US Domestic Money, Output, Inflation and Unemployment

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Abstract- The relationship between money and macroeconomic variables such as output, inflation and unemployment is the basis of macroeconomic policy piquing the interests of both academic economists and policy makers especially in the aftermath of the Great Recession. With the Federal Reserve expanding its balance sheet by an estimated $4 trillion, the current economic debate is whether there is a stable relationship between money and macroeconomic variables. In fact, previous research had shown that the link is tenuous and a more recent paper by Aksoy and Piskorski (2006) had concluded that accounting for the foreign holdings of US dollars holds predictive content for the path key macroeconomic variables such as output and inflation. This paper aimed to test this theory on a larger dataset including testing a small sample for the period after the Great Recession. I found that accounting for foreign holdings of US dollars improved the intrinsic information held in domestic money for the path of output after the great recession and the path of inflation between 1965-2007.

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Introduction

Macroeconomic research has mostly concerned itself with economic indicators such as output, inflation and private employment. The understanding of the role played by money and the relationship or the lack of amongst these indicators has become more important not least in the aftermath of the financial crisis of 2007/8 wherein policy makers and the general public have taken a keen interest in economic issues such as the level of currency in the system (via quantitative easing for example), inflation, output and the level of private sector employment.

Indeed, research (Aksoy and Piskorski, 2005, Aksoy and Piskorski, 2006) has attempted to elucidate whether there is a significant and stable relationship between US monetary aggregates and inflation and output. Prior to that, economic research (Friedman and Schwartz, 1963) had shown that the positive short term relationship between US monetary aggregates and inflation were non-existent. Moreover, it is generally accepted in macroeconomics – both theoretical and applied – that interest rates are a good predictor of the level of output ((Bernanke and Blinder, 1992, Friedman and Kuttner, 1992) and inflation in the US economy and the current debate in academic economic journals, economic blogs and media on when the Federal Reserve should raise short term interest rates in the USA lends support to this claim. However both the US monetary aggregates and interest rate channel were found not to contain any valuable guidance on the path of inflation ((Aksoy and Piskorski, 2006).

The US Dollar is an international currency. In fact the dollar is the most commercialized currency in the world. It also plays an important role as the reserve currency of the world. Individuals in developing countries store their monetary assets in dollars as it assures them of a stable value over a long period of time compared to the local currency. In countries where there is high inflation, everyday items such as groceries and durable goods are often priced in dollars. Central banks in many countries use the US dollar in monetary policy interventions and commodities and almost every international financial trade is priced in the US Dollar. This international feature of the US dollar implies that some amount of it is sent abroad making the link between US monetary aggregates on the whole and macroeconomic indicators like inflation, output and private employment tenuous (Aksoy and Piskorski, 2006). Indeed available estimates (Porter and Judson, 1996) suggest that over 50% of measured currency in circulation outside banks in 1995 was held abroad. Estimates are used, as it is quite difficult to use precise data about the foreign holding of US dollars since even though the total

amount of currency in circulation is known, measuring the exact domestic stock and foreign holdings is unwieldy for practical reasons such as invasion of privacy, costs and reliability of data gained. That said (Feige, 1996) observes that a significant proportion of what is estimated to be held abroad may actually be held locally by US nationals conducting business in the "underground economy" which involves unreported transactions.

The crux of this research is to ascertain whether the extent to which monetary aggregates are corrected for foreign holdings improves the intrinsic information found in the time series of the variables of interest i.e. inflation, output (Estrella and Mishkin, 1997, Aksoy and Piskorski, 2006) and private employment. In essence it is an empirical attempt at assessing the quantitative importance of removing foreign holdings of US dollars from the monetary base (Jefferson, 2000).

It is clear at this point that accounting for the foreign flows of US dollars is very important as these flows can alter the relationship between narrow monetary aggregates and US economic activity by providing significant information about the path of these macroeconomic variables. Furthermore, the loss of such crucial guidance can have serious implications for the conduct of monetary policy (Jefferson, 2000) by the Federal Reserve and fiscal policy by the central government especially in times when interest rates are low and inflation is low with aggregate demand also low as pertains in the US at the moment. In addition, monetary aggregates suffer from velocity shocks which serves as a noise impeding the signal from monetary aggregates (Estrella and Mishkin, 1997). Moreover, the US government also benefits from seigniorage of currencies held abroad and accounting for these is informative for policy prescription and analyses.

Measurement of Foreign Flows

A review of the existing literature elucidates several attempts to measure the foreign holdings of US dollars. Some estimates attempt to account for money used in the US "underground economy" (Feige, 1996) while others use nominal foreign holding of US currency (Jefferson, 2000) sourced from institutions such as the US Customs Service and the Federal Reserve Bank of New York. That said, consistent with Aksoy and Piskorski, 2006, this research uses the shipment proxy method published by Board of Governors of the Federal Reserve System in its Flow of Funds Accounts and by the Department of Commerce's Bureau of Economic Analyses in its International Investment Position of the United States. It is important to note that the published series are wholesale net currency shipments

of $100. It is believed that lower denominations notes like $5, $10, $20 and $50 are circulated domestically whereas mostly $100 is sent abroad. Indeed the results of a survey in 1995 suggests that just over 3% of $100 bills are held domestically (Bach, 1997). In addition, it is noteworthy that the shipment proxy method does not account for currency shipments through channels such as tourists, businesspersons, personal remittances and US military personnel stationed in foreign countries.

Figure 1:Quarterly Flow of US Dollars Abroad from 1965 to 2015.

