Do federal budget deficits cause crowding out?

Tricia Coxwell Snyder
William Paterson University

Abstract

Currently the U.S. President and congress are debating the size and role of government spending and tax policy. While congress passed the over $700 billion bailout plan to help stimulate the U.S. economy, many economists believe that this only increases our federal deficit and causes "crowding out". It is unclear whether expansionary fiscal policy helps stimulate the United States economy through the Keynesian multiplier effect or whether it causes crowding out of private investment? It's also unclear how much and how long it takes for investment, consumption, output, and interest rates to respond.

This paper examines the impacts of deficits on investment, consumption and output. Specifically, an error correction vectorautoregression (VECM) is employed to determine the predictive power of shocks to taxes, government spending, and deficits on investment, consumption, output and interest rates. Results show very little support for any crowding out affects. While interest rates appear to respond very little to deficits, reductions in taxes or increases in government spending appear to cause a relatively small increase in private investment, suggesting that the Keynesian multiplier effect outweighs or at least offsets any type of crowding out.

Keywords: Budgets, Fiscal Policy, Taxes and Government spending

INTRODUCTION

Currently the President and congress are debating the size and role of government spending and tax policies. Similarly, congress recently debated and passed the over $700 billion bailout plan to help stimulate the U.S. economy. How and to what degree do changes in tax policy and government spending and their accompanying changes in the U.S. budget deficit alter investment, consumption and output in the aggregate U.S. economy?

According to the Wall Street Journal, the current U.S. Federal deficit is close to $1.6 trillion dollars. Considering that the Federal debt is just the accumulation of all of the deficits and surpluses overtime, this just keeps adding on to our overall debt, which is currently close to $14 trillion dollars. This debt doubled while President Bush was in office and reduced taxes. It continues to grow at an even faster pace today with the recent expansion if government fiscal policy. In fact, the debt grows by over $4 billion dollars a day and the debt owed per person in the U.S. is now close to $45,000.

Since there is such a large deficit and debt that is due in large part to our recent cut in income taxes and increases in government spending, it is important to determine the impacts of fiscal policy on investment behavior and output for the U.S. economy. To do this, this paper does an empirical investigation into the predictive power of changes in taxes, government spending, deficits and debt for investment, consumption and output.

The political contrast between parties regarding tax policies directly relates to the contrast and debate that market-clearing neoclassical and Keynesian macroeconomist have regarding the impacts of government spending and tax policies on the overall economy. According to Baxter and King (1993), both the neoclassical and Keynesian models imply that there is a positive effect of government spending on GDP. However they suggest that the models differ in regards to how increases in government spending impact consumption and private investment. In general, neoclassical or market-clearing economists believe that increases in government spending and tax cuts "crowd out" private sector investment due to it causing higher interest rates. If government borrowing creates a greater demand for money and funds than is supplied, it leads to higher interest rates or a higher user cost of capital, creating higher prices for private firms to borrow money. As interest rates increase, firms face a lower rate of return and thus reduce investment. So as the public sector gets more, it "crowds out" private sector investment. As the private sector firms take on fewer investments, they also produce less and reduce output and thus GDP falls. Since the market-clearing model puts more emphasis on the long-run which assumes that our economy is at full employment or capacity, market-clearing economists suggest that increases in fiscal policy will also create long term inflationary effects. Thus, neoclassical economist would expect to find a negative relationship between government spending and consumption, private investment and GDP.

Building on the market-clearing model, Barro (1974) argued that tax cuts will not have an impact on the overall economy due to the Ricardian equivalence. Barro suggested that Ricardo believed that although taxpayers would have more money now, they would realize that they would have to pay higher tax in future and therefore save the tax cut in order to pay for the future tax increase. Thus, the extra saving by consumers would exactly offset the extra spending by government, so overall demand would remain unchanged. If this is the case, one might expect to not find any relationship between tax changes, and consumption, investment and output.

However, as Keynesian economist suggest any crowding-out effects are moderated by an increase in demand for goods in the private sector along with the multiplier or "accelerator

effect". As the demand for goods increases, firms will want to produce more and will actually increase output causing a "crowding in" effect. In the traditional IS-LM analysis, the increase in demand for private goods caused by a cut in taxes or increase in government spending stimulates the IS curve, generating an increase in aggregate demand, eventually increasing output. Thus, an increase in government spending or a decrease in taxes should find a corresponding increase in consumption, GDP and interest rates. The impact on GDP is likely to be bigger if the economy is not at full capacity, thus during a recession, one might expect a much bigger accelerator or "crowding in" effect causing a much larger increase in GDP. Thus, Baxter and King (1993) suggest that the Keynesian model would predict a positive relationship between tax cuts, increases in government spending, and investment and output, as long as the multiplier effect outweighs the impact of higher interest rates.

