Spring 2011

Bond vigilantes : the invisible hand of government regulation

Chris Marsten
University of Richmond

Bond Vigilantes: The Invisible Hand of Government Regulation

Chris Marsten

Honors Thesis in Economics
University of Richmond

April 2011

Advisor: Dr. Dean Croushore

Bond Vigilantes: The Invisible Hand of Government Regulation

Abstract:

Bond Vigilantes are bond investors who protest structural government debt by selling bonds, increasing real yields. This increases the costs for government to borrow, allegedly causing a decrease in expenditures and ultimately a decrease in structural deficits. Models are presented which capture this effect, and offer evidence that these mechanisms have occurred over the past 50 years.

Chris Marsten

I. Introduction

Adam Smith brought us the idea of an "invisible hand" to explain the self-regulating nature of free markets. Driven simply by self-interests, individuals and groups will optimize an economy far beyond the capabilities of any central planner. This mechanism has been a strong driving force in the private sector. The public sector, however, is often viewed as immune from the workings of this invisible hand. It is generally assumed that governments alter course only when voters force a change. But, is it possible that another "invisible hand" is able to affect government behavior?

Since the end of World War II, the U.S. Government's spending as a percent of GDP has steadily risen. From a low of 20.8% in 1955, the share ballooned to 34.0% in 1992. Meanwhile, the Federal deficit as a percent of GDP increased as well, reaching 4.8% in 1992, up from -1.6% in 1955. This jump above trend caused the bond markets to take notice, as the 10-year Treasury rates climbed from 5.3% in October 1993 to 8.0% in November of 1994, a 2.7% spike in 13 months. This spike made it more expensive for the U.S. Government to borrow, forcing the Clinton administration to curtail spending. By 1998, the government deficit became negative, falling to -.8% of GDP. Bond markets were satisfied, as the 10-year Treasury rate had fallen to 4.65% by December of 1998.

James Carville, President Clinton's political advisor, was impressed by the fiscal influence of the bond markets. Carville later said, "I used to think that if there was reincarnation, I wanted to come back as the president or the Pope or as a .400 baseball hitter. But now I would like to come back as the bond market. You can intimidate everybody."

The driving force behind these movements in the bond market has been attributed to a group known as the "bond vigilantes." The term "bond vigilante" was coined in the 1980's by Wall Street economist Dr. Ed Yardeni, who used the term to describe institutional investors who sell government bonds when they deem fiscal policy to be unsustainable and therefore pro-inflationary. These vigilantes are bond investors who are looking to maximize profit. When they deem fiscal policies to be inflationary, they leave the market, selling their bonds and in turn driving up the interest rate. This increases the cost for the government to borrow, and some believe this can force the government to reverse their inflationary policies.

Over the past 20 years, the term "bond vigilante" has become a common term in economic discussions. When fiscal crises hit governments such as Greece and Ireland, many believed bond vigilantes to be the driving force. With U.S. Government debt and deficits at record levels, there have been suggestions that bond vigilantes may affect the marketplace in the near future.

At the outset of my research for this paper, I interviewed Dr. Ed Yardeni about the best approach to modeling bond vigilante activity. In our interview, Dr. Yardeni explained that it would be difficult, and perhaps impossible, to prove the existence of bond vigilantes empirically, as the phenomenon has only occurred once or twice in the post-war economy. It is easy to see evidence of bond vigilantes abroad in fiscally unsound countries such as Greece, but there is less compelling evidence that this mechanism occurs in the United States, with the only clear exceptions being the previously mentioned activity in the 1980's and 1990's . The United States is the most trusted borrower in the world, issuing bonds which are considered virtually risk free.

Although there have been allegations of bond vigilantes exerting influence over the US, there is also doubt if bond investors could have any significant effect on such a strong and stable government. Therefore, this paper will examine the significance of bond vigilantes in all periods throughout the past fifty years, as it is possible there is always vigilante activity, just perhaps on a less obvious scale. We first determine how U.S. Government debt and deficit spending influence the bond markets, and then determine how this change to the real yield influences future Government spending. First, we analyze these relationships by running basic linear regressions on related variables. We then create a reduced-form vector autoregression to analyze the effects of orthogonalized shocks to measures of Government debt, observing their impact on the real yield. Later, we look at the effects of orthogonalized shocks to the real 10-year Treasury yield, and how they affect measures of Government expenditures.

II. Literature Review

There has been little direct research on either the existence or importance of bond vigilantes. The idea of bond vigilantes was coined in the 1980's by economist Ed Yardeni. Since then, the concept has become mainstream, and has risen to greater prominence in recent years, sparked by record levels of Government spending and debt. A quick Google search for the term will return countless news articles which reference bond vigilantes, yet there has been no significant empirical research on the subject.

Due to a lack of research, there is no defined explanation of how bond vigilantes work. To gain a better understanding of the concept, I talked to Dr. Ed Yardeni, who coined the term. In our interview, Dr. Yardeni explained that bond vigilante activity is driven by inflation. This makes sense. Bond investors are solely interested in maximizing profits. Any factor which may hurt their investment (namely inflation) will cause these investors to sell the bonds, increasing yields. With regards to government, Yardeni explained that these investors are worried about structural (not cyclical) deficits. In other words, investors aren't worried about changes due to the business cycle, but rather debt indicators suggesting a fundamental and permanent issue within the government.

