The FED Balance Sheet and Inflation

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1 INTRODUCTION

The introduction of trillions into the economy by the Federal Reserve Bank may very well presage the start of a massive inflationary trend. In addition the FED has been purchasing more and more Government Securities which results in more money being printed. We have seen M2 grow explosively as well. What does this mean? In this paper we look at some of these issues in detail, albeit it is a first look and will require further analysis. Our main conclusion is that the money has been absorbed and not released. The absorption of the funds into the economy seems to imply that the excess capital is being held and not used as a base for extending new credit and thus increasing M2. We see the doubling of the Fed's assets and no change in M2. The concern is that an M2 increase will result in an explosive inflation.

In this report we address the following issues:

1. The Fed's Balance Sheet: This is a review of what is on the Fed's BS and also perhaps what is not. The BS has doubled in the past few months and this has been of a concern. Such increases included the Bear Stearns disaster but there is a great deal more. We examine this factor.

2. M2 to Monetary Base Ratio: The M2/MB ratio has also changed abruptly. M2 is stalled, which frankly is good. We examine what might explain this at least to one level of detail. We observe that the excess reserves has exploded but that is slowly dropping again. Where did it go and why is it dropping?

3. Yield Curve: We examine the yield curve over the past few months to see if there is any reflection concerning the issue of inflation. We have seen a spread between the 90 day and 10 year yields but it seems to be subsiding.

4. Inflation: Finally we look at inflation and its components. The forward looking methodology for inflation is no longer workable and we address that issue.

We consider the monetary actions of the Government still of primary concern. This means that watching the monetary elements may in the long run be a more effective means to understanding the ongoing nature of the economy.

2 FED BALANCE SHEET

The Fed's Balance Sheet, BS, has undergone a dramatic set of changes since the aggressive moves on the part of the Government in the Fall of 2008. Thus a look at the BS and a continuing assessment of the changes made to it will be essential to understanding monetary policy going forward. However, and this is a critical factor, there may very well be significant factors which are off balance sheet and which are not visible to the public. There have been reports to this effect but any evidence is missing. We thus will deal with public information.

There are certain metrics which are worth following in view of the anticipated inflation which is expected at the end of this expansion in Government spending. The first is the nature of the Fed's assets especially in Treasury maturities.

2.1 Assets

The following Table is the Fed's Assets for July 1, 2009 and July 2, 2008. The points of difference are telling. Namely there has been a trillion added to the Assets in the BS by the FED buying debt from the Government. Recall that when the FED does this it in effect prints money.

There has been an 85% increase in the Assets in total. The holdings of Notes and Bonds has increased significantly. There was an increase of almost 300% in Treasury securities alone. There was $940 Billion put on the Asset side.

The Liabilities show the balance. The Liabilities increased 79% and the equity an balancing amount.

Reserve Bank credit, related items	*July 1, 2009*	*Jul 2, 2008*
Reserve Bank credit	$1,986,952	$1,097,897
Securities held outright	$1,216,327	$737,489
U.S. Treasury securities (1)	$656,995	$178,157
Bills (2)	$18,423	($3,317)
Notes and bonds, nominal (2)	$590,748	$178,356
Notes and bonds, inflation-indexed (2)	$42,803	$3,632
Inflation compensation (3)	$5,022	($513)
Federal agency debt securities (2)	$96,798	$96,798
Mortgage-backed securities (4)	$462,534	$462,534
Repurchase agreements (5)	$0	($110,250)
Term auction credit	$282,808	$132,808
Other loans	$118,875	$102,095
Primary credit	$35,910	$21,049
Secondary credit	$3	($83)
Seasonal credit	$63	($32)
Primary dealer and other broker-dealer credit (6)	$0	($1,738)
Mutual Fund Liquidity Facility	$14,922	$14,922
Credit extended to American International Group, Inc. (7)	$42,834	$42,834
Term Asset-Backed Securities Loan Facility	$25,143	$25,143
Other credit extensions	$0	$0
Net portfolio holdings of Commercial Paper Funding Facility LLC (8)	$119,669	$119,669
Net portfolio holdings of LLCs funded through the Money Market Investor Funding Facility (9	$0	$0
Net portfolio holdings of Maiden Lane LLC (10)	$25,896	($3,920)
Net portfolio holdings of Maiden Lane II LLC (11)	$15,989	$15,989
Net portfolio holdings of Maiden Lane III LLC (12)	$20,162	$20,162
Float	($1,989)	($470)
Central bank liquidity swaps (13)	$115,299	$53,299
Other Federal Reserve assets (14)	$73,917	$31,026
Gold stock	$11,041	$0
Special drawing rights certificate account	$2,200	$0
Treasury currency outstanding (15)	$42,431	$3,754
Total factors supplying reserve funds	$2,042,624	$1,101,651

As to the growth of Treasury holdings by the FED. we not that simply if the Treasury wants money and there may be no buyer for its notes then the FED will buy it with "printed" money. This is the stuff which ends up creating inflation if it gets loose out in the economy. So let's see what we have. We show below these results.

We will note the tremendous growth and more importantly look at the rate of growth on a 12 week running average, it is in excess of 30% per annum on a going forward basis. This is the main concern and if others decide not to buy Treasuries then things just get worse. Also remember that the money has not been let loose quite yet. The worry and concern should be watching that continuing rate of growth.

2.2 Liabilities and Equity

The following are the balance of Liabilities and the Capital Account for the BS. The largest increase was for the top line of FED notes which were not in the FED system.

Liabilities		
Federal Reserve notes, net of F.R. Bank holdings	871,291	76,196
Reverse repurchase agreements	72,256	31,165
Deposits	1,006,269	985,539
Depository institutions	726,260	710,028
U.S. Treasury, general account	78,142	74,003
U.S. Treasury, supplementary financing account	199,939	199,939
Foreign official	1,473	1,364
Other	454	203
Deferred availability cash items	3,212	181
Other liabilities and accrued dividends	5,774	2,583
Total liabilities	1,958,802	1,095,303

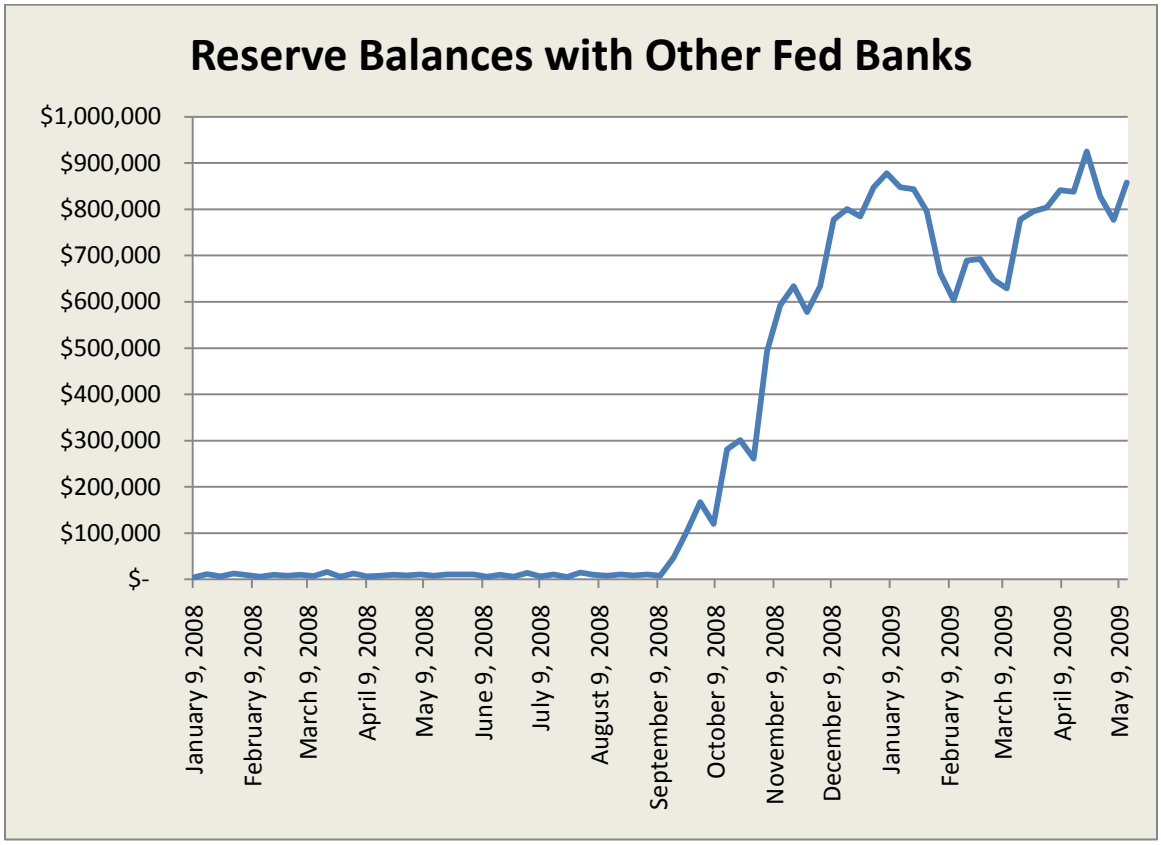
Capital Account		
Capital Paid In	24,497	4,621
Surplus	21,264	2,771
Other Capital Accounts	2,840	328
Total Capital	48,601	7,719

2.3 FED Dynamics

We can now look at the dynamics of the FED BS by first looking at the reserve balances with other FED banks as shown below. This has exploded.

We then follow that with a chart depicting the maturity on these securities. The next chart shows the increases in the reserve balances. This has been the major source of increase.

We follow this with a breakout of the maturity of these balances at the most recent time. The dominant portion is 1-5 years.


