

On Measuring the Money Supply

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Key Points

- Oskar Morgenstern warned in *The Limits of Economics* (1937), that the formulation of economic policy was handicapped by the lack of relevant data and errors in its measurement.
- In this paper, the measurement of the money supply is used to illustrate Morgenstern's point.
- The most relevant measure of money for purposes of nominal national income determination is an inclusive, broad money metric.
- Most central banks fail to report the most inclusive broad money metrics, and what is reported are measured with the use of simple-sum aggregates.
- Divisia monetary aggregates are superior to simple-sum aggregates. These superior measures are used and data are reported for the United States by William A. Barnett at the Center for Financial Stability in New York.

Introduction

The great Oskar Morgenstern (1902–77) wrote in *The Limits of Economics* (1937) that the inherent difficulties confronting economic policy lie in the distance between economic theory and its application. That gap exists because of the lack of relevant data and errors in its measurement, and also, in many cases, economic theory that is ill-suited for the problems at hand. As Morgenstern put it:

None the less, the thoroughly empirical character of economic theory cannot be stressed too strongly. *A priori* theory would be very easy if it were possible to dispense with the necessity of dealing with reality and with the flux of economic events and if

it were sufficient to lock oneself in a room and invent the world of facts, adopting the attitude that if theory and reality did not then agree, so much the worse for reality. (Morgenstern, 1937, pp 9–10)

And, if primary data and measurement problems were not bad enough, Morgenstern stressed that, to get things right, an applied economist should possess “a certain instinct for reality and a well-developed sense of proportion...” (Morgenstern, 1937, pp 9–10) so that he doesn’t get trapped in the gap between the speculations of theory and the actual facts. Indeed, Morgenstern, a high priest of economic theory and empirical measurements, concluded that: “Strange as it may seem, the relevance of the artistic turn of mind is particularly great in the social sciences” (Morgenstern, 1937, p. 5).

The measurement of the money supply is used to illustrate the relevance of Morgenstern’s “theory-data gap” conjecture. The most robust national income determination model is the monetarist model. The course of the economy, when measured in nominal terms, is determined by the course taken by the money supply. Indeed, the positive relationship between the growth rate of the money supply and both nominal GDP and nominal aggregate demand growth is unambiguous and overwhelming.

So, just what is the measure of money that is most suited for taking the temperature of the economy and forecasting its course? Is a narrow metric, like the monetary base (M0), the best? Or should we focus on broad money metrics, like M3 and M4? For national income determination, the more inclusive the metric, the better. Indeed, for the most complete and accurate picture, one should include all of the important components of money supply, not just a few.

To obtain money supply data is simple enough. Just go to the Federal Reserve’s monetary database (Fed) and pick the broadest money supply measure, and you will be ready to go. Right? No, it’s not that simple. First, since the Fed stopped reporting the M3 money supply measure in March of 2006, one is left with M2 as the broadest measure it reports; and M2 is not very broad.

The Fed’s money supply measures are limited to rather narrow metrics, and that is a problem. To obtain superior, broader measures, one must go to The Center for Financial Stability (CFS) in New York, where I serve as a

Special Counselor. The CFS was founded in 2009 by Lawrence Goodman to, in part, improve on the measurement and reporting of money supply statistics. The CFS was fortunate in that William A. Barnett, the world's leading expert on Divisia monetary aggregates, agreed to develop and lead the Center's Advances in Monetary and Financial Measurement program. In addition to his expertise in Divisia monetary aggregates, it is noteworthy that Barnett is the Founder and President of the Society for Economic Measurement, and that he spent time as a systems engineer at Rocketdyne during an early chapter in his professional career. It was there that he observed rocket engine tests and learned that "[i]n engineering and physical sciences, investment in measurement is very high" (Serletis, 2017). The CFS, under Barnett's watchful eye, produces a detailed monthly report: "CFS Divisia Monetary Data for the United States" (Center for Financial Stability, 2019). That report contains a broad money measure: M4. It includes five more components than M2: institutional money-market funds, long-term deposits, repurchase agreements, commercial paper, and Treasury Bills. These components are important because they all serve, in varying degrees, as money. To exclude them from a measure of money would be to exclude a great deal.

