"Money" is the Reserves not the Money*

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Abstract

In this paper I will argue that the institutional implementations that we commonly include in our monetary aggregates are actually more similar to the concept of monetary base. I will also argue that the institutional implementation of accounts payable operates as money. This slightly translated definition implies that a new monetary aggregate that includes accounts payable may be useful for conducting and informing monetary policy.

1 Introduction

Modern monetary theory focuses on the ability of fiat money to implement allocations that would be impossible without the presence of money. In order to describe money's role in this we have focused on the ability of individuals, often with a limited productive capability, but more importantly where no collaboration is required for production and there are no strictly intermediate goods. The final and most important theme is that money is part of virtually every transaction. The real world is different in ways that make this simplification inappropriate.

Consider the transactions that you, as an individual, make every month. How many are made with cash on hand or by writing a check? Quite a few you say; a few cups of coffee, perhaps some gasoline or lunch. Now count the number of transactions that you receive invoices for- your accounts payable. There are many of those and their dollar value will exceed that of your cash out of hand transactions.

If you own a business, how many of your sales are paid in cash, by check, or other near cash upon delivery? If you are not a retail sales business, not many. Most will accumulate as accounts payable and be paid via invoice. Very few

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transactions are made purely with cash or near cash as part of the transaction without first generating some kind of accounts payable.

This observation is true on the macro scale. In 1999, the estimates of M1 and M2 were $1,017 and $4,546 billion dollars, respectively[FR6]. While that does seem rather large, US corporations reported that their accounts receivable were $7,745 billion dollars[IRS02]. Corporate accounts receivable alone is seven times M1 and almost twice M2. "Inside money", issued by private entities swamp the outside money issued and regulated by the monetary authority. Focusing solely on "outside", government created money is probably a severe limitation on our monetary aggregates because it ignores the "inside" money that is so prevalent.

The relationship between accounts receivable and outside money is not a modern phenomenon dependent on rapid communication and sophisticated accounting methods; It is the most ancient functioning of money. Innes [**?**] has a multitude of examples from ancient Rome, Babylon, Medieval France. Shubati, a Babylonian open accounting system, pre-dates the existence of government produced coins by thousands of years. These simple, clay, tamper resistant, records of the debt of one person to another were regularly created for small transactions and traded to facilitate other transactions. French Medieval market fairs had not as their main function the goods trade but the clearing of accounts between merchants. The accounts themselves being organized in the form of hazelwood tallies that indicated creditor, debtor and the amount of the debt. Each side of the transactions receiving half the tally as proof of debt. These tally circulated and goods were sold with nary a coin exchanging hands. The British government did not give up this practice until the early nineteenth century. Accounts payable is far from being a new monetary concept -it is the oldest.

Under this broadened definition of money, what then is the function of cash and near cash, the most visible outside money, in business and personal finance? It is a buffer stock for differences in the rate that you pay off your accounts payable and collect your accounts receivable. You will commonly accumulate cash or near cash from collecting accounts receivable to pay one of the accounts payable. Cash and near cash smooth over difference in the two flows. The mantra of small business, "Its all about cash flow", isn't repeated so frequently without reason.

The function of cash and near cash to households and business is exactly analogous to the function of reserves to a bank. Reserves buffer the differences in the rate that accounts receivable, i.e., loans, are collected and the rate at which accounts payable, i.e., deposits, are paid. Both are simple buffer stocks.

If the two kinds of reserves, banking reserves for deposits and a firm or household's reserves for accounts payables, are functionally equivalent then why are accounts payable not included in a monetary aggregate the same way demand deposits are included in monetary aggregates? The difference is not necessarily in the individuals' ability to collect on an account receivable to decrease an account payable, which is different by a mater of degree. Banks conventionally transfer funds very quickly when one of your demand orders is processed, but your contract with the bank gives them considerable leeway, often similar to the

terms in many invoices. So, it is not necessarily the speed of the transactions.

The main difference seems to be that we count accounts payable in our monetary aggregates only when they are the accounts payable of a firm specializing in facilitating high frequency financial transactions, e.g., banks. The accounts payable of non-specialist firms and low frequency facilitators are not included. The vast majority of banking functions are distributed throughout non-specialist firms and so are ignored.