Reserve Balances with Other Fed Banks
$1,000,000
$900,000
$800,000
$700,000
$600,000
$500,000
$400,000
$300,000
$200,000
$100,000
$-
January 9, 2008
February 9, 2008
March 9, 2008
April 9, 2008
May 9, 2008
June 9, 2008
July 9, 2008
August 9, 2008
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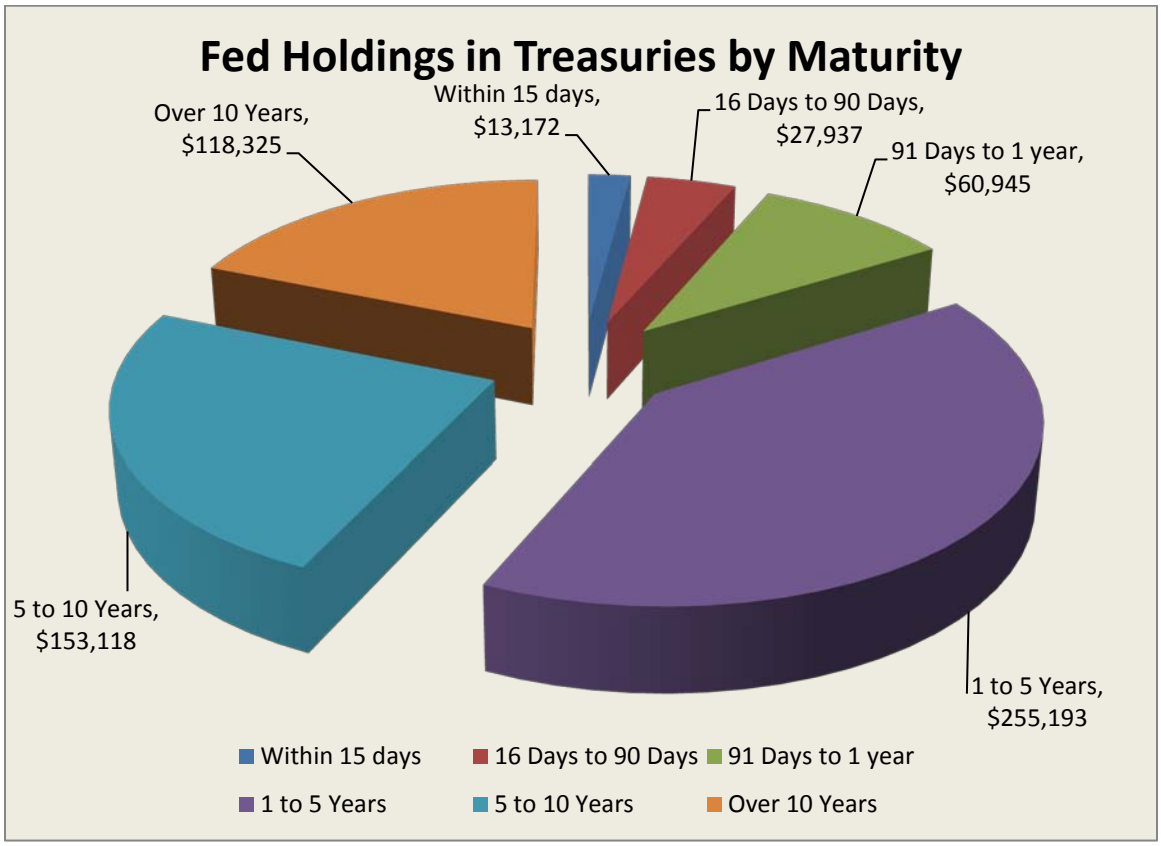
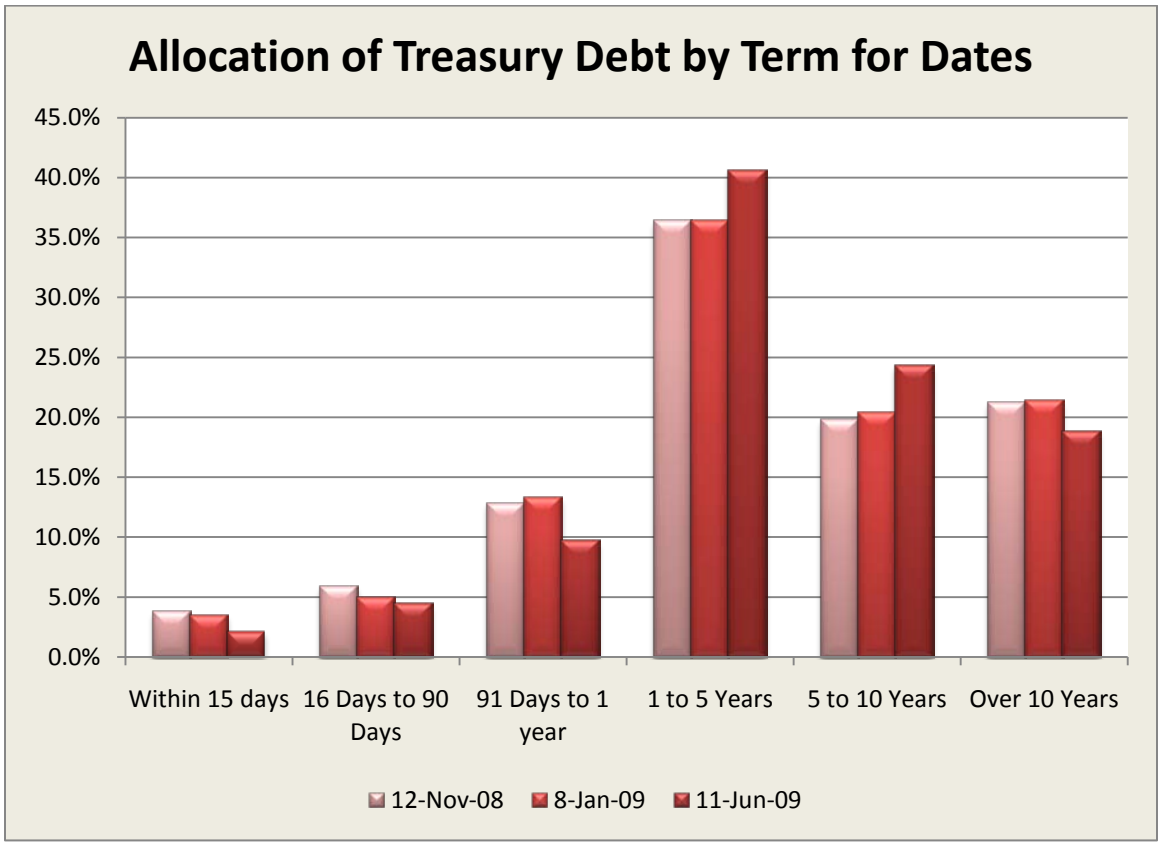
May 9, 2009


Fed Holdings in Treasuries by Maturity
Over 10 Years, $118,325
Within 15 days, $13,172
16 Days to 90 Days, $27,937
91 Days to 1 year, $60,945
5 to 10 Years, $153,118
1 to 5 Years, $255,193
Within 15 days
16 Days to 90 Days
91 Days to 1 year
1 to 5 Years
5 to 10 Years
Over 10 Years

We see that there is some percent growth to the shorter term notes. The second chart shows the explosion in delinquencies of debt as recorded by the FED. The credit card debt delinquency is on a separate axis because it is exploding at a rapid rate. It exceeds any past level and this represents an added risk for the banks as they try to come out of the housing mess. In addition we still see the explosive delinquencies in residential and commercial meaning that there is no time soon that we would expect a resolution. This will thus change the nature of the Fed's balance sheet as Treasury debt will become a more risky proposition.

It will be important to watch these figures as well as the Treasury spreads, Fed's assets, and the velocity of money and imputed inflation. Looking forward we still anticipate a 10% plus inflation rate depending on what the FED does. The problem is that if Bernake is replaced by Summers we may see wild fluctuations in the FED policy which may likely exacerbate the problem which is still two years down the road.



3 M2, MB, AND THE BANKING SYSTEM DEPOSITS

We have been tracking M2 and the monetary base MB ratio, also the assets of the FED and we spent a few minutes looking at where the problem is, namely the FED has pumped in money and it is just hung up somewhere. So where. We performed a simple analysis. The math is simple and the results are startling.

Let us start with some math. First for M1. This is M1 and it is a sum of cash and demand deposits. The cash can be some multiple of the demand deposits as we show and the graph shows some modulation of that over the last 30 months. Now for M2 we have:

This is standards where we list small savings and time deposits and then everything else. Now for the ratio we have been looking at. We can now apply some of the previous rations to obtain the appropriate ratios. And finally we have for the other ratios:

Now when we use the Fed data we obtain: Which is the chart we have been following. Namely we see that M2 to the money base has collapsed. The money went out but then disappeared. Where did it go? We first looked at the ratios in the analysis and they are shown below:

This did not account for the dramatic difference. Then we looked at the excess reserve ratio, e, and this is shown below:

And this was quite telling. The excess reserve ratio, until last fall, was close to zero as one would have expected. Then as the FED pumped money into the banks the ratio exploded. The money is being hoarded if one does the analysis this way. Yet it may also be that the required reserves may have no value and the money is covering the reserves. This does not appear in the simple monetary analysis. We will be watching this closer. There is one hopeful sign here which is the excess ratio seems to be falling at a fast rate, a possible sign of the loosening up of the banks.

Our concern still is as it has been for the past nine months that explosive inflation is just behind us and running faster than we think

3.1 Monetary Structure

Ml includes funds that are readily accessible for spending[1]. M1 consists of:

(1) currency outside the U.S. Treasury, Federal Reserve Banks, and the vaults of depository institutions;

[1] See http://research.stlouisfed.org/fred2/categories/25

(2) traveler's checks of nonbank issuers;

(3) demand deposits; and

(4) other checkable deposits (OCDs), which consist primarily of negotiable order of withdrawal (NOW) accounts at depository institutions and credit union share draft accounts. Seasonally adjusted M1 is calculated by summing currency, traveler's checks, demand deposits, and OCDs, each seasonally adjusted separately.

The currency component of M1, sometimes called "money stock currency," is defined as currency in circulation outside the U.S. Treasury, Federal Reserve Banks, and the vaults of depository institutions. Data on total currency in circulation are obtained weekly from balance sheets of the Federal Reserve Banks and from the U.S. Treasury. Weekly currency in circulation data are published each week on the Federal Reserve Board's H.4.1 statistical release "Factors Affecting Reserve Balances of Depository Institutions and Condition Statement of Federal Reserve Banks." Vault cash is reported on the FR 2900 and subtracted from total currency in circulation. For institutions that do not file the FR 2900, vault cash is estimated using data reported on the Call Reports.

The demand deposits component of M1 is defined as total demand deposits at commercial banks and foreign related institutions other than those due to the U.S. government, U.S. and foreign depository institutions, and foreign official institutions. In order to avoid double counting those deposits that are simultaneously on the books of two depository institutions, the demand deposit component of M1 excludes cash items in the process of collection (CIPC) and Federal Reserve float. Demand deposits due to depository institutions in the United States and the U.S. government, as well as other demand deposits and CIPC are reported on the FR 2900 and, for institutions that do not file the FR 2900, are estimated using data reported on the Call Reports. Demand deposits held by foreign banks and foreign official institutions are estimated using data reported on the Call Reports. Federal Reserve float is obtained from the consolidated balance sheet of the Federal Reserve Banks, which is published each week in the Federal Reserve Board's H.4.1 statistical release.