So, the CFS money supply metrics contain important components that are excluded in the Fed's M2. In this sense, the CFS data are superior. But, narrowness is only the start of the Fed's data problems.

What really separates the CFS measures from the Fed's is that the Center's measures of money are not just a simple sum of the various components that make up the different measures of money, the various Ms. It has long been recognized that simple-sum aggregation can result in big measurement problems. Indeed, Irving Fisher in his classic 1922 book, *The Making of Index Numbers*, concluded that simple-sum aggregation can lead to the very worst type of index numbers (Fisher, 1922, p. 29). When it comes to measuring monetary aggregates, even the dean of Monetarism, Milton Friedman (1912–2006) acknowledged that there were cases in which simple-sum aggregation might result in poor measures of the money supply (Friedman and Schwartz, 1970, pp 151–2).

Why was Friedman's conjecture correct? Money takes the form of various types of financial assets that are used for transaction purposes and as a store of value. Money created by the Fed (notes, coins, and banks' deposits at the Fed) represent the monetary base (M0). This state money, or high-powered money, is imbued with the most 'moneyness' of the various types of financial assets that are called money. Components of the monetary base are ready to use in transactions in which goods and services are exchanged for "money."

But, in addition to the assets that make up the monetary base, there are many others that possess varying degrees of moneyness—a characteristic which can be measured by the ease of, and the opportunity cost associated with, exchanging them for base money. These other assets are, in varying degrees, substitutes for money, and are included in broader measures of money. But these other assets should not receive the same weights when they are summed to obtain a broad money supply measure. Instead, those assets should receive less weight per unit than the other components of high-powered monetary base, with the ones that are easiest to substitute for base money receiving higher weights than those that possess a lower degree of moneyness.

How can we dump simple-sum aggregates and determine the weights that should be attached to the components of broad money supply metrics? Enter William Barnett. Using a theory of aggregation developed in 1925 by the French engineer Francois Divisia (1889–1964), Barnett pioneered the application of the Divisia index to money supply measurement. So, the broad measures of money produced in the CFS's monthly report are not just simple-sum M3 and M4 numbers. They are superior Divisia M3 and Divisia M4 measures, in which their components are weighted according to the moneyness of each component.

We all know that good science is not possible without good data. Do not forget Morgenstern's "theory-data gap" conjecture. After all, bad measurements and faulty data can result in disastrous missile launches. What pilot would want to be "flying blind," with an altimeter that was malfunctioning? What about the money supply? Do the Fed's faulty metrics really make any difference for policymakers and investors? In a word, the

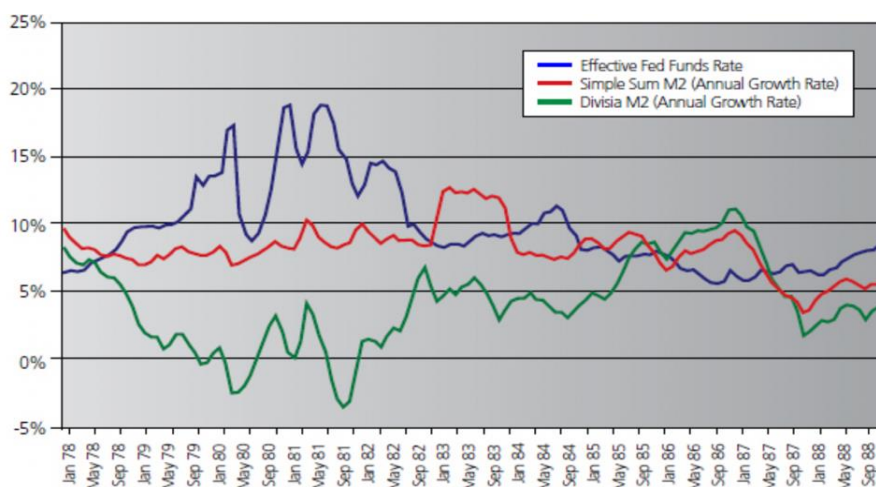
answer is “yes.” Let us take a look at one dramatic example of how the Fed’s data caused economic “crash landings.”

When Paul Volcker took the reins at the Fed, the state of the US economy’s health was “bad.” Indeed, 1979 ended with a double-digit inflation rate of 13.3%. Remember stagflation?