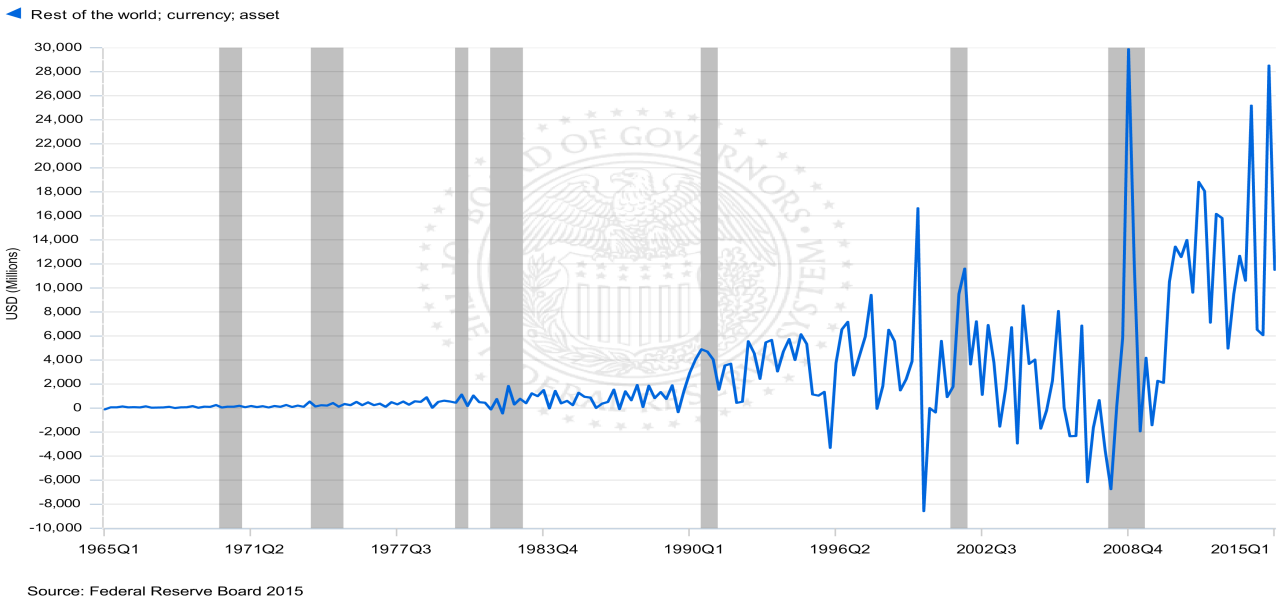


Figure 1 shows the quarterly flow of US dollars abroad from 1965 to 2015. The shaded regions represent US recessions. From the chart, it is evident that the 1990s and 2000s saw an increase in the foreign flows of US dollars. The highest level of foreign flows is recorded in 2008 the year of the great recession. A number of reasons could explain this observation but notable amongst them is that the great recession caused investors and business people to seek yield and investment opportunities in emerging economies as these economies had decoupled themselves from the advanced economies in terms of synchronization of business cycles (Abiad et al., 2012). Moreover, the 2000s has been a time in the history of many emerging economies - particularly in Africa – wherein national governments have aimed to move away from aid dependency and finance developmental projects via debt financing. And

a sizable number of these debts are issued in US dollars and subsequently bought by large institutional investors domiciled in the USA (Ebeke and Kyobe, 2015).

Figure 2. Log Scale Chart of Quarterly Flow of US Dollars abroad from 1965 to 2015.

