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John V. Duca is a research officer at the Federal Reserve Bank of Dallas. The author thanks Anne King and Chih-Ping Chang for their excellent research.

Commentary

SOME BACKGROUND ON MONEY-DEMAND INSTABILITY

PAST EPISODES OF MISSING money can shed light on whether bond and/or equity funds should be added to M2. My perspective on how to analyze monetary aggregates can be characterized as a dynamic market-share approach. If financial aggregates have a stable relationship to nominal GDP and if banks have a stable share of the financial market, then bank-based monetary aggregates like M2 will be helpful indicators. The two most pronounced episodes of missing money, M1 in the mid-1970s and M2 in the early 1990s, occurred when the competitiveness of the banking system declined.

In the mid-1970s, firms shifted away from bank loans toward commercial paper at a time when Regulation Q induced banks to ration credit and banks were passing along the heightened cost of reserve requirements when interest rates were high. On the liability side, binding deposit rate ceilings and high interest rates led firms and households to adopt cash management and to use money market funds which purchased commercial paper and Treasury bills. In terms of flows, firms used the proceeds from issuing paper to pay off bank loans while banks used these funds to pay off depositors who were shifting assets into money funds. In Figure 1, the development of money funds allows part of the flow of short-term finance to bypass the banking system.

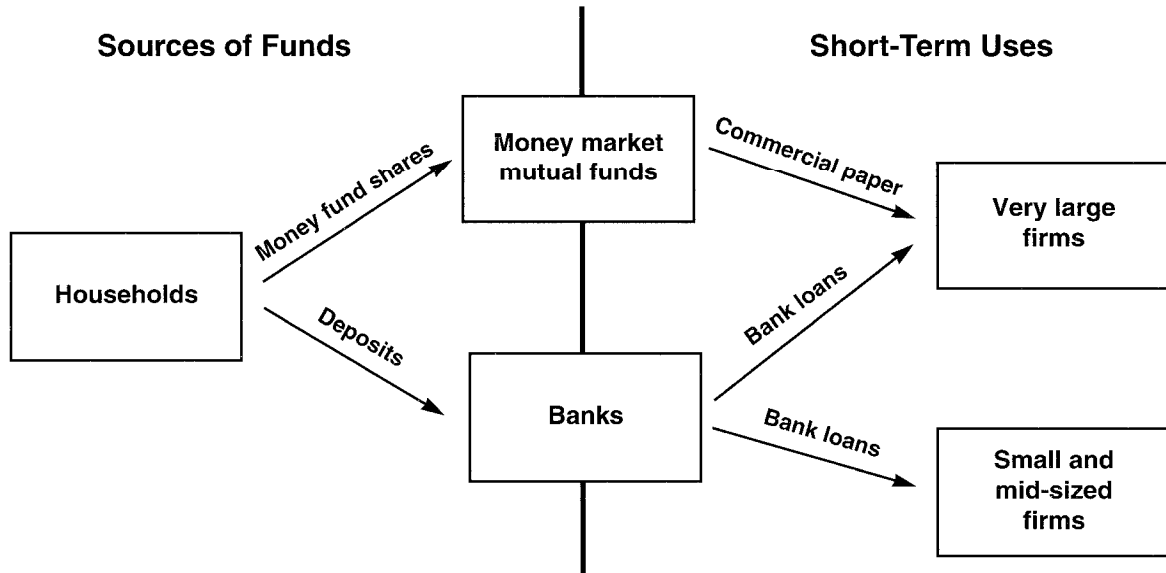
By comparison, the bypassing of the banking system in the early 1990s occurred in the flow of medium- to long-term finance (Figure 2). Higher

deposit insurance premiums and more costly risk-based capital standards led banks to boost the spread of prime over short-term rates, which helped induce firms to shift toward bond and equity financing. At the same time, wider net interest margins stemming from regulatory changes, coupled with a steep yield curve, encouraged households to shift out of small time deposits into bond and equity funds. In terms of flows, firms paid off bank loans with proceeds from issuing bonds and stocks bought by mutual funds whose purchases, in turn, were financed by assets that households shifted out of bank deposits. Both episodes show how the banking system is not a closed loop, because agents innovate to circumvent banks when banks become relatively more costly to use.

THE CENTRAL EMPIRICAL ISSUE

If one could model the shocks to money demand, then modified money-demand models would work. However, if households have fundamentally changed their asset behavior, then it may be better to broaden an aggregate. In assessing the impact of Resolution Trust Corporation (RTC) activity and the yield curve on M2, I have found that M2 plus non-IRA/Keogh household bond funds is more explainable than M2 using Federal Reserve Board-style (circa 1990) M2 models (Duca, forthcoming). This suggests that the behavioral relationships have changed. However, given that bond funds were negligible prior to the mid-1980s, the analysis was effectively conducted over a period when bond fund assets did not suffer sizable capital losses. *The issue of*

Figure 1
Short-Term Finance



whether to add bond or bond and stock funds to M2 is an empirical one and boils down to whether we lose more from making M2 more vulnerable to capital gains and losses than we gain from internalizing portfolio shifts between M2, and bond and equity funds.

