2010

Pricing Bond Yields in the European Bond Market

David Cook
Claremont McKenna College

CLAREMONT McKENNA COLLEGE

PRICING BOND YIELDS IN THE EUROPEAN BOND MARKET

SUBMITTED TO

PROFESSOR NZINGA BROUSSARD

AND

DEAN GREGORY HESS

BY

DAVID COOK

FOR

SENIOR THESIS

FALL/2010
11/29/10

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I. Introduction

In the past, it was generally accepted that developed countries would never default on their debt. This made sense during normal economic cycles of growth and decline because governments could borrow in bad times and repay their debts during good times. In addition, these developed countries have solid infrastructure and efficient financial markets that distinguish them from emerging countries, which have been known to default in the past. However, the recent global financial crisis and accompanying recession have challenged the belief that sovereign debt from developed countries is risk-free according to Roubini and Bykere (2010).

Specifically, Greece's debt crisis in the spring of 2010 (and Ireland's in the fall of 2010) proved to the world that even the sovereign debt of countries in the European Union are not safe. Had it not been for a joint bailout by the EU and the International Monetary Fund, Greece would have defaulted on its bonds. As a result of this increased risk, the rates for Greek debt skyrocketed, and the country was forced to pay the price for its poor financial discipline. Other countries, such as Ireland and Portugal, also found themselves in a similar position as Greece (though not to the same extent), and the interest rates on their government bonds also jumped as investors wanted increased compensation for taking on additional risk.

These three countries have something in common: high budget and trade deficits as a percentage of GDP. This makes it very hard for them to repay their debt. They cannot pay it using tax revenue because they are running a budget deficit, so they do not have any extra tax revenue leftover. In addition, the governments cannot count on cash inflows from other countries to help make payments on their debt because they are running a trade deficit. A current account surplus is an indicator of economic strength because the country must be producing more goods

and services than it needs, and these products must be in high global demand in order to have a trade surplus. Therefore, these macroeconomic indicators can be used as a proxy for a country's ability to avoid default. High deficits increase the probability of default, so countries with high deficits must pay a premium on their debt because of this risk.

Many papers have looked into the relationship between budget account levels (among others) yield spreads. The unanimous conclusion is that higher levels of government debt result in larger yield spreads relative to a benchmark country (Lonning 2000, Bernoth, von Hagen, and Schuknecht 2006, Schuknecht, von Hagen, and Wolswijk 2009). Surprisingly, the literature does not look at the effect of the current account on bond yields. Many people have studied how different factors affect the current account, but this research is not directly applicable to my topic. I want to take the literature a step further by examining the yield spreads of countries that are running budget and trade surpluses.

The fact that a country has both a budget and trade surplus (I refer to this as a double surplus) indicates that they can use tax revenue to repay existing debts, and that they can count on foreign money to bolster the domestic economy. This makes it extremely unlikely that a double surplus country will default on their sovereign debt in the short-term. As a result, they should not have to pay a default risk premium on their short-term debt. The literature already suggests that these countries should have lower yields on their bonds than countries that do not have a budget and trade surplus, specifically because budget surpluses have been shown to lower yields spreads (Schuknecht, von Hagen, and Wolswijk (2009)). This paper seeks to determine if investors decrease the premium required to hold debt from double surplus countries.

To accomplish this, I look at the yields of 2-year maturity bonds from 1998 to 2008 for eleven countries that use the Euro as their national currency. I use the yields on German 2-year

bonds as the benchmark to get yield spreads for every country in my sample, a practice that is common in the relevant literature such as Bernoth, von Hagen, and Schuknecht (2006) and Favero, Pagano, and von Thadden (2008). Germany is used as the benchmark because it is the largest economy in the EU (it has the fourth largest nominal GDP in the world) and it is the world's second largest exporter. These two facts, combined with consistent fiscal conservatism, make Germany a perennially safe country to invest in. Using member countries in the EU simplifies the model by eliminating the need to control for currency risk, inflation risk, and barriers to investment. Also, liquidity has been shown by Bernoth, von Hagen, and Schuknecht (2006) and Favero, Pagano, and von Thadden (2008) to have no significant effect on sovereign bond yields in the EMU. I use an unbalanced panel of data to conduct ordinary least squares regressions with and without fixed effects.

II. Literature Review

A lot of empirical research has been done on bond yields relative to macroeconomic indicators including research by Benczur (2001), Bernoth, von Hagen, and Schuknecht (2006) and Favero, Pagano, and von Thadden (2008). The results of this literature have implications for both governments and investors. Many papers have shown that budget deficits and other related measurements like debt service ratios and external government debt as a percentage of GDP are positively correlated to yields (Bernoth, von Hagen, and Schuknecht (2006), Ardagna, Caselli, and Lane (2007), and Schuknecht, von Hagen, and Wolswijk (2009)). This means that investors think sovereign bonds from countries that are not fiscally responsible are more risky, particularly with regard to default risk. Therefore, those countries must pay higher interest rates in order to attract investors. On the other hand, countries that are fiscally responsible are rewarded with the

ability to offer lower yields on their bonds. This paper seeks to determine if the 2-year bond yields from fiscally responsible countries are really proportional to their risk of default, which, in the case of double surplus countries, is virtually nonexistent.