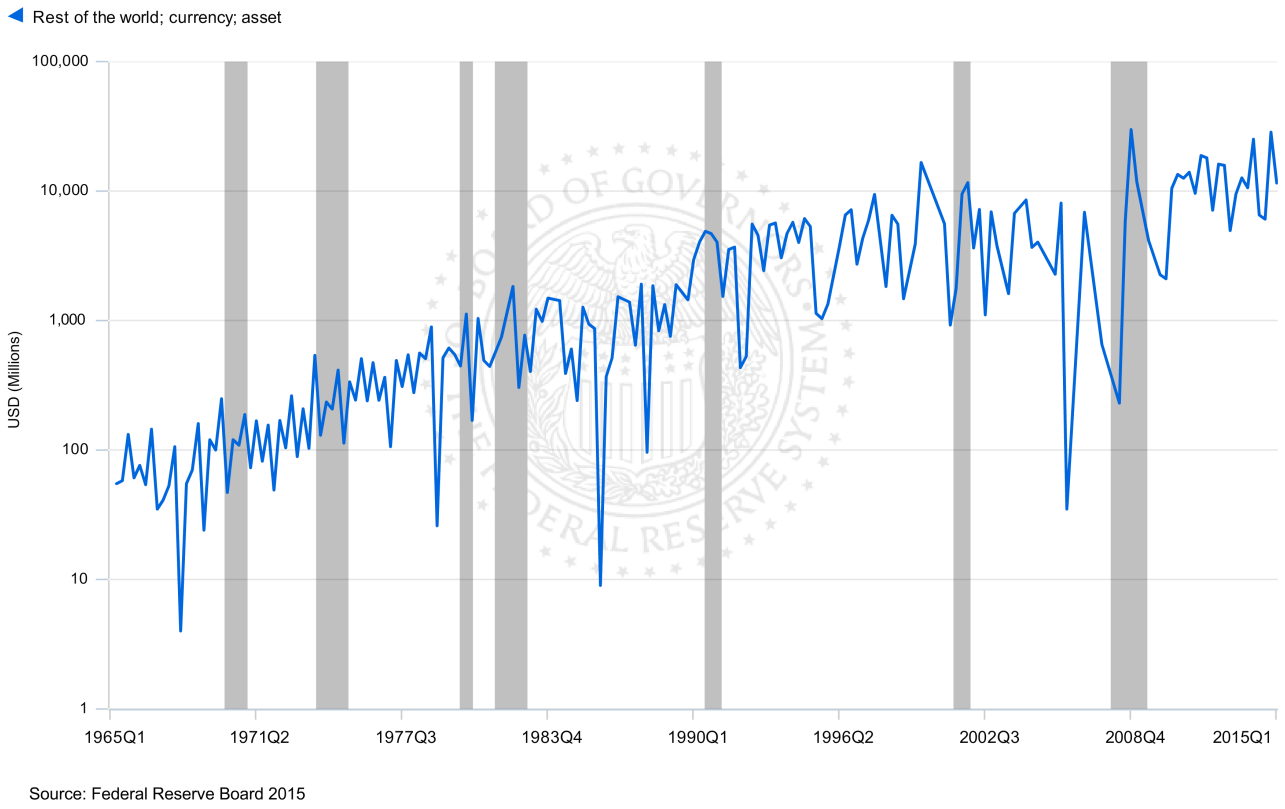
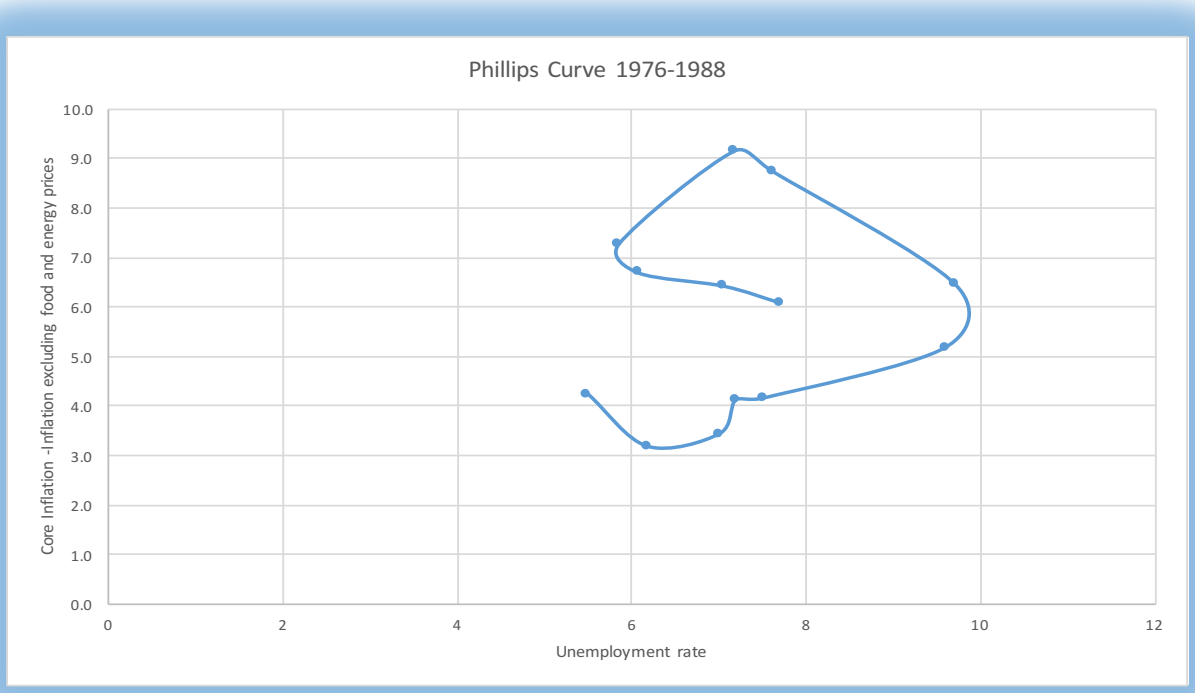


Figure 2 shows the ratio of change in the quarterly flow of US dollars abroad from 1965Q1 to 2015Q1. It can be seen from the chart foreign flows of US dollars has been increasing in an unstable manner since 1965 with the great recession period of 2008 seeing the highest increase. Both charts are highly informative in that they show that the ratio of foreign flows to currency circulating domestically is not constant over time especially when one considers the fact that the growth rate of the domestic currency is not constant. Indeed according Aksoy and Piskorski (2006), a constant growth rate of foreign flows to domestic currency will not have any predictive content for key macroeconomic indicators.

US Money and Unemployment

The current economic climate in advanced economies with specific emphasis on USA has brought the question of what full employment is into the centre of economic policy for both economic policy makers and academics. Traditionally, central banks and economic policy makers have relied on the Phillips curve to forecast the optimal level of inflation in the economy which allows economic agents to optimise the use of both human and capital resources i.e. as the jobless rate falls, inflation rises. However, since 2010, data on US unemployment and inflation indicates both are falling at the moment prompting economic analysts to question the empirical strength of the Phillips curve (Lansing, 2015, Owyang, 2015). I graphically explored the shape of the Phillips curve in the period between 1976-1988 and 2006-2014 and the fall in both unemployment and inflation during the latter period is evident.

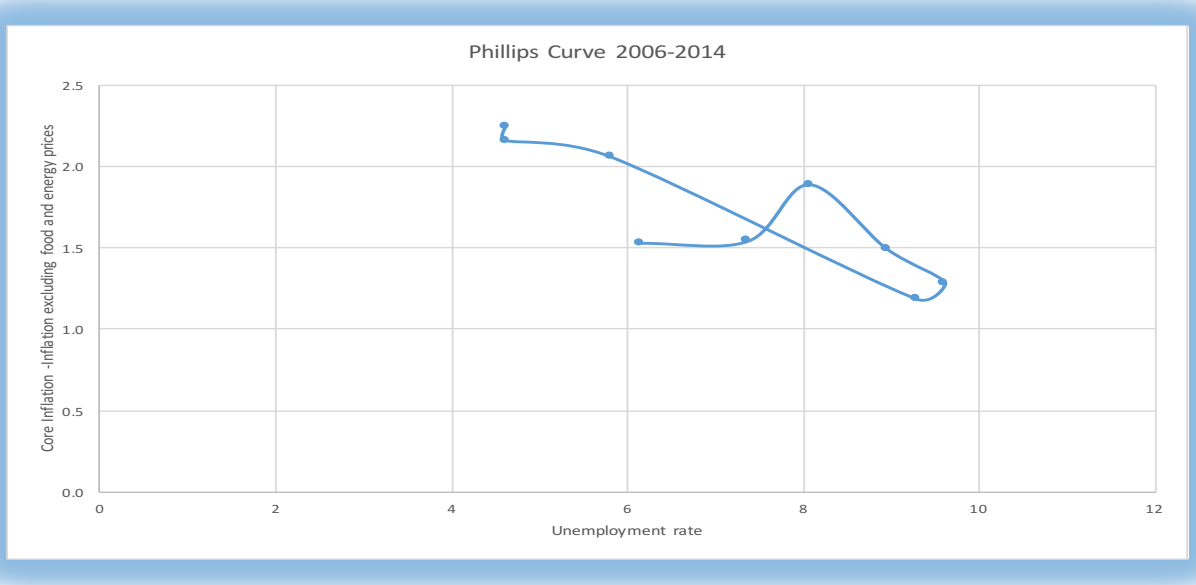
Figure 3 Phillips curve between 1976-1988