The recent stimulus package and bailouts were aimed at trying to increase liquidity and lending by banks and thus under an IS-LM analysis should help increase the LM curve to the right, which should help increase aggregate demand and GDP. In contrast to the increase in the IS curve, this should help to reduce interest rates.

To determine whether the neo-classical market clearing model or the Keynesian non-market clearing model better predict and explain the U.S. economy, many empirical economist have tried to examine the impacts of deficits on investment, consumption and GDP. While Lusvigson (1996) found that deficit-financed tax cuts lead to higher investment if there is elasticity of labor and the debt shock is short, she also found that if the labor supply is inelastic or the debt shock appears permanent, there is crowding out. She suggests that if there is an elastic labor supply, a tax cut creates an incentive to work more and produce more (by substituting labor for leisure), so even though current consumption increased, the increase in output is even greater.

Similarly, Blanchard and Perotti (2002) also found mixed results. Their findings suggest that increases in government spending increase consumption, supporting a Keynesian type multiplier effect. However, they also find that increases in both government spending and taxes have a negative impact on private investment supporting a neoclassical approach. Dotsey (1994), and Feldstein and Eckstein (1970) all find support that deficits do cause "crowding out" and reduce private investment and output. In contrast, Darrat (1989) found no evidence supporting crowding out effects.

Edelberg, Eichenbaum, and Fisher (1999) and Burnside, Eichenbaum, and Fisher (2000) suggest that different types of government spending has different impacts. There is no clear consensus regarding the size or even the directional impacts of changes in taxes, government and deficits on consumption, investment and GDP.

ESTIMATION PROCEDURE

This paper examines the direction and the size of an impact of taxes, government spending, deficits and debt on consumption, investment and GDP. Following Blanchard and Perotti (2002), an error correction vector autoregression is employed to determine the predictive power of tax changes, government spending, deficits, and debt on consumption, investment, output and interest rates. Data regarding aggregate demand and its components is available from the Bureau of Economic Analysis. Data regarding the average marginal tax rate and interest rates can be obtained the National Bureau of Economic Research (NBER) and the St. Louis Federal Reserve

websites respectfully. After obtaining the data, a VECM is estimated with interest rates, marginal tax rates, government spending (taxes, and deficits), investment and GDP.

While many researchers have used a single equation "St. Louis" type approach, which place structural causality assumptions onto the model. Following Chowdhury et al (1986) a nonstructural ECM model is employed instead to avoid imposing potentially spurious aprior constraints on the exogeneity of the variables in the system. While this approach cannot determine direct causality, it is a good way to test the explanatory power of deficits, interest rates, investment and GDP by allowing for direct and indirect effects between the variables in the system.

A nonstructural approach also allows for the incorporation of the proper lags of each series to avoid an omitted variable bias. To determine the proper lag length of each variable, this study uses the Log Likelihood Ratio, Akaike Information Criteria (AIC) and the Schwarz Information Criterion (SBC).[1]

In general the following VAR is estimated:

$$\Delta y_t = \Pi_0 + \Pi y_{t-j} + \Pi_1 \Delta y_{t-1} + \Pi_2 \Delta y_{t-2} + ...\Pi_p \Delta y_{t-p} + e_t \qquad (1)$$

where y_t is a vector of endogenous variables (Deficits, Interest rates, Investment and GDP) , Π is a matrix with elements Π_{jk} such that one or more of the $\Pi_{jk} \neq 0$, Π_i is a (nxn) coefficients matrices, *t* represents the time period, *p* represents the lag length, and e_t is a (nx1) vector of error terms.

A VAR is a useful method for analyzing the impact of a given variable on itself and on all other variables in the system by using forecast error variance decompositions (FEVD) and impulse response functions (IRF). By breaking down the variance of the forecast error for each variable into its components, FEVDs are a useful tool to analyze the impact of deficits on interest rates, investment and GDP. This allows one to examine which innovations better explain the error variance of consumption, investment and GDP. IRFs are also useful in tracing out the effects of a one-time shock to deficits and interest rates on the time paths of investment and output. These tools enable policy makers to empirically evaluate the magnitude and sign of the impacts of shocks to deficits in terms of its ability to predict changes in interest rates, consumption, investment and GDP.

Since all estimations use a Cholesky decomposition (to ensure that the covariance matrix of the innovations is diagonal), IRF results may be dramatically altered depending upon the order of equations in the system. To remain consistent with Blanchard and Perotti (2002) and Taylor (1995), deficits and interest rates are ordered first, followed by changes in the real variables investment and GDP. This is also consistent with the interest rate transmission mechanism ordering, yet it also incorporates the relative price mechanism of a market-clearing model. While the chosen recursive model is not implied to represents the true structure of the economy, it does provide a basis to present evidence.