When talking about bonds, one should always be aware of several different kinds of risk: default, exchange rate (when dealing with international bonds), interest rate or inflation, and liquidity. Default risk is the most closely monitored type of risk, and there are 3 credit rating agencies that rate different bond issuers based on the issuer's ability to make payments on its debt. Much of the literature that deals with bonds looks into how default risk affects bond yields. Default, especially at the developed sovereign level, is a scary occurrence, and investors often severely penalize countries for increasing default risk.

Benczur (2001) analyzed bond risks and market reactions to changes in risk. He looked at bond spreads from developing countries using relief or restructuring on sovereign borrowing in the next 5 years as a proxy for default risk, 5-year annual sample variance of bond spreads as a proxy for illiquidity, a currency crisis dummy variable, and country dummy variables. His model demonstrated that about 27% of bond spreads can be attributed to default risk. In real terms, this means that with a 10% increase in predicted default, there was 6.5 basis point increase in spreads. Liquidity had an even larger effect; it explained 60% of the spread, and an increase in the liquidity variable of .5 lead to 12 basis point increase in the bond spread. He also found that, during times of crisis, bond spreads increase by much more than can be explained by changes in default or liquidity risk. This makes sense in the realm of extremely risky and volatile developing nation markets that are not easy to invest in, but these results do not necessarily translate to bonds in developed markets.

In fact, Favero, Pagano, and von Thadden (2005) show that the modern European sovereign bond market behaves quite differently. After the formation of the European Monetary Union, currency risk was no longer an issue, and member countries gained the financial support of the other countries in the union. Therefore, bond yields converged, but still maintained significant differences due to perceived risk factors. They use bid-ask spreads as a proxy for liquidity and find that liquidity has no direct effect on bond yield spreads. In addition, their models suggest that an international risk factor plays a significant role in determining spreads.

Bernoth, von Hagen, and Schuknecht (2006) look at the European bond market before and after the formation of the EMU. In line with the other literature, they found that government debt significantly effects yield spreads both before the EMU and after. However, they note that the specific measurements of government debt have changed since the EMU began. Before the EMU, the level of government debt was a statistically significant variable, but the meaningful measurement of debt switched to debt service ratios after the EMU formed. Another change due to the formation of the EMU is the importance of liquidity. Liquidity, as measured by relative market size, was negatively correlated with bond interest rates, but, once the EMU started, this correlation ceased to exist.

Schuknecht, von Hagen, and Wolswijk (2009) add to the bond literature when they show a relationship between government fiscal data and the interest the government must pay on its debt. Specifically, if a country has a level of debt (as a percentage of GDP) that is 10% greater than that of Germany, they must pay 0.026% more interest than Germany. Additionally, when a country's budgetary deficit exceeds that of the benchmark country (again as a percentage of GDP) that country must pay 0.04% more on its debt. These results show that macro fiscal data do play a role in bond spreads. Government debt and budgetary deficit are both measurements of

fiscal responsibility, and investors expect compensation for buying debt in countries that are not fiscally disciplined.

Investors use current factors and expectations of future values to price investments. What this generally means is that a trend in recent policy decisions may be used to make future projections, and these projections will magnify the effect of the policy. Accordingly, there is a difference in the effects of fiscal policy on long-term and short-term debt. Ardagna, Caselli, and Lane (2007) demonstrated that a 1% increase in the ratio of budget deficit to GDP will immediately increase 10-year bond yields by 7 basis points, and the cumulative impact will increase substantially after 5 and 10 years by 66 and 146 basis points respectively. This suggests that changes in fiscal measurements will continue to increase bond yields even 10 years after the fact, which could be bad news for governments that continue to take on debt and run deficits.

My null hypothesis is: double surplus countries will have bond yields that reflect a lower level of risk. I predict that countries that have a budget and trade surplus will be forced to pay a default risk premium on their short-term debt that is not proportional to their actual risk of default. This will happen for a number of reasons. First, the nature of double surplus countries might cause a positive effect between double surpluses and yield spreads. Countries that have a double surplus are generally smaller in terms of GDP than countries that do not have one, so investors could be forcing the double surplus countries to pay a premium because they are small. Second, there are many different factors that investors already use to predict a country's risk of default, so they may not be combining two of them that have important short-term effects into a single variable. This would suggest a market inefficiency that some investors could take advantage of.

III. Data

Analyzing bond spreads of member countries in the EMU has its benefits in that it eliminates the need to control for currency, liquidity, and inflation. Member countries do not have the power to create inflation in their shared currency, so if they really want to use this strategy to pay off their debts, then they must leave the union. Leaving the union would be a difficult process financially and politically, so this is highly unlikely (Alesina, Broeck, Prati, and Tabellini (1992)). While focusing on countries in the EMU has major benefits, the limitations are the lack of countries in the EMU and its recent formation in 1998. As a result, I do not have an ideal number of observations in my unbalanced panel.