Source: Bureau of Labour Statistics and FRED

Figure 3 above shows that the predicted long run relationship between inflation and unemployment was fairly robust as can be seen from the "normal shape" of the Phillips curve.

Figure 4 the Phillips Curve between 2006 to 2014



Source: Bureau of Labour Statistics and FRED

Figure 4 shows the inflation dynamics since the financial crisis began. There has been a decoupling of unemployment from inflation, as according to the predictive properties of the Phillips curve low rates of unemployment should push inflation higher through the demand pull-effect.

Calculating Domestic Money

Consistent with Aksoy and Piskorski (2006), domestic money Md_t is calculated as level of currency C_t minus foreign holdings of the US dollars FH_t. This is expressed in notation form as

$$Md_t = C_t - FH_t$$

Where Md_t is domestic money, C_t is the level of currency as issued by the Federal Reserve and FH_t is the foreign holdings of US dollars. Now to determine the amount of domestic money in circulation, the amount of foreign holdings of US dollars must be known and it is not easy to estimate this. Thus an assumption must be made about the amount of foreign holding of US dollars at the last quarter preceding the beginning of the data series, which is 1964 Q4 in this instance. I assume five levels of initial foreign holdings at 0%, 10%, 20%, 30% and 40% to help determine the accuracy of the empirical method used and the reliability of the theory.

Data

I used quarterly data from 1965Q1 to 2014Q4 giving η = 200 observations. The variables of interest are output represented by real Gross Domestic Product (GDP), Inflation represented by the GDP Deflator and Unemployment represented by Unemploy (level of unemployment in thousands). The financial parameters used to assess the movements in the variable of interest are corrected domestic money *Md*, currency *C*, monetary base of the board of governors of the Federal Reserve System *BGBase* and from the Federal Reserve Bank of St Louis, St Louis adjusted monetary base *SLBase*, M1 money stock *M1*, M2 money stock *M2* and the federal funds rate $FUNDS$. With the exception of the federal funds rate that is in percent form, all data series are in their levels[1]. I restricted the first set of estimations to 2007Q4 to account for the effect of the great recession on macroeconomic variables (Blanchard and Leigh, 2013). I also estimate a small sample from 2008Q1-2014Q4.

Econometric Methodology

Granger Causality Tests

In line with friedman and Kuttner, (1992), the vector autoregressive specification[2] for output, inflation and NAIRU are as follows.

Output changes:

$$\Delta\gamma_t = \alpha + \sum_{i=1}^{4} \beta_i \Delta\gamma_{t-1} + \sum_{i=1}^{4} \lambda_i \Delta\rho_{t-1} + \sum_{i=1}^{4} \delta_i \Delta\mathfrak{m}_{t-1} + \upsilon_t \quad (2)$$

where $\Delta\gamma$, $\Delta\rho$, and $\Delta\mathfrak{m}$ are the levels in output, inflation and the financial variables respectively. The inflation equation is

$$\Delta\rho_t = \alpha + \sum_{i=1}^{4} \beta_i \Delta\rho_{t-1} + \sum_{i=1}^{4} \lambda_i \Delta\gamma_{t-1} + \sum_{i=1}^{4} \delta_i \Delta\mathfrak{m}_{t-1} + \upsilon_t \quad (3)$$

[1] With the exception of the federal funds rate, all data series were transformed into their natural logarithms forms to stabilise the variance and reduce heteroscedasticity. All data series with the exception of GDP were found not to be stationary after Augmented Dickey-Fuller tests were carried out. They were then first differenced but the differenced data series are not used in the estimations as would have been the case if I were estimating a standard vector autoregression (*see LÜTKEPOHL, H. 2006.*) the non-stationary series are cointegrated of order 2 i.e. I (2). This implies that there are two long run relationships among the variables of interest that enables me to explore the causal link by testing for granger causality.

[2] For the GDP, inflation and unemployment equations, I ensure that the vector autoregression is well specified by checking for no serial correlation in the residuals. Lag selections tests pointed to three lags (i.e. HQ and SC) but had the residuals autocorrelated. Increasing the lags to 4 ensured that there was no autocorrelation in the residuals.

where $\Delta\rho$, $\Delta\gamma$, and $\Delta\mathfrak{m}$ are the levels in inflation, output and the financial variables respectively. The changes in Unemployment is specified as

$$\Delta\mu_t = \alpha + \sum_{i=1}^{4} \beta_i \Delta\mu_{t-1} + \sum_{i=1}^{4} \lambda_i \Delta\rho_{t-1} + \sum_{i=1}^{4} \delta_i \Delta\mathfrak{m}_{t-1} + \upsilon_t \quad (4)$$

where $\Delta\mu$, $\Delta\rho$, and $\Delta\mathfrak{m}$ are the unemployment level, inflation and the financial variables respectively. Essentially, a variable γ_{2t} is said to be (Granger) causal for a variable γ_{1t} if the former helps improve the forecasts of the latter.