[1] Following Blanchard and Perotti (2002) a four-quarter distributed lag is used. Similar to Blanchard and Perotti (2002), augmented Dickey-Fuller and Phillips-Perron test results do not support cointegration between taxes and government spending. Results are available upon request.

RESULTS

Results suggest that budget deficits appear to cause crowding out. Results from impulse response functions (IRF) in Graphs 1 and 2 show the impacts of deficits on Investment behavior and GDP. Results in Graph 1 show that positive Federal budgets have a strong and positive impact on investment behavior through the first 5 quarters. This impact falls around quarter 6, but then picks up again at the end of the first year.

Results from FEVD tables 1 and 2 also suggest that budget deficits have a strong influence on investment behavior and GDP. Tables 1 and 2 show that budget shocks explain close to two thirds of the innovations in private investment and GDP. Combined, this suggests that budget deficits do cause crowding out of private investment and a reduction in future GDP.

Investment also appears to explain some of its own innovations, supporting Keynes' idea of investment responding to "Animal Spirits". Thus, changes in investment appear to be driving future changes in investment behavior. This may be due to investor confidence or fear and can be seen in FEVD Table 1 showing that investment explains close to 20% of its own innovations.

While investment explains much of its own innovations it also helps to explain some of the fluctuations in GDP as well. Investment explains close to fifty percent of GDP in the second quarter. Collectively this suggests that while deficits have a strong impact on investment behavior, investment behavior has an impact on GDP.

In contrast, interest rates and inflation never explain more than 4% of the shocks to real investment or GDP. Results are similar when taxes and government spending are estimated separately and when reordering deficits last.

While interest rates and inflation don't appear to impact investment and GDP, budgets appear to have an influence on interest rates and consumer prices. Impulse response functions in graph 4 show that deficits increase long-term interest rates over the first year by close to .1 percent, this impact dies away and is not statistically different that zero after the 5th quarter. FEVD results in Table 4 also show that budgets explain close to twenty percent of the innovations in long-term interest rates.

Results showing that deficits cause increases in long-term interest rates contradicts the findings of Darrat (1989) and Romer (1988), who suggested that deficits have no long term impacts on increasing long-term interest rates. Darrat, actually shows that increases in long-term interest rates actually increases the deficit, since they increase the borrowing cost for the U.S. government.

Results in Graph and Table 4 show that higher consumer prices relate to increases in nominal long-term interest rates. While this result is not surprising, it does suggest that higher prices create higher inflation expectations, increasing long-term interest rates. Interest rates also appear to respond to increases in investment behavior as well.

To better understand how budget deficits impact investment and output it is important to know how the components of the deficit, taxes and government spending influence investment and output. Thus, in all regressions are re-estimated with taxes and government spending in place of budgets. Results re-estimated using both taxes and government spending in place of the budget continue have are very mixed.

It is interesting to note that taxes have a much larger impact on investment and GDP then government spending. Table 5 shows that taxes explain close to a third of the innovations in Investment behavior, while shocks to government spending explain five percent or less. However, impulse response function results in Graph 5 show that the directional impact of taxes

changes from a positive to a negative impact after the first year back to a positive impact by the end of the second year. This change in sign from positive to negative is a very different result than that found by Blanchard and Perotti (2002), who find that an increase in taxes reduces investment by about a third through the first 5 quarters.

Taxes change their directional impact on GDP around the second year, going from positive to negative. This contradicts results found by Blanchard and Perotti (2002), suggesting that an increase in taxes has a negative effect on GDP reaching its peak around the 5th quarter. Thus, it appears as if taxes have a strong impact on investment and GDP, but it is unclear whether it is a positive or negative impact.

Results in graph 6 show that increases in government spending increase investment and GDP, supporting Keynes's multiplier effect. However, this positive impact falls significantly after the first year and is similar to that found in Blanchard and Perotti (2002). FEVD results in Tables 5 and 6 show that government spending has a relatively small impact on investment behavior, but it has a relatively strong and growing impact on GDP, further supporting Keynes' multiplier affects. These tables also show that shocks to government spending also cause reductions in consumer prices. However, this may be an indirect affect caused by a strong correlation during recessions causing prices to fall, while government spending increases.

While budget deficits, and more specifically increases in taxes, appear to cause crowding out, the over debt level appears to have very little to no impact on investment or GDP. Tables 7 and 8 show that the national debt explains 8 percent or less of the innovations in investment and output. Similarly, graphs 9 and 10 show that the impact of the debt also changes from negative to positive after the first year.

