Fiscal Policy of 2009 and the Fed's Role[1]

The economic outlook in 2009 indicated that household spending had started to stabilize but was still constrained due to considerable job losses, diminished housing wealth and credit crunch. The graph below shows that while personal consumption expenditures on durable goods had bottomed in 2009-Q2 as it had plummeted by 12.4 percent from the previous year, expenditures eventually started to pick up as by 2009-Q4, the growth rate was -5.239 percent from the previous year. Business had curtailed their inventories, staffs, and fixed investment. Likewise, the graph shows that the business inventories and domestic investment picked up some steam after 2009-Q2. Yet, they were far below the pre-crisis levels, and the FOMC continued to delineate tightening policies and exit strategies. The members believed that the status quo monetary and fiscal policies would gradually resume the "sustainable economic growth in the context of price stability."

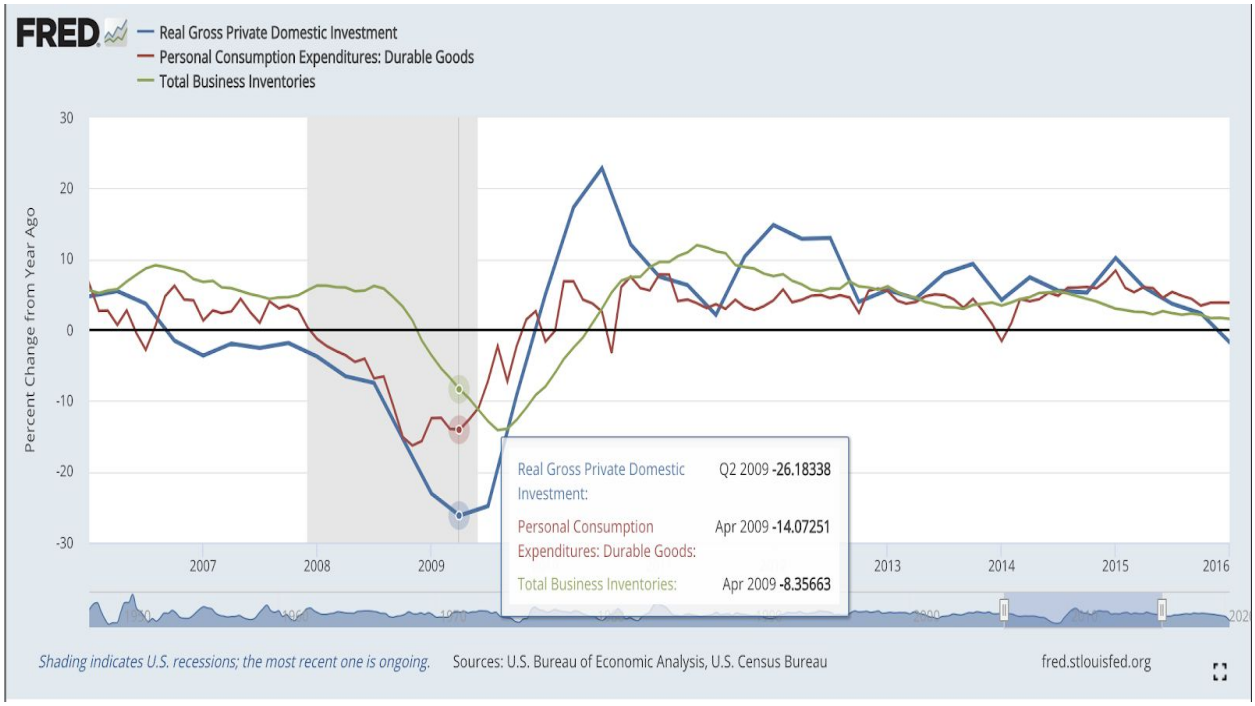

Fig 1. Investment, consumption and business inventories during, pre and post the global financial crisis.

Chairman Bernanke stated in September 2009 that although growth perceived in 2009 will prevail in 2010, the recovery in 2010 will be moderate due to the then-ongoing headwinds, credit constraints, deleveraging by households, and sectoral adjustments in the economy. Unless the economy grew at a pace faster than the long-term growth rate, jobs would only be modestly created. Consumer spending, which approximates 70 percent of the GDP, had shrunk in 2019-Q2 at 1.2 percent annually, whilst their savings shot up by greater than 5 percent of their disposable income, contrasting starkly with the

[1] I wrote this commentary during my time as a Data Analyst at Employ America in 2020. The underlined phrases/words in blue letters contain the links to the cited articles and journal papers.

profligate spending observed during the housing boom. Mr. Glenn Hutchins added that albeit the corporate sector and the financial markets (Wall Street) have stabilized, the real activity (produced in Main Street) is very low, sluggishly rising without experiencing sustainable gains, and vulnerable to exogenous shocks. He believed that in approximately 18-30 months, the economy would overcome the headwinds and imbalances that were putting a dent on the unemployment rate.

To normalize the policy for the long run, Ben Bernanke linked the exit strategy to the Fed's management of the balance sheet. LSAPs heavily expanded the monetary base (incorporated in the liabilities section of the Fed's balance sheet) in 2009 as the ratio of the Fed's assets to GDP skyrocketed by 61.57 percent in 2009. The Nobel laureate, Milton Friedman, pronounced the monetary base as "high-powered money" as it is the "raw material" to create money – it promotes a higher velocity of money in the form of greater number of transactions to fuel the economy. As the economy recovers, banks are able to lend their reserves, generating money (M1 and M2) faster than when the economy is contracting. Easier credit conditions through a permanent surge in the balance sheet are a harbinger for inflationary pressures in the form of actual and expected inflation. Nonetheless, if the Fed credibly withdraws excess reserves (or liquidity), then that will apply brakes on rising inflation and inflation expectations, according to most economists.