This paper will describe the desirable characteristics of a monetary aggregate, both with respect to monitoring the economy and engaging in fiscal policy of the monetarist bent. This characterization will encompass how estimates of monetary aggregates are constructed from their source data and how frequently the elements of that source data are available for estimation. The paper will then demonstrate how the M2 monetary aggregate, with the addition of accounts payable or accounts receivable, satisfy those conditions, in many cases better than the traditional M2 monetary aggregate, but fails to have desirable characteristics as a policy control. The final section of the paper will proffer an explanation that rationalizes the empirical results.

2 A Good Aggregate is...

Monetary aggregates have two principle uses indicators and controls. As an indicator, monetary aggregates can be used to estimate nominal GDP, future inflation and a host of other interest rate related values. It also holds a place in the monetarist tradition as a control for nominal GDP. To satisfy this dual use, indicator and control, monetary aggregates must have the following four properties:

1. They must be estimable at relatively high frequencies.
2. They must be estimable with a relatively small amount of sampling variation.
3. They must have a stable relationship with nominal GDP, i.e., velocity relationship.
4. They must have a stable relationship with the monetary base, i.e., multiplier relationship.

High frequency estimation is necessary since a noisy indicator of something like nominal GDP is not very useful if it is estimated as infrequently as GDP itself. In order for the noisy indicator to be useful for interperiod estimates of GDP it must be estimated more frequently. This property is even more important if the monetary aggregate is being used as a control. High frequency data allows for faster reactions and minimizes overreactions and corrections.

While sampling variation is often ignored, monetary aggregates are not an exact count, they are the result of several interlocking surveys. As a survey, a great deal of effort has gone into minimizing the variance of the estimates,

subject to the the cost constraints of those firms participating in the survey. The sampling variation in these estimates must also be small enough to allow decisions.

The final necessary property of a monetary aggregate as an indicator is that it must have a stable relationship with nominal GDP, meaning there is either a stable velocity relationship or a steady change in the velocity relationship. Without this kind of stable relationship the aggregate loses its ability to be used as an indicator.

The final property, that the money multiplier is stable, is necessary only if the monetary aggregate will be used as a control. It is completely unnecessary for indicator purposes, but it is what allows monetary policy through the monetarist channel. Without a stable relationship between the monetary base and the monetary aggregate, there is no control.

The next section of the paper will describe how the Federal Reserve Board constructs monetary aggregates and how the accounts payable estimates constructed by the Internal Revenue Service can be included in these estimates. This will address the first two properties of good monetary aggregates: that they be estimable at a relatively high frequency and that they be estimable with reasonably low sampling variation. The section that follows will describe the second two properties, the velocity and multiplier relationship.

3 How to Build a Monetary Aggregate

The current monetary aggregate statistics are calculated and published as preliminary estimates weekly by the Federal Reserve Board at about 4:30 p.m. every Thursday as statistical release H.6. The information required for these estimates are collected through the Federal Reserves own data on cash orders and transfers at its cash offices and several reporting forms required by the Federal Reserve.

The majority of the items required for the construction of M2 are collected via FR-2900, a form that is generally filed weekly by all deposit institutions, with some exempt institutions reporting quarterly[FR2]. The forms are designed to satisfy the requirements of Monetary Control Act of 1980 (MCA) and the Garn-St. Germain Depository Institutions Act of 1982 (Garn-St. Germain Act). This form provides information on demand deposits (6% of M2), other checkable deposits in banks (5%), small repurchase agreements (17%), and savings (44%). Together this represents the most solid, reliable, high frequency data that the Federal Reserve Board has available, representing approximately 72% of M2. Information on money market mutual funds, which constitute approximately 17% of M2, and IRA/Koegh balances, which are subtracted from M2, are collected via FR-2051a. This form is also filed weekly by Investment Company Institute members (ICI), which account for about 95% of all mutual funds in the US. Many non-member funds also voluntarily report.

There are other adjustments, mostly subtractions that take into account government deposits and the like. The most uncertain components of M2 are

travelers checks issued by non-depository institutions[1], which are minuscule at less than 1% of M2, and currency, contributing roughly 11% of M2.

The final component of M2, currency, provides the most problems both empirically and theoretically. Many theoretical models of money require an outside anchor to determine price levels. Early work in the area, notably Gurley and Shaw [Gur60] and Patinkin [Pat61] greatly depended on not having a foreign sector. Later work in King Plosser [KP84], Chari, Christiano and Eichenbaum [CE95] and Coleman, Gilles and Labadie [CL96] continued with the same assumption of no foreign sector. This means that it is empirically necessary to separate domestic and foreign held currency.