CONCLUSIONS

Results suggest that deficits do create some crowding out of private investment. More specifically, it appears that taxes crowd out investment and output, but only for the first year. However, while deficits and taxes cause crowding out, the national debt has little impact on investment and output, and government spending appears to create a "crowding in" affect, supporting the Keynesian multiplier effect.

Of course, there are also other concerns regarding such a large deficit and national debt. What is the opportunity cost of paying so much in interest out of our national budget? How much and to whom does our government have to pay back this large national debt? Will the U.S. have the resources if needed to combat future downturns in the economy?

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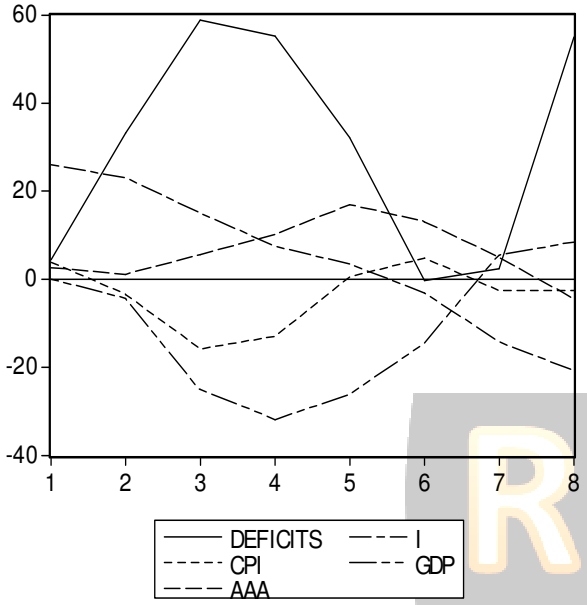
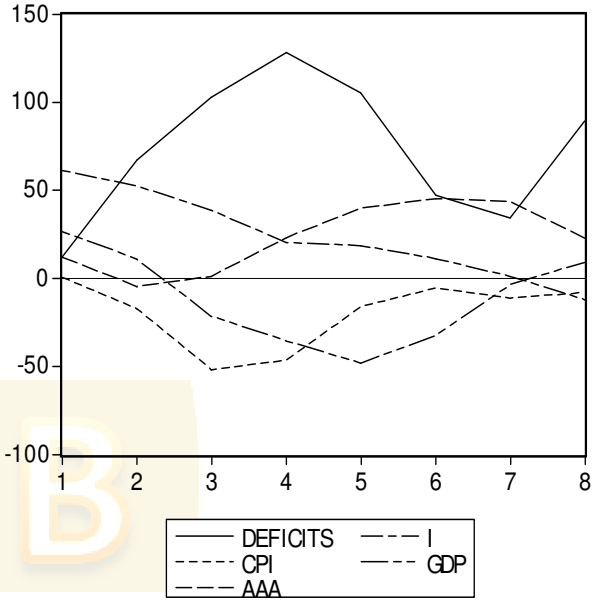
APPENDIX A: IMPULSE RESPONSE FUNCTION (IRF) GRAPHS

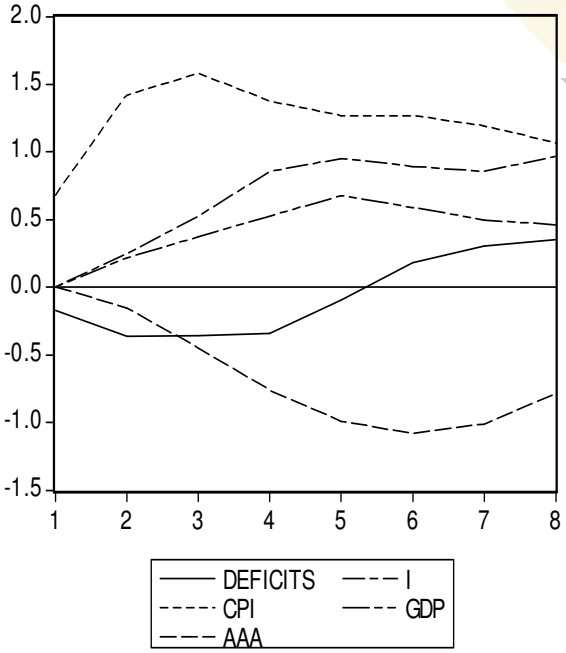
Graph 1: IRF of Investment to a One S.D. Innovations