Although there has been no direct research, there has been work done on related phenomenon. Most Macroeconomic textbooks consider the "Crowding Out" effect in the bond markets a basic economic principle. The concept behind the crowding out theory is that an increase in government borrowing raises interest rates, driving out private investment. When selling bonds on the open market, a government is increasing the supply, driving down the price, and raising the yield. This movement in yields is similar to the bond vigilante movement, except it is caused by a basic supply and demand mechanism. Bond vigilante theory suggests this change in the yield is also influenced by investors' inflationary fears.

There have been numerous papers written on the crowding out effect, leading to mixed results. Most studies find that an increase in debt or deficit does lead to an increase in the real rate, but the significance of this movement varies. Friedman's paper, *Crowding Out or Crowding In?* (1978), finds that long term debt financing leads to a crowding out effect through a higher bond yield. Engen and Hubbard's paper, *Federal Government Debt and Interest Rates (*2005), looks at the inconsistencies of past studies, and creates their own model which suggests a one percent increase in Debt as a percentage of GDP leads to an increase in real yields of two to three basis points. Other studies suggest a larger movement. Although the fundamental reason for the movement is different, we should still find a similar result when we model the bond vigilantes. However, there haven't been studies as to how this change in the real yield would affect Government spending patterns.

III. Data

This analysis uses quarterly data from the 2nd quarter of 1955 through the 4th quarter of 2010. The raw data used in this paper was received from multiple sources. Nominal 10-year treasury rates, Federal credit liabilities (debt), total Federal expenditures, Federal interest expenditures, and Federal defense expenditures were taken from Haver Analytics' database with help from Debbie Johnson, Chief Economist Yardeni Research, Inc and Mali Quintana, Senior Economist Yardeni Research, Inc [Dr. Yardeni kindly provided me with access to the Haver Analytics database]. The S&P 500, real U.S. GDP, nominal U.S. GDP, and the U.S. GDP deflator (base year =2000) were taken from the St. Louis Federal Reserve Economic Data (FRED). The 10-year expected PCE inflation rate from Q2 1955 through Q2 2005 was found in Sharon Kozicki's paper *The Term Structure of Expected Inflation*. The 10-year expected PCE inflation rate, as well as the 10-year expected CPI inflation rate from Q1 2007 through Q4 2010 was found in the Philadelphia Federal Reserve's *Survey of Professional Forecasters*. Finally, data for Federal discretionary spending was found on the Congressional Budget Office's website.

To turn this raw data into a more useable and standard form, several conversions took place. 10-year treasury rates, expenditures, and liabilities were converted from monthly to quarterly data using a simple averaging function. Nominal 10-year yields were converted to real yields through the equation $(1+r)(1+\pi) = (1+R)$, where r is the real interest rate, π is the inflation rate (using 10-year inflation expectations), and R is the nominal 10-year yield. The 10-year expected PCE inflation rate was created by combining Kozicki's variable from Q2 1955 through Q2 2005 and the *Survey of Professional Forecasters* variable from Q1 2007 through Q4 2010. The *Survey of Professional Forecasters* only carries this variable back through Q1 2007. To fill in the gap from Q3 2005 through Q4 2006, .35 was subtracted from the CPI *SPF* forecast. The difference between the 10-year expected PCE inflation and 10-year expected CPI inflation in Q1 2007 was .35, which is also the average difference from Q1 2007 through Q3 2007.

Finally, we create a new variable called Adjustable Government Spending. This variable is created by subtracting both Federal interest expenditures and Federal defense expenditures from total Federal expenditures. This variable is meant to capture areas of government spending which officials can modify in the short-run. More details on this variable are explained later on.

IV. The Model

Two models are needed to understand the effect of the bond vigilantes. The first model is used to see if an increase in U.S. Government debt variables affects the real 10-year treasury yield. This is similar to the crowding out effect. The second model needed determines if a change in the real 10-year yield affects Government spending.

Yield Model

First, we create a model that looks at variables which affect the 10-year real yield. As suggested by Yardeni, the first model simply relates the yield to inflation expectations and a measure of government spending. We also include the percent change in the S&P 500 to capture the business cycle.

$$r_t = \beta_o + \beta_1 \pi^e + B_2 \sigma + \beta_3 G + \varepsilon_o$$

Where r is the real 10-year yield, π^e is the 10-year expected PCE inflation rate, σ is the percent change in the S&P 500, and G is the Federal Government debt as a percentage of GDP. See Figure 1 Column 1 for the results of a simple linear regression. [1]

Figure 1:

Variable	No Lag		4 Quarter Lag	
Intercept	3.11	(4.78)	2.87	(3.78)
10-Year Price Expectations (π^e)	0.084	(1.38)	0.104	(1.54)
S&P 500 Percent Change (σ)	0.015**	(2.51)	0.015**	(2.37)
Debt as a Percent of GDP (*G*)	-.008	(.54)	-0.003	(.19)

In Figure 1, we see that debt as a percentage of GDP has a minimal effect on the real yield, with a beta of -.008, which is not statistically significant, with a t-Stat of 1.1.

In many ways, this result is expected. Given the nature of Government spending, and the often slow spread of information about policy changes to the public, it is likely that there are lags involved. Next, we look at a lagged model.

We keep the original model, but replace the debt measure with Federal Government debt as a percentage of GDP, lagged four quarters. See Figure 1 for the

[1] * Denotes significance at the 90% level, ** at the 95% level, *** at the 99% level

results. Now, lagged debt as a percent of GDP has a beta of -.003, and a t-Stat of .19, so the results are still not statistically significant.