The other checkable deposits component of M1 consists of negotiable order of withdrawal (NOW) accounts and automated transfer service (ATS) balances at banks, thrifts, and foreign related institutions, credit union share draft balances, and demand deposits at thrifts. These items are reported on the FR 2900 and, for institutions that do not file the FR 2900, are estimated using data reported on the Call Reports.

Total Checkable Deposits: Demand deposits plus other checkable deposits. Calculated by the Federal Reserve Bank of St. Louis.

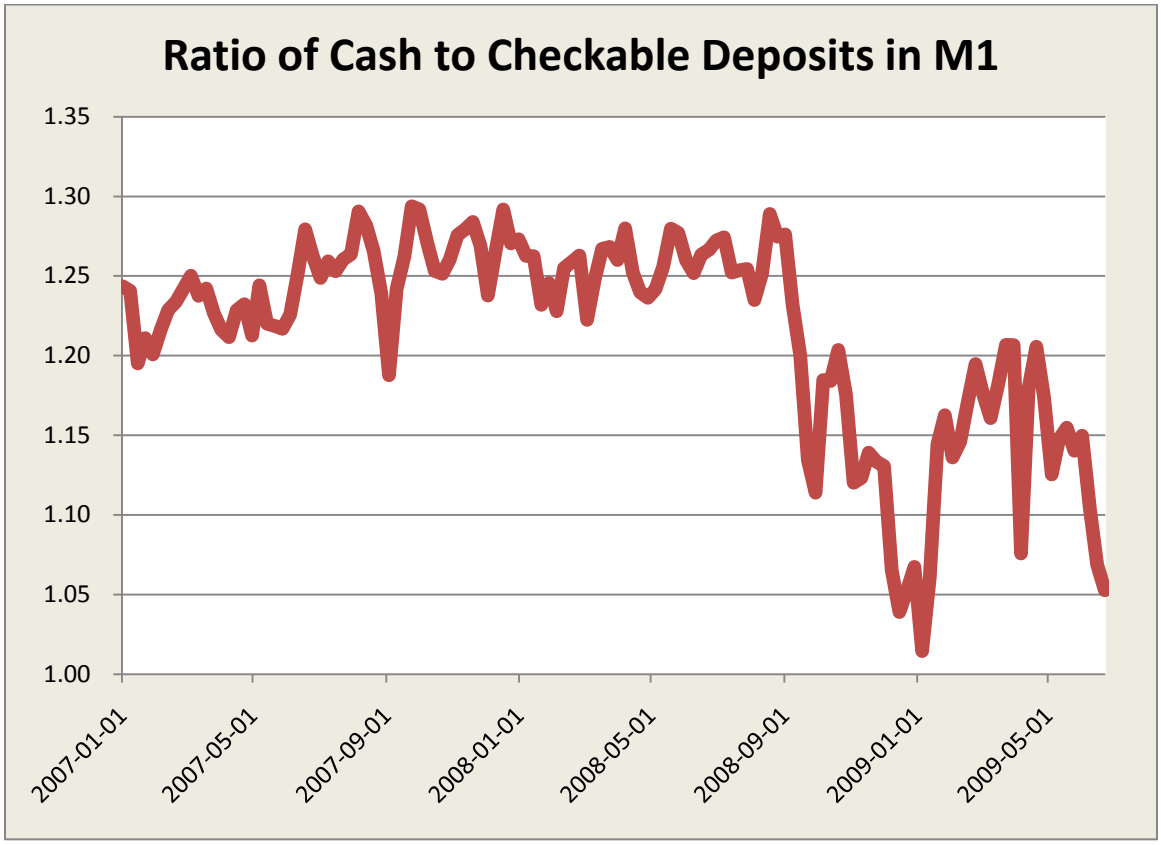
3.2 The Money Balance

We can now analyze the M1, M2 and MB data on the basis of simple flows. The St Louis FED provides all the data necessary to monitor these numbers.

Let us begin with a simple statement for M1. It is just the sum of cash plus demand deposits. We further assume that the demand deposits are some multiple of cash. Thus was can also write M1 as a set of constants times the demand deposits.

We do this below and we plot c as a function of time:

$$M = D + C$$
$$M = Money\ Supply$$
$$C = Cash$$
$$D = Demand\ Deposits$$
$$M = D + cD = (1 + c)D$$
$$M = M1$$



The above plot of c, the fraction of demand deposits as cash seems to fluctuate between 1.05 and 1.3 with a drop timed with the fall market disturbance.

Now we can move on to M2. M2 includes a broader set of financial assets held principally by households. M2 consists of M1 plus:

(1) savings deposits (which include money market deposit accounts, or MMDAs);

(2) small-denomination time deposits (time deposits in amounts of less than $100,000); and

(3) balances in retail money market mutual funds (MMMFs).

Seasonally adjusted M2 is computed by summing savings deposits, small-denomination time deposits, and retail MMMFs, each seasonally adjusted separately, and adding this result to seasonally adjusted M1.

M2=C+D+D*+MI

C=currency

D=Checkable Deposits

D*=Small Savings and time deposits

MI=monetary instruments

This allows us to write the balance for M2 as shown below:

$$M2=C+D+D^{*}+MI$$
$$=M1+D^{*}+MI$$
$$D^{*}=Small\ Savings\ and\ Time\ Deposits$$
$$MI=All\ Other\ Stuff$$

Now we can take the ratio of M2 to the Monetary Base, the MB. First the MB is defined as:

$$MB = RR + ER + C$$

$$RR = Required\ Reserves$$

$$ER = Excess\ Reserves$$

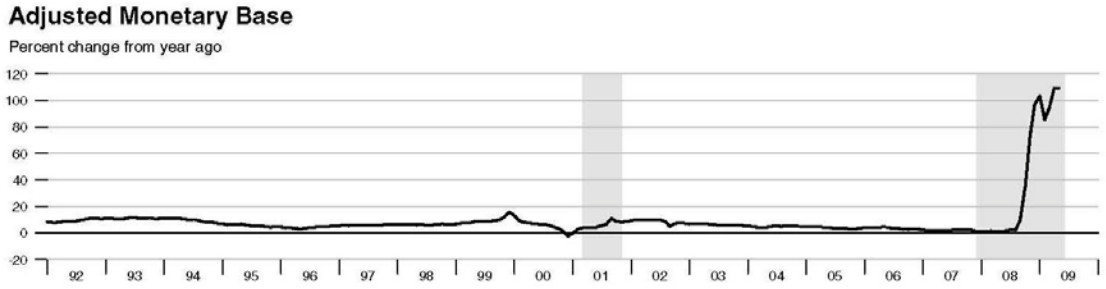
$$C = Cash$$

$$MB = \left(\frac{RR}{D} + \frac{ER}{D} + \frac{C}{D}\right)D$$

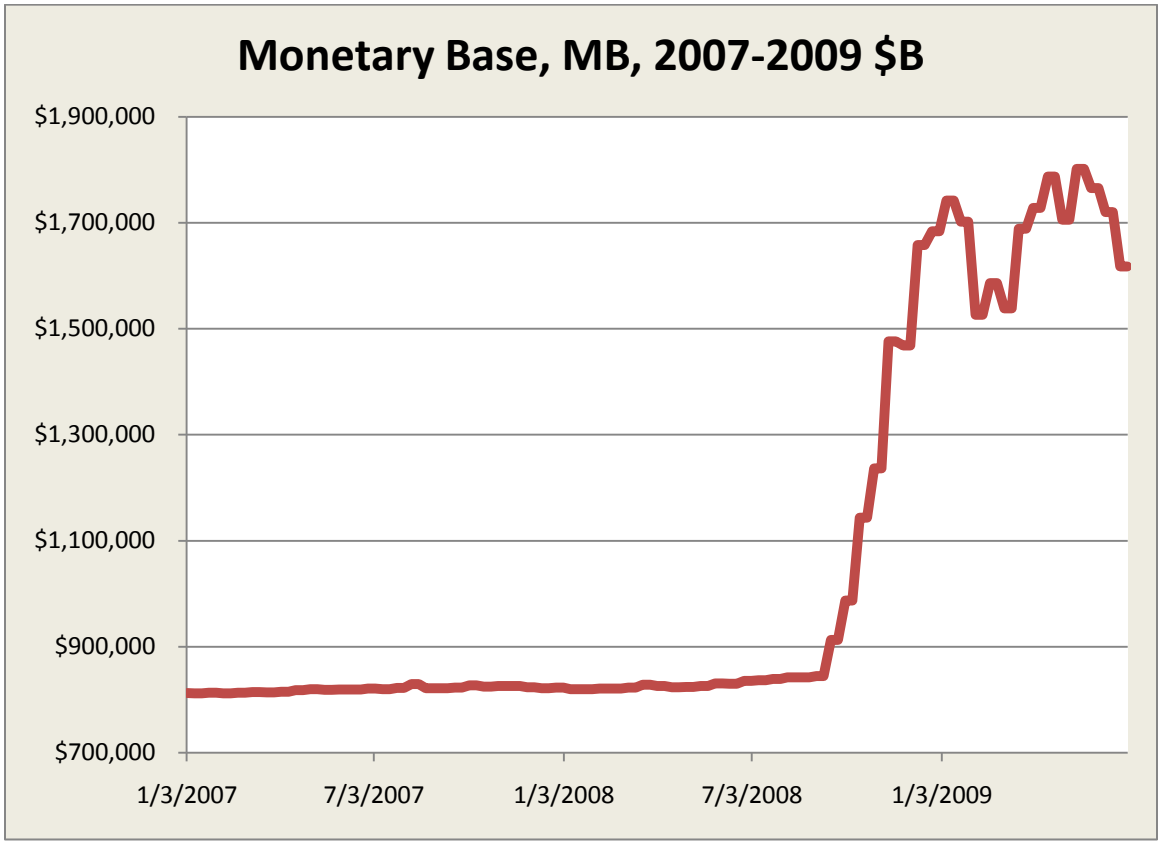
$$= (r + e + c)D$$

Thus MB is the sum of cash, plus the required FED reserves, typically 10% of the Demand Deposits, plus an excess reserve. The excess reserve is also some fraction of the Demand Deposits and typically it is as close to zero as can be made. However as we shall see this has been violated in this case.