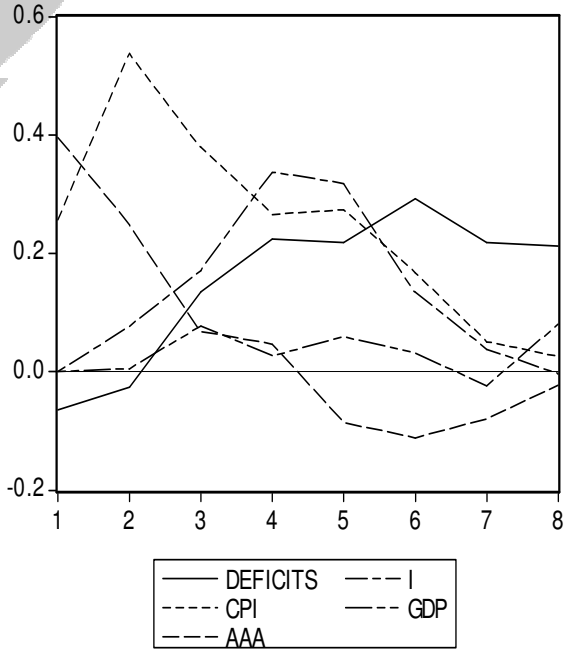
Graph 2: IRF of GDP to a One S. D. Innovations



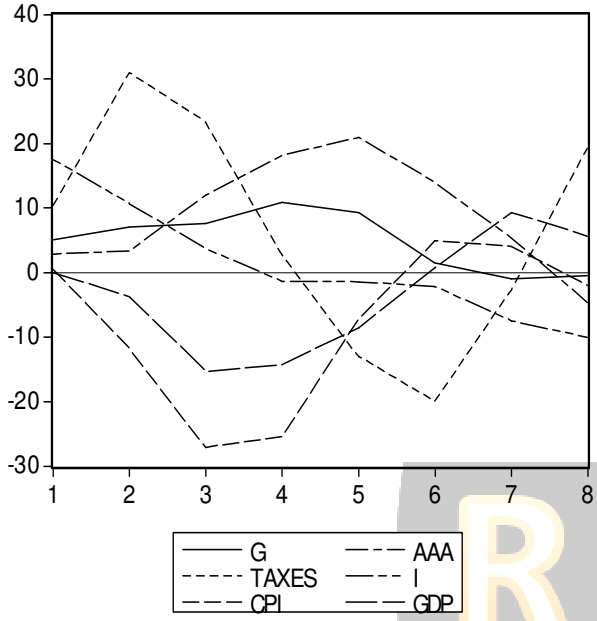
Graph 3: IRF of CPI to a One S.D. Innovations



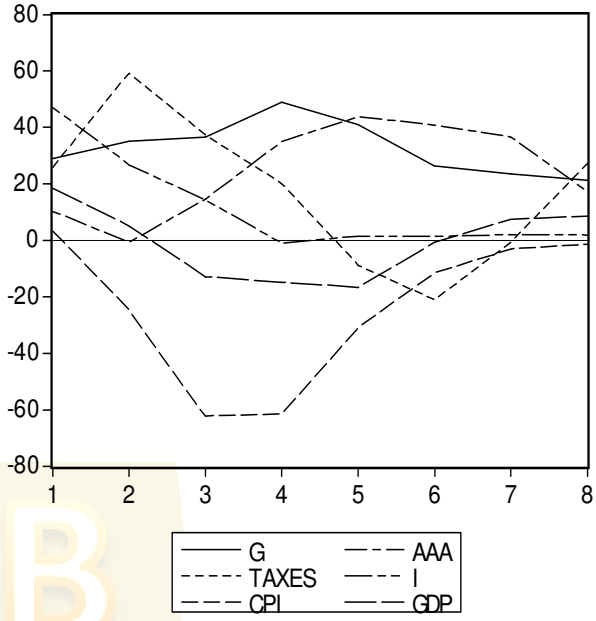
Graph 4: IRF of AAA to a One S.D. Innovations



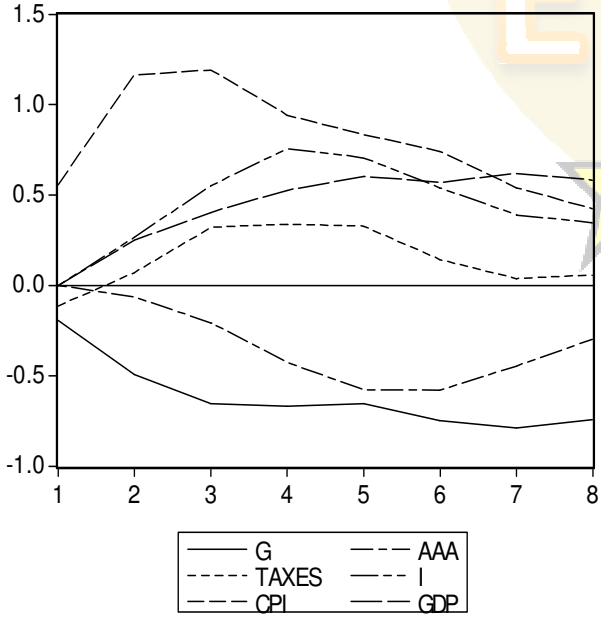
Graph 5: IRF of Investment to a One S.D. Innovations