Chairman Volcker realized that money matters, and it didn’t take him long to make his move. On Saturday, October 6, 1979, he stunned the world with an unanticipated announcement. He proclaimed that he was going to put measures of the money supply on the Fed’s dashboard. For him, it was obvious that, to restore the US economy to good health, inflation would have to be wrung out. And, to kill inflation, the money supply would have to be controlled.

Volcker achieved his goal. By 1982, the annual inflation rate dropped to 3.8%—a great accomplishment. But the problem was that the Volcker inflation squeeze brought with it a relatively short recession (less than a year) that started in January 1980, and another, more severe slump that began shortly thereafter and ended in November 1982.

Paul Volcker’s problem was that the monetary altimeter installed on his dashboard was defective. When Volcker looked at his M2 gauge, he was viewing M2 data that were calculated by a simple summation of their components—the normal Fed procedure. As shown in Figure 1, the Fed thought that double-digit Fed funds rates that it was engineering allowed it to tap on the money-supply brakes with just the right amount of pressure. In fact, if the money supply had been measured correctly by a Divisia metric, Volcker would have realized that the Fed was not just tapping on the brakes, but unnecessarily slamming on them from 1978 until early 1982. The Fed was imposing a monetary policy that was much tighter than it thought—an excessive tightness that resulted in two recessions.

Figure 1: Volcker's Monetarist experiment (United States)

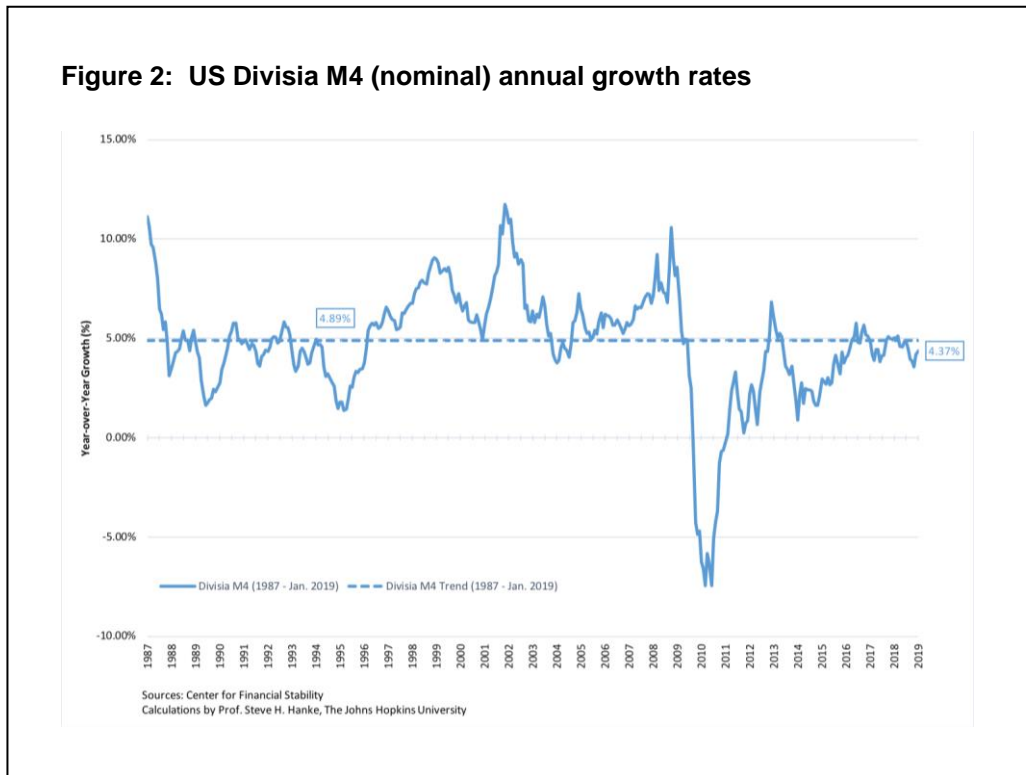
Sources: Center for Financial Stability and the Federal Reserve Bank of St. Louis
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Why were there huge divergences between the standard simple-sum measures of M2 that Volcker was observing and the true Divisia M2 measure? As the Fed pushed the federal funds rate up, the opportunity cost of holding cash increased. In consequence, retail money market funds and time deposits, for example, became relatively more attractive and received a lower weight when measured by a Divisia metric. Faced with a higher interest rate, people had a much stronger incentive to avoid “large” cash and checking account balances, opting to keep their funds in relatively high-yielding assets. As the federal funds rate went up, the divergence between the simple-sum and Divisia M2 measures increased.