The Figure below shows the MB over time. Note its explosion since the recent financial disturbance. It is this explosive number which concerns us.



The most recent data from 2007-to the present is shown below.



Thus we see that the MB has been flat for a long period and then bumped up more than double. Reseves and currency did not change, extra reserves did, most likely the result of write offs.

One should remember that a bank can loan out 90% of the DD and thus generates flow of funds into the economy. If e is increased dramatically the money is NOT loaned but frozen.

Now we define the ratio of interest:

$$\frac{M2}{MB} = \frac{C + D + D^* + MI}{MB}$$

$$MB = Monetary\ Base$$

Then we can write M2 as follows, where we have used the standard multiples.

$$M2 = \frac{C}{D}D + \frac{D}{D}D + \frac{D^*}{D}D + \frac{MI}{D}D$$
$$= (c + 1 + \frac{D^*}{D} + \frac{MI}{D})D$$

This yields an equation we can incorporate as follows by solving for e, the excess ratio:

$$e = \frac{c + 1 + \frac{D^*}{D} + \frac{MI}{D}}{\frac{M2}{MB}} - r - c$$

We can now take this simple formulation and apply it to the data.

3.3 Data

First we present the data as available from the St Louis FED. First we show the typical M1 data as is available. We use cash and demand deposits including checks as a fit to our model

DATE	*M1*	*M1 Cash*	*M1 Demand Deposits*	*M1 Checks*
2007-01-01	$1,365	$757	$303	$306
2007-01-08	$1,362	$752	$297	$309
2007-01-15	$1,383	$749	$315	$312
2007-01-22	$1,373	$747	$306	$310
2007-01-29	$1,378	$746	$313	$308

Then we use M2 data as shown below.

DATE	*M2*	*M1*	*Small Denomination Time Deposits = D**	*Retail Money Funds*	*Savings*
2007-01-01	$7,050	$1,365	$1,167	$800	$3,718
2007-01-08	$7,054	$1,362	$1,170	$807	$3,715
2007-01-15	$7,074	$1,383	$1,170	$803	$3,718
2007-01-22	$7,071	$1,373	$1,171	$803	$3,724
2007-01-29	$7,072	$1,378	$1,172	$806	$3,717
2007-02-05	$7,067	$1,373	$1,173	$806	$3,715
2007-02-12	$7,067	$1,367	$1,174	$808	$3,718
2007-02-19	$7,071	$1,365	$1,175	$810	$3,720
2007-02-26	$7,089	$1,363	$1,177	$812	$3,737

Finally we have MB as we have discussed above and shown below.

Date	MB^2
2009-02-18	$1,586,175
2009-02-25	$1,586,175
2009-03-04	$1,538,658
2009-03-11	$1,538,658
2009-03-18	$1,688,971
2009-03-25	$1,688,971
2009-04-01	$1,727,747
2009-04-08	$1,727,747
2009-04-15	$1,787,481
2009-04-22	$1,787,481
2009-04-29	$1,705,920
2009-05-06	$1,705,920
2009-05-13	$1,801,666
2009-05-20	$1,801,666
2009-05-27	$1,765,237
2009-06-03	$1,765,237
2009-06-10	$1,720,104
2009-06-17	$1,720,104
2009-06-24	$1,617,508
2009-07-01	$1,617,508

The following Table incorporates the above data into the data required to determine e. It should be self explanatory'

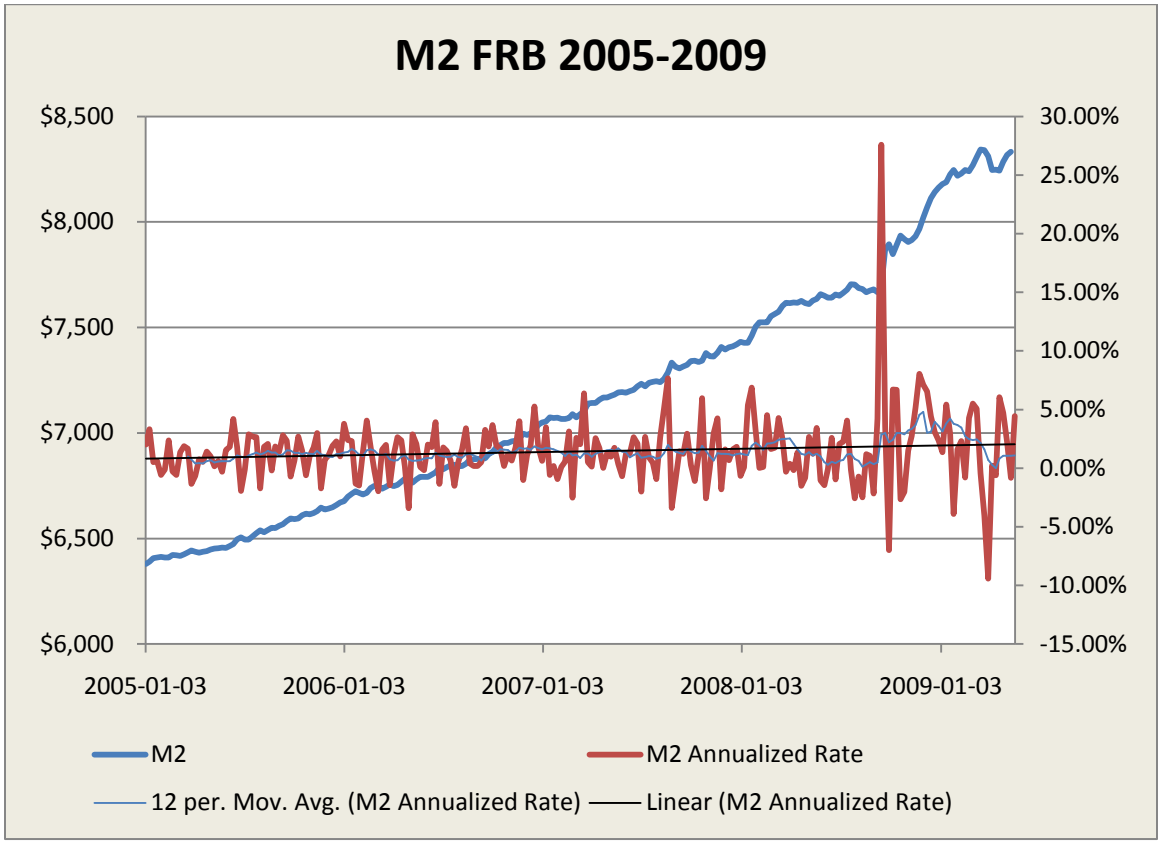
M1	M2 $B	M2/MB	MI	M2 Small Savings and Time Deposits D*	M1 Checkable Deposits D	"D*/D"	"MI/D"	Sum	rD Required Reserve Ratio	Cash Deposits	c Ratio of currency to checkable deposits	e Excess Reserve Ratio
$1,365	$7,050	8.67	$4,518	$1,167	$609	1.92	7.42	9.34	0.10	$757	1.24	(0.01)
$1,362	$7,054	8.68	$4,522	$1,170	$606	1.93	7.46	9.39	0.10	$752	1.24	(0.00)
$1,383	$7,074	8.71	$4,521	$1,170	$627	1.87	7.22	9.08	0.10	$749	1.20	(0.00)
$1,373	$7,071	8.69	$4,527	$1,171	$616	1.90	7.34	9.24	0.10	$747	1.21	0.01
$1,378	$7,072	8.69	$4,522	$1,172	$621	1.89	7.28	9.17	0.10	$746	1.20	0.01
$1,373	$7,067	8.70	$4,521	$1,173	$616	1.90	7.34	9.24	0.10	$749	1.22	0.00
$1,367	$7,067	8.70	$4,526	$1,174	$611	1.92	7.41	9.34	0.10	$750	1.23	0.00
$1,365	$7,071	8.69	$4,530	$1,175	$609	1.93	7.44	9.37	0.10	$752	1.23	0.00
$1,363	$7,089	8.72	$4,549	$1,177	$605	1.95	7.52	9.47	0.10	$751	1.24	0.00

[2] See https://www.federalreserve.gov/datadownload/Review.aspx?rel=H3

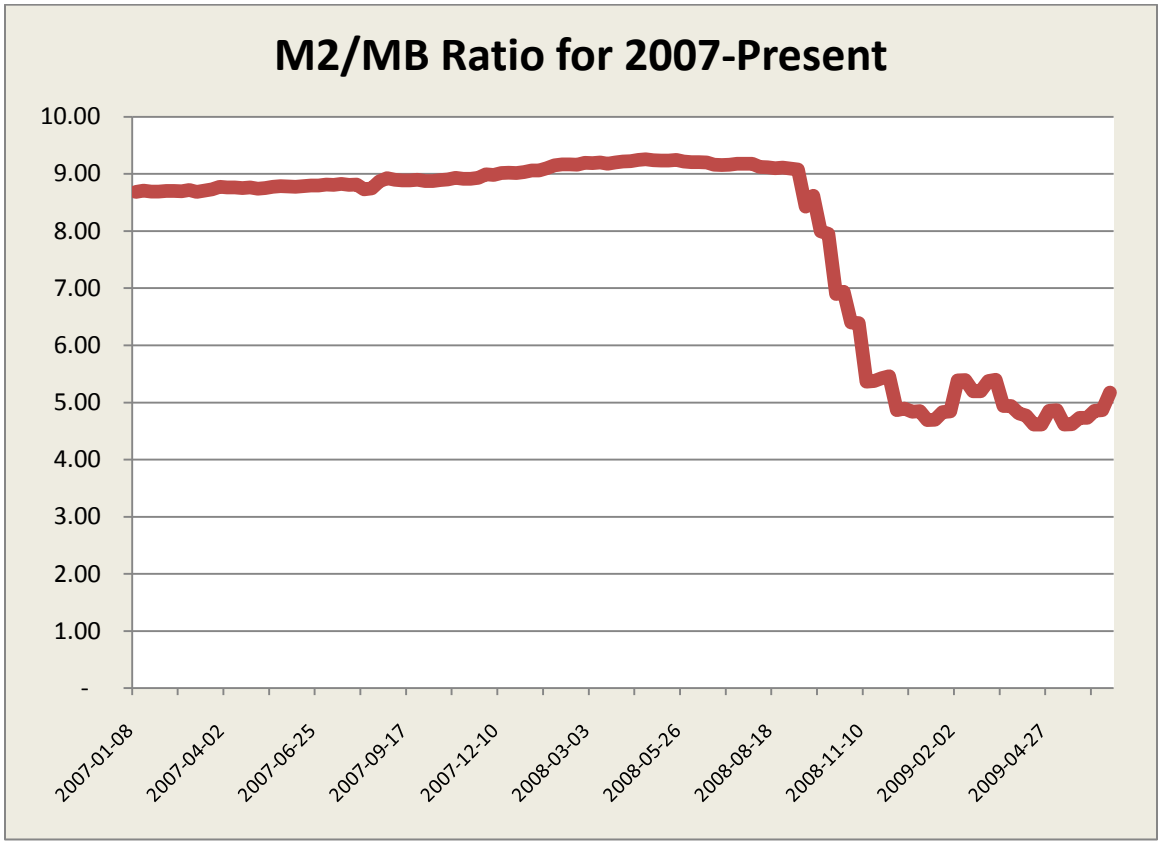
3.4 Analysis

The following is a detailed analysis that leads to the evaluation of the excess holdings.