Results of Test for Granger Causality

The null hypothesis is that the coefficients of all the lagged financial variables considered individually in the vector autoregressive equations for output, inflation and unemployment are zero. The table presents results for all three equations and they have been split into two periods; 1965Q1 to 2007Q4 and 2008Q1 to 2014Q4[3].

Output

There appeared to be no significant causal relationship between the level of domestic money and output in US between 1965 and 2007 and accounting for whether 10%, 20%, 30% or 40% of US dollars were held by foreigners produced no significant (5% level) causal relationship. These suggest that money held no predictive content for output for that period. That said the empirical analyses supports the theory well when one looks at the data from 2008. Specifically, there was no significant causal relationship when the assumption of zero amount of money being held by foreigners is made but but when one accounts for 10%, 20%, 30% or 40% of US dollars being held by foreigners, there is a significant causal relationship between corrected money and output suggesting that corrected money has intrinsic information about the path of output since the great recession.

[3] Aksoy and Piskorski (2006) estimate two periods from 1966:2 to 1998:2 and 1980:2 to 1998:2 with the latter accounting for the period where the relationship between monetary aggregates and macroeconomic variables were documented to fail. That said, this expectation has become even more widespread among academics and policy makers since the great recession of 2007/8. In fact interest rates (federal funds rate) has remained low since 2009 despite a growing economy while the effect (Olivier Blanchard, Eugenio Cerutti, and Lawrence Summers, 2015) of falling unemployment on inflation has been muted. Thus I test granger causality for the period 1965Q1 to 2007Q4 and 2008Q1 to 2014Q4.

Table 1: p-values: Granger Causality $\varkappa$ - square[4] statistics

Variable	Output		Inflation		Unemployment	
	1965:1-2007:4	2008:1-2014:4	1965:1-2007:4	2008:1-2014:4	1965:1-2007:4	2008:1-2014:4
	χ - square	χ – square	χ – square	χ - square	χ - square	χ -square
Domestic Money						
Md(0%)	0.661	0.122	0.055	0.117	0.566	0.271
Md(10%)	0.992	0.047	0.052	0.209	0.211	0.107
Md(20%)	0.992	0.047	0.052	0.209	0.211	0.107
Md(30%)	0.992	0.047	0.052	0.209	0.211	0.107
Md(40%)	0.992	0.047	0.052	0.209	0.211	0.107
Uncorrected monetary aggregates and federal Funds rate						
BGbase	0.760	0.002	0.986	0.869	0.272	0.350
SLbase	0.695	0.157	0.133	0.038	0.281	0.173
M1	0.066	0.824	0.795	0.505	0.347	0.765
M2	0.004	0.378	0.326	0.001	0.825	0.816
Δ*FUNDS*	0.000	0.314	0.602	0.000	0.000	0.298

Note: Domestic money (X%) represents the assumed percentage of foreign holdings of US dollars held in 1964Q4.

Inflation

Corrected money held predictive content for the path of inflation between 1965 and 2007. Specifically, when no amount of foreign dollars were held by foreigners (0%), money had no intrinsic information on the path of inflation but had a significant causal relationship when 10-40% of US dollars were held by foreigners between 1965 and 2007. However, in the aftermath of the great recession, corrected money holds no predictive content for the path of inflation irrespective of the percentage of US dollars held by foreigners.

Unemployment

Domestic money both corrected and 0% level held no intrinsic information about the path of unemployment in both samples.

[4] I carried out a granger causality tests based on the F Test statistic and found that the *p* – values were similar to those of the chi square test statistic therefore the chi-square tests values are reported in this paper. I did not use the White heteroscedasticity consistent standard errors as the VAR for granger causality was set up in the levels and the data was not differenced even though they were found to be heteroscedastic.

Uncorrected monetary aggregates

Generally, monetary aggregates performed badly compared to domestic money. In fact M2 held intrinsic information for the path of output and between 1965 and 2007 and for inflation between 2008 and 2014. The Board of Governors monetary base could only predict the path of output after the great recession. That said, the federal funds rate successfully predicted the path of output and unemployment from 1965 to 2007 but failed to do so after the great recession and held intrinsic information for the path of inflation during this period suggesting that tax and expenditure policies may offer more intrinsic information during this period.

Stability tests

I analysed the stability of the output, inflation and unemployment relationships by carrying out a number of exercises based on recursive *p* values, formal coefficient stability tests and out of sample forecasting exercise.

Recursive p values

Recursive *p* values involve graphically investigating the stability of the probability values for the chi-square statistics of the granger causality tests for three autoregressive specifications. I estimate two recursive equations where in the first instance, the end quarter of the entire sample i.e. 2014Q4 is held fixed while in the second the start point of the entire sample is held fixed.

Where the end sample is held fixed

Figure 4a: Recursive p-values for corrected domestic money at 30%[5] of foreign holdings of US dollars assumption for output inflation and unemployment respectively.

For all three graphs (figure 4a), the first point represents the granger causality test statistic for the period 1965Q1 to 2014Q4 and the next point represents the period 1965Q2 to 2014Q4 and the process repeats itself throughout the sample period where the last plotted point is 2014Q4 to 2014Q4.

[5] The need for brevity and clarity required that I only present the graphical representations of the corrected (30% only) domestic money for output, inflation and unemployment equations as that for the other assumptions, 0%, 10%, 20% and 40% produced similar results with similar standard errors.

