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DEMAND FOR LIQUIDITY

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ABSTRACT

In the 2008-2011 time period, the Federal Reserve injected approximately \$2 trillion in new reserves into the U.S. banking system. Monetarist theory suggests this should have resulted in a significant increase in nominal GDP and/or the price level. The failure of nominal GDP and/or prices to respond as predicted is an anomaly. Our paper provides explanations for why GDP and the price level have failed to increase.

Keywords: Monetary Base, Excess Reserves, Equation of Exchange, Multiplier, Velocity, Liquidity Demand

1. INTRODUCTION

It is a basic principle of monetarist economics that changes in the supply of money cause proportionate changes in the nominal value of output and the price level. If, for example, the money supply is doubled, then, in equilibrium, nominal GDP should double, as will the GDP implicit price deflator. The precise results are modified if real output grows, but the underlying principle remains the same. Increasing the money supply leads to increases in nominal GDP and/or increases in the price level. The underlying rationale for this is the assumption that the demand for money is a linear function of income. Or equivalently, the income velocity of money is constant. An excess supply of money operates through a real balance effect, expanding aggregate demand, until higher nominal income matches the increase in the money supply.

Economists who agree with the monetarist viewpoint are then forced to explain what appears to be a major anomaly. Over the recent five year period, 2006-2011, monetary policy in the United States was extremely expansionary. Two extended episodes of "quantitative easing" - QE1 and QE2 -- led to a significant increase in the monetary base. Textbook explanations of monetary transmission mechanisms suggest this should have, by now, led to a sharp increase in the money supply, and hence to increases in nominal output and the price level. Yet that has not occurred. It is, to paraphrase Sherlock Holmes, a case of the dog that didn't bark. The money supply has failed to grow proportionately to the increase in the monetary base, and nominal GDP and the price level remain far below their expected levels.

The purpose of this paper is to offer reasons why the monetarist prediction has failed to come true. Why has a significant increase in the monetary base failed to result in a proportionate increase in nominal output and prices? This is not to suggest that monetary policy is completely ineffective. In the absence of QE1 and QE2, output and prices might have fallen much more than they actually did, and the United States might have experienced a repeat of the Great Depression. But the evidence suggests that an expansionary monetary policy, by itself, may be insufficient to return the economy to full employment under the present circumstances.

2. THEORY

We start with Irving Fisher's (1922) equation of exchange using the income definition of velocity, so that

$$MV = PQ, \quad (1)$$

Where M is the nominal money stock, V is the income velocity of money, P is the average level of prices, and Q is real output.

Accepting Fisher's argument that V, the velocity of money, is constant, we get the result that percentage changes in the money stock, dM/M , must be matched by equal percentage changes in nominal GDP, dPQ/PQ . If real output Q is also held constant, then dM/M will be matched by an equal percentage change in the price level, dP/P . This is Fisher's well known quantity theory of money result. Doubling the money supply doubles the price level.

The argument that velocity is constant because of institutional factors such as the length of pay periods found theoretical justification in

Baumol's (1952) inventory theoretic model of money demand. Friedman and Schwartz (1963) provided empirical evidence that velocity is relatively stable.

Defining $k = 1/V$, the equation of exchange can be rewritten as:

$$M = kPQ, \quad (2)$$

or,
$$M/P = kQ. \quad (3)$$

These are now money demand functions. Equation (2) says that nominal money demand is a linear function of nominal income, while equation (3) says the demand for real money balances is a linear function of real income. Clearly, if V is constant, then k is constant, and money demand is linear in income, in either nominal or real terms.

Following Patinkin (1965) and Barro (1984), we assume that agents do not suffer from money illusion. This implies that if the money supply exceeds money demand, then a real balance effect will occur. Agents will increase their spending relative to their incomes, in order to reduce their excess money balances. Within a closed system, however, total money balances are fixed, so equilibrium requires that incomes rise to match the higher money balances. The price level rises until real money balances fall back to their original levels.

The anomaly: In retrospect, the United States suffered a housing price bubble that peaked in 2006. Mortgage backed securities lost value due to default risk as homeowners found their houses were worth less than their mortgage debt. Banks that held portfolios of CMOs were perceived as being potentially insolvent, as were firms like AIG which insured the mortgage backed bonds.