First we look at M2 and its growth. This is shown below. From early 2005 through the present it has grown about $2 Trillion. However the greatest rate of growth has been over the past three quarters. One can see the volatility in that period.



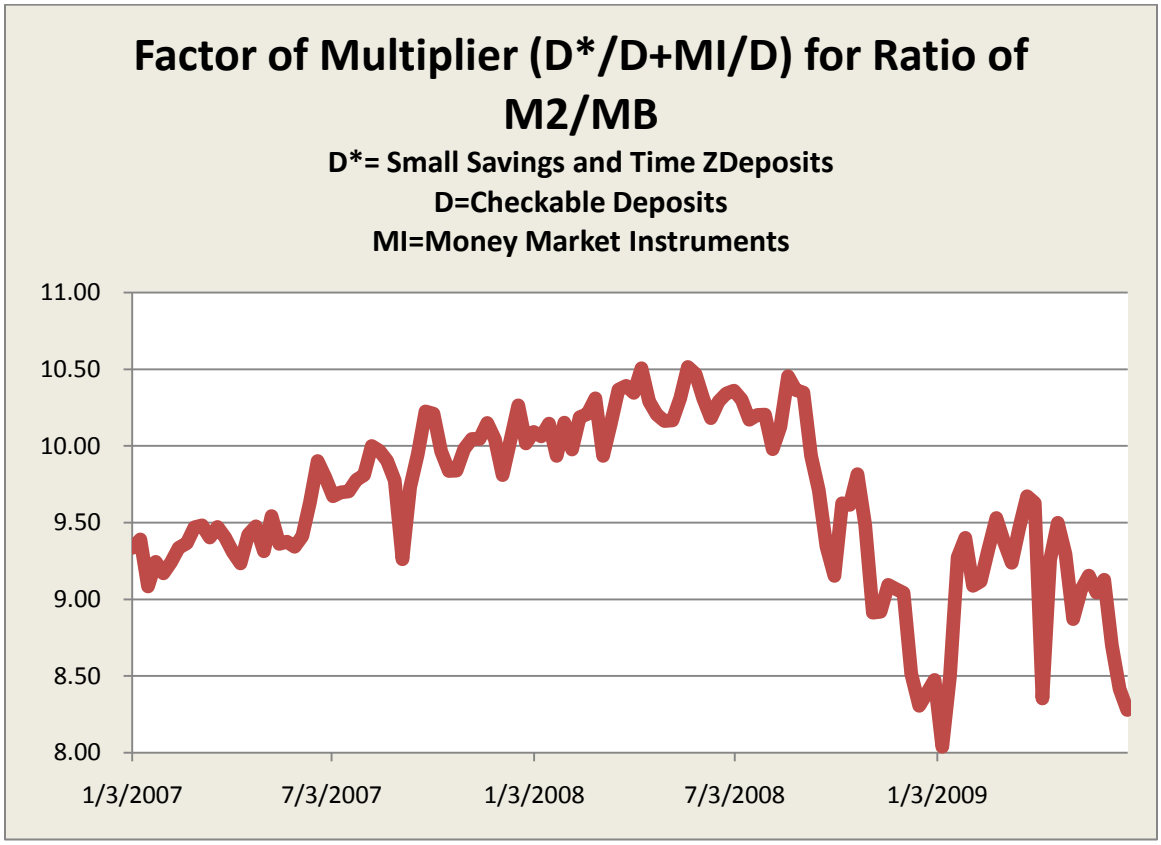
We now plot the M2/MB ratio using M2 and MB seasonally adjusted weekly data. This is shown below. The ratio is flat at about 9 and then drops to 4.5, a 50% decrease. Namely M2 did not change the MB did. This has been the figure which concerns us for we would anticipate pressure to drive M2 to match the M2/MB ratio of 9.0.

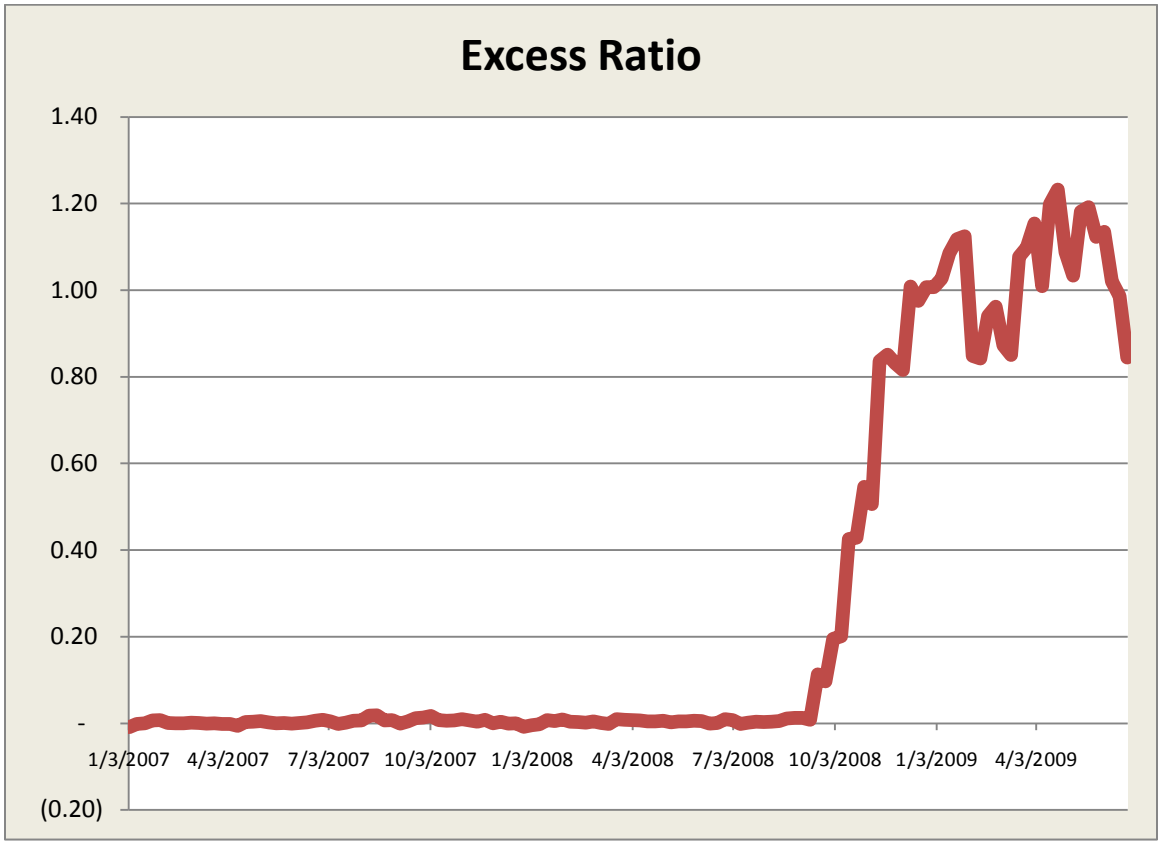


The next step was to calculate the ratios of key factors to Deposits which we did in the next chart. There seems to be a limited amount of variability here.\

Then we calculated the excess ratio, e, and this we plot below as well. Here we see what has happened. The excess ratio was nearly 0 for previous periods with little if any variability as would be expected in normal banking procedures. The required reserves are held and any excess is lent out using the FED as the backup bank in the event that cash in excess of reserves is required. This is normal procedures. However since the banking disruption last fall the excess has increased to over 1.0! In one sense this makes no sense. In another this may be hiding losses reflected in putative assets on banks' balance sheets. Unfortunately we cannot see through to that level of detail.

We would be concerned that there is no discussion regarding this point because it sets up a massive amount of M2 sitting behind a set of locked doors which may flow out and create inflation.


Factor of Multiplier (D*/D+MI/D) for Ratio of M2/MB
D*= Small Savings and Time ZDeposits
D=Checkable Deposits
MI=Money Market Instruments
11.00
10.50
10.00
9.50
9.00
8.50
8.00
1/3/2007
7/3/2007
1/3/2008
7/3/2008
1/3/2009


Excess Ratio
1.40
1.20
1.00
0.80
0.60
0.40
0.20
-
(0.20)
1/3/2007
4/3/2007
7/3/2007
10/3/2007
1/3/2008
4/3/2008
7/3/2008
10/3/2008
1/3/2009
4/3/2009