This particular exercise has been attempted several times with various methodologies, the most comprehensive of which are Porter and Judson [PJ96] and the follow-up article Anderson and Rasche [AR00]. Both papers come to the conclusion that nearly half of the currency in circulation is held outside the United States.[2] The main point is that there is considerable uncertainty about the amount of currency actually in the country and this component, accounting for a significant amount of M2 at 11%, could be quite different from what is being reported.

To this fairly noisy figure I am proposing to add a little more noise in the form of a general accounts payable estimate. In this paper, I will focus on the reasonable ease of constructing an estimate of accounts payable from federal corporate tax returns. This may not be the best method and is definitely inferior to the weekly data collection performed by the Federal Reserve Board for its other monetary aggregates. The annual figures presented here should provide an adequate proof of concept should the augmented aggregate ever be chosen to be fully implemented.

The rough empirical "proof of concept" work presented in this paper focuses on the accounts receivable and accounts payable reported by corporations filing IRS forms 1120 and 1120-A. I have chosen corporate accounts payable and receivable for several reasons. First, accounts payable and accounts receivable are both measures of the same thing. Second, corporate statistics are very large and readily available from the IRS relative to partnership and sole proprietorship information.

Every account payable held by a firm or individual is an account receivable by another firm or individual. This means that even if we had all accounts payable from all business sources, we would still not have all accounts receivable since there would still be a large block of accounts payable held by individuals, for which there is no readily conceivable source of data. Those accounts payable held by individuals will be for the most part, payable to businesses which will have them listed on their books as accounts receivable, which is available via the IRS data. Rather than choosing one series over the other or combining them in a statistically efficient manner, the analysis will look at both series as possible augmentations to the existing M2 monetary aggregate.

[1] These are included as Savings

[2] Anderson and Rasche [AR00], p.37 and [PJ96], p. 899 which actually states a figure between 55% and 70%.

The IRS provides much more data on corporate tax returns than it does for either sole proprietorship or partnership returns. No information from sole proprietorship returns is provided for accounts receivable and payable and only accounts payable is made available for partnerships. Furthermore, partnership accounts payable are typically about 1/10th of corporate accounts payable, \$191billion vs \$2,501billion in 1998.[3] The IRS makes the further declaration that this is understated because many partnerships do not file balance sheet items.[4]

The corporate accounts payable and receivable data used in this paper were harvested from the Statistical Abstract of the United States, the tables themselves reference the U. S. Internal Revenue Service's annual Statistics of Income publication. A quick survey of the data shows that there is a definitional gap in the data beginning in 1980 for accounts payable but the nature of the change is unclear. The analysis that follows will compensate for this by examining two sub-periods 1964 to 1979 and 1980 to 1999.

The IRS provides information about the sample used to construct the corporate accounts payable and receivable in Internal Revenue Service (2002). The figures used in this paper were constructed from an asset stratified sample of 80,705 returns, with the largest corporations entering the sample with certainty. Corporate returns are also unique in that in order to collect the sample they must have a 24-month sample period in order to account for variations in fiscal years and the number of extensions available to them.[5] Given the likely inflow rate of these returns, it is likely that even without a monetary aggregate sampling system resembling that of the Federal Reserve Board, monthly estimates of accounts payable and receivable can be constructed from internal IRS data. The problems the IRS faces in constructing annual figures may actually be an advantage in constructing higher frequency statistics.

The next section will explore the viability of an augmented M2 that includes either corporate accounts receivable or accounts payable. It will show that conventionally defined M2 has a much more stable money multiplier relationship, i.e. is more controllable, but that the augmented aggregates have a much more stable velocity relationship, i.e., are better indicators.

4 The Velocity and Multiplier Relationship

The money multiplier and velocity measure two halves of the relationship between the monetary base and the goods market. The money multiplier measures the relationship from the base to the money supply while velocity measures the relationship between the money supply and the goods market. An ideal monetary aggregate would have a very stable relationship with both the monetary base and the goods market.