To prevent a liquidity crisis from spiraling out of control, the Federal Reserve System began a policy of flooding the financial system with new money. Besides holding short term interest rates at nearly zero, the Fed conducted two separate episodes of quantitative easing, in which it purchased pre-announced quantities of longer-term securities. These episodes, QE1 and QE2, were unprecedented in Fed history, expanding

the monetary base significantly. See Figure 1 for documentation.

Normally, an increase in the monetary base leads to an increase in the money supply. In turn, the increase in the money supply leads to a rise in total spending, which drives up nominal income and prices. The anomaly is that this did not happen. Or it has not happened as rapidly as monetarist theory would suggest. Why not?

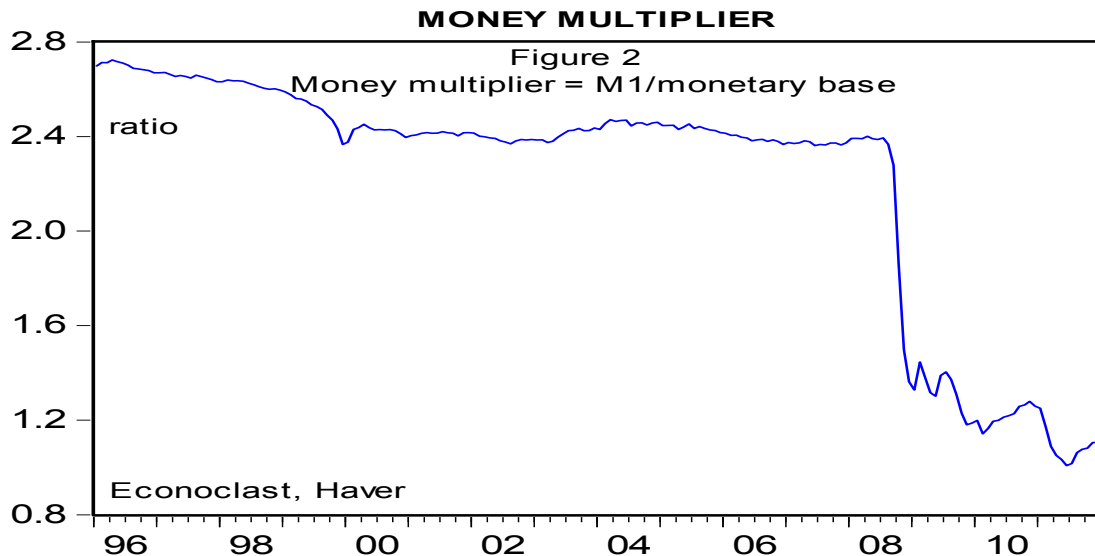
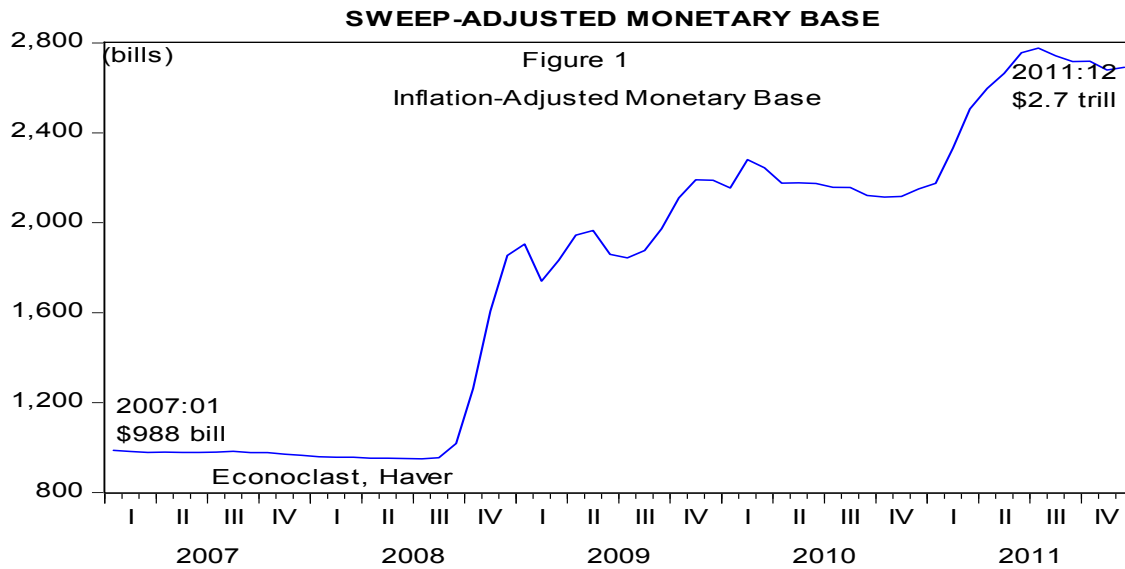
We suggest there are three reasons why the increase in the monetary base failed to cause a proportionate rise in nominal income and prices:

- 1) An increased demand for liquidity by banks. Rather than lend to businesses, commercial banks have chosen to hold higher than normal levels of excess reserves.
- 2) An increased demand for liquidity by non-financial firms. This is possibly due to an inability by non-financial firms to borrow from banks, leading them to increase their cash holdings.
- 3) An increased demand for liquidity by households. The fall in housing values reduced the net worth of households by about \$9 trillion. To repair their balance sheets, households have saved, increasing their demand for cash.

3. FEDERAL RESERVE ACTIONS

The Federal Reserve increased the monetary base by nearly \$2 trillion from mid-2008 to the end of 2011 through QE1 and QE2, Figure 1. The monetary base, in absolute terms, increased by a factor of 2.7 over that approximate 2.5 year period. In comparison it took from 1980 to 2007 -- 27 years -- for the base to increase by a factor of 2.6 in inflation-adjusted terms.

The Federal Reserve expanded the monetary base starting in the 2008 financial panic at a far greater pace than at any time in its history. The quantity theory of money suggests that U.S. nominal GDP should be increasing rapidly by this time in terms of either the price level and/or real GDP. The U.S. economy was approximately 2.5 years into its recovery at the end of 2011 and neither inflation nor real GDP had accelerated much, which is unexpected (Bernanke.)

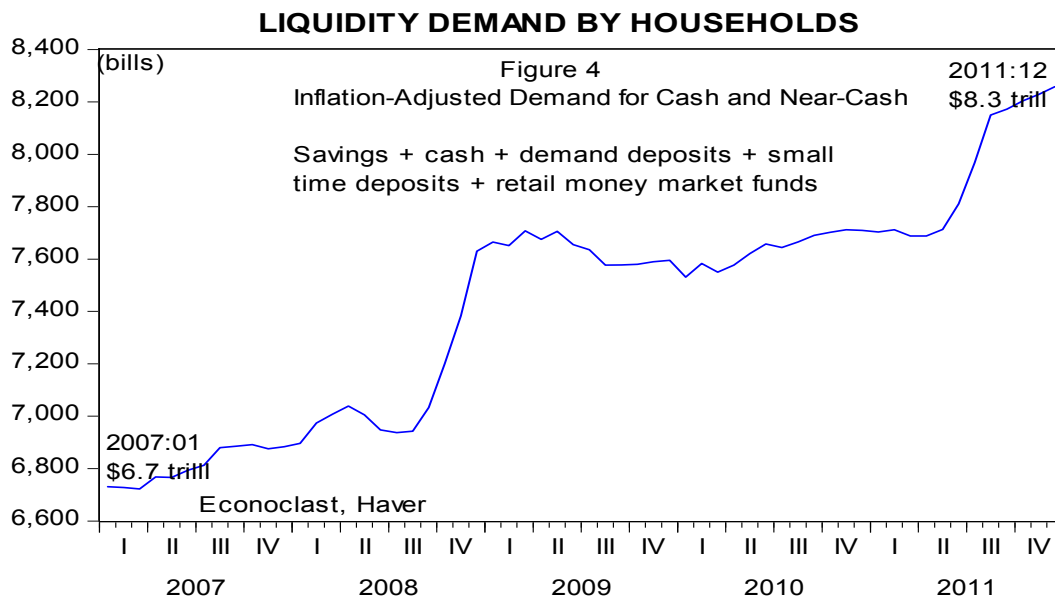
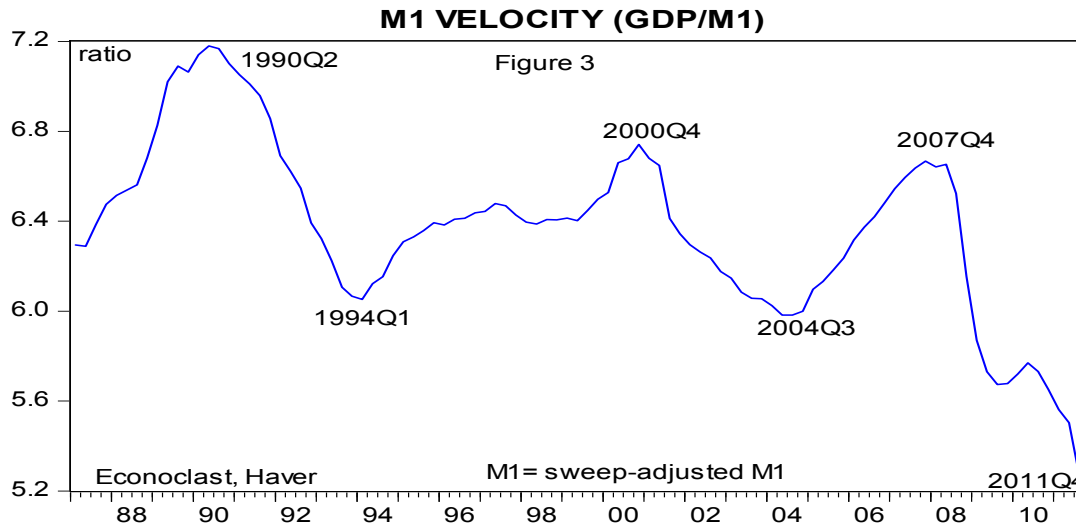


