The Economic Impact of Carrying Government Debt on Interest Rates

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This paper examines the relationship between government debt and interest rates using a dataset of 124 countries. The effect of debt on interest rates is established in a number of ways including differentiating between OECD and non-OECD countries as well as exploring the long-term effect of a shock to debt. Prior research has done similar studies on the United States as well as with other countries, and the OLS equation used in this study is similar to studies done on the United States. I use an OLS regression model that also includes time and country fixed effects to control for natural differences in interest rate climate between countries in each set as well as the difference in interest rates over time. I find that for every 1% increase in debt/GDP for OECD countries there is a 0.09% increase in interest rates, significant at the 1% level, and that there is a decrease of 0.05% for non-OECD countries, also significant at 1%. A panel VAR model is also used with debt/GDP as the impulse variable and interest as the response, and I find that a 11% increase in debt leads to a 2% increase in interest rates between 5-10 years after the shock.

Interest Rates; Government Debt; OECD vs Non-OECD; Fiscal Policy

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Since the mid 20th century, the United States national debt has grown significantly, with the total number topping $33

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my research

believe that this is a significant expansion of some of the ideas that are present in these studies and will contribute more to the understanding of how public debt and interest rates interact.

While the previous two papers focus solely on the United States, there have also been previous studies that examine multiple countries using similar methodologies. Noriaki Kinoshita (2006) uses panel data from 19 OECD countries to determine the relationship between debt and interest rates from both a theoretical and empirical perspective. While my research will be strictly empirical, the theoretical model does provide some insight into how interest rates and debt react to both each other and external factors. The author incorporates the country's birth rate into the model and concludes that when birth rate is relatively high, government debt afaf

finds that for both net and gross debt, the beta coefficient for consumption/GDP is statistically significant. She also finds that when regressing for the coefficient on debt/GDP, a 1% increase in debt/GDP leads to an increase of 20-25 basis points for interest rates. However, once country fixed effects are controlled for, this effect significantly reduces to 4-5 basis points per 1% increase. Turner and Spinelli utilize a significantly different empirical model to estimate their results, with explanatory variables including a measure for inflation volatility, slope of each country's yield curve, and a proxy for the "global savings glut". This proxy variable is used to measure each country's indebtedness, and is the primary indicator that they are solving for. They run a regression using a dataset from 1980-2012, analyzing their equation for both internal and external public debt. They find that when government debt is entirely domestically financed, a 1% increase in government debt leads to an increase in interest rates by 2-2.5 basis points. However, they find that when government debt is externally financed, there is an amplified effect results[illegible] and that a 1% increase in government debt leads to a 3.5-3 basis point increase in interest rates. Each of these papers use varying methods to reach the same desired relationship, and find similar results. While differing explanatory variables and methodologies are used between two studies by Kinoshita and Turner and Spinelli, their results fall within the same range as each other and the two papers discussed previously.

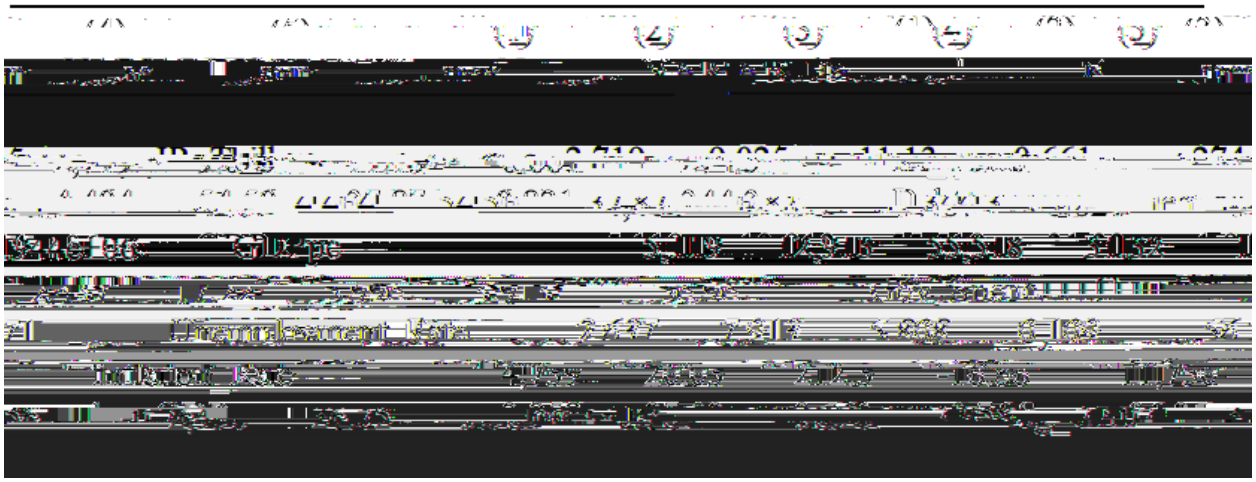
Previous studies have also implemented alternative