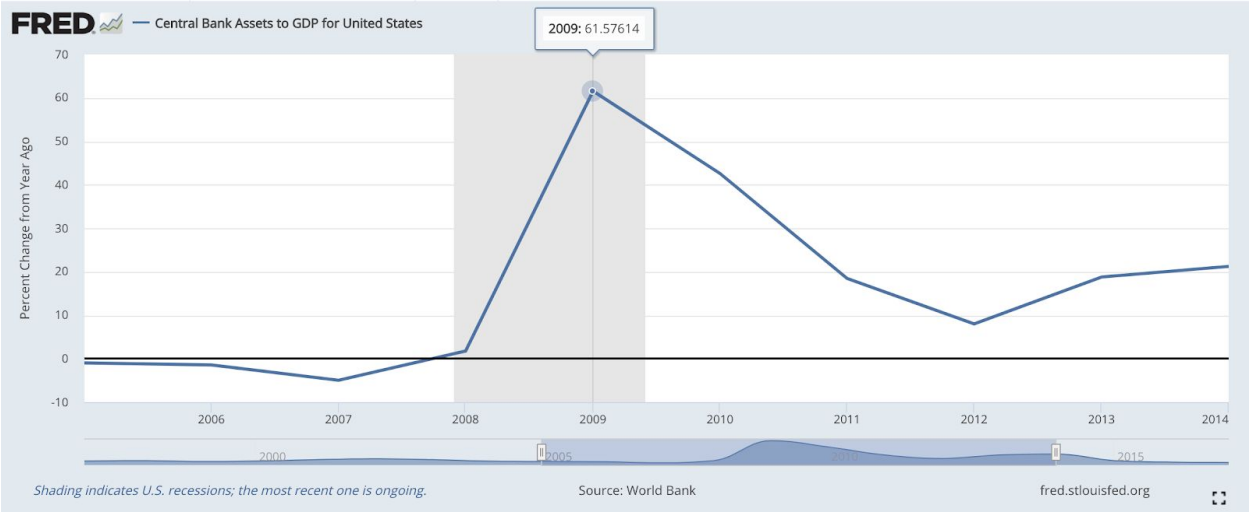

Fig 2. Percent change in the ratio of the total assets held by the Federal Reserve Banks and the GDP of the United States

Therefore, Ben Bernanke was eager to discuss the exit strategies and thought that tightening monetary policies should eliminate the large reserve balances to avert and neutralize undesirable effects. The Chairman believed that if the Fed decided not to unwind the positions in the balance sheet, then two approaches of tightening the monetary policy were to pay interest on reserve balances and reduce the stock of reserves. As the FOMC decided to lift off the policy rate from the ZLB, it could also raise the interest paid on the balances of the commercial banks held at the Fed, which was then only 25 basis points. Hence, the interest rate that the Fed pays would act as a floor of the short-term federal rates, including the

federal funds rate. Furthermore, incrementing the rates paid on balances would disincentivize banks to lend their reserves for less than the return they would earn from depositing the funds with the Fed, curtailing excessive credit growth. Alternative measures include reverse repurchase agreements wherein the Fed would agree to buy securities at a higher price in a later date. Selling a proportion of the total assets (or securities) through open market operations would diminish the reserves. These appropriate exit strategies would raise the policy rates, reduce the monetary base and constrict the credit flow and money supply, tightening the monetary policy.

One risk that can arise is that premature tightening of the monetary policy in the presence of the zero lower bound constraint would be very hard to reverse, so the risks of raising the rates earlier than necessary behooves the Fed to postpone the initial rate hike.

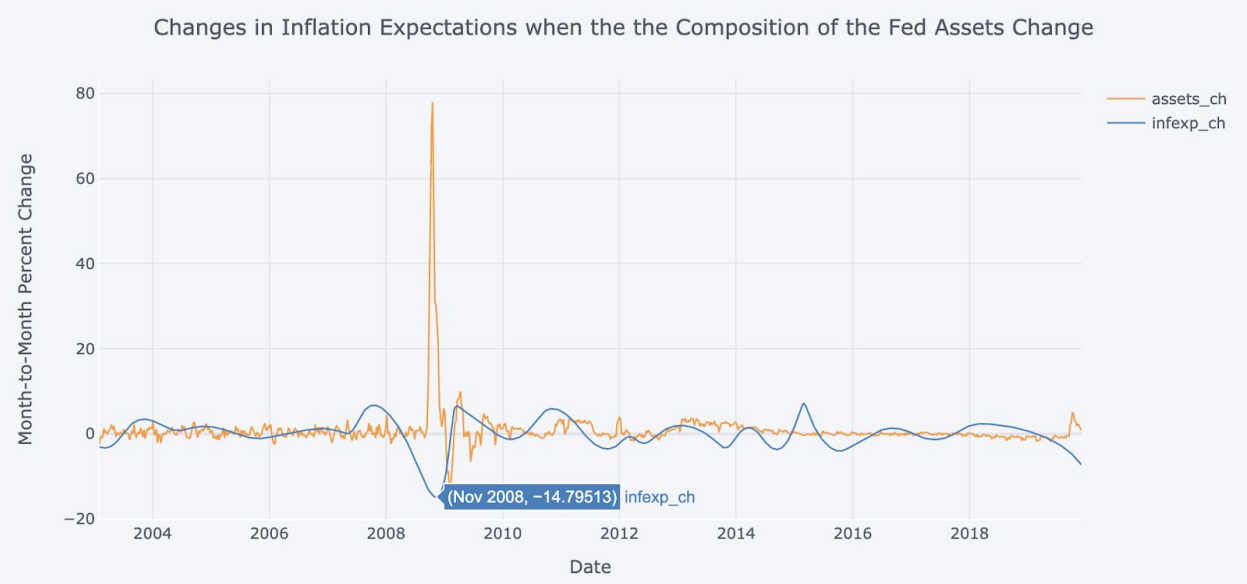

Fig 3. Investment, consumption and business inventories during, pre and post the global financial crisis. [2]

I have shown how changes in the Fed's composition of the balance sheet - *assets_ch,* alters the inflation expectations - *inf_exp_ch* as reported in the University of Michigan survey. Here, *assets_ch* and *inf_exp_ch* are the percent change from a month ago of the Fed's total assets (less elimination from consolidation). Regressing *inf_exp_ch* against *assets_ch* yields that when the growth in the assets rise by 1 percent, then the growth in the inflation expectations changes reduces by 0.24 percent, and the coefficient on *assets_ch* is statistically significant.

$$infexp\_ch = 0.0027 - 0.2419\ assets\_ch$$

[2] If you would like to look at the python (Jupyter notebook) codes I did to plot graphs and generate estimates from models, then please click this link to my GitHub account.

