The Reasons of the Plunge in the Velocity of M1 from 2007 to the Present Time

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Abstract

Changes in demand for money can be brought about by many factors. The trending of money demand during the Great Rescission of 2008 was different than most other times in the economy of United States. This paper indicates the reasons of the money demand trend in this specific period. It also uses time series econometrics as the empirical methodology to analyze and verify the possible reasons. This paper also further focuses on the importance of the decline in velocity for monetary policy during and after the contraction of 2007-2009 and suggests what could be possibly inferred from it.

Keywords: demand for money; interest rate; time series; recession

- **Introduction**

The equation of exchange (show as below) shows the relationship between the amount of goods produced (Y), the price level (P), amounts of money (M), and how money moves (V):

$$M \times V = P \times Y \tag{1}$$

The Cambridge equation further emphasizes on the money demand, which is the focus of this paper. Assuming the whole economy is at equilibrium and the price level is exogenous, the Cambridge equation is equivalent to the equation of exchange (as shown below) with velocity equal to the inverse of k:

$$M \times \frac{1}{k} = P \times Y, \tag{2}$$

where M is the money supply and P and Y represent the price level and the real income. The demand for money can be represented by k in this case. The economy of the United States has been undergoing a plunge in the velocity of M1 (M1V) (as shown in Figure 1) since 2007, which is tantamount to a rise in the demand of money (k) (as shown in Figure 2).

Figure 1 Velocity (M1V) from 2007-2018

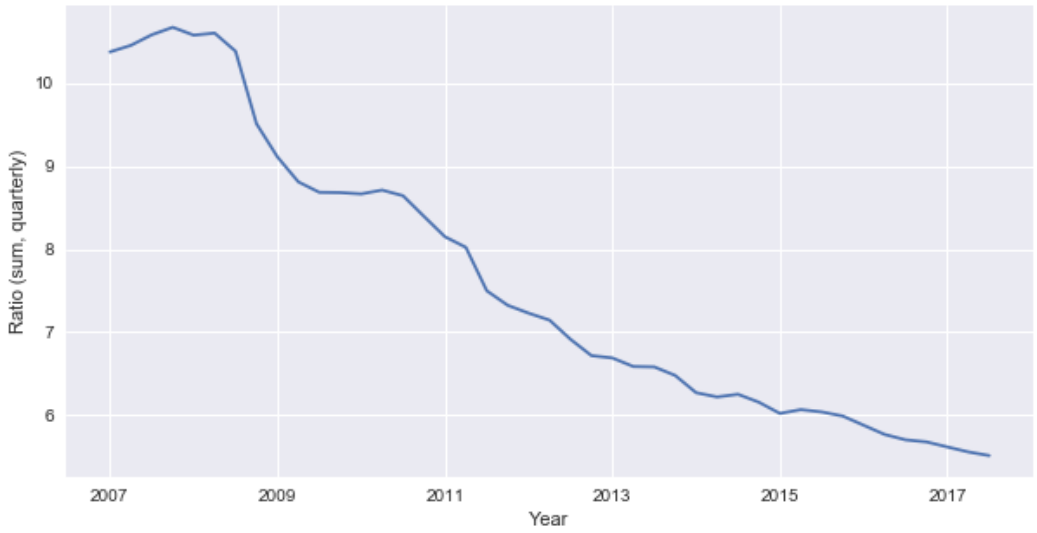
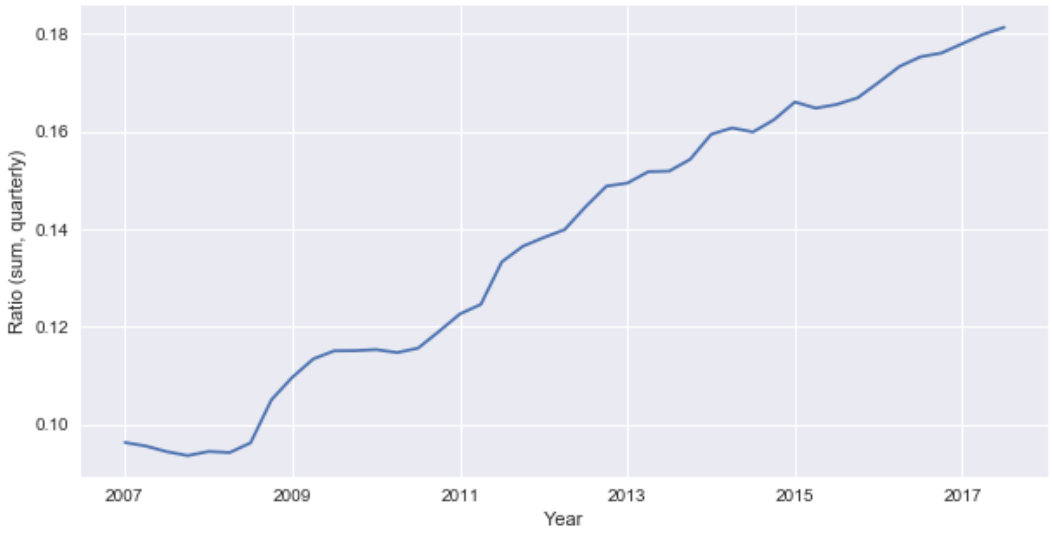