One explanation for this lack of movement is that perhaps investors are more interested in the current direction of the Government debt. A variable such as the Government budget deficit may show a different aspect of the analysis, reflecting the direction of Government debt as opposed to simply the aggregate levels. Recreating the same model as before, but this time substituting the Deficit as a percentage of GDP instead of Debt, we get similar results. With non-lagged data, Deficit as a percentage of GDP has a beta of .001 with a t-Stat of .03, which is not statistically significant. Inserting a four quarter lag, we get a beta of .02, with a t-stat of .49, which is still not statistically significant. For the comprehensive results, see Table A in the Appendix section.

As we saw, the "vigilante" mechanism can be lagged, so it is possible these models are not fully capturing the effect. To better understand the lagged relationships of the variables in question, we can run a reduced-form vector autoregression. A vector autoregression is an econometric model used to understand how multiple time series interact with each other. This allows us to look at the back and forth effect of the vigilantes and the government without having to worry about a complex number of lags.

The first VAR we create looks to determine how Government debt influences the 10-year real yield. As we are using quarterly data, we set p equal to four, meaning there are four lags in this model. We also set the lead equal to 12, meaning the model forecasts out 12 periods (3 years) ahead.

$$r_t = \alpha_o + \alpha_1^1 r_{t-1}^1 + \alpha_2^1 r_{t-2}^1 + \cdots + lagged\ values\ of\ Y, \sigma, \pi^e, and\ G$$

Where r is the real 10-year treasury yield, Y is the natural log of real GDP, σ is the natural log of the S&P 500, π^e is the 10-year price expectations, and G is the natural log of real Government debt. We include real GDP to give our model an indication of the overall economy. We include the S&P 500 to capture the business cycle. We include 10-year price expectations as this is the driving force behind bond yields, and is a key mechanism for vigilante activity. Finally, we include the 10-year real yield and the Government debt as these are the variables we are interested in observing.

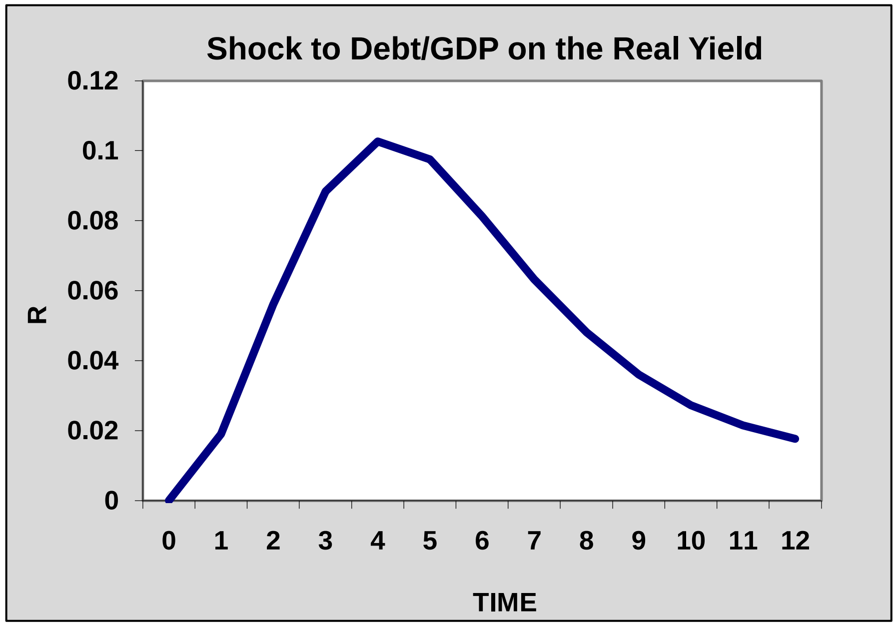
When creating a VAR, the structure can be important; earlier variables must have a contemporaneous effect on later variables, and later variables must not have a contemporaneous effect on earlier variables[2]. When we run the VAR, we are given an orthogonalized impulse response function which shows the effect of a one standard deviation shock to the independent variable on the dependent variable. In this case, we are looking at the effect of a one standard deviation spike in Federal debt on the 10-year real treasury yield. See Figure 2 for the impulse data and corresponding graph.[3]

[2] Note: Although the order can be important, we found that changing the order in this model doesn't have a significant effect on the results, suggesting a strong model. The same is true for the other VARs listed

[3] A complete set of impulse response functions can be found in Table B in the Appendix.

Figure 2:

Quarter	Effect on R
0	0
1	0.01903
2	0.05601
3	0.08836
4	0.10262
5	0.09748
6	0.08128
7	0.06322
8	0.04804
9	0.036
10	0.02723
11	0.02144
12	0.01763

