excess reserves held at the Fed increases the money base

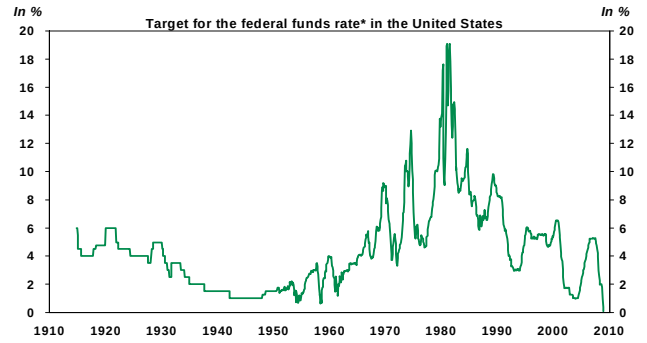


Sources: Federal Reserve and Desjardins, Economic Studies

AND THEN WHAT?

At its meeting on December 16, the monetary policy committee decided to set the federal funds rate between 0 and 0.25%, for the first time ever in the United States (graph 8). The committee also noted that the Fed would continue to expand its balance sheet so as to sustain the financial system. The new US$500B program to buy up mortgage-backed securities (MBS) backed by Fannie Mae, Freddie Mac and Ginnie Mae also becomes effective at the beginning of this year; another US$200B program to assist consumer credit should come into effect next month. These programs, and the others that could follow, are intensifying financing needs for the central bank.

Graph 8 – The federal funds rate has never been this low in modern times



* Discount rate before 1950.
Sources: Federal Reserve, Global Financial Data and Desjardins, Economic Studies

To date, the Fed has been able to stretch its balance sheet without overly increasing inflation risks, but some may think that it could lose control, sooner or later. The Fed is now relying on excess reserves to balance its interventions. For one reason or another, if those reserves were to start being use by financial institutions to extend more loans to consumers

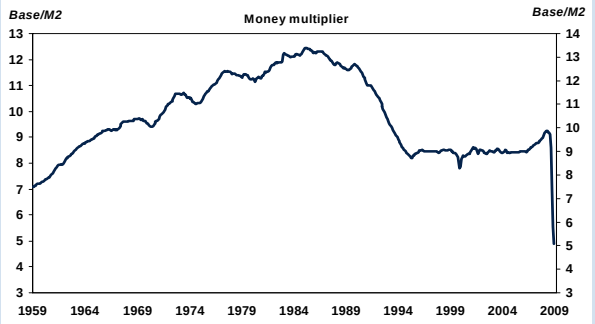
Box 3
Money multiplier

The money multiplier is the ratio between the money base and the money supply. All other things being equal, an increase in the money base leads to a proportional increase in the money supply. However, a change in the desired level of reserves can influence the multiplier and change the ratio between the base and the money supply (graph C).

Namely:

- *B*, the money base defined by the total of coins and notes in circulation *C* and bank reserves *R*
- *cr*, the reserve coefficient, i.e. the fraction of deposits that banking institutions keep as reserves;
- *cc*, the cash coefficient, i.e. the portion of demand deposits *D* that people want to hold in cash *C*;
- *M*, the money supply defined by the total of coins and notes in circulation *C* and demand deposits *D*;

Graph C – Money multiplier is down due to an increase in the reserve coefficient



Sources: Federal Reserve and Desjardins, Economic Studies

$M = \frac{cc+1}{cc+cr} \times B \Leftrightarrow M = m \times B$, in which m is the money multiplier.

The result is that the money supply is equal to *m* times the money base, and that this multiplier depends on the reserve coefficient and cash coefficient (see demonstration below). Increasing the reserve coefficient decreases the money multiplier and, in this type of situation, having the money base explode is not worrisome

Demonstration

$$\frac{M}{B} = \frac{C+D}{C+R} = \frac{\frac{C}{D}+1}{\frac{C}{D}+\frac{R}{D}} = \frac{cc+1}{cc+cr} \Leftrightarrow M = \frac{cc+1}{cc+cr} \times B$$

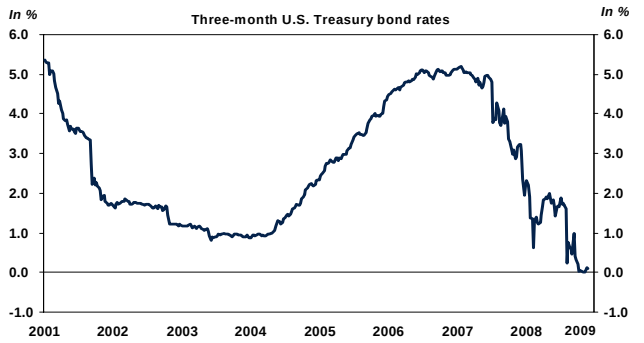
and business, which would increase money supply, the situation could become truly explosive. Unless it wants to print money, the Fed would therefore have to again turn to the U.S. Treasury to supply it with more funds. In exchange, this would mean an even greater increase in the government's budget deficit. With a projected deficit of US$1,200B for 2009, to which the Obama administration's economic recovery plan (estimated at almost US$800B) will have to be added, the Treasury seems to have increasingly limited leeway.[2] Still, the popularity of Treasuries in periods of turmoil means that the cost of this additional debt remains very low (graph 9). Moreover, when the Fed unwinds these operations, it will be able to pay back the Treasury which, in turn, will be able to pay back its debt. This is thus an attractive avenue that authorities should explore before falling back on the printing press.

CONCLUSION

Given that the money supply is under downside pressure due to shrinking credit by financial institutions and that the Fed's interventions assume a responsible use of money printing, the risks of monetary inflation are very low. However, inflation

[2] Congressional Budget Office. *The Budget and Economic Outlook: Fiscal Years 2009 to 2019*, January 2009.

Graph 9 – Investors are agreeing to finance the U.S. government at a low charge



Sources: Datastream and Desjardins, Economic Studies

pressure could arise over the medium term if the Fed waits too long to unwind its commitments and raise key interest rates. A change in financial institutions' behaviour regarding excess reserves is also a risk. In that case, it would be better for the Fed to request more funding from the U.S. Treasury.

Massive use of the money printing press must only be considered as a last resort, and the Fed knows it. In the end, a long period of deflation could justify it. Money theory is clear on the matter: sharp growth in the money supply usually succeeds in generating enough inflation to eradicate a widespread tumble by prices. Still, let us specify that, before it is driven to creating money, the Fed would probably consider other means of supporting the economy. The problem with deflation is that real short-term interest rates can no longer be negative, which makes it difficult to stimulate aggregate demand. Budgetary measures or other Fed actions to reduce market interest rates will be favoured first, before looking to extreme solutions.

Moreover, for now, deflation is not expected in the United States, but the annual change in prices could brush or even cross into negative territory for a short time in the months ahead. Much of the drop in the inflation rate is due to the substantial decline in prices for energy and raw materials. Only with a more widespread decline in prices and even nominal wages could we characterize the situation as deflationary and perhaps really consider the printing press.

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