The Changing Meaning Of Money

"What growth in conventionally measured money means for inflation will continue to change."

Because inflation can quickly disrupt an economy, central banks have tried to develop policies to keep inflation in check. One approach assumes that there is a stable relationship between economic activity and the measured money supply. Recently, this relationship has been changing because people have been changing how they handle their finances and how they pay for goods and services. As a result, what the measured money supply means, in terms of what it reveals about economic activity, has also changed.

Does M2 Still Measure Up?

Money and economic activity are linked by the famous equation of exchange:

$$money \times money's\ velocity = the\ price\ level \times real\ GDP,$$

or

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

In other words, changing hands V times during a year, the money stock, M, facilitates the transaction of Y goods, which each cost P dollars. Converting this equation into growth rates yields two important relationships:

$$inflation = \frac{money}{supply}\ growth + velocity\ growth - \frac{real}{output}\ growth$$

and

$$\frac{nominal}{GDP}\ growth = \frac{money}{supply}\ growth + velocity\ growth,$$

where *nominal GDP growth* equals growth in the dollar volume of gross domestic production (output growth plus inflation). U.S. output typically grows at about 2.5 percent annually. Thus, the equation of exchange strongly suggests that, over the long run, inflation can be kept at zero by limiting money supply growth to equal 2.5 percent minus growth in velocity.

Money holdings typically fall and velocity rises as the spread between a riskless short-term market interest rate and the average yield on monetary assets rises. The stability of the relationship between interest rates and velocity is what makes it possible for money to be a useful indicator of not only inflation, but also of nominal GDP ($P \times Y$), since GDP data are available after a long lag, unlike data on money and interest rates. If velocity is predictable, then by controlling money supply growth, the Federal Reserve can control long-run inflation. While this sounds easy, shifts in how people conduct their finances and how they pay for goods can undermine the stability of the money–GDP relationship, thus making the Fed's inflation-fighting job more difficult in practice.

History bears this out. The M1 monetary aggregate that measures the money supply as checking deposits plus currency was once touted as the "holy grail" by monetarists. But M1 began to fall from grace in the mid-1970s when its velocity was unusually high, and M1 growth underpredicted real GDP, based on prior velocity behavior. Then in the early 1980s, the interest-rate sensitivity of M1 jumped as financial innovations and deregula-tion created new deposits that combined savings and transactions features and helped firms avoid holding non-interest-bearing de-mand deposits. As a result, atten-tion turned to M2, a broader and less interest-rate-sensitive aggregate that was created in 1980.

M2 was redefined to include not only conventional M1, passbook savings accounts and small time deposits, but also new types of money, such as money market mutual funds, overnight instruments and, in 1982, money market deposit accounts. M2 had a stable relation-ship with nominal GDP during the 1980s (Small and Porter 1989). However, this relationship broke down in the 1990s as M2 became more sensitive to bond yields and as households shifted toward bond and stock mutual funds and toward Treasury securities (see Duca 1995b for references).

Such breakdowns in the link be-tween money and nominal output have spurred efforts to either rede-fine money to include new types of "money" or revise money models to account for changing relation-ships between money and nominal output.[1] Understanding why the money–income relationship can shift is critical to finding new ways of deriving information from money.

Why the Money–Nominal GDP Relationship Can Shift

A stable link between M2 and nominal GDP will hold as long as people handle their finances in the same way.[2] However, a market economy will continuously create new financial products and markets will react to fundamental changes in the tastes of households (*Table 1*).

Since the early 1980s, the attrac-tiveness to households of owning non-M2 assets has increased be-cause of two types of technological change: lower costs of transferring funds from nonmonetary assets to transactions deposits (from bond mutual funds to money market funds, for instance) and greater use

Table 1
How Market Forces Can Cause Unusual Weakness in Money

Fundamental type of factor	Examples
Technological innovations	
Lower transfer costs	Lower mutual fund commission (load) fees
	Easier purchase of Treasury securities
	Electronic banking
	Easier banking and investing by phone
Financial services from nonassets	More widespread credit cards and lines
	Automatic teller machines
	Electronic wires and transfers
Demographics, preferences and learning	
Demographic shifts	Rising population share of middle-aged people preparing for retirement
Preferences and financial sophistication	Rising share of households with portable pensions due to IRA/Keogh laws and increased job uncertainty
	Greater tolerance of investment risk