(0.0001) (0.02)

Furthermore, the graph indicates that while *assets_ch* is very volatile due to the huge spike in 2008 followed by relatively milder fluctuations in 2009, *inf_exp_ch* shows less variance. Thus, the long run inflation expectations are less sensitive to changes or inelastic to changes in the amount of assets that the Fed has in its balance sheet, even if the Fed enlarges them as it did during the financial crisis of 2009. Given the low fears of inflationary pressures, as evident from the inflation expectations, the Fed's concern for lifting the federal funds from the ZLB rate is prematurely wrong. To corroborate, the June 2009 transcript on the FOMC's meeting highlights that the long run inflation expectations were properly anchored. Finally, some economists were apprehensive that if the Fed did not tighten the policy, then the markets would perceive the Fed as "monetizing" the government debt, while others thought that further buying federal agency securities would appear like the Fed was trying to allocate credit in the private sector.

When the government prints money, instead of taxing its citizens to repay the debt, then the government monetizes debt. Equivalently, the Fed creates reserves by purchasing securities that the treasury department issues. Without any change in real output, the presence of a large money supply flowing in the system brews inflationary pressures. Amid the lingering fears about the steps that the Fed might take, the Chairman Ben Bernanke testified in Congress in June 2009 that "the Federal Reserve will not monetize the debt." Similarly, then New York President William Dudley tried to assure the agitated markets that, "the Fed's purchases have not been motivated by accommodating an expansive fiscal policy and the large fiscal deficits that are its consequence. I can assure you that the Federal Reserve will never engage in a program to accommodate or facilitate an unsustainable fiscal policy program.". Yet, after the FOMC's announcement on March 18, the 10-year treasury yields rose significantly from 2.51 percent to 4.01 percent in April 05, 2009. A probable cause for the spike is the fear of inflationary pressures from the deteriorating fiscal setting.

While some members of the April 2009 FOMC meeting proposed to purchase a large amount of additional Treasuries to effectuate a substantial impact on the treasury yield. Others felt that purchasing large amounts would be tantamount to monetizing the government debt. In the following meeting in August, the FOMC decided not to buy the original $300 billion; rather, suggested to end the program by October. If the Fed had decided to purchase the treasuries, whether it would actually monetize the debt would largely depend on the aggregate amount of the purchases. Indeed, buying an additional $1 trillion would be considered as debt monetization as the amount that the Fed would have owned in its assets (about $1.77 trillion) would have tremendously exceeded the currency in circulation (which was about $917 billion as of early September 2009).

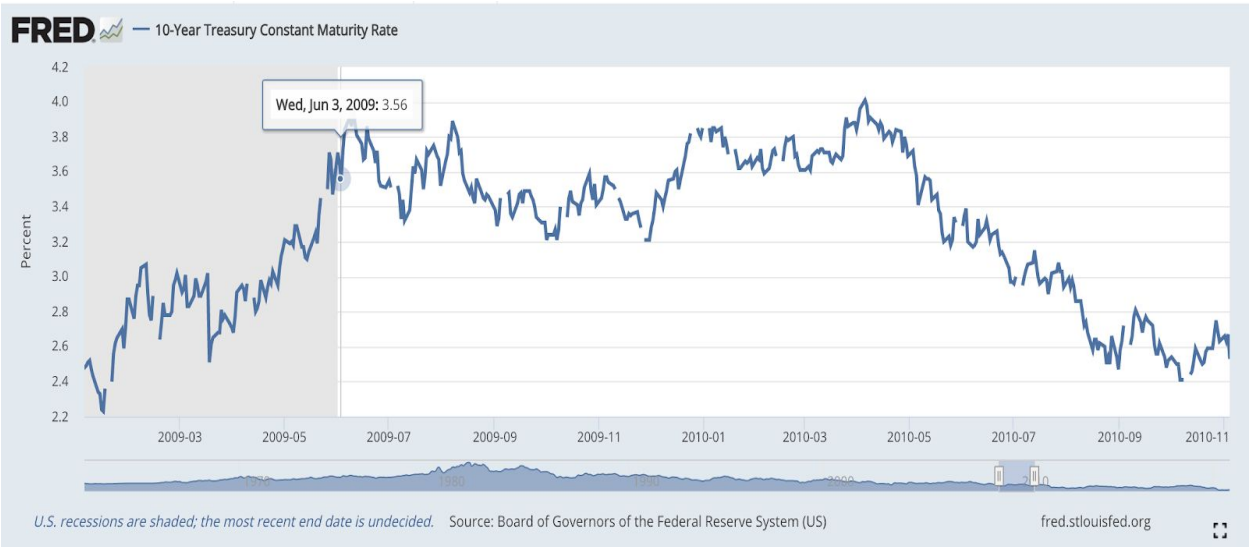

Fig 4. Sharp plummet in the 10-year Treasury yield on June 03,2009 after former Chairman Ben Bernanke's statement in Congress to reduce the rising fiscal deficit.