Alas, the data problems associated with Volcker's monetary experiment have been ignored by the Fed. Indeed, as Bill Barnett concluded in his book *Getting It Wrong: How Faulty Monetary Statistics Undermine the Fed, the Financial System, and the Economy*: “When more and better data were needed by the private sector, as the complexity of financial products grew, the quantity and quality of Fed data declined” (Barnett, 2012, p. 17).

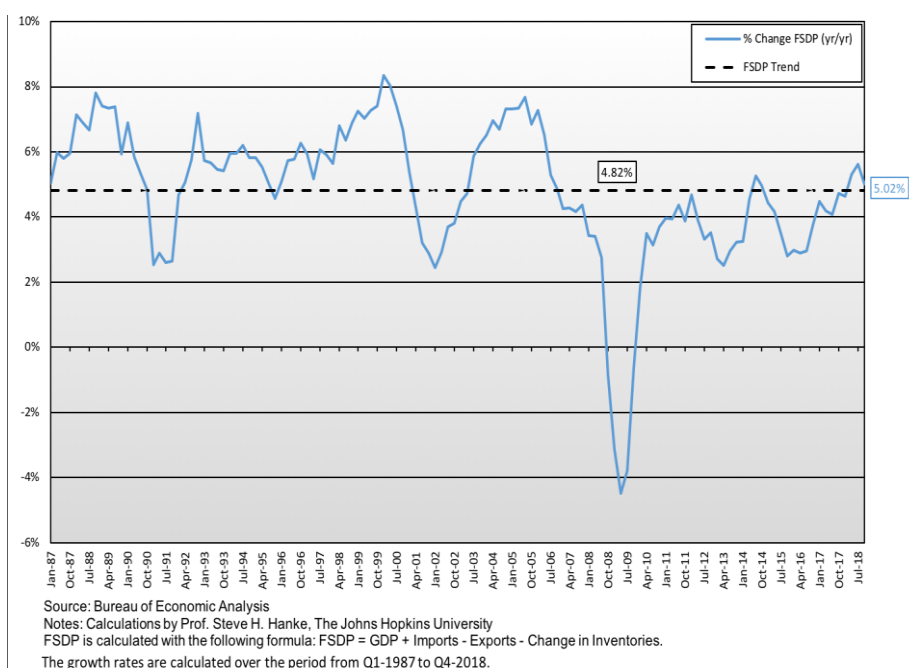
Fortunately, we have a reliable alternative for the provision of high-quality money supply data: The Center for Financial Stability.

Where are we today? As shown in Figure 2, the Divisia M4 growth rate is 4.37% yr/yr. That rate is a bit weak. Indeed, it is lower than it has been during the past year, and it is also below its trend rate for the past 30 years of 4.89%. This suggests that the Fed's balance sheet unwind has resulted in somewhat of a "tight" monetary stance.



If we turn to nominal aggregate demand, as measured by final sales to domestic purchases, its rate of 5.02% yr/yr is slightly above its 30-year trend rate of 4.82%. So, for now, things look pretty good. But a monetary storm cloud would develop if the Fed were to misstep and slip into a quantitative tightening mode. Without Divisia M4 on the Fed's dashboard, the Fed might not realize the storm forming on the horizon.

Figure 3: Change in final sales to domestic purchasers (nominal)—USA, 1987 to present



So, the measurement of the money supply validates Morgenstern’s “theory-data gap” conjecture, and leads to one of the important conclusions contained in his classic book *On the Accuracy of Economic Observations* (1963):

Students have to be brought up in an atmosphere of healthy distrust of the “facts” before them. They must also learn how terribly hard it is to get good data and to find out what really is a “fact” (Morgenstern, 1963, p. 305).

And, to that, I will simply say: “Amen.”

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