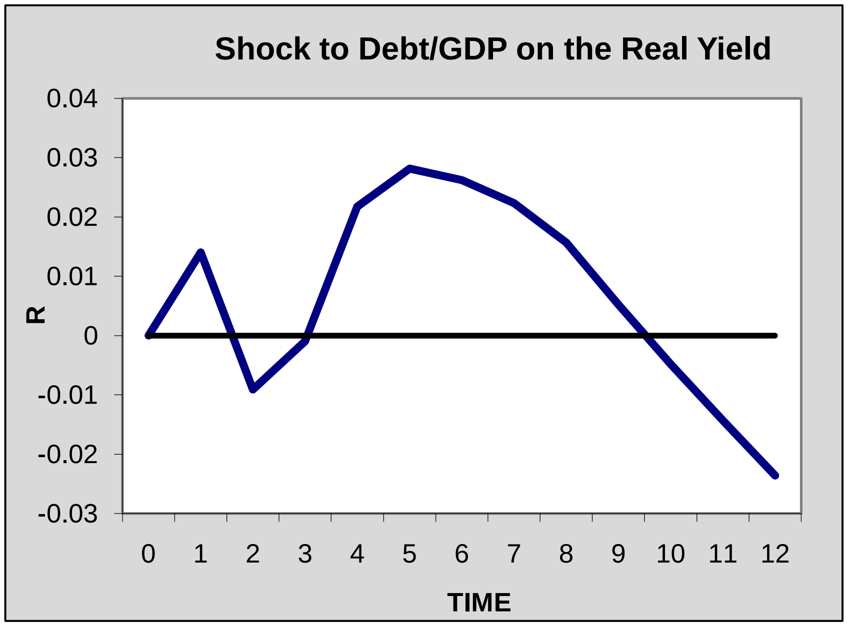


In Figure 2, we see that a shock to the Federal debt as a percent of GDP increases the real yield over time. After two quarters, there is a .056 % increase in the real yield. The effect peaks at .10% after 4 quarters before tapering off.

We can also apply this same model to a more temporary measure of debt, the Federal deficit. Copying the same logic as before (p=4, lead=12), we run a VAR on the natural log of real GDP, the natural log of the S&P 500, the real 10-year treasury yield, 10-year price expectations, and the Federal deficit as a percentage of GDP. The resulting impulse response function shows the effect on the 10-year yield from a shock to the Federal deficit as a percentage of GDP. See Figure 3 for the impulse data and corresponding graph.

Figure 3:

Quarter	Effect on R
0	0
1	0.01406
2	-0.0091
3	-0.00095
4	0.02176
5	0.02814
6	0.02623
7	0.02231
8	0.01568
9	0.00524
10	-0.00481
11	-0.01433
12	-0.02359



In Figure 3, we see that a shock to the Federal Deficit has a generally positive effect on the real yield, but the effect isn't too strong. After 1 quarter, there is a .014% increase in the real yield. After going negative for two quarters, this shock increases to a maximum of .028% after 5 quarters, before decreasing. One explanation for this is that investors are mostly concerned about the government's ability to pay off their debts. They would be concerned about the effect of long-term structural deficits, which really isn't captured in this deficit variable. This is why I believe we see a somewhat ambiguous effect when looking at the deficit, but see a strong effect when looking at the debt.

Government Model

The previous models suggest that increases in the government debt leads to a higher interest rate. This higher yield makes it more expensive for the government to borrow. In theory, this should cause the government to eventually cut spending to compensate for the increased costs. To test this hypothesis, we must create a second model to determine if the real yield influences government spending. This model is similar to the first, but relates Federal Government expenditures as a percentage of GDP to the S&P 500, 10-year Treasury yield, PCE inflation rate, and inflation expectations.

$$GE_t = \beta_o + \beta_1 \pi^e + \beta_2 \sigma + \beta_3 r + \varepsilon_o$$

Where *GE* is the Federal Government expenditures as a percent of GDP, π^e is the 10-year expected PCE inflation rate, σ is the percent change in the S&P 500, and *r* is the 10-year yield. We find that the 10-year yield has a beta of .021, suggesting that an increase in the real yield leads to an increase in government spending as a percentage of GDP. This result is not statistically significant, with a t-Stat of .14. Lagged data provides a similar result. See Figure 4 below.

Figure 4:

Variable	No Lag		4 Quarter Lag	
Intercept	27.3***	(45.5)	27.1***	(45.3)
10 Year Price Expectations (π^e)	.72***	(6.6)	.62***	(5.59)
S&P 500 Percent Change (σ)	.01	(.82)	.03**	(2.28)
10-Year Real Treasury Yield (*r*)	.021	(.14)	.068	(0.45)

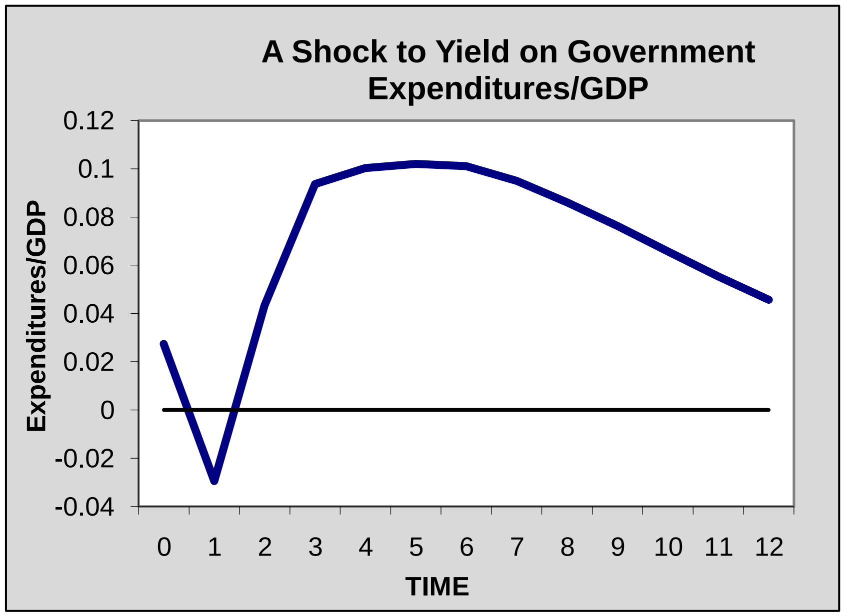
As before, this mechanism is going to be complexly lagged, so we can repeat the steps from before, and create a VAR which includes government expenditures. For this model, we will use the same structure as before (p=4, lead=12), but change some of the variables.

$$GE_t = \alpha_o + \alpha_1^1 GE_{t-1}^1 + \alpha_2^1 GE_{t-2}^1 + \cdots + lagged\ values\ of\ Y, \sigma, \pi^e, and\ r$$

Where *GE* is total Government expenditures as a percent of GDP, *Y* is the natural log of real GDP, σ is the natural log of the S&P 500, π^e is expected 10-year inflation, and *r* is the real 10-year yield. See Figure 5 for the impulse data and corresponding graph.