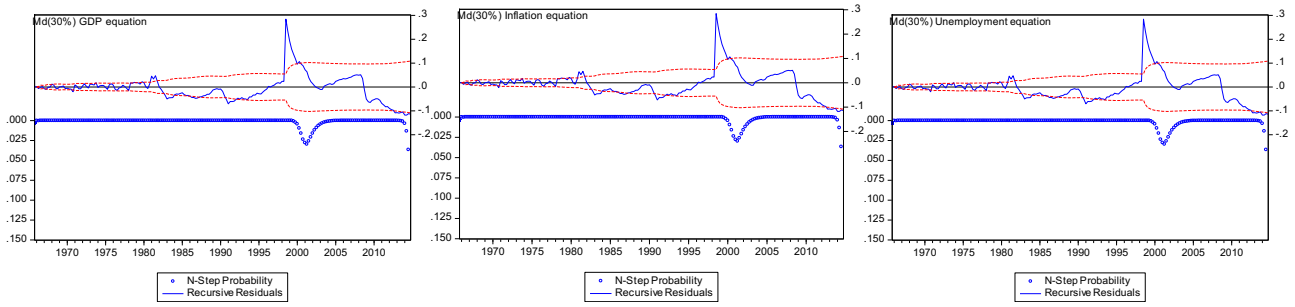
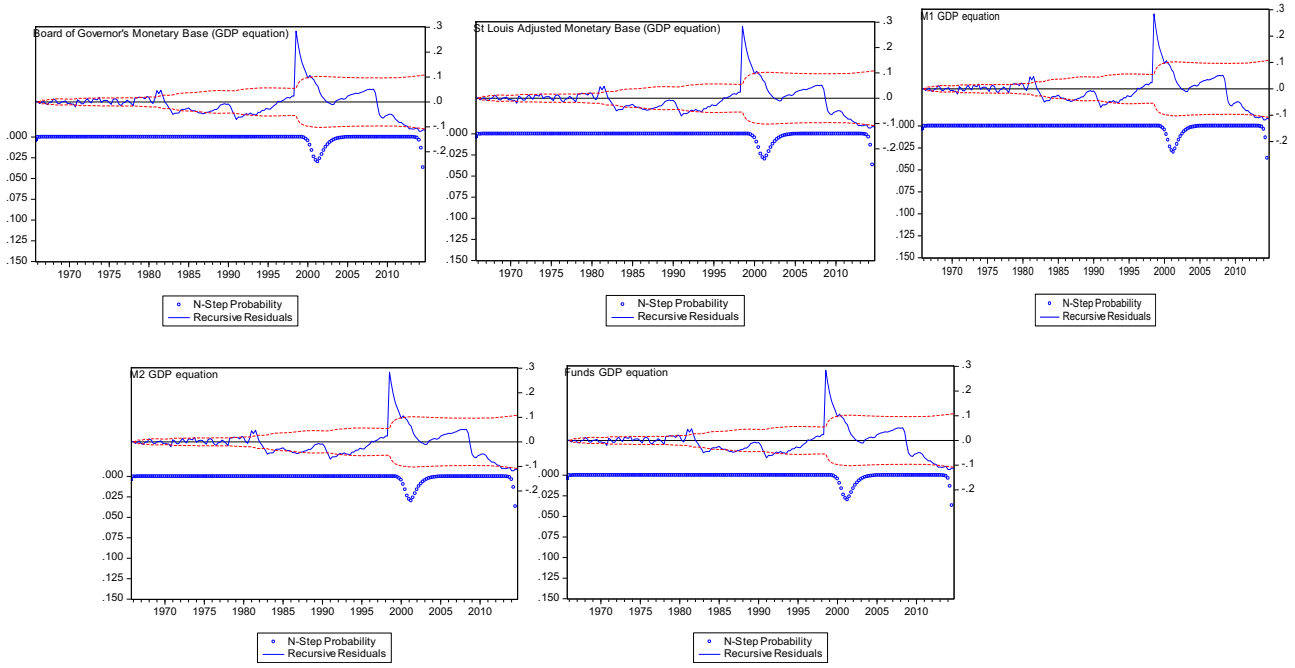


Figure 4b Recursive p-values for uncorrected monetary aggregates when the end sample is fixed for output equation[6]

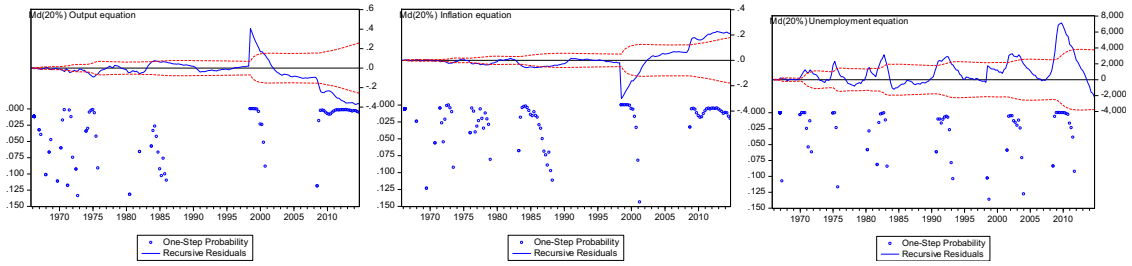


For all five graphs (figure 4b), the first point represents the granger causality test statistic for the period 1965Q1 to 2014Q4 and the next point represents the period 1965Q2 to 2014Q4 and the process repeats itself throughout the sample period where the last plotted point is 2014Q4 to 2014Q4.

When the start of sample is held fixed

Figure 5a Recursive p-values for corrected domestic money at 20% assumption of foreign holding of US dollars for output, inflation and unemployment equations respectively.

[6] I only show the graphical representation for the output equation as the graphs shown are similar to those for output and inflation and I used inflation only in the second scenario where the start of sample is fixed to give a clearer picture of the outcome of the stability tests.



In the graphical representation above (figure 5a), I present recursive *p* values of the granger causality test static for when the start of the sample period is fixed for output, inflation and unemployment equations. The first plotted point refers to 1965Q1 to 1975Q1 and the next is 1965Q1 to 1975Q2 thus subsequent *p* values represents the expanded samples stability tests.