EU and OECD countries with interest as the impulse variable and public debt to GDP and growth rate as response variables. This differs from the approach that I will take in that I will instead observe shocks to debt and their impact on interest rather than a shock to interest. However, the methodology is still similar to both of these studies in that I will be using a large set of data that includes many countries. Qureshi and Liaqat differentiate multiple regressions by country income, and find varying results depending on the development stage of the country. They find that external debt growth has an adverse effect on GDP growth for all countries in the dataset, but that there is actually a positive effect on income growth for low to middle income countries. They also find that there is a negative impact of GDP growth on debt growth across the board. The final effects that this paper estimates differ from the effect that I wish to exemplify in that they are using GDP growth and income growth instead of interest rates, but the methodology and equations that they use influenced my approach to panel VAR significantly. Jacobs et al. conclude that there is a causal link between economic growth and public debt, but that there is not a reverse relationship between debt and economic growth. During their analysis they consider the relationship between debt and interest rates and find that there can be variation between the effects of debt and interest rates. There were some cases in which the real interest rate remained constant at a very low level, but that other countries experienced major effects to interest rates from moves in public debt. Although this paper focuses solely on EU and OECD countries, the fact that they saw a significant difference in the way that interest rates can be impacted by debt motivated my decision to further investigate how interest rate effects can be different by using a larger dataset that includes OECD and non-OECD countries.

My research will combine aspects from each of the previous papers and will add to the existing literature in multiple ways. I will use a regression equation and methodology that is

similar

since consistent data from pre-1980 is scarce, especially for non-OECD countries. There are 124 countries included in this dataset, which leads to 5,500 observations across all variables that I include. The dependent variable that I am estimating for is interest, which I measure as the interest rate on each countries' treasury bills. This is done to account for differences in monetary policy autonomy across countries, since some countries do not set their own federal interest rates. Explanatory variables include inflation, government spending, GDP, GDP per capita, unemployment, and debt. Inflation is measured as Consumer Price Index, as this is the most widely used indicator for inflation. Government spending is measured as a percentage of GDP, as is debt. Debt is the main explanatory variable that I base my analysis on, and the debt number that is being compared to GDP is total federal debt. Additionally, GDP is measured as log millions of each countries' domestic currency to avoid a large skew in the regression results. Summary statistics for each of these variables are as follows:



The main way that I estimate the relationship between interest rates and debt is via the OLS regression below:

where $\pi_{)}$ is lagged inflation, S is government spending, G is log GDP, c is GDP per capita, u is lagged unemployment, O is an id[redacted] country is an OECD country whethe.

The first set of results that I will discuss are the results from the OLS regression, which are below:

First, the coefficients for debt provide interesting information regarding the relationship between debt and interest rates for my study. The coefficients are all statistically significant at the 1% level except in column 1, which is the regression in which the OECD interaction term as well as fixed effects are excluded. The coefficients are positive in each of the subsequent columns, which is consistent with the existing literature. However, the magnitude of the coefficients is much smaller than expected. The largest coefficient comes from column 4, which is the regression with both fixed effects and the interaction term and its value is only 0.0894, which indicates that a 1% increase in debt/GDP leads to a 0.089% increase in interest. Another interesting result comes from the coefficients

These results indicate that the debt shock that will be discussed is statistically significant, with the Prob > Chi2 value being below the 5% threshold. Next, to exemplify the magnitude to which the debt shock affects interest rates, I compose an orthogonalized IRF graph:

The left graph indicates the response of interest due to the debt shock that is illustrated in the right graph. The y-axis is in percentage points, and the x-axis is in years. Therefore, the initial shock is roughly an 11% increase in debt/GDP, and the response of interest reaches a maximum

This graph shows how much of the change in interest can be explained by the shock to debt in each of the years after the initial shock. Initially, the shock effect is fairly low, but as time goes on the change in interest is more than 40% due to the shock. This is consistent with the hypothesis I pose in the previous section, that there is likely to be a dynamic effect of debt on interest rates beyond the static effect that is captured by the OLS method.

Overall, the two methods of OLS and panel VAR work together to establish the relationship between interest rates and debt. My OLS regressions indicate that when debt/GDP increases by 1%, there is a 0.09% increase in interest rates for OECD countries, and a 0.05% decrease in interest rates for non-OECD countries when fixed effects are included. The results for OECD countries are consistent with existing

shock. This could be consequential for fiscal policymakers, as the effect on interest rates is a factor that must be considered when deciding on government spending. The fact that there is a lingering effect of debt increases on interest rates should indicate to policymakers that while there may not be a significant immediate effect of debt decisions on interest rates, there could be unintended consequences in the future.

Turner, David, and Francesca Spinelli. “The Effect of Government Debt, External Debt and Their Interaction on Oecd Interest Rates.”

, Dec. 2013. ,