[3] U.S. Census Bureau (2001), p. 475 , 477

[4] U.S. Census Bureau (2001), p. 475

[5] Internal Revenue Service (2002), p. 3.8-3.9

This sense of tightness will later be operationalized by looking at the variance of the velocity and money multiplier relations. The overall assessment of the monetary aggregate can then be evaluated by looking at the variance of the product of the money multiplier and velocity relations. It is entirely possible to have two monetary aggregates, such as MA and MB in the figure above, where the length of the vectors indicate the variance of the relationships. Monetary aggregate MB may be the best monetary aggregate as far as control is concerned since the product of the multiplier and velocity relations has a smaller velocity, but a monetary aggregate MA may be much better for monitoring the economy since the velocity relationship is much less variable. The remainder of this section will attempt to how M2 and the augmented M2 aggregates fit into this picture. They may be the superior aggregate for control purposes or monitoring purposes, or they may be inferior for all uses.

4.1 Velocity

The velocity relationship is the most important connection between monetary aggregates and the real economy, if monetary aggregates are going to be used as an interperiod indicator for the goods market. The empirical velocity is simply current value GDP divided by the money supply, however that is defined. This indicates roughly how many times each dollar is spent in a year. Figure 1 below shows the empirical velocity for M2 and M2 augmented with either corporate accounts receivable or corporate accounts payable as described in the previous section.

The graphic clearly shows that the velocity relationship between current value GDP and M2 with corporate accounts receivable is clearly more stable

Figure 1: GDP Velocity

Table 1: Standard Deviation of Velocity

	Years	
Series	1964-1979	1980-1999
M2+AR	0.034	0.044
M2+AP	0.040	0.056
M2	0.053	0.158

than the traditional M2 definition of the money supply. The velocity relationship between M2 and corporate accounts payable is marred by the discontinuity in the definition discussed in the previous section (Shown on the diagram as a vertical line).

The difference in the variance of the three series is quite pronounced and indicates that a movement towards including more accounts payable from non-specialist firms can greatly improve interperiod estimates of goods market activity. Table 1 below shows the standard deviations of the three velocities over the two sub-periods that define the definitional change in accounts payable. While the performance of all three aggregates are very similar in the early period, with the newly constructed series having a slight advantage, the performance in the later period shows the advantages of the augmented series. The standard deviation of the M2 velocity is 0.158 while the other, newly created, series have a standard deviation of only 0.044 and 0.056.

Another interesting velocity style metric is the relationship between the money supply and Gross Domestic Private Investment. If a monetary aggre-

Figure 2: Investment Velocity

Table 2: Standard Deviation of Investment Velocity

	Years	
Series	1964-1979	1980-1999
M2+AR	0.010	0.010
M2+AP	0.015	0.034
M2	0.029	0.034

gate is going to have a strong relationship to short term movements in GDP it should happen through this, the most volatile of all GDP components. Figure 3 below shows the velocity style relationship between investment and the monetary aggregates. A similar pattern where the relationship between the new aggregates and the goods market is much more stable than that of conventional M2 continues to hold true. As in the previous velocity relation the series that uses corporate accounts receivable, rather than corporate accounts payable, is significantly more effective. This claim may invalidate the assertion made in the previous section that these are two measures of the same underlying value, but further research is needed to determine the causes of this dramatic difference.

The evidence to this point has been fairly conclusive that the M2 augmented with either corporate accounts receivable or accounts payable has a much more stable velocity relationship both with GDP and Gross Domestic Private Investment and would be quite effective for monitoring the economy between quarterly GDP estimates. The next section will show that the same pattern does not hold true with the money multiplier relationship.

Figure 3: Money Multiplier

Table 3: Standard Deviation of Money Multiplier

	Years	
Series	1964-1979	1980-1999
M2+AR	2.63	3.1
M2+AP	1.88	1.55
M2	0.83	1.62

4.2 Money Multiplier Relationship

The money multiplier describes the simple relationship between the monetary base and the monetary aggregate. This relationship is only important if the monetary aggregate will be used to manipulate the economy rather than monitor it.

Figure 4 below shows the empirical money multiplier for the three monetary aggregates over our data horizon. This diagram shows that, while M2 augmented with accounts receivable is much less stable, that the relative performance between M2 and accounts payable augmented M2 is much closer. Looking at the variance of the money multiplier relationships in the two sub-periods (shown in Table 3 below), it is clear that M2 outperforms the two augmented aggregates in the earlier sub-period. In the more recent sub-period M2 augmented with accounts payable actually outperforms M2.