Figure 5:

Quarter	Effect on Expenditures
0	0.02735
1	-0.0294
2	0.04334
3	0.09367
4	0.10024
5	0.10205
6	0.10103
7	0.095
8	0.08608
9	0.07626
10	0.06566
11	0.05536

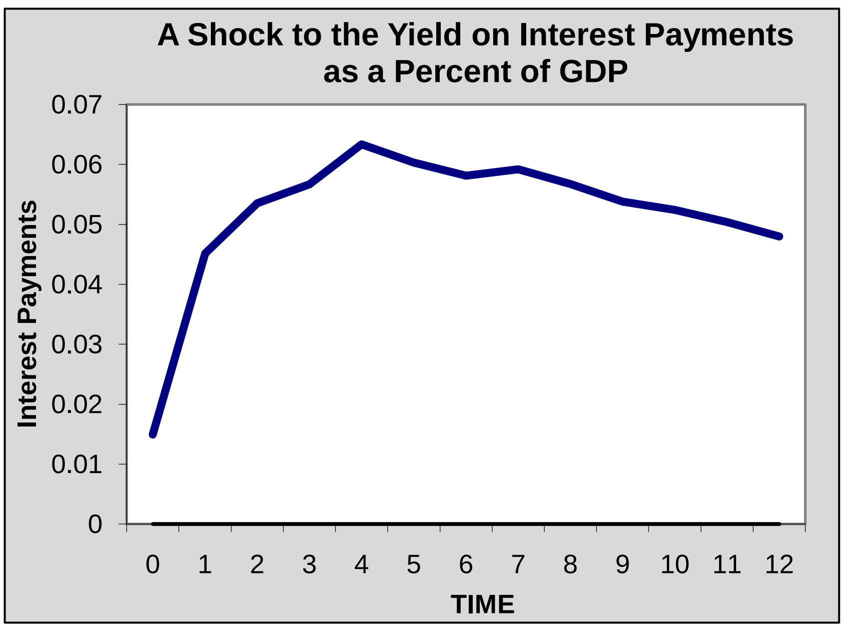


In Figure 5, we see that a one standard deviation shock to the real yield has a generally positive effect on total government spending as a percent of GDP. These results suggest that total U.S. Federal Government expenditures may be immune to shocks in the real yield. Known as the most reliable lender in the world, the US Government already borrows for the lowest interest rates. Most investors assume the risk for default is virtually zero. When a government is as massive and as reliable as the US government, it is unlikely that a change in the interest rate will have a significant impact on expenditures, a theory which the model supports.

However, it is possible that the increased cost to borrow does affect where the U.S. Government spends its money. Logically, when the yield increases, Federal interest payments will likely increase. These payments are the Federal Government's least discretionary obligations, and therefore they are unlikely to be adjusted in the near to moderate term. We can test the logical theory that an increase in the yield increases these payments. Using the same structure as before (p=4, lead=12), we run a VAR on the natural log of GDP, the natural log of the S&P 500, the real 10-year treasury yield, 10-year price expectations, and Government interest payments as a percent of GDP. See Figure 6 for the impulse data and corresponding graph.

Figure 6:

Quarter	Effect on I
0	0.01494
1	0.04513
2	0.05353
3	0.05668
4	0.06335
5	0.06033
6	0.05815
7	0.05919
8	0.05675
9	0.0538
10	0.05239
11	0.05038
12	0.04798

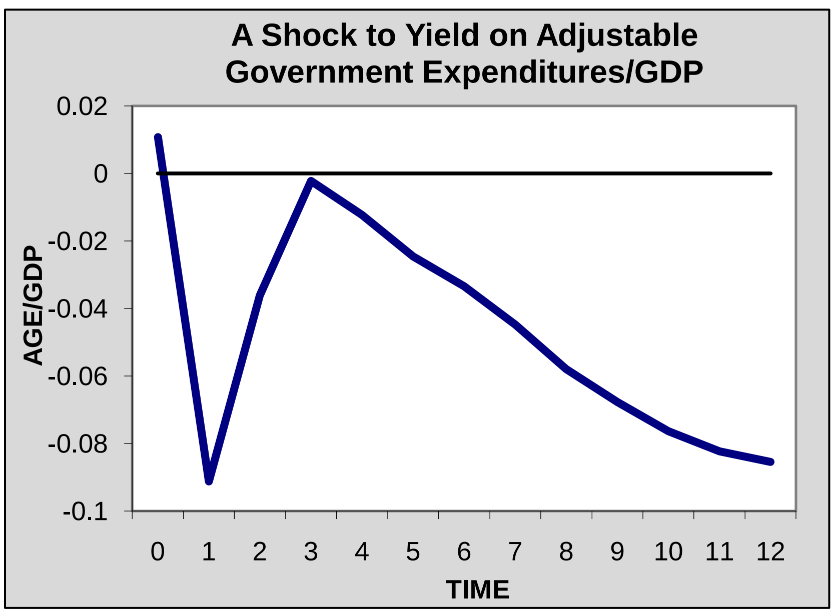


As expected, Figure 5 shows that a shock to the real yield increases Federal interest payments as a percent of GDP.