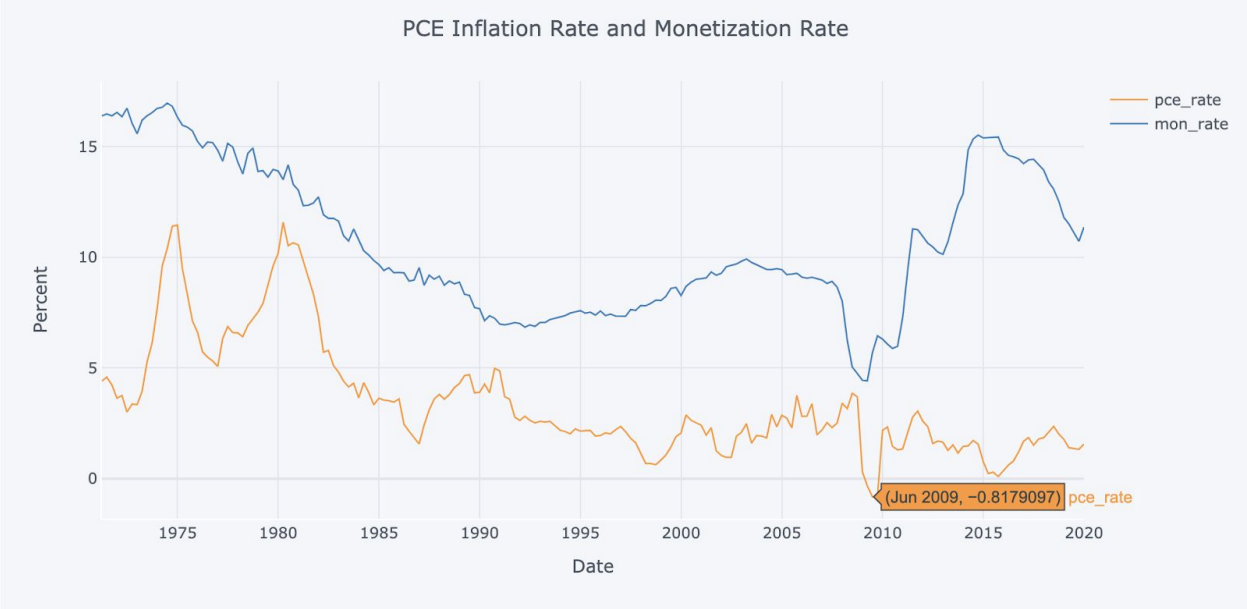

Fig 5. Inflation and monetization rates over the years.

The graph shows the trajectory of the monetization rate - *mon_rate* and PCE inflation rate - *pce_rate* using quarterly data from January 1970 to December 2019. I have calculated *mon_rate* as the percent of total debt held by the Federal Reserve Banks. Specifically, the formula that I have applied is:

$$mon\_rate = \frac{Federal\ Debt\ held\ by\ the\ Fed\ Banks}{Total\ Public\ Debt} \times 100$$

From the graph and correlation results, we see that overall *mon_rate* and *pce_rate* move in the direction $-corr(mon\_rate, pce\_rate) = 0.479$ and generally fall during and before an economic and/or financial crisis. Prior to January 2010, they had a strong positive correlation $-corr(mon\_rate, pce\_rate) = 0.716$, which is consistent with the economic theory that debt monetization imposes an upward pressure on inflation. However, the relationship weakened after the GFC ended, wherein they moved in opposite directions $-corr(mon\_rate, pce\_rate) = -0.388$. *pce_rate* reached the negative territory i.e. the economy was experiencing deflation in 2009 when *pce_rate* fell from -0.323 in March to -0.817 in June, and it prevailed at that lowest level till September 2009. Then, it soared to 2.186 percent in December 2009. Throughout this period, *mon_rate* was also following a similar trend.

I performed a structural break analysis, called the Chow test, to examine for a structural break on June 03, 2009. That day Chairman Ben Bernanke warned the Congress to reduce the exorbitant fiscal deficit (which was $189,651 as of May 2009). He attributed the sharp increase in bond yields to the markets' expectations of larger fiscal deficits and improved economy. Raising a red flag about controlling the deficit to preclude a debt trap, he unequivocally stated that the Fed would not monetize the debt. His statements were a shock to the financial markets. For instance, the 10-year treasury fell by 9 basis points to 3.56 percent and the S&P 500 Index dropped by 1.4 percent. Thus, I have hypothesized that his statement would significantly affect the inflationary expectations and monetization rates.

The Chow Test examines the equivalence of the true coefficients estimated from two separate regression models.

H_0 : *the two coefficients are equal*

H_A : *the two coefficients are unequal*

In other words, the null hypothesis is that the model before the proposed break point is equal to the model after the break point, and the alternative hypothesis is that the models fitting two different time periods are dissimilar. The Chow test avoids the problem of overt omitted variable bias in a before-and-after analysis. Formally, I evaluated this by conducting an F-test on the Chow statistic.

$$Chow\ stat = \frac{(RSS_p - (RSS_1 + RSS_2))/k}{(RSS_1 + RSS_2)/(n_1 + n_2 - 2k)}$$

RSS_p = pooled or combined regression in the entire dataset

RSS_1 & RSS_2 = regression lines before and after the break point, respectively.

n_1 & n_2 = number of observations in the subsets before and after the break point, respectively

k = number of variables

To satisfy the Gauss-Markov assumptions, each of the pooled models must have *i.i.d* normally distributed errors with mean 0. Thus, the mean and variance of the errors should be constant and not be serially correlated. I tested if residuals are heteroskedastic and autocorrelated, and plotted the residuals and the estimated means. Because *mon_rate* and *pce_rate* have unit root, autocorrelated and heteroskedastic, I tested the Gauss Markov assumptions and created the regression models using the 4-quarter difference values of the *mon_rate* and *pce_rate.* The Breusch-Pagan test resulted in the $p-value = 0.5931 > 0.05$. So, we reject the null hypothesis and conclude that the OLS model of differenced growth rates are homoskedastic. The ACF and the PACF plots indicate slight autocorrelation of upto 3 lags in the differenced *mon_rate,* and upto 2 lags in the differenced *pce_rate.*