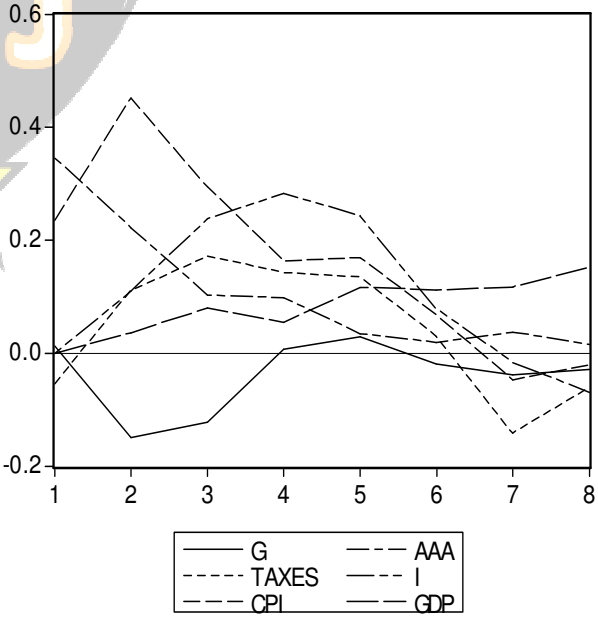
Graph 6: IRF of GDP to a One S.D. Innovations

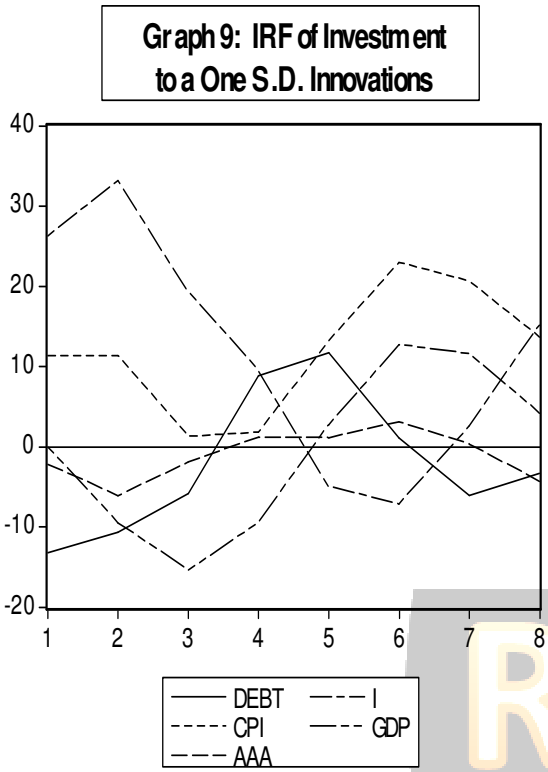


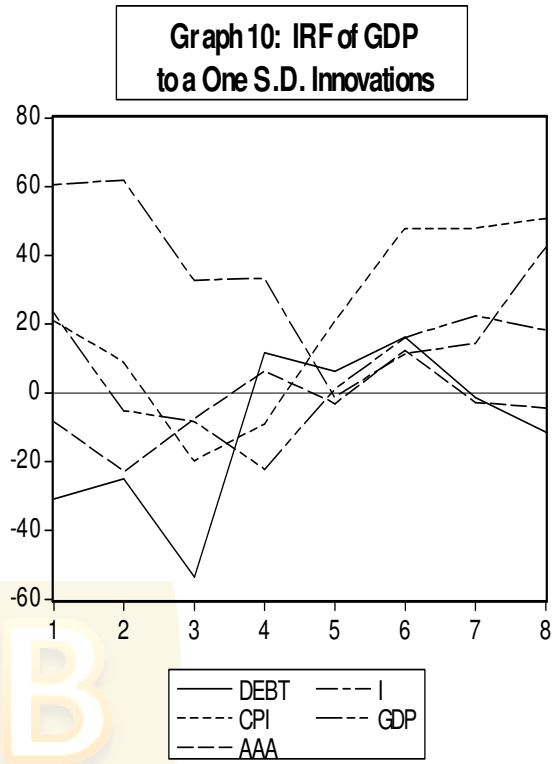
Graph 7: IRF of CPI to a One S.D. Innovations



Graph 8: IRF of AAA to a One S.D. Innovations




Graph 9: IRF of Investment to a One S.D. Innovations
40
30
20
10
0
-10
-20
1
2
3
4
5
6
7
8
DEBT
I
CPI
GDP
AAA