We have now determined that M2 augmented with corporate accounts payable has a more stable relationship velocity and money multiplier relationship than M2 has over the last 20 years. It has yet to be determined if accounts payable

Table 4: Bivariate Normal Approximation of the Money Multiplier and Velocity Relationships

		1964-1979			1980-1999		
		Mean	Variance/Covariance		Mean	Variance/Covariance	
M2+AR	Money Multiplier	20.18	10.3223	-0.1361	24.59	10.2379	-0.1154
	Velocity	0.83		0.0021	0.77		0.0019
M2+AP	Money Multiplier	15.06	4.5672	-0.1022	14.67	2.7076	-0.0619
	Velocity	1.11		0.0052	1.29		0.0031
M2	Money Multiplier	2.72	1.5830	0.0013	10.18	2.9548	-0.2283
	Velocity	1.63		0.0032	1.84		0.0211

augmented M2 is superior for control purposes because the variance of the product of the money multiplier and velocity is unknown. M2 may yet be a better overall aggregate depending on how the velocity and money multiplier relationships are correlated in the two sub-periods.

4.3 Controllability Assessment

Assessing the overall suitability of the aggregates requires a few more assumptions. By controllability we are looking at the relationship between the monetary base and the real economy, current value GDP. Obviously if we take the product of the per period money multiplier, the velocity relation and the monetary base we will get per period current value GDP exactly. In order to make this assessment we need to look at the stability of the product of the multiplier and velocity over the two time periods.

The previous variance calculations only assumed a constant mean, finite variance and independence over time. To calculate the variance of the product of the money multiplier and velocity requires a distributional assumption. In order to keep things simple, velocity and the money multiplier will be assumed to time independent bivariate normal. Given these assumptions, Table 4 below shows the bivariate normal approximation of the three monetary aggregates over the two sub-periods.

Except for one case the empirical money multiplier and velocity are negatively correlated. These distributions imply the following standard deviations for the products of velocity and the money multiplier. This table confirms the initial conjecture from looking at the variances of the velocity relationship and money multiplier relationship- M2 augmented with corporate accounts payable is a superior monetary aggregate not just for monitoring purposes but also for control in the later, post -1980 period. There are more sophisticated ways of making this evaluation that take into account, possibly, time varying means, and more complex intertemporal error structures. But, under this very simple model M2 augmented with corporate accounts payable has been a much more controllable monetary aggregate over the last 20 years.

Table 5: Standard Deviation of the Product of Velocity and the Money Multiplier

	Years	
Series	1964-1979	1980-1999
M2+AR	3.212	3.181
M2+AP	2.132	1.641
M2	1.258	1.718

5 Summary and Conclusions

Monetary aggregates have focused on the accounts payable of firms that specialize in high frequency financial transactions, i.e., banks and their ilk. Monetary aggregates become broader as the aggregate includes accounts payable that are less and less liquid. This paper proposed an alternative dimension for the liberalization of monetary aggregates. Rather than focus on liquidity, it focused on including the accounts payable of firms that are not specialists in monetary transactions and are regular firms. This particular change enables the figures to encompass many more of the transactions we engage in every day.

An investigation of the feasibility of such a monetary measure shows that one can be constructed from corporate tax filings collected by the Internal Revenue Service. They will also have a periodicity similar to the current monetary aggregates but with the potential for more sampling noise.

When M2 and M2 augmented with either corporate accounts receivable or accounts payable were compared with respect to their ability to monitor the economy, the velocity relationship, the augmented statistics significantly outperformed M2 providing a much more stable velocity relationship. In the post-1980 period, M2 augmented with corporate accounts payable outperformed traditional M2 displaying a more stable monetary multiplier relationship.

This of course brings up the question of, Why?. The answer has to do with how the line between t goods and money markets are conceptualized. This has always been a challenge for microeconomics. Defining the geographic, characteristic and temporal bounds on a market is a matter of art, but it has always been useful to think of the line between two markets to be quite fuzzy. Transactions are to some extent part of several markets. The line between money and goods is similarly fuzzy. For example, the monetary base is definitely in the money market and buying a cup of coffee is definitely in the goods market but there is a vast middle ground of transactions that are somewhat monetary and somewhat real. The monetary aggregates are a measure of activity at some point conceptually between the two. We should be looking for an aggregate that performs well with the current transactions mechanisms in our economy.

If the Internal Revenue Service would provide estimates of corporate accounts payable and accounts receivables more frequently than once a year, augmented M2 would be a valuable addition to the current family of monetary aggregates.

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