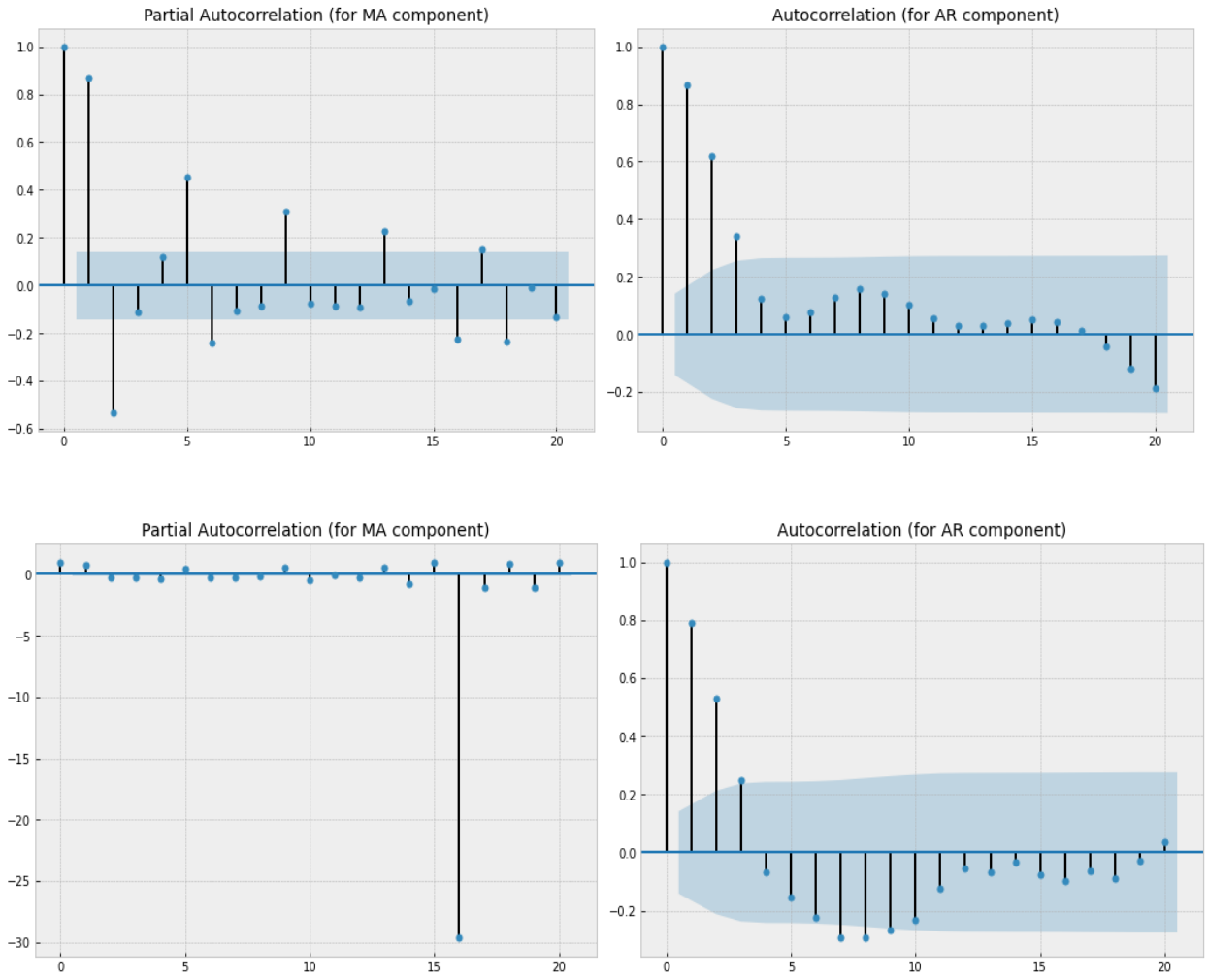

Fig 6. PACF and ACF of differenced mon_rate (top) and differenced pce_rate (bottom)

Consequently, the ACF plots of the 4-quarter difference residuals (obtained when I regressed the differenced *pce_rate* against the differenced *mon_rate)* shows the presence of serial correlation of upto 2 lags.

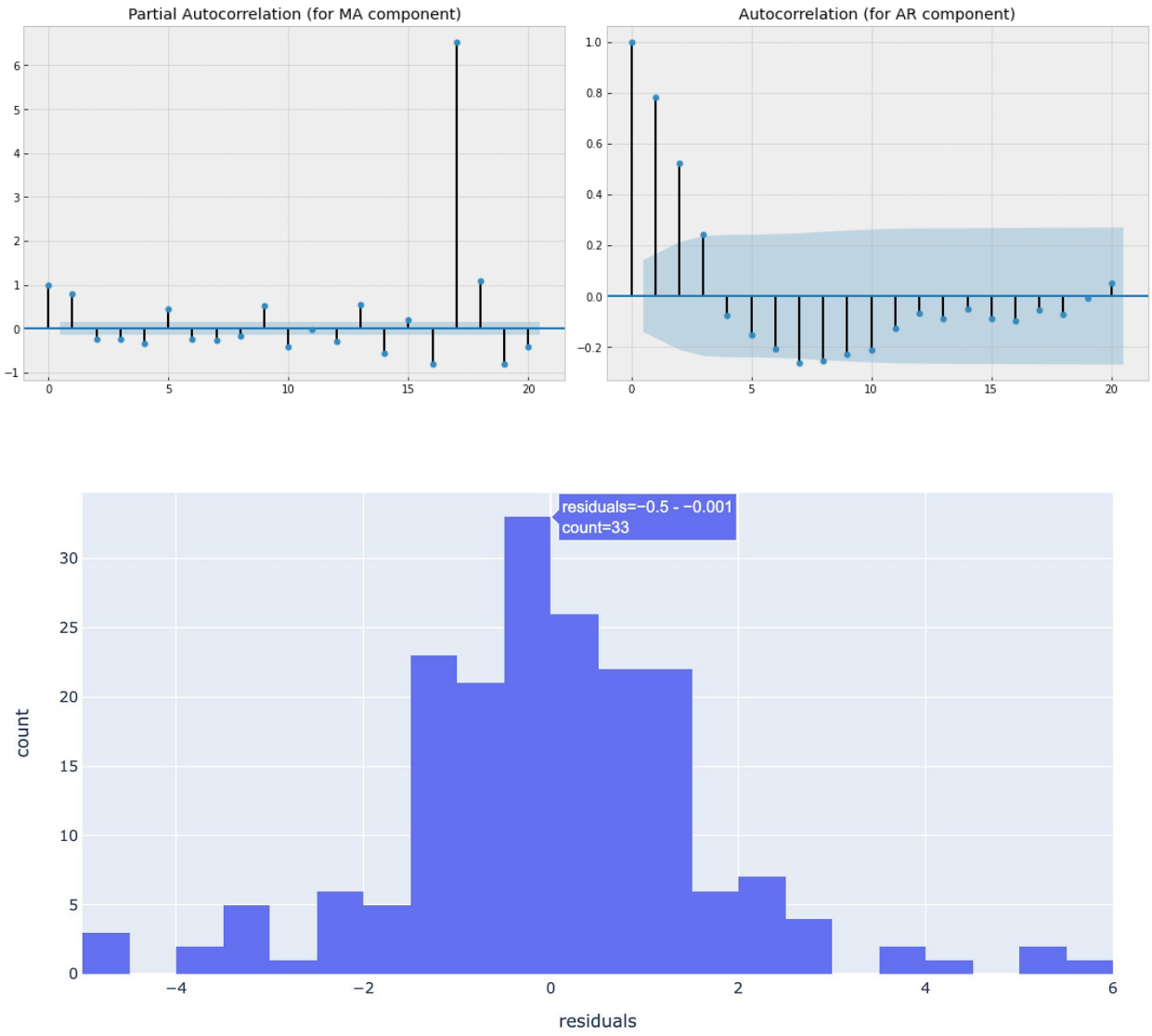

Fig 7. ACF and PACF of plots of the 4-quarter difference residuals (above) and normally distributed residuals (below)