of financial services from nonasset products (such as credit cards). Nonmonetary assets are any assets not included in the definition of the monetary aggregates, while nonasset products are instruments or ways of conducting transactions that do not directly and immediately involve holding an asset (for example, using a credit card to pay for something) until final settlement is made. As the cost of shifting between non-M2 assets and checkable deposits falls, the incentive to hold checking deposits to avoid transfer costs declines. Since households balance the transfer cost savings from holding money against the higher yields on alternative assets, lower transfer costs have induced lower money holdings. For example, over the past 10 years, the costs of shifting from a bond mutual fund to a checkable money market fund have fallen as transfer fees have fallen and as transfers have become easier. As a result, when longer term interest rates (on bond funds) are high relative to short-term rates (on money market funds), people are more likely to hold bond funds today than 10 years ago when transfers involved higher fees and greater headaches.

Thanks to improvements in financial products, households and firms can now better coordinate cash inflow with cash outflow. As a result, they can reduce check usage by consolidating many purchases into fewer check payments. They also have less need to hold checking balances for unexpected expenses.

Aside from technological changes, a rise in households' awareness of assets outside of M2 and their tolerance for risk can lead to unusual weakness in M2. For example, if households needed less extra return on stocks to compensate them for the extra investment risk, then at a given gap between the yields on M2 and stocks, they will hold less M2 and more stocks.

Technology and New Products

Lower asset transfer costs. The costs of shifting between non-M2 and checkable M2 assets have fallen in several ways. First, load (commission) fees on mutual funds have fallen sharply over the past two decades.[3] Furthermore, many mutual funds now also allow a greater number of free transfers among funds in asset management accounts. These accounts offer a host of investments, including bonds and equities, and allow no-cost shifts among investments within mutual fund families that typically include a checkable money market fund. So, a person who unexpectedly gets hit with a big car repair bill can use the phone to shift funds from an equity fund to a money market fund (without incurring a fee) and then write a money market fund check. Furthermore, many banks now offer mutual funds and allow customers to jointly manage their mutual fund and deposit balances. Additionally, the Federal Reserve has made it easier for people to buy Treasury securities, a change that, coupled with interest rates, encouraged people to take money out of M2 deposits and buy Treasury securities.[4]

More generally, the spread of better information technology is lowering transfer costs. In particular, the rise of electronic banking (especially via personal computer) poses potentially large reductions in the pecuniary and convenience costs of making such transfers.[5] Unfortunately, continuous data on asset transfer costs over long periods are lacking. Nevertheless, the limited evidence implies that lower transfer costs have led people to reduce M2 balances. In particular, lower transfer costs of using bond and equity funds likely explains why most of the unusual weakness in M2 during the 1990s has been in small time deposits (which compete with stocks and bonds) and money market mutual funds (which were unusually weak when relative yields on stocks and bonds yields were high).

Financial services from nonassets. In the 1970s and 1980s, technological advances and high interest rates induced firms to avoid using non-interest-bearing demand deposits to conduct transactions. Cash management techniques, coupled with the increased use of electronic transfers, allowed firms to more easily and cheaply tap nonmonetary assets to meet cash shortfalls. Breaking with the tradition of holding a lot of non-interest-bearing demand deposits, firms adopted cash management techniques that enabled them to better predict their cash

needs. Also, firms increasingly used wire transfers when they needed to shift funds. The result was a decline in demand deposits held by firms.

Financial innovations later spread to households after improvements in computer software made such innovations cost-effective for people. By providing liquidity and by enabling households to weather temporary changes in asset prices (such as stock prices), credit cards and credit lines likely induced many households to hold less money and more nonmoney assets.

For example, using 1983 data, Duca and Whitesell (1995) find that each 10-percentage-point rise in the probability of owning a credit card lowers checking accounts by 9 percent and checkable money market mutual funds and money market deposit accounts by 11 percent. The impact of credit cards on checkable balances is likely larger today because credit card ownership has spread, credit cards are more widely accepted, credit card purchases are more quickly processed, and consumers are now offered greater incentives to use credit cards. Another important innovation is the spread of automatic teller machines (ATMs). ATMs have reduced the need for people to carry extra cash by allowing them to easily withdraw cash from their checking or savings accounts.[6]

Evidence shows that because people gained a greater choice in how to pay for goods, the composition of M2 had shifted away from transactions and toward nontransactions accounts. Coupled with lower transfer costs, greater use of nonmoney ways of making payments could now be lowering M2, in addition to altering its composition.