4 YIELD CURVE DATA

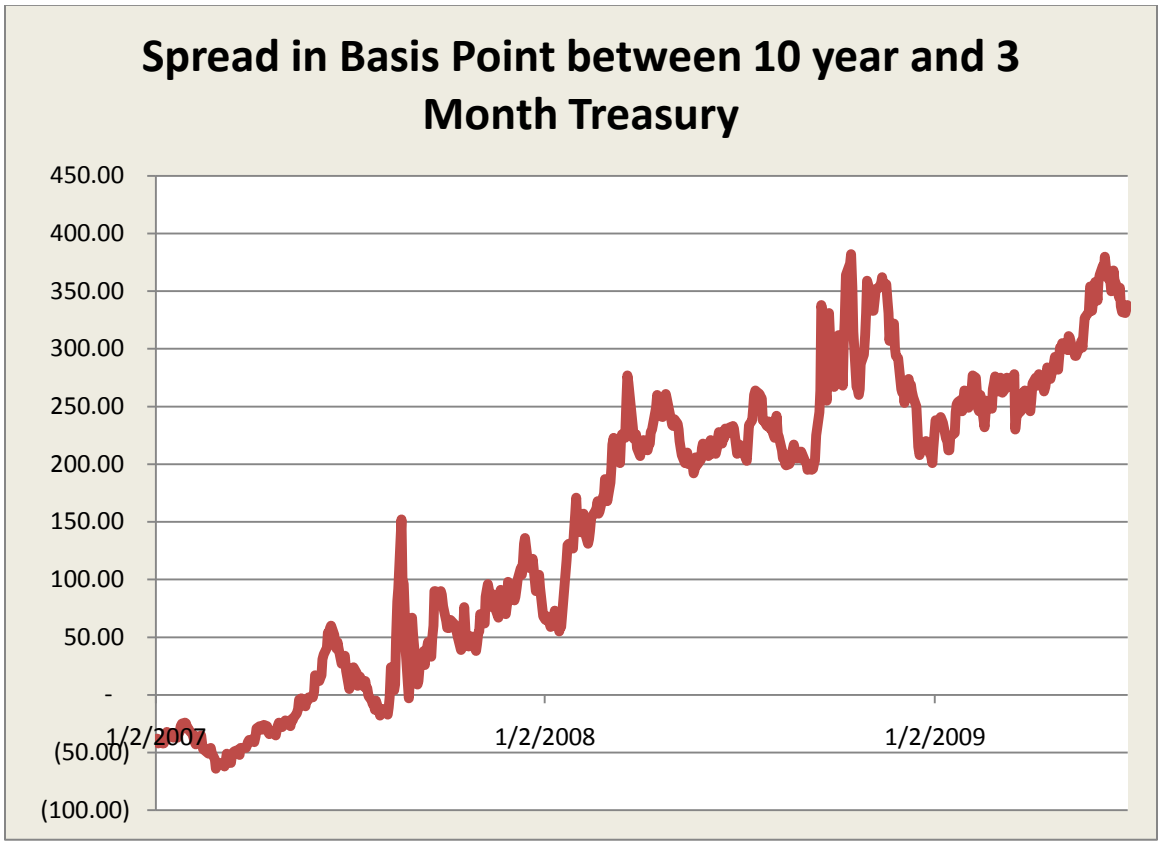
The following depicts the spread in Treasuries for the 3 month and 10 year securities. We fist plot the spread in basis points and then as a percent of the 10 year.

The one below is the spread in basis points. Note that the spread is increasing at a rapid rate in the past few weeks. This is a reasonable estimator of pending inflationary pressure on the tail. There have been spikes before but we see what appears to be a growing trend. Thus may portend the growth in the long term rates despite the attempts by the FED to keep the short term rates down. The yield curve has a significant upward slope at this time and we anticipate it increasing.

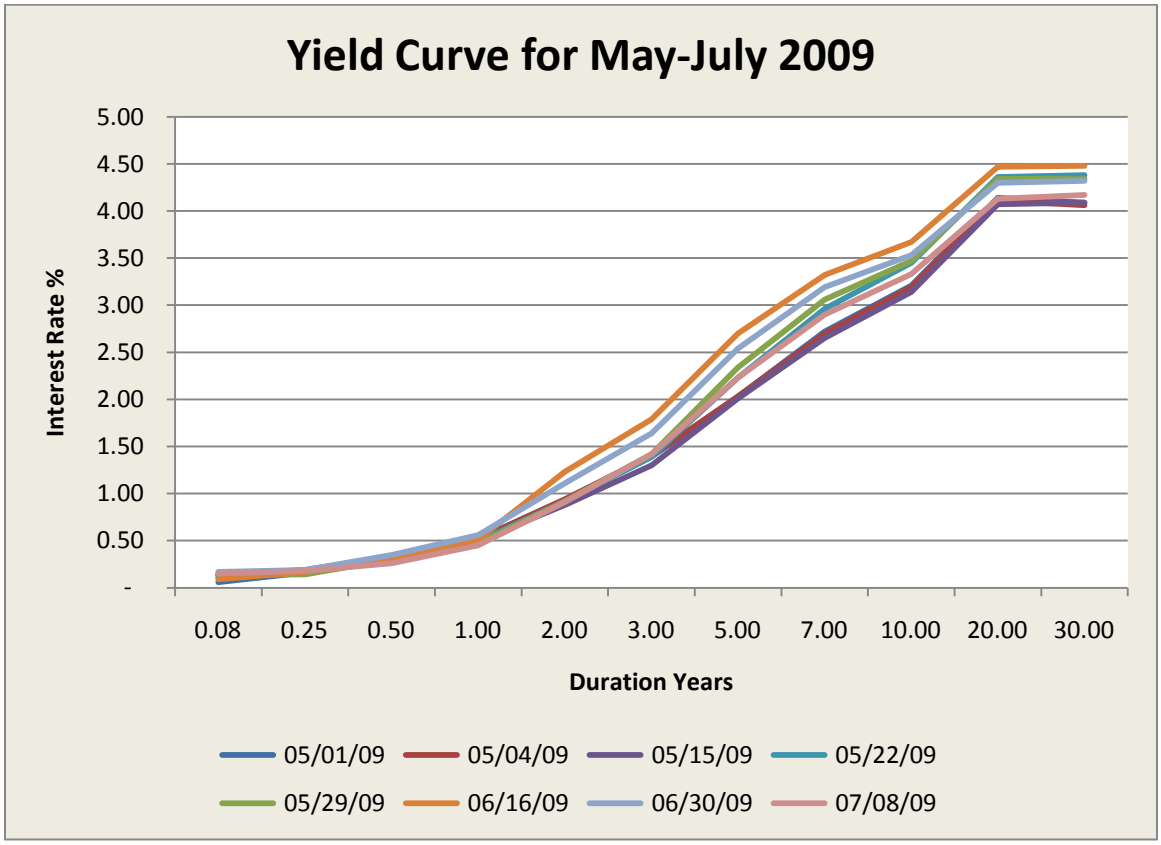
4.1 Recent Data

We show below the spread between 3 month and 10 year Treasuries. The first chart shows the spread as a percent of the 10 year base and the second is the spread in absolute bases points.

The following is the spread in bases points. Viewed in this manner we can see the increasing steepening of the yield curve. Frankly it is not that great but it does show the effect of the FED in clamping down on the low end.

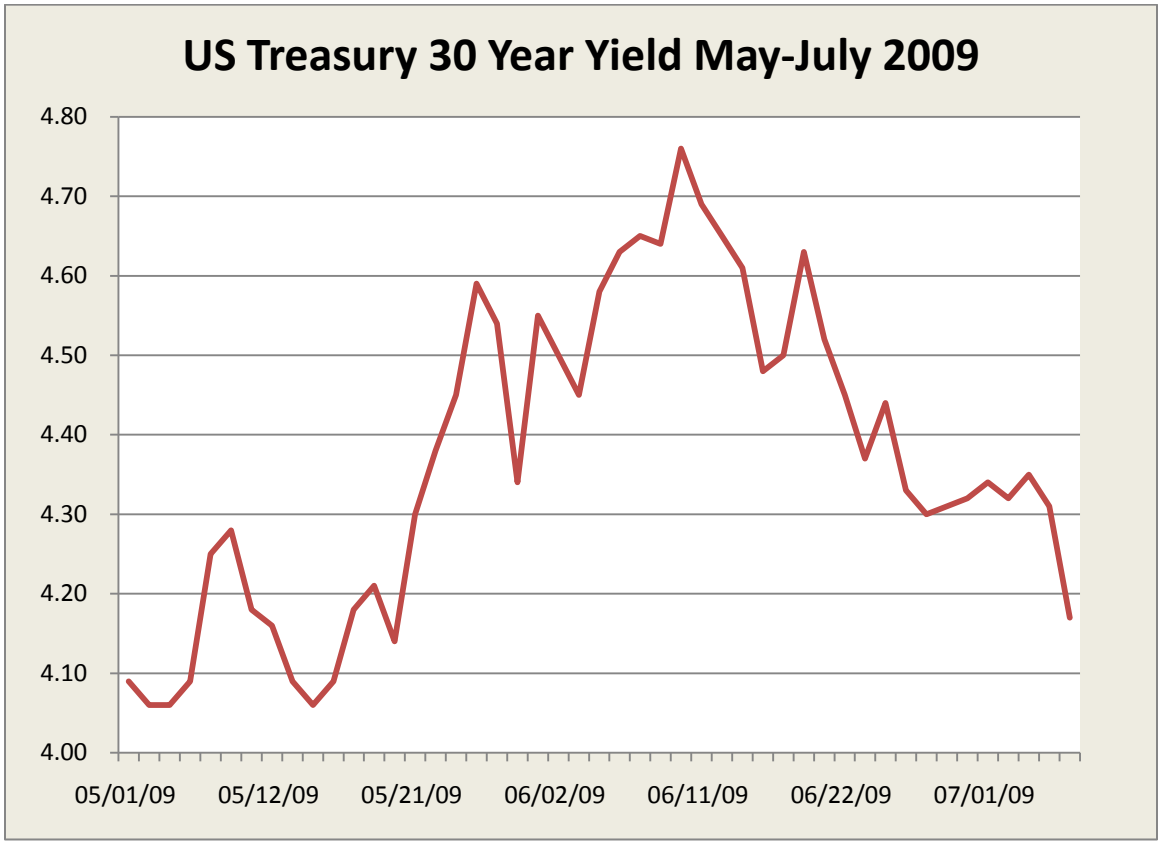


The following is an overlay of several daily yield curves over the past few months. The widening at the top end is visible although it is not that great.