Finally, I have performed the normality test to check whether the residuals are normally distributed. The low p-value of 0.026 indicates that the residuals are not normally distributed. Despite non-normality and slight autocorrelation in the residuals, the residuals are homoskedastic and have a mean of approximately. So, I have presumed that the Chow test will be robust to the residuals' non-normality. The result of the Chow Test is a Chow Test statistic of 2.598 tested against an F-distribution. The p-value is 0.0267, implying that there is a 2.67 percent chance that the model (of 4-quarter differenced growth rates) before June 2009 is the same as the model after June 2009, given the evidence. Thus, the model of 4-quarter differenced monetization and PCE inflation rates vary pre and post GFC.

Fiscally, the government officials were apprehensive of the ballooning debt of $\$12,311,349$, which was 84.16 percent of the total GDP in 2009-Q4. The total debt had peaked to 21.63 percent in 2009-Q2 than compared to a year ago, raising fears that the Congress would have to raise the debt ceiling to preclude the government from defaulting on its own debt.

Fig 8. Year-to-year percent change in the total public debt.

The general concern was that long-term deficits from the fiscal stimulus package spike the interest rates, making goods and services costlier for consumers to buy. Consequently, the US's security and competitiveness in terms of global trade might be undermined. Larger deficits would increase the US's reliance in foreign creditors such as China. The deficits had primarily skyrocketed as the stimulus packages of 2008 and 2009 were enforced. The debate around the efficaciousness of the stimulus package - American Recovery and Reinvestment Act (ARRA) has been contentious as both the proponents and opponents of the stimulus package had varying results and conclusions if the stimulus positively impacted the economy. According to Kenneth Rogoff, interest rates could escalate if the markets expect higher inflation or default due to the burgeoning debt. Whilst the first stimulus (ARRA) was warranted, he invalidated the sanctioning of a second stimulus by claiming that "it makes no sense to use stimulus just to postpone the reality of lower economic growth over the coming decade."

From the date when it was signed into a law on February 12, 2009 when the unemployment rate - *unrate* was 8.3 percent, *unrate* actually rose to 9.9 percent in December 2009. The underlying argument prevailed around the notion of "multiplier": if more government spending on the stimulus package and tax cuts boosts the overall economy by a greater

proportion. Formally, it is the ratio of the change in national income to the change in government spending: $\frac{\Delta Income}{\Delta\ Government\ Spending}$

Various research papers had measured the performance of ARRA on growth and employment. Feyrer and Sacerdote (2011), Wilson (2012) , Chodow-Reich et. al (2012), Zandi and Blinder (2010) concluded that the stimulus had a positive and significant effect on employment and growth, and three (Oh and Reis, Taylor, Conley and Dupor) concluded that either the effects were minute or not detectable. Five of the studies employed econometric experiments to distinguish the effects of stimulus from other causes in the empirical data, while four studies used modeling. Several of the studies estimated the multiplier effect of the stimulus to evaluate the degree of effectiveness.

Majority of the papers encountered the problem of endogeneity, wherein the effects of stimulus could be clouded by other variables not in the model itself, but contained in the error term as an unobserved factor. For instance, because some of the more devastated states received more stimulus funds from the government, to control for the disproportionate spending, economists had to involve instrumental variables when conducting state by state analysis. Another common problem was the spillover effects of funding from one to another state, which could underestimate the true impact of the stimulus on the economy.

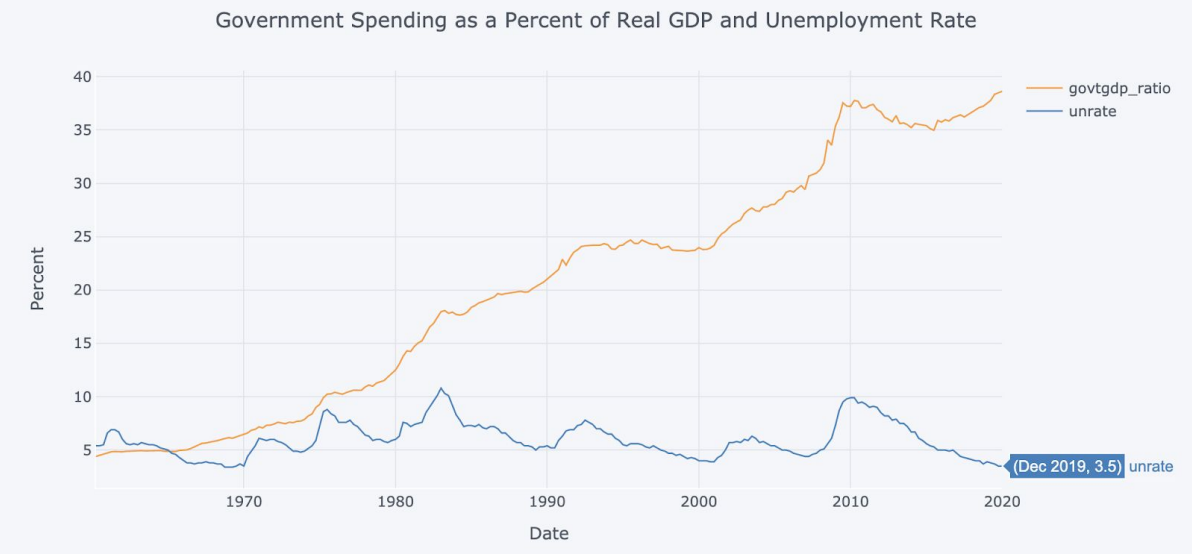

Fig 9. Burgeoning fiscal spending as a percentage of real GDP and the level of unemployment rate.