Graph 10: IRF of GDP to a One S.D. Innovations
80
60
40
20
0
-20
-40
-60
1
2
3
4
5
6
7
8
DEBT
I
CPI
GDP
AAA

APPENDIX B – FORECAST ERROR VARIANCE DECOMPOSITION TABLES

Table 1: FEVD of Investment					
Period	**Deficits**	**CPI**	**AAA**	**Investment**	**GDP**
2	47	1	0	51	1
4	67	4	1	13	15
6	63	3	4	11	19
8	66	3	4	12	15

Table 2: FEVD of GDP					
Period	**Deficits**	**CPI**	**AAA**	**Investment**	**GDP**
2	37	2	1	52	7
4	65	11	1	17	5
6	65	8	6	13	9
8	66	7	8	11	7

Table 3: FEVD of CPI					
Period	**Deficits**	**CPI**	**AAA**	**Investment**	**GDP**
2	6	89	1	2	2
4	4	71	8	11	5
6	3	57	17	16	7
8	3	52	19	19	7

Table 4: FEVD of 30-Year AAA Interest Rates					
Period	**Deficits**	**CPI**	**AAA**	**Investment**	**GDP**
2	1	61	37	1	0
4	7	57	22	15	1
6	15	48	17	19	1
8	20	45	17	18	1

Table 5: FEVD of Investment						
Period	**Taxes**	**G**	**CPI**	**AAA**	**I**	**GDP**
2	**34**	**2**	**8**	**24**	**54**	**1**
4	**35**	**4**	**32**	**9**	**10**	**10**
6	**36**	**5**	**26**	**7**	**8**	**9**
8	**38**	**5**	**23**	**8**	**8**	**9**

Table 6: FEVD of GDP						
Period	**Taxes**	**G**	**CPI**	**AAA**	**I**	**GDP**
2	**45**	**16**	**6**	**1**	**29**	**4**
4	**26**	**20**	**33**	**6**	**13**	**3**
6	**21**	**23**	**28**	**15**	**10**	**3**
8	**22**	**23**	**25**	**18**	**9**	**3**

Table 7: FEVD of Investment 1					
Period	**Debt**	**CPI**	**AAA**	**I**	**GDP**
2	**8**	**0**	**2**	**90**	**0**
4	**4**	**3**	**1**	**94**	**0**
6	**2**	**7**	**1**	**90**	**1**
8	**1**	**12**	**1**	**84**	**2**

Table 8: FEVD of GDP					
Period	**Debt**	**CPI**	**AAA**	**Investment**	**GDP**
2	**5**	**1**	**3**	**49**	**43**
4	**3**	**4**	**1**	**65**	**28**
6	**2**	**11**	**1**	**67**	**19**
8	**2**	**17**	**2**	**66**	**13**