The traditional relationships between the monetary base and M1 and between money and economic activity have not responded in the expected fashion. The money multiplier from 1996 through 2007 averaged 2.48 which says that during that period a one-dollar increase in the base resulted in M1 increasing by nearly \$2.50, Figure 2. Post 2007 through 2011 it averaged approximately 1.5.

The fall in the value of the money multiplier corresponded with the recession that started in

late 2007 and, in particular the financial panic which followed the Lehman Bros bankruptcy in September 2008. Households and businesses sharply reduced spending during the recession and financial panic coinciding with the decline in the money multiplier.

Velocity of M1 typically falls after a recession but velocity fell more than usual after the recent recession, reflecting the low level of interest rates and financial panic, Figure 3.

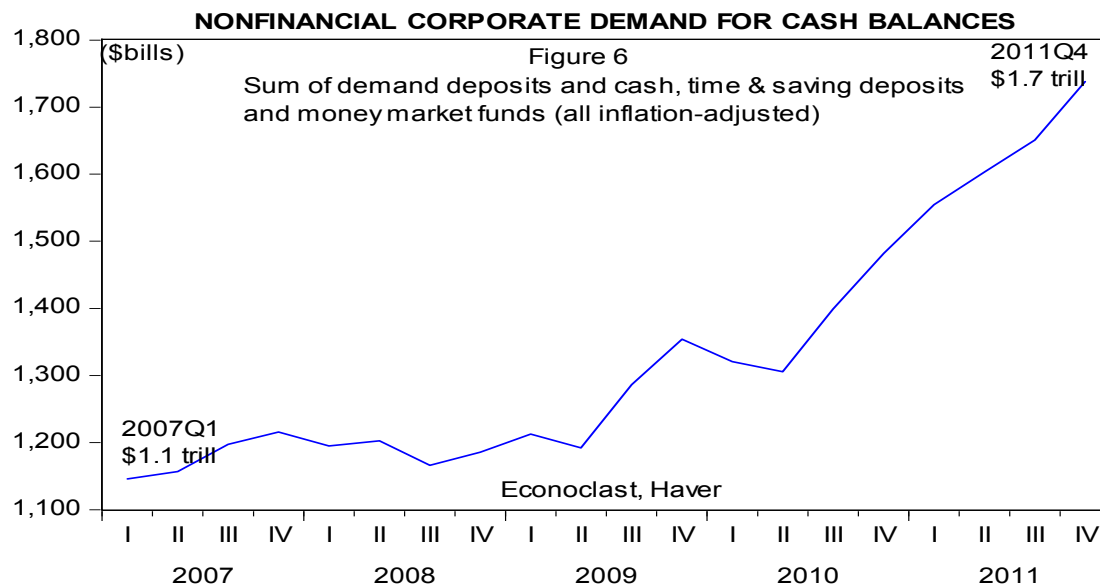
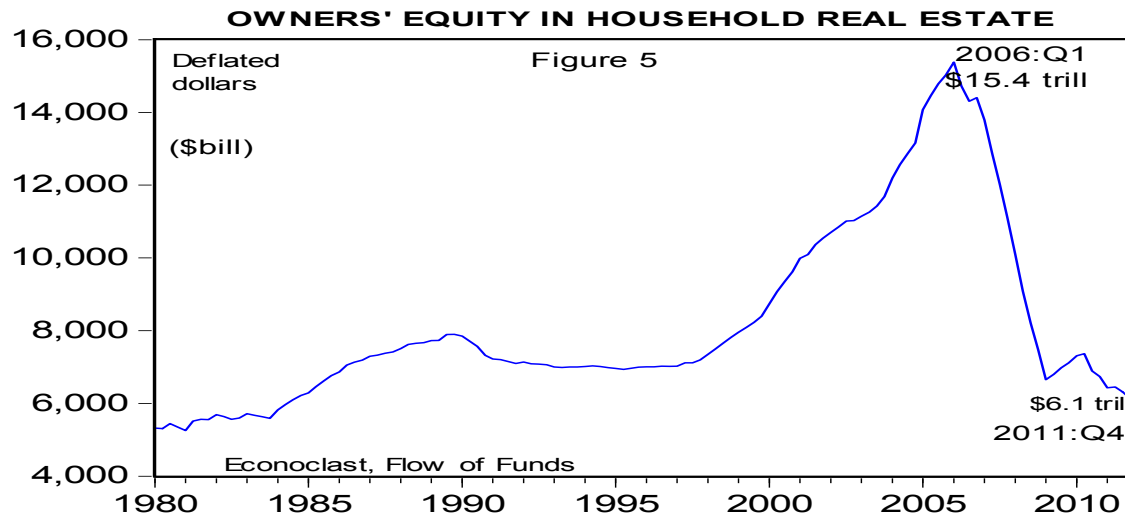


4. CASH AND NEAR-CASH DEMAND

4.1 Household

Households sharply increased their demand for cash and near-cash during the housing price meltdown and the 2008 financial panic, as expected, and again in the latter part of 2011, Figure 4. The total increase from 2007 through 2011 was \$1.6 trillion which amounts to approximately \$14,000 per household. Perhaps the increase in demand in 2011 reflected a combination of U.S. Treasuries being downgraded one notch from Triple A and the events in Europe concerning the central government financial viability of some central government sovereign debt obligations. Housing price declines and the subsequent decline in homeowners' equity started in 2006

and continued through 2011, Figure 5. Households likely attempted to repair their balance sheets, in part, by holding more cash and near-cash. But the sudden changes in household liquidity demand in 2008 may have reflected, in part, the decline in homeowners' equity on the household balance sheet. But, in particular, the increase in liquidity demand resulted from the shock to the U.S. financial system of the decline in value of the \$2 trillion in mortgage-backed securities held by global financial institutions (Wallison.) The timing of the shock corresponded with the Lehman Bros bankruptcy and the decline in asset values on the balance sheets of financial institutions following mark-to-market accounting guidelines which in turn resulted in adverse shocks on the real economy.