Generally, the data on the US economy since 1960 indicates that when the government spending as a percent of real GDP - *govtgdp_ratio,* rises by 1 percent, then the unemployment rate also rises, albeit by a minuscule 0.02 percent, and the coefficient on *govtgdp_ratio* is statistically significant. Resultantly, the fiscal multiplier from government spending is less

than 1, insinuating that deficit government spending decimates jobs as it crowds out private investment by pushing the interest rates higher.

$$unrate = 5.5628 - 0.0198\ govtgdp\_ratio$$
$$(0.217) \qquad (0.009)$$

Berman and McGranahan (2014) constructed a mathematical formula that calibrates the fiscal impetus, which measures the aggregate impact of taxes, purchase and transfers across various state, local and federal governments on economic growth. Based on the formula, they showed that the government's fiscal policy had a greater expansionary impact during the Global Financial Crisis, than it had during other crises since 1960. Yet, the recovery was marred by a severe contractionary influence than the fiscal policy had in previous recessions, insofar as its efficaciousness as a tool to boost economic growth became very questionable. The Economic Stimulus Act of 2008 and the ARRA of 2009 increased the transfer payments and dwindling taxes. Whilst the former allocated tax rebates to people whose income was in specific income brackets, the latter truncated personal income tax rates and allotted more money for defense and lesser amount of transfer payments. Nonetheless, the effects were very transient as the economic growth's extensively contracted as fiscal spending was scaled down. This juxtaposes with most recoveries that did not encounter curtailed fiscal spending. From the graph, we notice that the government spending shrunk for four consecutive years from 2008-Q2 to 2012-Q2.

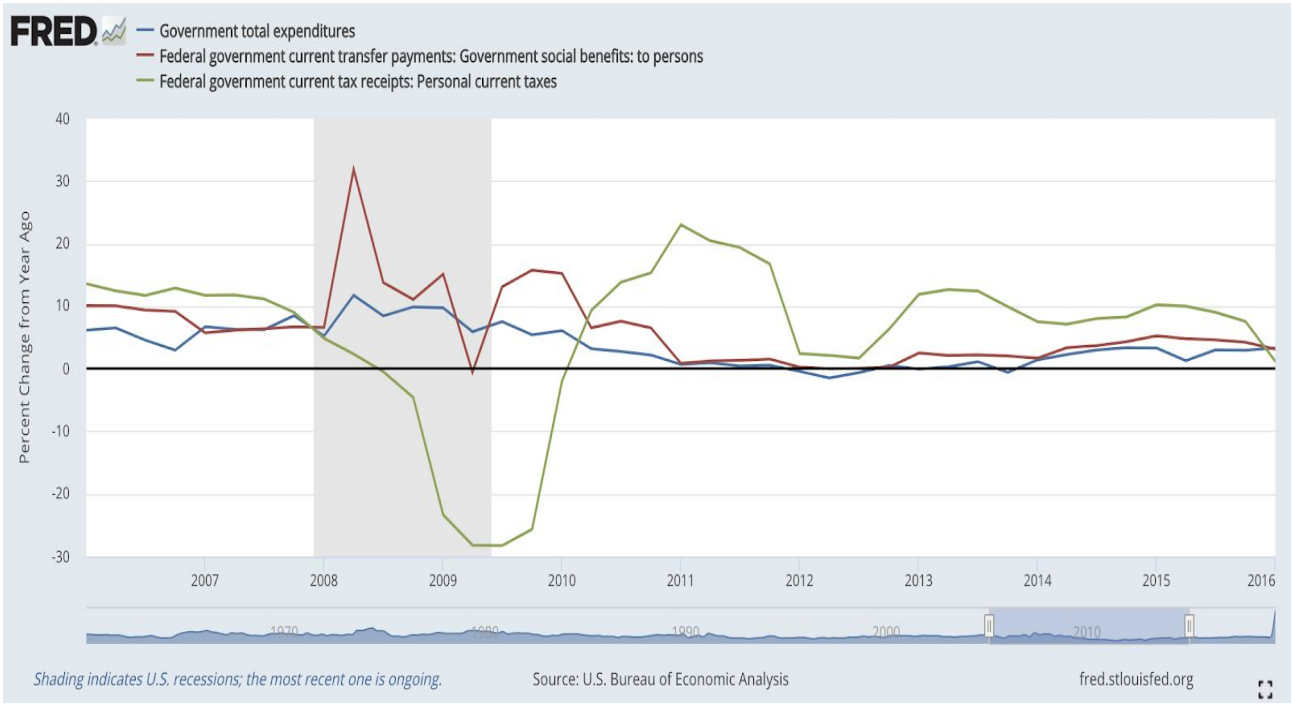

Fig 10. Percent change of the federal government's tax receipts, transfer payments and total expenditures.

Notwithstanding the growth in transfer payments, they were still lower than the average growth rate perceived in the prio recessions since 1960. Furthermore, the tax policy's net effect was nearly zero, proving that the tax revenues did not ascend as much as they normally did in recoveries. Adding fuel to the fire diminished purchasing power of consumers. As a corollary, the purported expansionary policy during the GFC culminated with a counterintuitive contractionary policy during the recovery.

On a related topic, Waki and Fujiwara (2017) scrutinized the effect of fiscal forward guidance - role of forward guidance in the context of fiscal policy. They evaluated the welfare effects of announcing future fiscal shocks by dynamic stochastic general equilibrium models. Their numerical and analytical experiments highlight that it is advantageous to have selective transparency. Whilst communicating distortionary future fiscal policy shocks can be a detriment to the forecasts of social welfare, communicating non-distortionary shocks enhance welfare. Fiscal forward guidance entails asking if the fiscal authority can enhance welfare by revealing superior information about policy actions in the future. Usually, changes in the fiscal policies are announced beforehand, and macroeconomic variables behave differently if they are pre-announced, than if they aren't. The variance in effects of unanticipated and anticipated fiscal shocks opens doors to a window of opportunities that the fiscal authority's announcements may be a relevant policy measure. Furthermore, such communications may diminish the heightened uncertainty by forecasting fiscal actions for longer time horizons. Using a neoclassical growth model, they emphasized on the communication's role by subjecting the fiscal actions to exogenous shocks consisting of distortionary taxes and spending. Privately detecting the signals on future policy shocks, the government communicates those signals credibly to the public. Economic agents become more abreast of the future shocks, therefore the new shocks become effective. The authors studied how the timing and uncertainty of the policy actions alter and conclude that social welfare reduces when the government informs the private sector about the future tax shocks. On the other spectrum, welfare rises when the government apprises them of the future spending shocks insofar as their correlation is weak. Analytically, they proved the results for a stylized three-period model and validated the results via a generic model though numerical exercises. Therefore, they underscore selective transparency as an optimal communication policy as the governments may have to be circumspect, and without absolute transparency.