Figure 2 Demand for Money (k) from 2007-2018



The first section of this paper examines the reasons for the increasing demand for money in the in the United States. And it extends my findings on the possible money demand factors, shows and tests all the factors. It also finds out the most important reason among all of them applied to data in the United States from 2007 to present.

The second section states the importance of the decline in money velocity during and after the Great Recession of 2008. And it also indicates what could possibly be inferred from the plunge in the velocity.

I. Money Demand Factors

- Possible Reasons

In 2004, Joseph Atta-Mensah from Bank of Canada pointed out how a few factors play significant roles in an economic agent's demand for money:

$$\frac{M_t}{P_t} = \beta_0 + \beta_1 y_t + \beta_2 r_t + \beta_3 EUI_t + \varepsilon_t \,, \qquad (3)$$

where M is nominal money, P is the price level, y is real income, r is the interest rates, EUI is the proxy for economic uncertainty, ε is the error term, and βs are coefficients to be estimated (Atta-Mensah, 2004). His work emphasized economic uncertainty, which was measured by a composite of inflation uncertainty, exchange rate uncertainty and a few other factors. This section identifies the three factors Atta-Mensah suggested and explains the significance of each.

First of all, as mentioned in the introduction, income is one of the most important factors of demand for money since the money supply in the circulation is close to the product of the demand for money and the nominal income according to the Cambridge equation:

$$M = k \times PY \quad (4)$$

Therefore this paper will use nominal income instead of real income as Atta-Mensah suggested. And nominal income could be associated with nominal GDP, therefore this paper uses nominal GDP to mimic the concept of nominal income during the Great Recession.

Secondly, people's uncertainty about the future plays a big role in determining how much money they wish to hold in cash or in their bank accounts. Generally, in a booming economy in which the certainty of future is promising, people often tend to do more transactions. Money itself is a sole, simply and pure reflection of uncertainty on any point of view (Vickers, 1979). Economic uncertainty should have a positive correlation with the demand for money, meaning that the more people are unconfident about the future economy, the more money people demand, normally for holding in their checking accounts. The economic activity level, the mood of the stock market, inflation uncertainty, exchange rate uncertainty, long-term interest rates and short-term interest rates are usually the keys to evaluating the economic policy uncertainty of a country (Atta-Mensah, 2004)

Finally, the interest rate is the factor that widely affects the demand for money. According to Keynes, it is the price which brings into balance the willingness to hold wealth in the form of cash with the supply of cash (Appelt, 2016). The asset demand for money is inversely related to the market interest rate because people will expect a rise in the interest rate and hold their wealth in money instead of investing at a low interest rate. In other words, the lower the interest rate is, the more money people wish to hold in their pockets. Among all the common interest rates, commercial paper rate is one of the rates that best reflects the willingness of business, which is

big part of the economy, to hold money. Because it is a short-term debt and is a very cost-effective means of financing.