Figure 5b Recursive p-values for monetary aggregates of Board of Governors monetary base, St Louis Adjusted monetary base, M1, M2 and the federal funds rate for unemployment equation

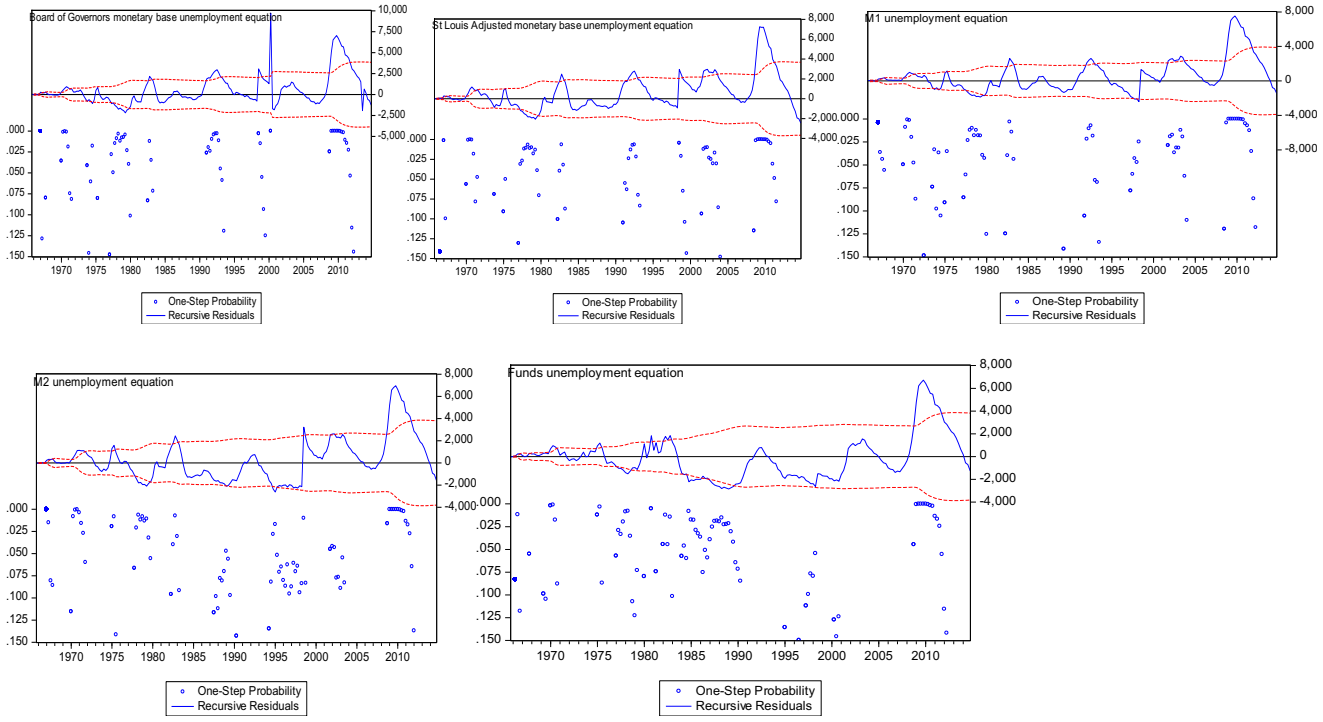


Figure 5a above is a representation of the recursive *p* values of the granger causality test static for when the start of the sample period is fixed for the uncorrected monetary aggregates. The first

plotted point refers to 1965Q1 to 1975Q1 and the next is 1965Q1 to 1975Q2 thus subsequent *p* values represents the expanded samples stability tests. In all graphical representations, it can be seen that the standard errors that is the size of the prediction errors are fairly stable for output, inflation and unemployment autoregressive equations. This is an indication that the output, inflation and unemployment relationships are fairly stable. In addition, when the start of the sample is fixed, it can be seen that there are few data points that lie outside the confidence interval computed by the previous estimation indicating the possibility of a reduced or non existent forecast error for all equations and whether the consideration is corrected domestic money (*see footnote 6*) or uncorrected monetary aggregates. Furthermore, through out the sample period for both when the start sample is fixed and when the end sample is fixed, there appears to be an increased forecast uncertainty from around the year 2000. It is very difficult to pinpoint a cause for this but speculatively this could be due to the 2001 recession.

Formal stability tests

I assessed the stability of the coefficients of the granger causality tests by performing a full sample stability test. I performed three tests, the Quandt-Andrews statistic in Wald form, mean Wald statistic and Exponential average Wald statistic. The null is no break point within 30% trimmed data from 1980Q1 to 2000Q1. The results of the coefficient stability tests are displayed in table 2 below.

From table 2 below it can be seen that the relationship between output, inflation and unemployment is not stable for both corrected domestic money and uncorrected monetary aggregates. There are structural breaks that explain the evidence against the stability of output, inflation and unemployment.

Table 2: Tests for structural change – 30% trimming.

Variable	Output			Inflation			Unemployment		
	Wald Test statistic			Wald Test statistic			Wald Test statistic		
	sup	mean	exp	sup	mean	exp	sup	mean	exp
Domestic Money									
Md(0%)	736.60*	335.30*	363.90	2916.69*	376.33*	1453.95	157.99*	101.57*	75.76
Md(10%)	3406.43*	572.91*	1698.82	3452.84*	460.11*	1722.02	125.73*	86.55*	59.00*
Md(20%)	3406.43*	572.91*	1698.82	3452.84*	460.11*	1722.02	125.73*	86.55*	59.00*
Md(30%)	3406.43*	572.91*	1698.82	3452.84*	460.11*	1722.02	125.73*	86.55*	59.00*
Md(40%)	3406.43*	572.91*	1698.82	3452.84*	460.11*	1722.02	125.73*	86.55*	59.00*
Uncorrected monetary aggregates									
BGbase	16090.83*	911.10*	8041.02	7072.49*	979.88*	3531.85	150.11*	73.71*	70.68*
SLbase	6871.19*	503.59*	3431.20	6132.53*	959.14*	3061.87	167.90*	116.74*	81.56
M1	3477.67*	294.76*	1734.44	5047.99*	1507.78*	2519.60	143.00*	104.50*	68.80
M2	902.90*	312.86*	447.19	5347.85*	1217.10*	2669.53	145.54*	89.56*	69.43
Δ*FUNDS*	4922.05*	445.10*	2456.63	3476.37*	667.92*	1733.79	215.93*	161.83*	105.42

* indicates tests are significant at 5% level using Hansen *p* values.