Are Demographics, Preferences And Learning Playing a Role?

Greater tolerance of investment risk can stem from changes in employment patterns, demographics and in other factors that boost financial awareness.

Demographics. According to the life-cycle theory of consumption, people borrow when they are young because their income is below that of later years, save in middle age when their income is highest and then draw down their savings in retirement. An implication of this theory is that savings rates and the share of wealth invested in higher earning non-M2 assets should rise in the peak earning years before retirement. By increasing the average need to fund retirement, demographic trends may be inducing an overall shift toward risky assets with higher expected long-term yields and away from lower earning M2 deposits. Alternatively, as people reach their peak earning years, their ratio of income to spending falls. As this ratio falls, so too will the public's demand for low-transactions cost M2 deposits.

Consistent with these implications, Duca and Whitesell (1995) find that small time and savings deposits are higher for older age groups, after controlling for income and wealth. Furthermore, Morgan (1994) finds that the average share of household assets held in stocks and bonds rises with the population share of 35- to 54-year-old people.

Changing preferences and learning. Two factors that could be depressing M2 holdings are households' increased awareness of investments outside of M2 and an associated rise in households' willingness to tolerate risk in the assets they control. Aside from new technology and financial products, increased job uncertainty and the liberalization of IRA/401K accounts have induced a shift toward portable (defined contribution) retirement plans that have given households a greater role in managing their retirement assets. This shift, in turn, has induced households to incur large, one-time costs to learn more about bond and equity investments for retirement. In addition, with many mutual funds, people can count their IRA/Keogh mutual fund balances along with other mutual

fund holdings toward meeting the minimum balance requirements for opening asset management accounts. As a result, IRA and Keogh assets effectively reduce the minimum balance requirement on non-IRA/Keogh mutual fund assets. Consistent with this, both IRA/Keogh and non-IRA/Keogh bond and equity fund assets rose in the mid-1980s after tax laws were eased and in the early 1990s.[7] Cross-section data confirm a big shift in household portfolios toward bond and equity funds and away from bank CDs since the late 1980s.[8]

Conclusion

The recent breakdown in the link between nominal GDP and conventionally defined M2 reflects how technological changes have enabled households to hold less money and more nonmonetary assets. Such innovations have reduced the costs of transferring funds from other assets to checking accounts, or, as in the case of credit cards and lines, have reduced the need to hold money that arises from mismatches of cash inflow and outflow. Changes in tastes and the age composition of the U.S. population may also be heightening the extent to which people can substitute other financial assets for money.

The information revolution will likely further reduce the benefits from holding traditional forms of money by fostering the spread of new electronic types of money, banking through personal computer, credit lines and financial management software. Together with these advances, a likely continuing shift toward portable (defined contribution) retirement plans and tax incentives will likely increase peoples' role in managing their retirement assets. These factors will likely lead people to further reduce their holdings of conventionally defined "money" and increase their investments in higher earning alternative assets. As a result, what growth in conventionally measured money

means for inflation will continue to change.

—John V. Duca

Notes

I thank the late Stephen Goldfeld and my many colleagues throughout the Federal Reserve System for sharing their insights on money with me over the years.

[1] For examples, see Collins and Edwards (1994), Duca (1995a and 1994) and Koenig (1995).

[2] For a more technical discussion, see Duca's (1995b) modified version of Milbourne's (1986) model of money.

[3] For evidence, see Orphanides, Reid and Small (1994).

[4] See Feinman and Porter (1992).

[5] For more details, see Holland and Cortese (1995) and Lewis (1995).

[6] Daniels and Murphy (1994a) find that a 100-percentage-point rise in the probability of ATM use increased the velocity of currency (transactions/currency) by 40 to 45 percent for transactions account holders, while Daniels and Murphy (1994b) estimate that a 5-percent rise in the proportion of ATM users would boost average transactions account balances by 4.5 percent. Together, these studies imply that ATMs induced households to shift from holding cash to holding transactions balances in the mid-1980s.

[7] See Duca (1995a) for evidence.

[8] See Kennickell and Starr-McCluer (1994) for cross-section evidence. These factors are consistent with a study by Blanchard (1993), who found that the extra return that investors demand from equities over bonds has trended downward since the 1940s and abruptly fell in the early 1980s.

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