- **Test**

In determining the significance of real income, economic uncertainty and interest rate on demand for money during the Great Recession in 2008, I researched the nominal GDP of United States (GDP), the Baker-Bloom-Davis Monetary Policy Uncertainty Indices for the United States (MPUUS) and the 90-day Commercial Paper Rate (R) from 2007 to 2018. The reason of choosing nominal GDP for nominal income is due to their close relationship and has been mentioned in the previous section. And 90-day Commercial Paper Rate is a relatively short-term rate that represents the interest rate in the United States, specifically in the business field. Both data can be found on Federal Reserve Bank of St. Louis (FRED). The Baker-Bloom-Davis Monetary Policy Uncertainty Indices for the United States are extracted from newspaper articles and is able to reflect the economic uncertainty of United States (Baker et al., 2016). For instance, while the interest rate is floating with a large amplitude, which would make people more uncertain about the current economy, the monetary policy uncertainty index rises. When positive analyses of the stock market come out, the monetary policy uncertainty index undergoes a reduction because individuals become more confident about the economy. The measurement of all the data are calculated as the quarterly sum as indicated in each figure (as shown in Figure 3-5).

Figure 3 Nominal GDP for the United States (GDP) from 2007-2018

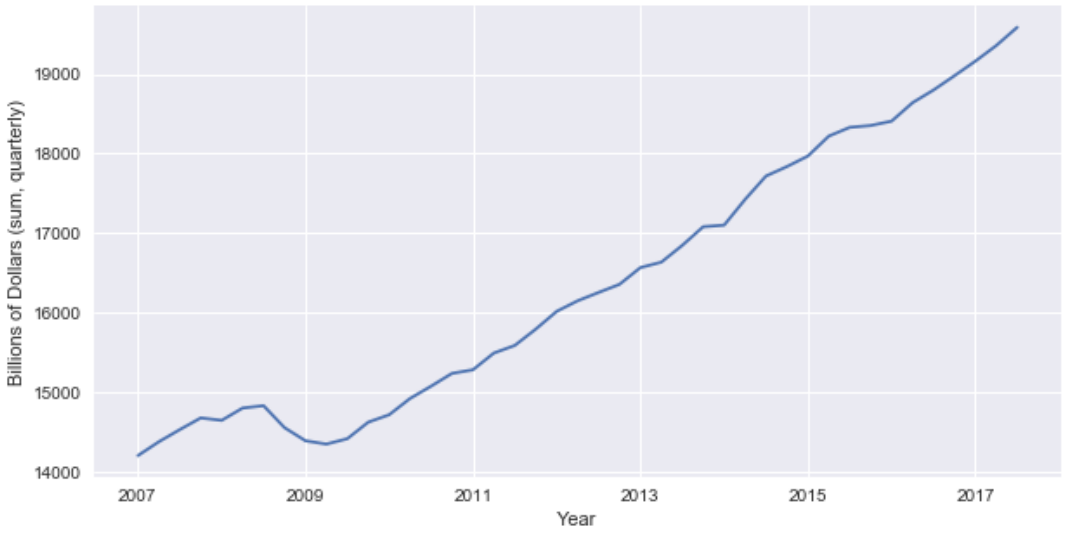


Figure 4 Baker-Bloom-Davis MPU Indices for the United States (MPUUS) from 2007-2018