There are some areas of expenditure which the government can't quickly adjust. Defense spending is the most basic responsibility of a government, and therefore is unlikely to be affected by other factors, at least in the short-run. Running the VAR on Defense spending, we find that a shock to the real yield increases the variable by a maximum of .035%, suggesting defense spending may be immune to short term fluctuations in the yield[4]. Taking total expenditures, and subtracting out interest payments as well as defense spending, we are left with a residual variable which reflects areas of Government expenditures which can be more easily adjusted in the short run. We call this new variable adjustable Government spending. So, how does this new measure of Government spending react to a shock in real yields? Using the same structure as before (p=4, lead=12), we run a VAR on the natural log of real GDP, the natural log of the S&P 500, the real 10-year treasury yield, 10-year price expectations, and adjustable Government expenditures as a percent of GDP. See Figure 7 for the impulse data and corresponding graph.[5]

Figure 7:

Quarter	Effect on AGE
0	0.01074
1	-0.09127
2	-0.03618
3	-0.00221
4	-0.01231
5	-0.0246
6	-0.03342
7	-0.04479
8	-0.058
9	-0.06778
10	-0.07636
11	-0.08231
12	-0.08546



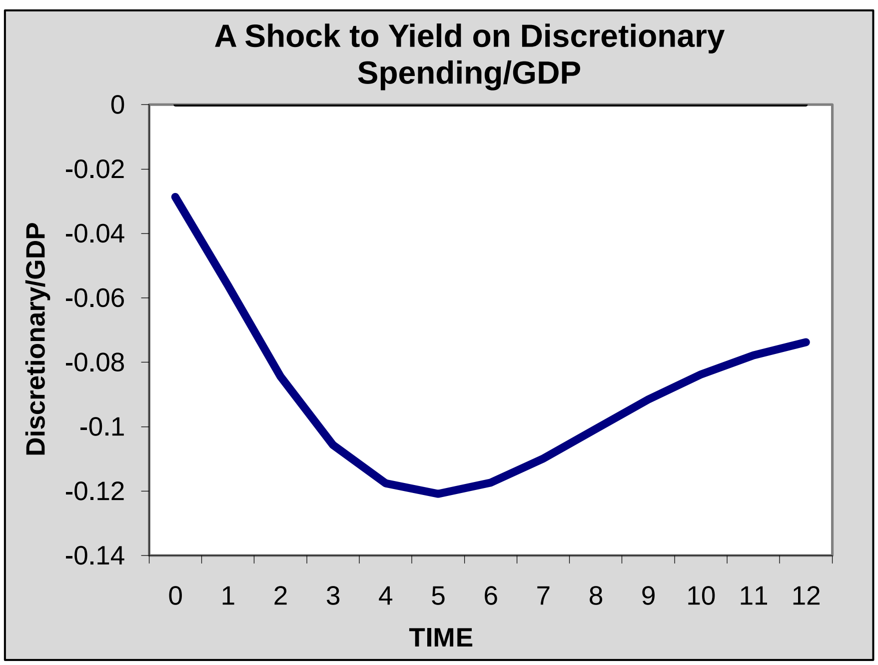
[4] The impulse response function for defense spending can be found in Table D in the Appendix
[5] A complete set of impulse response functions can be found in Table E in the Appendix.

In Figure 7, we see that a shock to the real yield has a negative effect on levels of adjustable Government spending. After 1 quarter, there is a -.09 percent decrease in adjustable Government spending. After some volatility, this shock returns to -.085% after 12 quarters.

Assuming adjustable areas of Government expenditures are influenced by the yield, we should be able to observe the effect in specific variables. One of these variables should be discretionary government spending, which is a relatively non-obligatory area of spending. Due to limited data, we can only look at this variable back to 1971, and must use annual data. Running a slightly changed VAR model, with a one period lag, and a 3 period forecast, and looking at the natural log of real GDP, the real 10-year treasury yield, 10-year price expectations, the natural log of the S&P 500, and Federal discretionary payments as a percent of GDP, we see the real yield effect on an discretionary spending. See Figure 8 for the impulse data and corresponding graph.

Figure 8:

Quarter	Effect on Discretionary
0	-0.02864
1	-0.05612
2	-0.08442
3	-0.1057
4	-0.11761
5	-0.12082
6	-0.11741
7	-0.10991
8	-0.1007
9	-0.09159
10	-0.08377
11	-0.07779
12	-0.07371



In Figure 8, we see that a one standard deviation shock to the real yield has a generally negative effect on discretionary spending. Note that since this is annual data, the graph shows the effect over a 12 year period. These results are similar to those of adjustable government expenditures after 3 years, and shows that a positive shock to the yield has a long term effect on discretionary spending.

V. Areas for Further Research

International Vigilante Activity

It would be interesting to run these models on Greece, Italy, and other countries where bond vigilante activity is more apparent. On September 1, 2009, Greece's 10-year bond yield was at 4.5%. By September 2, 2010, only one year later, this yield had ballooned to 11.3%. These default fears are forcing the European Union to take drastic measures to curtail Greek debt, showing an obvious case of bond vigilante activity. It would be simple to replicate this paper's VAR models to analyze these effects, but one would need to collect enough data, which is difficult for many of these smaller economies.