A COMMENT ON COLLINS AND EDWARDS

This is a good paper. The authors are very careful in how they construct and describe the data used in building M2+. This study will be a helpful resource for many analysts.

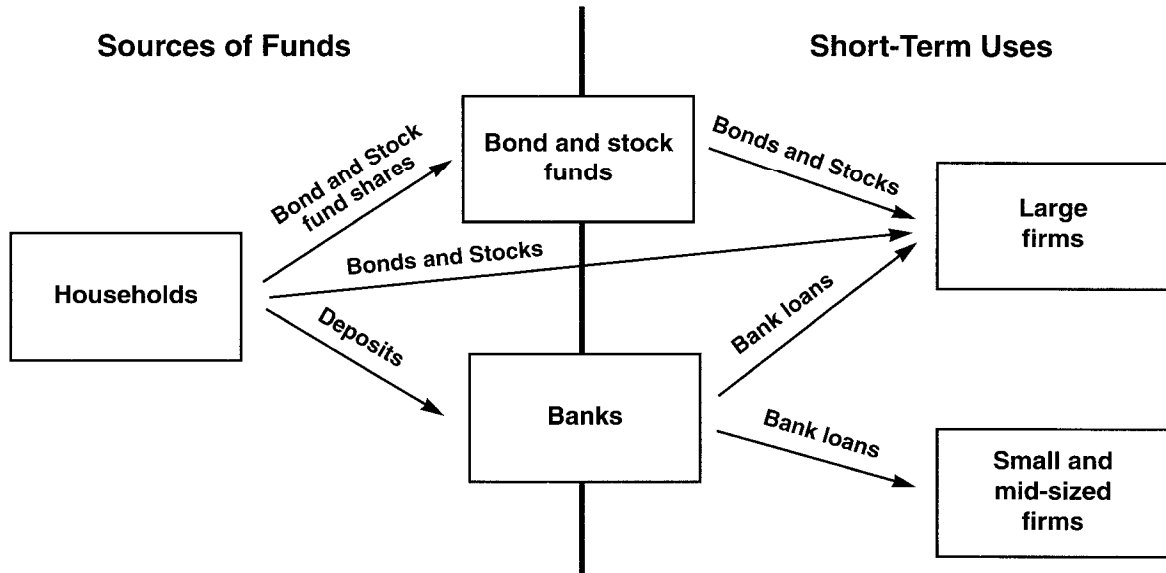
SOME COMMENTS ON ORPHANIDES, RRID AND SMALL (ORS)

Overall, this is a very nice and careful study. The only suggestion I have regards how the authors assess the indicator properties of M2 and M2+. I have some reservations about using only Granger regressions of GDP and money growth rates to assess indicator properties in the ORS study. This approach has the problem of letting bygones-be-bygones. That is, variability in money and GDP growth may obscure any

information in long-run relationships between money and nominal output, if such relationships still exist. On this point, ORS could look into a simple error-correction model of nominal GDP that imposes a long-run velocity relationship. They then could compare results using M2 versus M2+ as *additional* evidence about indicator properties.

To shed some light on this point, consider some forecasts of inflation using a framework that imposes a long-run relationship between money and nominal output. Namely, the (in)famous P-star model. Figure 3 shows out-of-sample forecasts of inflation, as measured by the implicit GDP deflator. These extend recent research with Zsolt Becsi (Becsi and Duca, forthcoming). As we can see, the P-star model using M2 severely under-predicts inflation to the point of forecasting deflation in 1993. By contrast, M2 plus bond funds (M2B) and M2+ do a good job of tracking this inflation measure since 1991, with a slight edge to M2B. Interestingly, M2 does a better job in predicting inflation during the mid-1980s' surge in bond and equity funds, whereas M2+ and M2B do better during the early-1990s' surge in mutual funds. Why?