Out of sample forecasting

Table 3: root mean squared errors for out of sample forecasting tests.

Variable	Output	Inflation	Unemployment.
Domestic Money			
Md(0%)	0.05	0.09	1932.64
Md(10%)	0.13	0.09	1870.29
Md(20%)	0.13	0.09	1870.29
Md(30%)	0.13	0.09	1870.29
Md(40%)	0.13	0.09	1870.29
Uncorrected monetary aggregates			
BGbase	0.23	0.13	1908.92
SLbase	0.14	0.12	1831.22
M1	0.14	0.14	1924.97
M2	0.08	0.14	1889.13
Δ*FUNDS*	0.22	0.12	1893.91

It can be seen from table 3 above that the root mean squared error (RMSE) for inflation is the smallest for any given assumption of foreign holdings of US dollars.

Performance of domestic money and monetary aggregates in the presence of federal funds rate

Finally, I test whether domestic money and uncorrected monetary aggregates have any predictive information for the path of output, inflation and unemployment in the presence of the federal funds rate and the results are laid out in the table 4 below.

Output equation

The presence of the federal funds rate does not appear to improve the intrinsic information held for the path of output for all levels of assumed foreign holdings of US dollars. In fact the federal funds rate seemed to have negatively impacted on the performance of corrected domestic money for the sample period 2008:1-2014:4.

Inflation equation

Adding the federal funds rate did not improve the predictive content of corrected domestic money for the path of inflation for the sample period 1965:1-2007:4 and 2008:1-2014:4.

Unemployment equation

The federal funds rate improved the intrinsic information in corrected domestic money for the path of private employment between the sample period 1965:1-2014:4 but did not improve the predictive content of corrected domestic money for the 2008:1-2014:4 sample period.

Uncorrected monetary aggregates

There was no significant effect of the presence of the federal funds rate on the ability of Board of Governor's monetary base, St Louis Adjusted monetary base, M1 and M2 to predict the path of output, inflation and unemployment for all sample periods

Table 4: p-values. Granger causality x- square statistics for all specifications that include the federal funds rate

Variable	Output		Inflation		Unemployment	
	1965:1-2007:4	2008:1-2014:4	1965:1-2007:4	2008:1-2014:4	1965:1-2007:4	2008:1-2014:4
Domestic Money						
Δ*FUNDS*	0.00	0.23	0.98	0.05	0.00	0.11
Md(0%)	0.81	0.11	0.16	0.62	0.08	0.11
Δ*FUNDS*	0.00	0.69	0.10	0.00	0.00	0.24
Md(10%)	0.98	0.27	0.16	0.15	0.04	0.11
Δ*FUNDS*	0.00	0.69	0.10	0.00	0.00	0.24
Md(20%)	0.98	0.27	0.16	0.15	0.04	0.11
Δ*FUNDS*	0.00	0.69	0.10	0.00	0.00	0.24
Md(30%)	0.98	0.27	0.16	0.16	0.04	0.11
Δ*FUNDS*	0.00	0.00	0.10	0.00	0.00	0.24
Md(40%)	0.98	0.27	0.16	0.16	0.04	0.11
Uncorrected monetary aggregates						
Δ*FUNDS*	0.00	0.56	0.62	0.00	0.00	0.53
BGbase	0.77	0.03	0.99	0.10	0.20	0.57
Δ*FUNDS*	0.00	0.42	0.96	0.05	0.00	0.52
SLbase	0.44	0.27	0.32	0.35	0.02	0.38
Δ*FUNDS*	0.00	0.33	0.15	0.00	0.00	0.24
M1	0.00	0.70	0.22	0.38	0.13	0.54
Δ*FUNDS*	0.00	0.59	0.21	0.02	0.00	0.20
M2	0.02	0.65	0.10	0.03	0.05	0.51

Conclusion

On the whole, accounting for the foreign holdings of US dollars held significant predictive content for the path of output after the great recession but appeared to only do that for inflation before the great recession. Both corrected domestic money and uncorrected monetary aggregates held no intrinsic information for the path of unemployment for all sample periods. The difference in the results gained and that of the current literature could be due to the different statistical approach employed and the length of the time series. Regardless of this, the results gained in this research paper suggests that accounting for foreign holding of US dollars can play an important role in the economic policy prescription and analyses by US economic policy makers.

Data Appendix

Flow of Funds Account, Federal Reserve Board of Governors: *Flow Estimate of US Dollars Abroad* – Billions of Dollars.

Federal Reserve Board of Governors: *Currency*, M1 Currency Component, Billions of Dollars, Seasonally Adjusted; *Board of Governors Adjusted Monetary Base* – Billions of Dollars, Seasonally Adjusted; *M1 Money Stock* – Billions of Dollars, Seasonally Adjusted; *M2 Money Stock* – Billions of Dollars, Seasonally Adjusted; *Federal Funds Rate* – Quarterly Percentage Points.

Federal Reserve Bank of St Louis – *Adjusted Monetary Base* – Billions of Dollars, Seasonally Adjusted; *Unemployment Level* – Thousands of Persons, Quarterly, Seasonally Adjusted.

US Department of Commerce, Bureau of Economic Analysis: *Gross Domestic Product* – Billions of Dollars, Seasonally Adjusted; *Implicit Price Deflator Gross Domestic Product* – Seasonally Adjusted 1996 = 100.

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