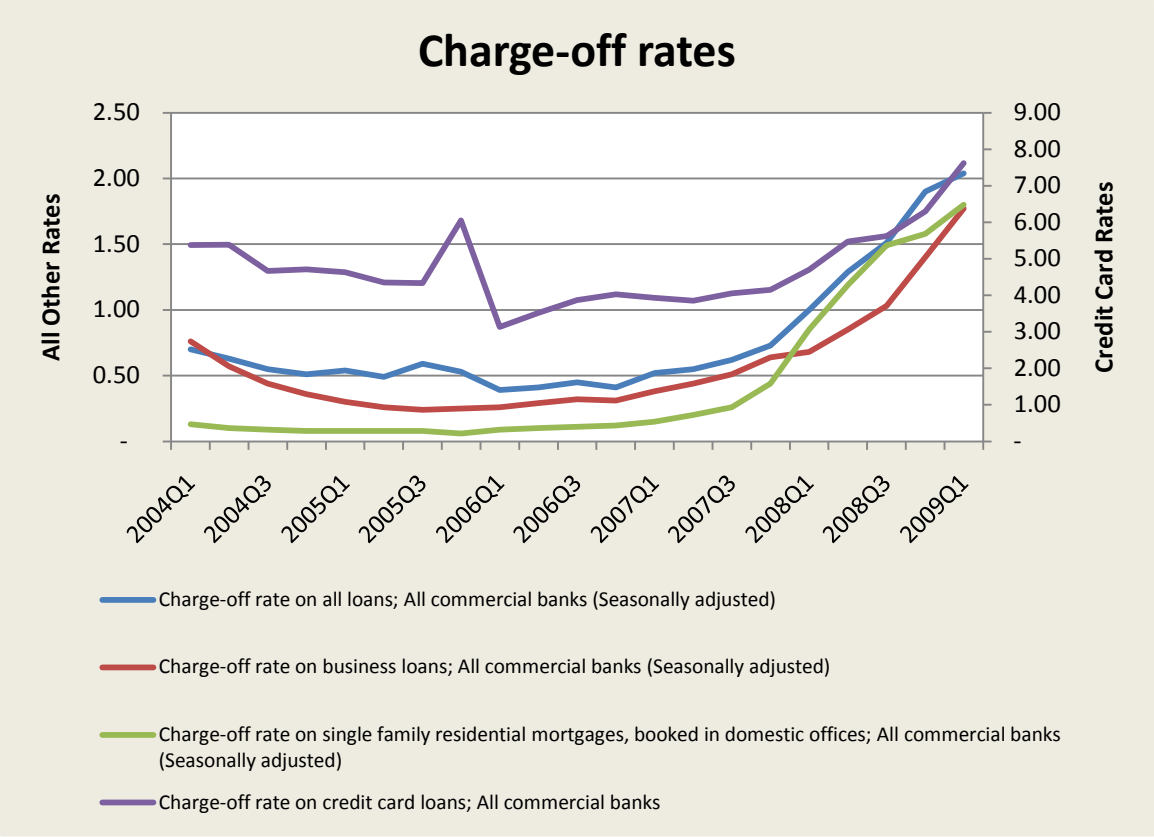


4.2 Other Elements

The 30 year Treasury yield is another benchmark yield which tops the yield curve,



The following are the charge off rates showing the losses occurring. The residential real estate charge off is the greatest and this will ultimately affect the overall yield curve as well especially at the high end.


Charge-off rates
All Other Rates
Credit Card Rates
2.50
2.00
1.50
1.00
0.50
-
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
-
2004Q1
2004Q3
2005Q1
2005Q3
2006Q1
2006Q3
2007Q1
2007Q3
2008Q1
2008Q3
2009Q1
Charge-off rate on all loans; All commercial banks (Seasonally adjusted)
Charge-off rate on business loans; All commercial banks (Seasonally adjusted)
Charge-off rate on single family residential mortgages, booked in domestic offices; All commercial banks (Seasonally adjusted)
Charge-off rate on credit card loans; All commercial banks

5 INFLATION

Inflation has always been a primary concern. It has been the classic was to get out of Government debt and it has also been the way to destroy an economy. In this section we build upon the results developed in the prior sections and look carefully at the potential for mass inflation.

5.1 Principles

Let us start with a few basic principles. Let us assume we have a basket of purchases, say I, each of which we buy a certain number of units of I, say q s, which units of I are priced at say p. Then the price of a basket of such units is given by:

$$P(n) = \frac{\sum_{k=1}^{N} p_k(n) q_k}{\sum_{k=1}^{N} q_k}$$

This we call a price index. It is a weighted price at some time n of a fixed basket of goods. We can define inflation rate as the relative ate of change of this price index. Namely we can states:

$$i = \frac{1}{P(T)} \frac{\partial P(t)}{\partial t}$$

where I is the inflation rate. Note that this is relative to the underlying price index and it is a rate of change.

The velocity of money is the ratio of the nominal income to the nominal money stock. Here we define nominal income as:

$$Y_N = Y(t)P(t)$$

and we thus define the velocity as[3]:

$$V(t) = \frac{Y_N(t)}{M(t)} = \frac{Y(t)P(t)}{M(t)}$$

[3] See Dornbusch p. 372.

We now can further examine the velocity of money, V, as the number of times money turns over per unit of time. For example V is a ratio of Y the totality of all purchases, divided by the money in the economy.

$$MV = PY$$

We can now look at the differentials of the two sides of the above identity. This will yield the following[4]:

$$\partial(MV) = M(\partial V) + (\partial M)V$$
$$and$$
$$\partial(PY) = P(\partial Y) + (\partial P)Y$$

Yet we know they are equal so we have:

$$\partial(MV) = M(\partial V) + (\partial M)V$$
$$or$$
$$\frac{\partial(MV)}{MV\partial t} = \frac{1}{V}\frac{\partial V}{\partial t} + \frac{1}{M}\frac{\partial M}{\partial t}$$
$$= v + m$$
$$where$$
$$v = \frac{1}{V}\frac{\partial V}{\partial t}$$
$$and$$
$$m = \frac{1}{M}\frac{\partial M}{\partial t}$$

Note that these are all relative rates of change with respect to time. Relative to the base value. This then yields the simple relationship:

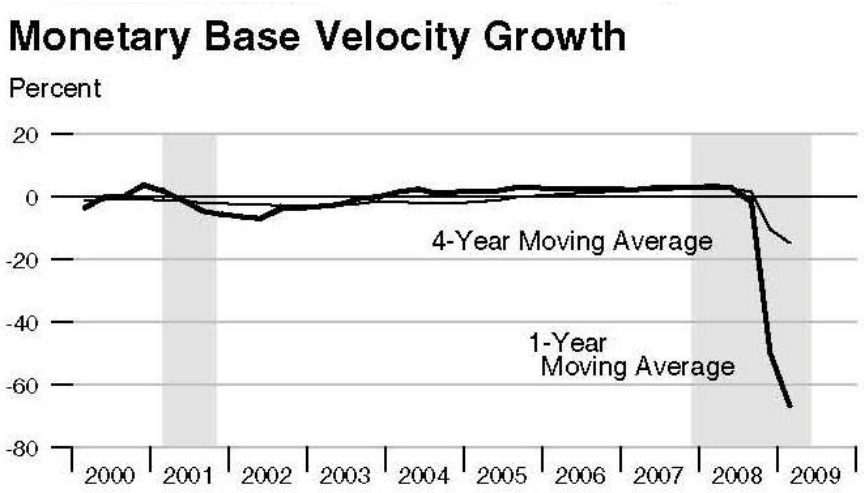
$$p + y = v + m$$
$$and$$
$$p = v + m - y$$
$$or$$
$$Inflation = Relative\ Rate\ of\ change\ in\ V + Relative\ Rate\ of\ Change\ in\ M$$
$$- Relative\ Rate\ of\ Change\ in\ GDP$$

[4] See Dornbusch p 643.

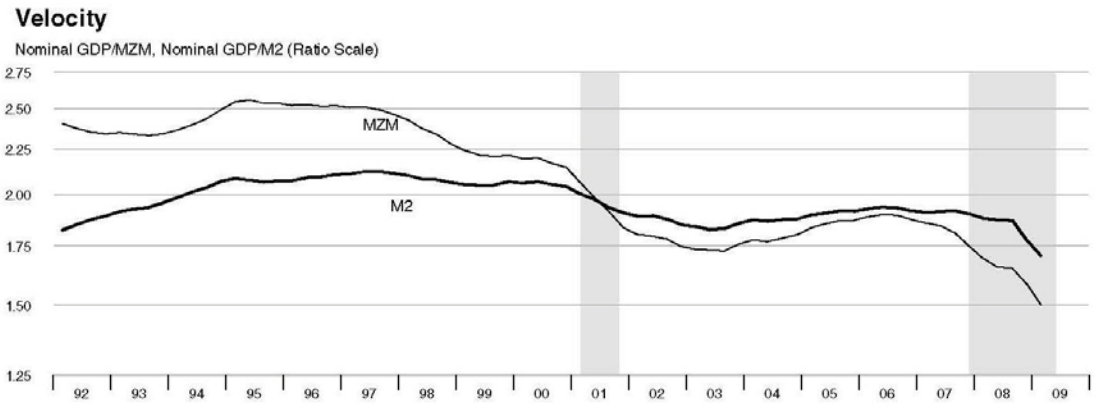
Here we define inflation as the rate of change of the price index. It is simply the rate of change in velocity, plus the rate of change in money supply less the rate of change in GDP.

5.2 Data

The velocity of money as published by the St Louis FED is shown below.



The following is the actual velocity chart.

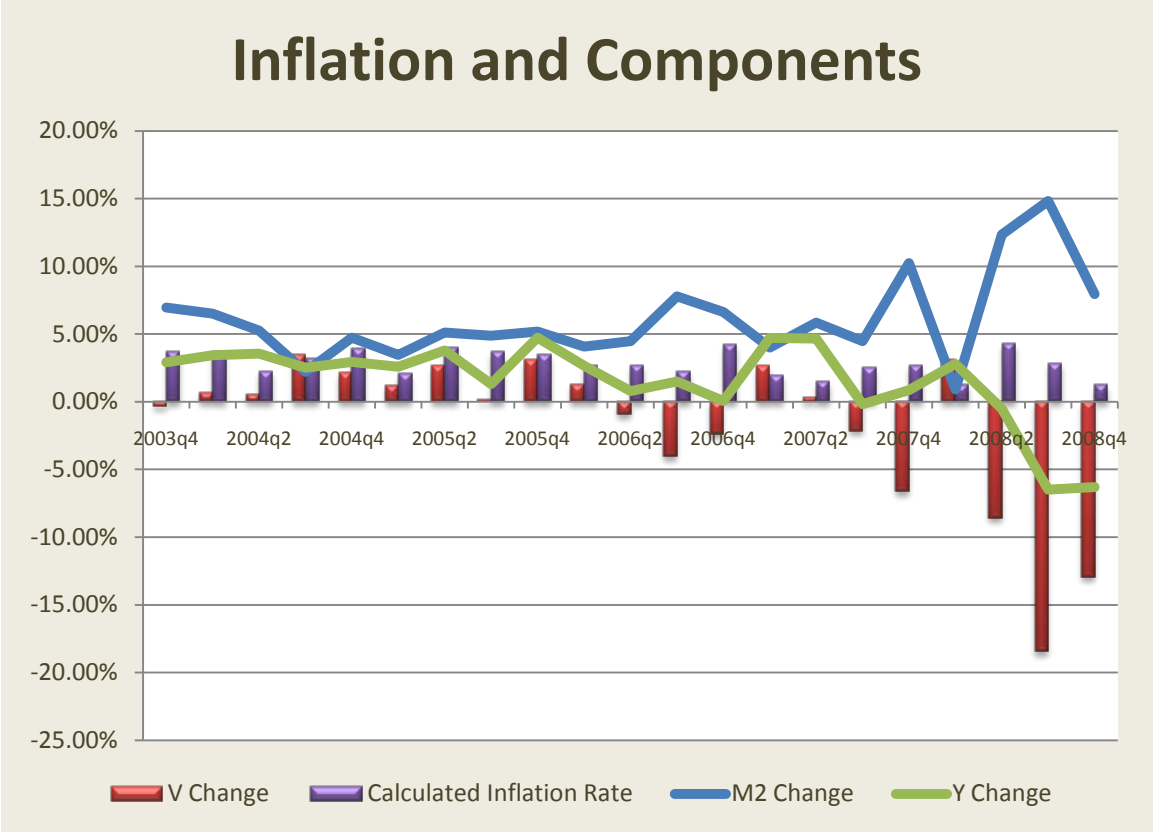


Now back to the equation. This means we can say:

Inflation= Relative Rate of Change in Velocity + Relative Rate of Change in M2 - Relative Rate of Change in GDP.