Vigilante Activity Throughout Select Periods

The analysis in this paper looks at bond vigilantes over the past 50 years. However, in recent U.S. history, bond vigilantes were fairly prominent (1980's and early 1990's). It would be interesting to analyze vigilante activity solely during these time periods, and compare them to the results from this paper. Conducting VAR analysis would be difficult due to a limited sample, but if other analyses were performed, I believe we would see an amplified result of what this paper found.

Bond Vigilantes Today and the Advent of "Dollar Vigilantes"

The models in this paper analyze vigilante activity over the past 50 years. However, there have been some recent developments which may alter the activity today. Most importantly, the Federal Reserve has been buying Government debt. This eliminates the need to sell bonds on the open market, reducing the influence the bond vigilantes have over the costs to borrow. Second, today, there is a larger percentage of public U.S. debt held by foreign governments. Although these governments can be "vigilantes" themselves, they are likely to look past minor fluctuations, and only react to major changes. Both of these changes may hinder bond vigilante activity to some degree.

So, does this mean the U.S. Government today is more immune to external constraints? Not necessarily. Lately there has been an increased interest in "dollar vigilantes." These are investors who short the U.S. dollar when they expect inflation to increase in the future. As with the bond vigilantes, these inflation fears can be sparked by perceived excess borrowing by the U.S. Government. This mechanism would decrease the value of the dollar, diminishing the government's ability to spend in real terms.

Regarding further research, it is likely that these dollar vigilantes have existed since the U.S. transition to fiat currency, albeit on a smaller scale than today. It would therefore be possible to create a VAR, which is similar to the one in this paper, to analyze their impact. However, as it appears the impact of these dollar vigilantes has increased only recently, it is possible this model may not be strong.

VI. Concluding Remarks

Bond vigilantes have gained prominence in recent years. The fiscal and financial crises faced by unsound governments such as Greece and Italy have shown that the invisible hand of the bond vigilantes can bend a government to its breaking point. However, the U.S. Government is in a unique position. It is the most trusted borrower in the world, and also the largest government, leading to an inherently stronger ability to borrow. Even so, we still see evidence of bond vigilante activity over the past 50 years, and also see evidence suggesting these vigilantes have influenced government spending. Areas of adjustable expenditure are affected, suggesting the U.S. Government reacts to the increased costs of borrowing, but does not have to perform a complete overhaul, at least with relatively minor changes in the real yield. Still, on April 18, 2011, Standard & Poors declared a negative outlook for the US AAA bond rating. This action, and the ensuing political discussions, suggests bond vigilantes may still be a strong force in the United States.

For a subject that is brought up daily on news networks and in economic conversation, it is surprising that there has been little to no serious research on the subject of bond vigilantes. By looking at bond vigilantes in the U.S. through an empirical approach, the results of this work help inform both investors and policy makers about the implications of government debt. This paper will hopefully serve as a foundation for more specialized research in the future.

VII. Appendix

Table A

Variable	No Lag		4 Quarter Lag	
Intercept	2.79***	(14.1)	2.73***	(13.4)
10-Year Price Expectations (π^e)	.099*	(1.9)	.10*	(1.9)
S&P 500 Percent Change (σ)	.015**	(2.5)	.014**	(2.3)
Deficit as a Percent of GDP (D)	.001	(.03)	.02	(.49)

Table B:

Shock to Debt as a percent of GDP on related variables:

Lag	Effect on Y	Effect on S&P	Effect on *r*	Effect on π^e	Effect on Debt
0	0	0	0	0	0.60997
1	0.00071	-0.00072	0.01903	-0.00144	0.7403
2	0.00161	-0.00317	0.05601	-0.0046	0.73467
3	0.00222	-0.00554	0.08836	-0.03232	0.82068
4	0.00216	-0.00472	0.10262	-0.06747	0.90246
5	0.00216	-0.001	0.09748	-0.08859	0.93768
6	0.00234	0.00341	0.08128	-0.09553	0.97389
7	0.00257	0.00749	0.06322	-0.09539	1.02035
8	0.00287	0.01091	0.04804	-0.09168	1.05934
9	0.0032	0.01374	0.036	-0.08666	1.08734
10	0.00351	0.01619	0.02723	-0.08258	1.10858
11	0.00377	0.01849	0.02144	-0.08037	1.12372
12	0.00398	0.02078	0.01763	-0.07977	1.13283

Table C:

Shock to Deficit as a percent of GDP on related variables:

Lag	Effect on Y	Effect on S&P	Effect on *r*	Effect on π^e	Effect on Deficit
0	0	0	0	0	0.56924
1	0.00011	-0.00379	0.01406	0.00325	0.41338
2	0.00009	-0.01101	-0.0091	-0.00458	0.41096
3	0.00108	-0.01119	-0.00095	-0.01553	0.3694
4	0.00134	-0.00964	0.02176	-0.03131	0.37771
5	0.00175	-0.00919	0.02814	-0.05191	0.3505
6	0.00196	-0.00858	0.02623	-0.06867	0.31965
7	0.00229	-0.00641	0.02231	-0.07664	0.30278
8	0.00263	-0.00444	0.01568	-0.07823	0.27953
9	0.00291	-0.00302	0.00524	-0.0774	0.25727
10	0.00319	-0.0017	-0.00481	-0.07453	0.23597
11	0.00344	-0.00033	-0.01433	-0.06952	0.2187
12	0.00369	0.0009	-0.02359	-0.06324	0.20226

Table D:

Quarter	Effect on Defense
0	-0.00371
1	0.01296
2	0.01939
3	0.02325
4	0.03001
5	0.02983
6	0.02918
7	0.03179
8	0.03304
9	0.03325
10	0.03429
11	0.03518
12	0.03546

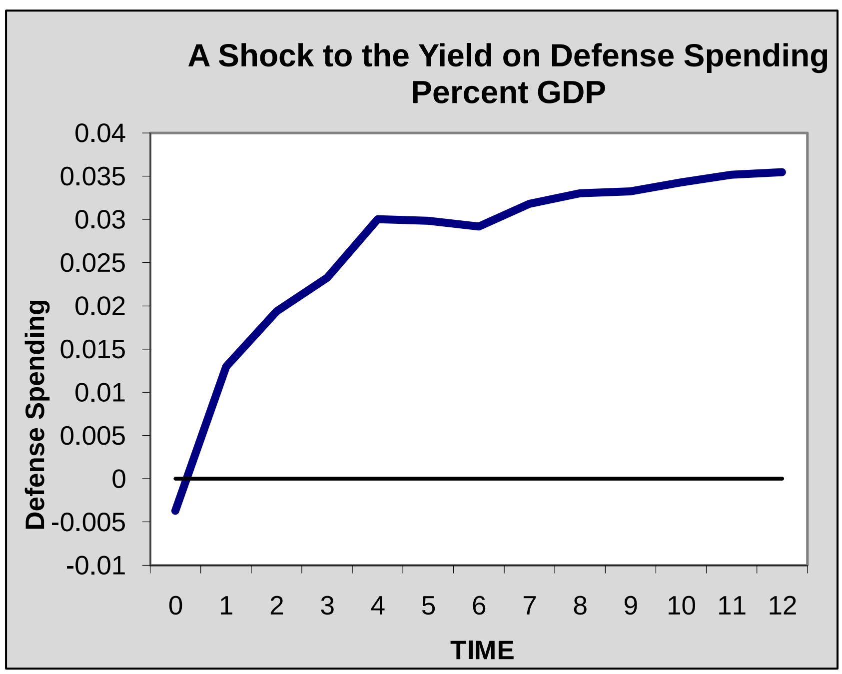


Table E:

Shock to real Yield on related variables:

Lag	Effect on Y	Effect on S&P	Effect on r	Effect on π^e	Effect on AGE[6]
0	0	0	0.38999	-0.01929	0.01074
1	0.00058	-0.00716	0.45739	-0.05768	-0.09127
2	-0.00054	-0.01111	0.38222	-0.1075	-0.03618
3	-0.00073	-0.0025	0.36657	-0.13306	-0.00221
4	-0.00051	0.00297	0.33445	-0.13383	-0.01231
5	-0.00008	0.00568	0.26764	-0.13527	-0.0246
6	0.00043	0.009	0.22727	-0.13936	-0.03342
7	0.00108	0.01226	0.19702	-0.13944	-0.04479
8	0.00167	0.01432	0.1582	-0.1361	-0.058
9	0.00212	0.01577	0.1226	-0.13149	-0.06778
10	0.00252	0.01697	0.09464	-0.1259	-0.07636
11	0.00284	0.0178	0.06979	-0.11981	-0.08231
12	0.00308	0.01843	0.04778	-0.11389	-0.08546

[6] AGE is Adjustable Government Expenditures as a percent of GDP

VIII. Works Cited

"The Bond Vigilantes." *The Wall Street Journal*. 29 May 2009. Web. 1 Apr. 2011. <http://online.wsj.com/article/SB124347148949660783.html>.

Coy, Peter. "Greece: How the Bond Vigilantes Left It in Ruins." *Business News, Stock Market & Financial Advice*. 10 Feb. 2010. Web. 1 Apr. 2011. <http://www.businessweek.com/magazine/content/10_08/b4167018421438.htm>.

Engen, Eric M., and R. G. Hubbard. "Federal Government Debt and Interest Rates." *NBER Macroeconomics Annual* 19 (2005). Print.

Federal Reserve Economic Database of St. Louis. Accessed April 2011.

Friedman, Benjamin M. "Crowding Out or Crowding In? Economic Consequences of Financing Government Deficits." *Brookings Papers on Economic Activity* 1978.3 (1978): 593-641. Print.

"Greece Government Bond 10 Year Yield." *TradingEconomics.com - Free Indicators for 231 Countries.* Web. 5 Apr. 2011. <http://www.tradingeconomics.com/Economics/Government-Bond-Yield.aspx?symbol=GRD>.

Haver Analytics Database. Accessed April 2011 with help from Debbie Johnson, Chief Economist Yardeni Research, Inc and Mali Quintana, Senior Economist Yardeni Research, Inc .

"James Carville Quotes." *GQ*. Web. 1 Apr. 2011. <http://www.great-quotes.com/quote/226268>.

Kozicki, Sharon, and Peter A. Tinsley. "Survey-Based Estimates of the Term Structure of Expected U.S. Inflation." *Bank of Canada Working Paper* 2006.46 (2006). Print.

Mankiw, N. Gregory. *Principles of Macroeconomics*. Mason, OH: South-Western Cengage Learning, 2009. Print.

"Survey of Professional Forecasters - Quarterly Macroeconomic Forecasts - Philadelphia Fed." *Federal Reserve Bank of Philadelphia*. Web. 1 Apr. 2011.

<http://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/>.

Yardeni, Ed. "Morning Briefing." *Yardeni Research -- Dr. Ed Yardeni's Economics Network*. Web. 1 Apr. 2011. <http://www.yardeni.com/>.