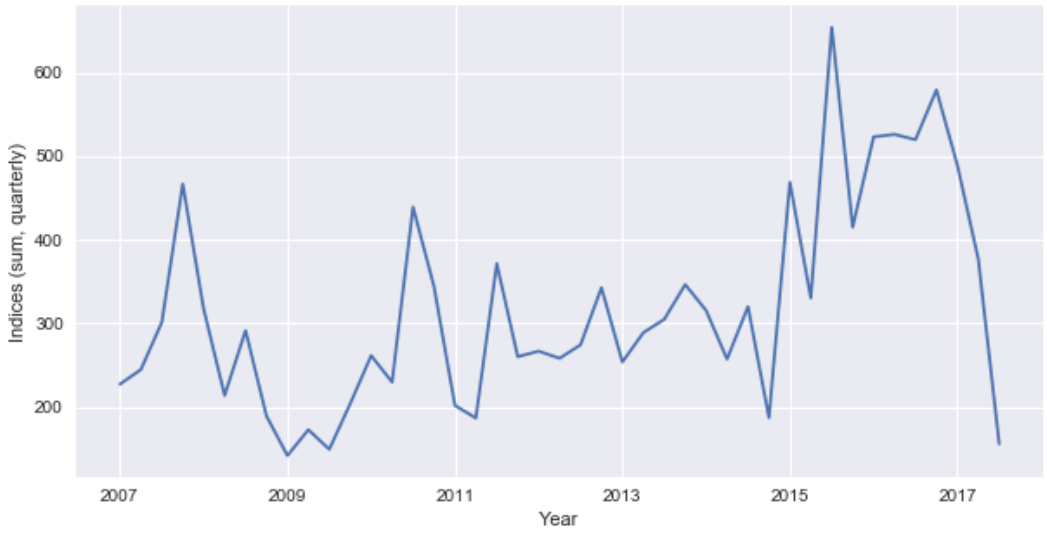
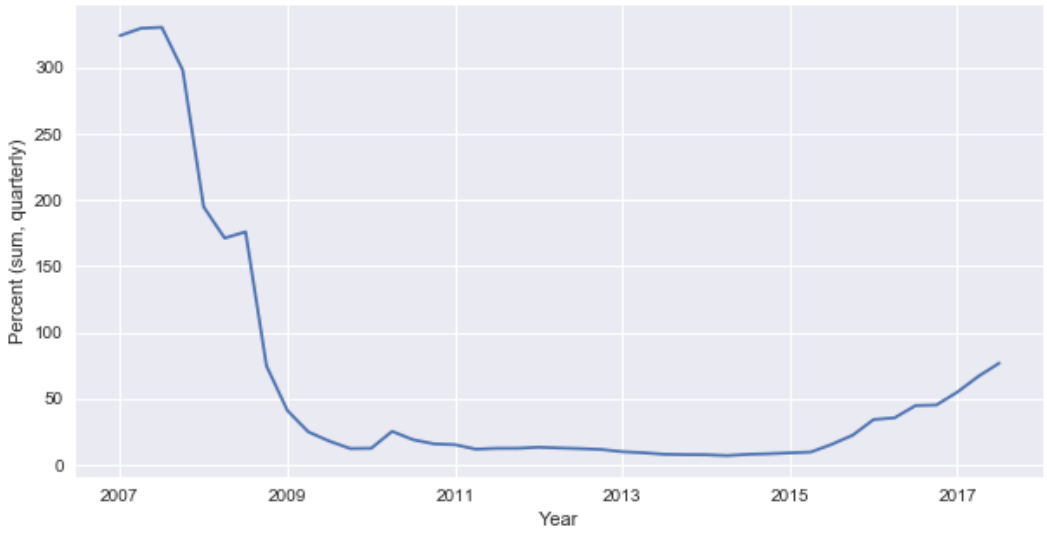


Figure 5 3-Month AA Financial Commercial Paper Rate (R) from 2007-2018



To first research the relationship of nominal GDP (GDP), economic uncertainty (MPUUS), and the interest rate (R) with money demand, I regressed the money demand (k) against them. The relationship is almost presented as linear. And the output from this regression is as shown in Table 1. The resulting output shows a strong relationship among all the variables and k as the correlation coefficient at 0.995. Additionally, the fact that the coefficients attached to the GDP and MPUUS are both positive and the coefficient of R is negative make reasonable economic sense according to explanation in previous section. Most importantly, we find the low interest rate being the most pronounced reason for the increasing demand for money during the Great Recession of 2008 in the United States since the absolute coefficient value of the interest rate is the greatest.