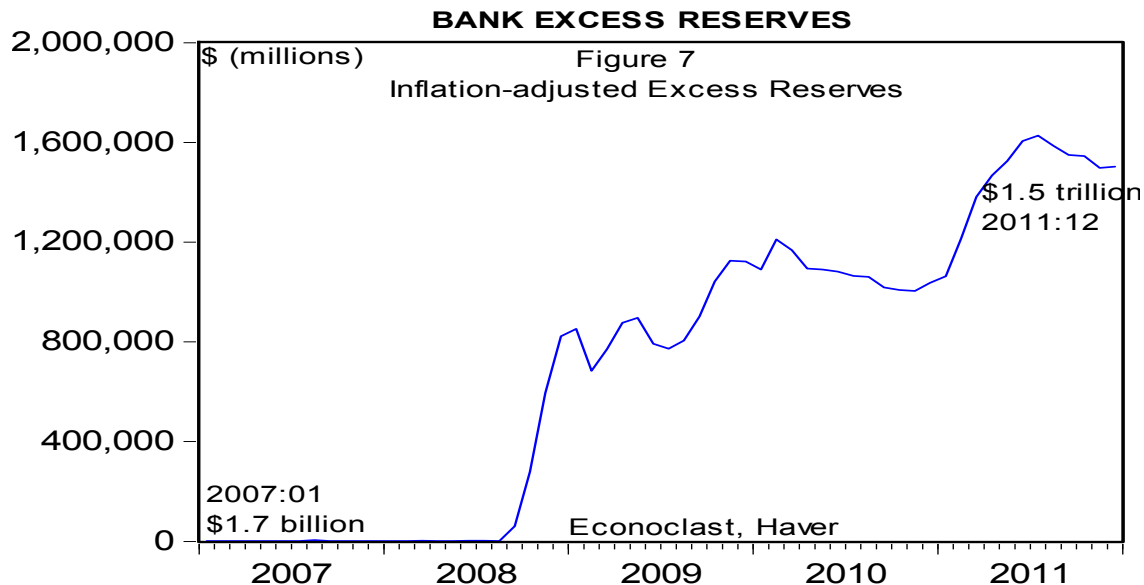
4.2 Nonfinancial Corporations

Nonfinancial corporations increased their demand for near-cash by approximately \$600 billion with most of the increase occurring post-2008, Figure 6. The increase may have reflected the response to the 2008 financial crises and/or the uncertain regulatory framework that both financial and nonfinancial corporations face. Policy and regulatory uncertainty may be high (Baker.) Plus corporations may need higher cash balances in order to self-finance as the traditional financing channels with banks may be impaired.

4.3 Banking

The banking system dramatically increased its excess reserves from under \$2 billion in 2007 to

\$1.5 trillion at the end of 2011, Figure 7. The monetary base increased approximately \$2 trillion over that time and the majority of that increase is being held as excess reserves. Quantitative easing (QE1) added a total of approximately \$1.25 trillion in purchases of mortgage-backed securities and \$175 billion of agency debt purchases to the Fed's balance sheet from November 2008 to March 2010. QE2 ran from November 2010 to June 2011 and added \$600 billion of Treasury securities to the Fed's balance sheet. QE1 and QE2 purchases of securities added new monies to the system which are reflected in the monetary base which increased approximately \$2 trillion over that time.



Banks hold much of the additional purchases of securities by the Federal Reserve as excess reserves. Total loans and leases at all commercial banks totaled \$6.91 trillion at the end of 2011. Loans and leases totaled \$7.3 trillion in December 2007, adjusted for inflation, the start of the recession. The lack of lending may reflect lack of demand and/or changed lending standards. But the money multiplier may not increase much until lending increases to lower the quantity of excess reserves.

5. SUMMARY

Households, businesses and commercial banks all increased their holdings of cash and near-cash

in response to the recent recession and financial panic resulting from the sharp decline in the value of mortgages held by global financial institutions. The mark-to-market accounting standards may have accelerated the write-down process in financial institutions, creating instability in the financial system which led to a series of adverse real sector shocks.

The Federal Reserve responded by purchasing nearly a combined \$2 trillion of incremental MBS and Treasury securities which increased the monetary base by about the same amount. The quantity theory of money suggests that nominal GDP should have responded to that large

increase in the monetary base by increasing rapidly. But that has not occurred.

Available evidence suggests that the common shock to the financial system of the decline in the value of mortgages impaired the monetary transmission channels and real economy so that the expected effect of quantitative easing on nominal GDP has not occurred. It may be that the time lags for monetary policy to work are much longer than previously thought because of the large negative shocks to the financial and real economy.

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