Now simply if the velocity rate return to where it was at less than 2% and the rate of increase in M2 was 2.5-3% and GDP was 3%. Thus inflation was 2% about. Yet if we see a doubling of M2 from the MB numbers than this would drive the inflation rate to astronomical levels if the leak to the economy is a fast one. This is the concern which we have.

Now let us look at the inflation over the past few years by separate components as shown in the following chart.



The concern here is that inflation is driven by increases in money supply. In our analysis we use M2. Thus far M2 has not grown significantly but MB, the monetary base has. We know that the ratio of M2 to MB seeks a level much higher than we now have seen, apparently because the e factor has exploded. However the M2 will grow to seek that level. When it does it presents as inflation. We have reduce the ratio by a factor of 2 the greatest change ever seen in our economy. That is a harbinger of things to come.

6 CONCLUSIONS

Based upon the analysis we have reached several conclusions. They are:

1. The Fed's BS shows a massive explosion of on the asset side. This then gets reflected in the MB numbers as well. This cannot stay on the sidelines for too long a period. When it begins to flow the FED must again re-adjust the interest rates upward, most likely kicking off another recession. If the current Administration adds another stimulus package it will just explode this even more.

2. The Monetary Base has increased despite almost no commensurate growth in M2. This must be watched.

3. The Yield Curve shows certain signs of pressure but it also clearly shows that there is little if pressure on demands for capital to push up the rates. The FED is keeping the short term rates down and the market is keeping the long term rates down. Inflation at this point is not a significant factor.

4. Inflation has all of the elements set for it to increase rapidly. We estimate that inflation rates in excess of 15% are possible if the recovery is not properly managed. The major concern would be the placement of a political person, such as Summers, in the position of the current Chairman. This may be a possibility. If such occurs then there is even the case for hyper inflation, 50% per annum and greater.

7 DEFINITIONS

M1: The sum of currency held outside the vaults of depository institutions, Federal Reserve Banks, and the U.S. Treasury; travelers checks; and demand and other checkable deposits issued by financial institutions (except demand deposits due to the Treasury and depository institutions), minus cash items in process of collection and Federal Reserve float.

MZM (money, zero maturity): M2 minus small-denomination time deposits, plus institutional money market mutual funds (that is, those included in M3 but excluded from M2). The label MZM was coined by William Poole (1991); the aggregate itself was proposed earlier by Motley (1988).

M2: M1 plus savings deposits (including money market deposit accounts) and small-denomination (under $100,000) time deposits issued by financial institutions; and shares in retail money market mutual funds (funds with initial investments under $50,000), net of retirement accounts.

M3: M2 plus large-denomination ($100,000 or more) time deposits; repurchase agreements issued by depository institutions; Eurodollar deposits, specifically, dollar-denominated deposits due to nonbank U.S. addresses held at foreign offices of U.S. banks worldwide and all banking offices in Canada and the United Kingdom; and institutional money market mutual funds (funds with initial investments of $50,000 or more).

Bank Credit: All loans, leases, and securities held by commercial banks.

Domestic Nonfinancial Debt: Total credit market liabilities of the U.S. Treasury, federally sponsored agencies, state and local governments, households, and nonfinancial firms. End-of-period basis.

Adjusted Monetary Base: The sum of currency in circulation outside Federal Reserve Banks and the U.S. Treasury, deposits of depository financial institutions at Federal Reserve Banks, and an adjustment for the effects of changes in statutory reserve requirements on the quantity of base money held by depositories. This series is a spliced chain index.

Adjusted Reserves: The sum of vault cash and Federal Reserve Bank deposits held by depository institutions and an adjustment for the effects of changes in statutory reserve requirements on the quantity of base money held by depositories. This spliced chain index is numerically larger than the Board of Governors' measure, which excludes vault cash not used to satisfy statutory reserve requirements and Federal Reserve Bank deposits used to satisfy required clearing balance contracts; see Anderson and Rasche (1996a, 2001, 2003).

Monetary Services Index: An index that measures the flow of monetary services received by households and firms from their holdings of liquid assets; see Anderson, Jones, and Nesmith (1997). Indexes are shown for the assets included in M2, with additional data at http://research.stlouisfed.org/msi/index.html .

Checkable Deposits is the sum of demand and other checkable deposits.

Savings Deposits is the sum of money market deposit accounts and passbook and statement savings.

Time Deposits have a minimum initial maturity of 7 days.

Large Time Deposits are deposits of $100,000 or more.

Retail and **Institutional Money Market Mutual Funds** are as included in M2 and the non-M2 component of M3, respectively

Excess Reserves plus RCB (Required Clearing Balance) Contracts equals the amount of deposits at Federal Reserve Banks held by depository institutions but not applied to satisfy statutory reserve requirements. (This measure excludes the vault cash held by depository institutions that is not applied to satisfy statutory reserve requirements.)

Consumer Credit includes most short- and intermediate-term credit extended to individuals. See *Statistical Supplement to the Federal Reserve Bulletin*, table 1.55.

Inflation Expectations measures include the quarterly Federal Reserve Bank of Philadelphia *Survey of Professional Forecasters*, the monthly University of Michigan Survey Research Center's *Surveys of Consumers*, and the annual Federal Open Market Committee (FOMC) range as reported to the Congress in the February testimony that accompanies the Monetary Policy Report to the Congress. Beginning February 2000, the FOMC began using the personal consumption expenditures (PCE) price index to report its inflation range; the FOMC then switched to the PCE chain-type price index excluding food and energy prices ("core") beginning July 2004. Accordingly, neither are shown on this graph.

CPI Inflation is the percentage change from a year ago in the consumer price index for all urban consumers.

Real Interest Rates are ex post measures, equal to nominal rates minus year-over-year CPI inflation. From 1991 to the present the source of the long-term PCE inflation expectations data is the Federal Reserve Bank of Philadelphia's *Survey of Professional Forecasters*. Prior to 1991, the data were obtained from the Board of Governors of the Federal Reserve System. Realized (actual) inflation is the annualized rate of change for

the 40-quarter period that corresponds to the forecast horizon (the expectations measure). For example, in 1965:Q1, annualized PCE inflation over the next 40 quarters was expected to average 1.7 percent. In actuality, the average annualized rate of change measured 4.8 percent from 1965:Q1 to 1975:Q1. Thus, the vertical distance between the two lines in the chart at any point is the forecast error.

FOMC Intended Federal Funds Rate is the level (or midpoint of the range, if applicable) of the federal funds rate that the staff of the FOMC expected to be consistent with the desired degree of pressure on bank reserve positions. In recent years, the FOMC has set an explicit target for the federal funds rate.

Federal Funds Rate and Inflation Targets shows the observed federal funds rate, quarterly, and the level of the funds rate implied by applying Taylor's (1993) equation

$$ft^* = 2.5 + \pi\, t-1 + (\pi\, t-1-\pi^*)/2 + 100 \times (yt-1 - yt-1\, P)/2$$

to five alternative target inflation rates, $\pi^* = 0, 1, 2, 3, 4$ percent, where ft^* is the implied federal funds rate, $\pi\, t-1$ is the previous period's inflation rate (PCE) measured on a year-over-year basis, $yt-1$ is the log of the previous period's level of real gross domestic product (GDP), and $yt-1\, P$ is the log of an estimate of the previous period's level of potential output.

Potential Real GDP is as estimated by the Congressional Budget Office.

Monetary Base Growth and Inflation Targets shows the quarterly growth of the adjusted monetary base (modified to include an estimate of the effect of sweep programs) implied by applying McCallum's (1988, 1993) equation $\Delta MBt^* = \pi^*$ + (10-year moving average growth of real GDP) – (4-year moving average of base velocity growth) to five alternative target inflation rates, $\pi^* = 0, 1, 2, 3, 4$ percent, where ΔMBt^* is the implied growth rate of the adjusted monetary base. The 10-year moving average growth of real GDP for a quarter t is calculated as the average quarterly growth during the previous 40 quarters, at an annual rate, by the formula

Velocity (for MZM and M2) equals the ratio of GDP, measured in current dollars, to the level of the monetary aggregate. MZM and M2 Own Rates are weighted averages of the rates received by households and firms on the assets included in the aggregates. Prior to 1982, the 3-month T-bill rates are secondary market yields. From 1982 forward, rates are 3-month constant maturity yields.

Real Gross Domestic Product is GDP as measured in chained 2000 dollars. The Gross Domestic Product Price Index is the implicit price deflator for GDP, which is defined by the Bureau of Economic Analysis, U.S. Department of Commerce, as the ratio of GDP measured in current dollars to GDP measured in chained 2000 dollars. Page 14:

Investment Securities are all securities held by commercial banks in both investment and trading accounts.

Inflation Rate Differentials are the differences between the foreign consumer price inflation rates and year-over-year changes in the U.S. all-items Consumer Price Index.

Treasury Yields are Treasury constant maturities as reported in the Board of Governors of the Federal Reserve System's H.15 release.

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