Table 1 Regression of k On GPD, MPUUS and R

OLS Regression Results

Dep. Variable:	k	R-squared:	0.995
Model:	OLS	Adj. R-squared:	0.995
Method:	Least Squares	F-statistic:	2767.
Date:	Sun, 02 Dec 2018	Prob (F-statistic):	2.12e-46
Time:	05:34:18	Log-Likelihood:	138.11
No. Observations:	43	AIC:	-270.2
Df Residuals:	40	BIC:	-264.9
Df Model:	3		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
GDP	8.347e-06	2.99e-07	27.958	0.000	7.74e-06	8.95e-06
MPUUS	2.926e-05	1.43e-05	2.050	0.047	4.14e-07	5.81e-05
R	-0.0001	1.6e-05	-7.638	0.000	-0.000	-8.98e-05

Omnibus:	1.061	Durbin-Watson:	0.194
Prob(Omnibus):	0.588	Jarque-Bera (JB):	0.904
Skew:	-0.075	Prob(JB):	0.636
Kurtosis:	2.306	Cond. No.	171.

The reasons for the change in money demand is multidimensional in different given periods of time. To sum this section up, the increasing money demand in the Great Recession of 2008 in the United States were caused by multiple factors including the low interest rate, people's increasing uncertainty about the future, and the steadily raising real income. And among all of them, low interest rate is the predominant. On the other hand, the reasons of the plunge in the velocity of M1 from 2007 were also because of the increasing real income, growing economic uncertainty of individuals and most significantly, the low interest rates.

II. Monetary Policy & Contraction

A contraction is a phase of the business cycle in which the economy as a whole is in decline. In order to pump the economy up, expansionary monetary policy, which involves increasing the money supply and decreasing the cost of borrowing, is usually considered feasible by the Fed. On the contrary, contractionary monetary policy is used to fight inflation which involves decreasing the money supply in order to increase the cost of borrowing which in turn decreases GDP and dampens inflation.

In the case of this paper, the contraction happened during the Great Recession and continued for a while. In theory, an expansionary monetary policy would be applied to fight back the Great Recession by the government. According to the data from FRED, the money supply by the Fed has been increasing since the Great Recession of 2008 took place (as shown in Figure 6). This is an obvious sign that the government has been applying expansionary monetary policy and has been trying to expand the economy.

Figure 6 Money Supply (M1) from 2007-2018

As mentioned previously, according to the classical quantity theory of money, the output of the economy is roughly equivalent to the product of money supply (M1) and velocity of money (M1V) (as shown in Figure 1). Nominal GDP (GDP) (as shown in Figure 3) is able to reflect the output of the economy. After a light drop in 2008, it was increasing at almost the same rate every year by small margins. It seems that the rising money supply (M1) offset by the diminishing velocity of money (M1V) since 2007, including the Great Recession of 2008. This is a sign that the economy was not growing as quickly as the government has expected. The monetary policy has been ineffective and has not been in-theory expansionary during the contraction.

Economist William A. Barnett has emphasized repeatedly that the monetary policy in the United States did not reflect the government's aimed-for expansive efforts (Barnett, 2012). His theory could be perfectly supported by the observation above. David G. Tuerck summarizes Barrett's findings and states that the Fed has failed in its adoption of interest rate targets, instead of money supply targets over recent decades. And the Fed has also used narrow techniques for measuring the money supply, causing it unwittingly to alternate between overly contractive and overly expansive money-supply policies since early 1980s (Tuerck, 2019).

Steven H. Hanke echoes Barnett's argument and argues that the Fed has not been using the correct but misleading money supply measurement technique. It does not recognize the difference between "private money" (which is produced outside of the Fed and which consists of assets of varying liquidity such as Treasury bills and commercial paper) and "public money" (which is also called "Fed money" and which consists of bank reserves and currency). Although

the Fed has been performing on interest rate targets and on public money, private money, which is much more significant in magnitude, backfires its goal over the past decades (Hanke, 2012).

- **Conclusion**

The plunge in the velocity of M1 since the Great Recession of 2008 was caused by multiple reasons including the increasing nominal income, growing economic uncertainty of individuals and the low interest rates. Among all the reasons, the low interest rates are the most important one. Furthermore, the plunge in the velocity of M1 from 2007 is offset by the increasing money supply and has not been contributing to a marked economic growth. This fact could indicate that the monetary policy in the United States was ineffective and failed to reflect government's aimed-for expansive efforts during the contraction and has been so until present.

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