Conclusion

This commentary reflects on the macroeconomic and financial outlook in 2009 when the global financial drew to a close and the recession officially ended. Specifically, I have discussed the Federal Reserve's exit strategy, its normalization policy through the premature hike in the federal funds rate, and the financial market's reaction via a drop in the 10-year Treasury yield. To that end, I conducted a structural break analysis (Chow test) to examine the impact of the former Chairman Ben Bernanke's statements (regarding the ballooning debt and fiscal deficits) on the investors' expectations. Gauging the monetization rates over time more closely, I finally reviewed the literature on the effectiveness of the

stimulus package - American Recovery and Reinvestment Act, and how fiscal forward guidance can be considered as an optimal communication tool.

References

Andolfatto, D. (2018, April 19). Debt Monetization: Then and Now. Retrieved November 06, 2020, from https://www.stlouisfed.org/on-the-economy/2018/april/debt-monetization-then-now Federal Reserve Bank of St. Louis

Baker, B. I. (2015, January 01). Fiscal impetus and the Great Recession : Monthly Labor Review. Retrieved from https://www.bls.gov/opub/mlr/2015/beyond-bls/fiscal_impetus_and_the_great_recession.htm

Bayh, E. (2009, November 19). A bipartisan push is needed to tame ballooning national debt. Retrieved from https://www.cnn.com/2009/OPINION/11/19/bayh.debt.bipartisan.commission/index.html

Bernanke, B. (2009, July 21). The Fed's Exit Strategy. Retrieved from https://www.wsj.com/articles/SB10001424052970203946904574300050657897992

Bernanke, B., Prasad, E., Bailey, M., Gayer, T., & Reinhart, V. (2015, September 09). A Year of Turmoil: Fed Chairman Ben Bernanke Reflects on the Stabilization of the Financial System since the Events of Last September. Retrieved from https://www.brookings.edu/wp-content/uploads/2012/04/20090915_bernanke.pdf

Blinder, A. S., & Zandi, M. (2010, July 27). How the Great Recession Was Brought to an End. Retrieved from https://www.economy.com/mark-zandi/documents/End-of-Great-Recession.pdf

Canzoneri, M., Cao, D., Cumby, R., Diba, B., & Luo, W. (2018). The forward fiscal guidance puzzle and a resolution. *Journal of Economic Dynamics and Control, 89*, 26-46. doi:10.1016/j.jedc.2018.01.013

Chodorow-Reich, G., Feiveson, L., Liscow, Z., & Woolston, W. G. (2012). Does State Fiscal Relief During Recessions Increase Employment? Evidence from the American Recovery and Reinvestment Act. *American Economic Journal: Economic Policy, 4*(3), 118-145. doi:10.1257/pol.4.3.118

Feyrer, J., & Sacerdote, B. (2011). Did the Stimulus Stimulate? Real Time Estimates of the Effects of the American Recovery and Reinvestment Act. *NBER Working Paper No. 16759*. doi:10.3386/w16759

Hilsenrath, J., & Leo, L. (2011, October 05). Bernanke Issues Warning, Urges Action on Economy. Retrieved from https://www.wsj.com/articles/SB10001424052970204524604576610712269716064

Kliesen, K. (2016, June 24). The Fed's Strategy for Exiting from Unconventional Policy: Key Principles, Potential Challenges. Retrieved from https://www.stlouisfed.org/publications/regional-economist/october-2013/the-feds-strategy-for-exiting-from-unconventional-policy-key-principles-potential-challenges

Matthews, D. (2011, August 24). Did the stimulus work? A review of the nine best studies on the subject. Retrieved from https://www.washingtonpost.com/blogs/ezra-klein/post/did-the-stimulus-work-a-review-of-the-nine-best-studies-on-the-subject/2011/08/16/gIQAThbibJ_blog.html

McGranahan, L., & Berman, J. (n.d.). Measuring fiscal impetus: The Great Recession in historical context. *Federal Reserve Bank of Chicago*.

Meeting of the Federal Open Market Committee on June 23 24, 2009 (2009). Retrieved from https://www.federalreserve.gov/monetarypolicy/files/FOMC20090624meeting.pdf

Rampell, C., & Healy, J. (2009, July 31). U.S. Economic Contraction Slowed in Quarter. Retrieved from https://www.nytimes.com/2009/08/01/business/economy/01econ.html

Rudebusch, G. (2010, June 14). The Fed's Exit Strategy for Monetary Policy. Retrieved from https://www.frbsf.org/economic-research/publications/economic-letter/2010/june/fed-exit-strategy-monetary-policy/

Samuelson, R. (2017, September 18). Unemployment: Why Stimulus 2.0 Might Backfire. Retrieved November 06, 2020, from https://www.newsweek.com/unemployment-why-stimulus-20-might-backfire-80969

Tempelman, J. H. (2009). Will the Federal Reserve Monetize U.S. Government Debt? *Financial Analysts Journal, 65*(6), 24-27. doi:10.2469/faj.v65.n6.5

Wesbury, B. (2009, October 11). The Economic Recovery Is Well Underway. Retrieved from https://www.wsj.com/articles/SB10001424052748703298004574459403222100882

Wilson, D. J. (2012). Fiscal Spending Jobs Multipliers: Evidence from the 2009 American Recovery and Reinvestment Act. *American Economic Journal: Economic Policy, 4*(3), 251-282. doi:10.1257/pol.4.3.251