Figure 2
Long-Term Finance



WHY THE MID-1980s' SURGE IN MUTUAL FUNDS DIFFERS FROM THE 1990s' SURGE

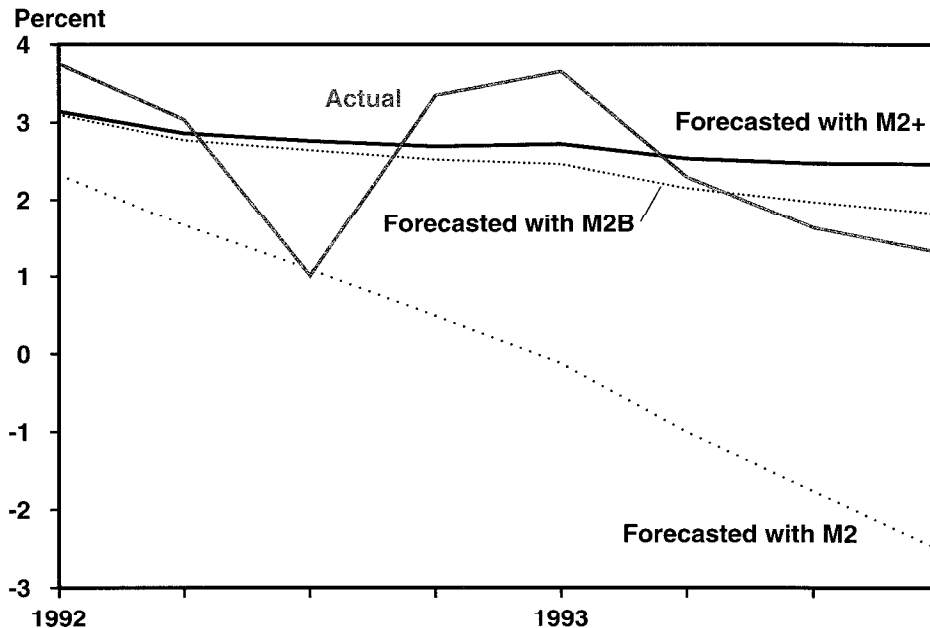
I believe that the answer reflects differences in the sources of inflows during these episodes. The surge of the mid-1980s came shortly after IRA, 401K and Keogh regulations were liberalized. Given the incentives to use these retirement vehicles, many households learned more about mutual funds and likely applied this knowledge to other asset holdings. This is consistent with the fact that household holdings of IRA/Keogh and non-IRA/Keogh bond and equity fund balances grew rapidly in the mid-1980s. It is also consistent with flow-of-funds data, which suggest that the assets that households shifted into bond and equity funds came more from direct holdings of bonds and equities than from M2 deposits. This finding is also consistent with the relatively good fit of M2 demand models in the mid-1980s.

By contrast, flow-of-funds data suggest that more of the inflows into bond and equity funds during the early-1990s reflected shifts out of M2 deposits rather than out of direct bond and equity

holdings. This is consistent with the missing M2 phenomenon of recent years.

Four factors may explain why the inflows into bond and equity funds came more from M2 in the early-1990s relative to the mid-1980s. First, compared to the mid-1980s, the yield curve was steeper for a longer period of time in the early-1990s. Thus, households had a greater incentive to shift out of M2 deposits in recent years. Second, because short-term rates fell much more in the early 1990s than in the mid-1980s, there were negative income effects on retirees holding small time deposits that encouraged them to shift out of bank CDs into higher-earning bond and equity funds. Third, declines in loads and fees on mutual funds (as shown by ORS) reduced the cost of shifting into mutual funds. Milbourne's (1986) modified Miller-Orr model implies that smaller loads will induce shifts from M2 into bond and stock funds. The fourth factor reflects the realization during the early-1990s that jobs are less secure—especially for professionals. As the world becomes more Schumpeterian, households will increasingly rely on portable, defined contribution pensions. Such plans typically require that households make investment

Figure 3
Actual and Forecasted Inflation from the P* Model
 (Implicit GDP Deflator, SAAR)



decisions. As a result of being more active in managing their retirement assets, households are becoming increasingly aware of alternatives to M2 and are becoming better managers of their assets.

Differences between the mid-1980s and early 1990s imply that future research should examine the substitutability of bond and equity funds not only for M2, but also for direct holdings of bonds and equity. In addition, future work that applies learning models to bond and equity funds may prove fruitful.

WHAT SHOULD THE FED DO?

I favor an eclectic approach to conducting monetary policy because innovation by the private sector at times causes breakdowns in the relationship between financial variables and the economy. That said, part of our job at the Fed is to update financial indicators in light of those innovations.

As for using monetary aggregates as indicators, I have two positions. First, since recent innovations are mainly affecting the non-M1 component of M2, narrow money measures, net of currency, could be used as information

variables within models that control for the high sensitivity of narrow money to interest rates and mortgage refinancing activity. Nevertheless, the high rate sensitivity of narrow aggregates limits their usefulness as monetary targets under the Humphrey-Hawkins Act. Second, I would also monitor M2 and M2 broadened to include bond and/or equity mutual funds, keeping in mind that capital gains and losses will have direct price effects on M2+ and M2B balances and will induce portfolio substitution between M2 and these broader aggregates.

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