Table 9: Data								
	Debt	**Deficits**	**Taxes**	**G**	**CPI**	**AAA**	**I**	**GDP**
1947		11796	41560.00	409.5280	22.33167	2.610833	201.3107	1776.141
1948		580	39415.00	439.4315	24.04500	2.816667	221.9570	1854.247
1949		-3119	39443.00	491.8805	23.80917	2.660000	202.8623	1844.708
1950		6102	51616.00	492.4268	24.06250	2.622500	241.9680	2005.951
1951		-1519	66167.00	672.7152	25.97333	2.860000	232.1540	2161.142
1952		-6493	69608.00	809.9760	26.56667	2.955833	227.7167	2243.869
1953		-1154	69701.00	868.0155	26.76833	3.199167	243.6163	2347.240
1954		-2993	65451.00	808.8960	26.86500	2.900833	247.4050	2332.360
1955		3947	74587.00	779.3387	26.79583	3.052500	279.5595	2500.302
1956		3412	79990.00	779.9713	27.19083	3.364167	280.7060	2549.746
1957		-2769	79636.00	814.7465	28.11333	3.885000	277.6818	2601.059
1958		-12849	79249.00	840.9278	28.88083	3.787500	257.7890	2577.628
1959		301	92492.00	869.4590	29.15000	4.381667	293.8233	2762.460
1960		-3335	94388.00	870.9543	29.58500	4.410000	296.3548	2830.932
1961		-7146	99676.00	914.7800	29.90167	4.350000	295.4447	2896.880
1962		-4756	106560.0	971.1073	30.25333	4.325000	322.1352	3072.390
1963		-5915	112613.0	996.1173	30.63333	4.259167	347.1320	3206.708
1964		-1411	116817.0	1018.046	31.03833	4.405833	380.6170	3392.315
1965		-3698	130835.0	1048.667	31.52833	4.493333	419.4620	3610.127
1966	322790.8	-8643	148822.0	1141.065	32.47083	5.130000	443.6307	3845.342
1967	333599.8	-25161	152973.0	1228.650	33.37500	5.506667	435.2953	3942.523
1968	351903.5	3242	186882.0	1267.212	34.79167	6.175000	465.6745	4133.393
1969	360338.0	-2842	192807.0	1264.260	36.68333	7.029167	494.7502	4261.800
1970	377484.2	-23033	187139.0	1233.733	38.84167	8.040000	484.3857	4269.940
1971	406343.0	-23373	207309.0	1206.882	40.48333	7.386667	520.8180	4413.263
1972	434049.5	-14908	230799.0	1198.124	41.80833	7.213333	583.4960	4647.730
1973	461402.5	-6135	263224.0	1193.927	44.42500	7.440833	637.0317	4917.010
1974	480510.0	-53242	279090.0	1223.997	49.31667	8.565833	597.9870	4889.916
1975	543285.8	-73732	298060.0	1251.582	53.82500	8.825833	532.9585	4879.519
1976	627291.5	-53659	355559.0	1257.203	56.93333	8.434167	585.3428	5141.295
1977	690353.8	-59185	399561.0	1270.978	60.61667	8.024167	669.3243	5377.652
1978	761931.5	-40726	463302.0	1308.415	65.24167	8.725000	750.1558	5677.624
1979	818335.0	-73830	517112.0	1332.841	72.58333	9.629167	793.1862	5855.049
1980	894744.0	-78968	599272.0	1358.820	82.38333	11.93833	741.9617	5838.979
1981	990572.2	-127977	617766.0	1371.209	90.93333	14.17083	758.2755	5987.190
1982	1120010.	-207802	600562.0	1395.284	96.53333	13.78750	705.2663	5870.944
1983	1337997.	-185367	666438.0	1446.259	99.58333	12.04167	756.6085	6136.170
1984	1552918.	-212308	734037.0	1494.866	103.9333	12.70917	884.2180	6577.116
1985	1813604.	-221227	769155.0	1598.978	107.6000	11.37333	930.8090	6849.265
1986	2096576.	-149730	854288.0	1696.189	109.6917	9.020833	941.6730	7086.509
1987	2334503.	-155178	909238.0	1737.113	113.6167	9.375833	946.7790	7313.277
1988	2580446.	-152639	991105.0	1758.917	118.2750	9.710000	977.9690	7613.889

1989	2837812.	-221036	1031972.	1806.787	123.9417	9.257500	1007.437	7885.927
1990	3198461.	-269238	1054996.	1864.040	130.6583	9.321667	986.5470	8033.908
1991	3617544.	-290321	1091223.	1884.398	136.1667	8.769167	922.4562	8015.142
1992	4026894.	-255051	1154341.	1893.178	140.3083	8.140000	977.0910	8287.072
1993	4382426.	-203186	1258579.	1878.202	144.4750	7.219167	1061.574	8523.449
1994	4678643.	-163952	1351801.	1878.024	148.2250	7.962500	1160.854	8870.673
1995	4944534.	-107431	1453055.	1888.904	152.3833	7.590000	1235.715	9093.724
1996	5206711.	-21884	1579240.	1907.927	156.8583	7.370000	1346.547	9433.894
1997	5418144.	69270	1721733.	1943.773	160.5250	7.261667	1470.775	9854.333
1998	5557693.	125610	1827459.	1984.990	163.0083	6.531667	1630.377	10283.52
1999	5680689.	236241	2025198.	2056.124	166.5833	7.041667	1782.057	10779.85
2000	5698931.	128236	1991142.	2097.794	172.1917	7.622500	1913.822	11225.98
2001	5812864.	-157758	1853149.	2178.316	177.0417	7.082500	1877.578	11347.16
2002	6191611.	-377585	1782321.	2279.633	179.8667	6.491667	1798.123	11552.97
2003	6728045.	-412727	1880126.	2330.451	184.0000	5.666667	1856.231	11840.70
2004	7345150.	-318346	2153625.	2362.009	188.9083	5.628333	1992.481	12263.81
2005	7929140.	-248181	2406876.	2369.882	195.2667	5.235000	2122.274	12638.38
2006	8494599.	-160701	2568001.	2402.085	201.5500	5.587500	2171.281	12976.25
2007	8988542.	-458555	2523999.	2443.118	207.3354	5.555833	2126.279	13254.06
2008	9913532.	-1412686	2104995.	2518.052	215.2470	5.631667	2018.406	13312.16
2009	11527348			2564.813	214.5490	5.313333	1649.322	12990.26
2010					217.5870	5.305000		