The Global Financial Database (GFD) provided me with annual yield data for 2-year bonds. GFD has bond yield indices for many sovereign bonds of different maturities. To keep each index at a constant maturity, it switches between bond issues as time passes and bonds get closer to their maturity while new bonds are issued. GFD has data for the open, close, high, low, and average yields for every year. I use the average yield because it is most representative of 2-year bond yields for that year. For a visual representation of bond yield spreads, see Figures 1 and 2. These bond yield spreads constitute the dependent variable in the model.

I use budget and trade level data from the International Monetary Fund's World Economic Outlook Databases. These numbers are as a percentage of GDP and measure potential default risk. Separately, GDP, GDP growth, and foreign direct investment data was retrieved from the World Bank's Data Catalogue and serve as controls in the model. This data is relatively complete for the countries in the panel.

I computed the debt service ratios using data from the Annual Macro-Economic (AMECO) database of the European Commission's Directorate General for Economic and

Financial Affairs. The debt service ratio is a country's debt payments divided by its export earnings. Both of these variables measure default risk.

Data for the global risk aversion factors was retrieved from Bloomberg and GFD. This variable is created by subtracting the average annual yield for low-grade 10-year US industrial corporate bond index from Bloomberg by the average annual yield for a 10-year US government bond index from GFD to get a yield spread. I was unable to find an index for all low-grade US corporate bonds that covered my entire date range, so I used an Industrials index to proxy for the entire market. This variable acts as another control in the model. For summary statistics for all of the variables, see Table 1.

IV. Economic Theory

As the literature has already shown, macroeconomic indicators do have an effect on bond yields (Bernoth, von Hagen, and Schuknecht (2006), Ardagna, Caselli, and Lane (2007), and Schuknecht, von Hagen, and Wolswijk (2009)). This means that investors use a country's financial statistics to determine how risky the country's sovereign bonds are. I will specifically look at the European Monetary Union bond market because it allows me to make some simplifications to my model due to the common currency. In essence, I will try to find evidence of default risk in bond yields for financially sound countries as selected based on whether or not the country has a double surplus. This would suggest that investors are overreacting to some other variable or they are incorrectly pricing the risk of those bonds.

The specific variable used to establish if safe bonds are being priced appropriately is the double surplus dummy variable. This variable has a value of 1 if an observation has a double surplus, and a value of 0 otherwise. Theory would suggest that double surplus countries are less

likely to default in the near-term because a double surplus is an indicator of good financial health. As a result, their bond yields should be lower to reflect this low risk. In other words, the coefficient on the double surplus dummy would be negative if the bonds were priced correctly.

Before creating a model with the double surplus variable, I ran a regression to determine if budget deficits and trade imbalances have the anticipated impact on bond yield spreads. To test this, I ran regressions with and without country fixed effects (see Table 1). As expected, budget deficits have a negative relationship on 2-year government bond yield spreads. This means investors force countries to pay a higher yield on their debt if the countries have a large budget deficit. Interestingly, the coefficient on the trade balance variable switches signs in the two regressions. In the basic model (regression 1), it is positive and significant, which indicates that countries with a trade surplus have to pay a higher yield than countries with a trade deficit. The coefficient switches signs in the fixed effects model (regression 2) suggesting that when a country decreases its deficit from year to year it is viewed as a safer country. The fact that the trade coefficient changes signs could indicate that it is not a good measure of default risk or that investors do not use it as an indicator of default risk. Despite this, there is not enough evidence to suggest it cannot be used as a measurement of a country's default risk. The trade balance variable in the basic model could be picking up country-specific factors that disappear in the country fixed effects model and are not controlled for by the other variables in the model.

V. Econometric Methodology

The method I use to analyze the risks and accompanying yield differences is similar to that used by Benczur (2001) and Schuknecht, von Hagen, and Wolswijk (2009). I run OLS regressions with and without country fixed effects, to see how budget deficits and trade balances affect yield spreads for government bonds. In looking at yield spreads relative to a benchmark, I

am able to control for a lot of the factors that affect European countries in general. Many papers that study the European bond market use this method, and they almost always use Germany as the benchmark. Germany is a fiscally conservative country that has remained perennially stable for several years, and is usually considered to be the safest country in the EMU. In keeping with the literature, I too will use Germany as the benchmark.

$$r_{it} - r_{gt} = \alpha + \beta_1 B_{it} + \beta_2 T_{it} + \beta_5 d_{it} + \beta_4 DS_{it} + \beta_6 D_{it} + \beta_7 GG_{it} + \beta_8 F_{it} + \beta_3 G_{it} + \beta_9 R_{it}$$

Each data point represents one year from 1998 to 2008 for a total of 11 European countries. The dependent variable is the difference between the average yield on one of the country's 2-year bonds (r_{it} where i represents one of the 11 countries and t is the year) and the average yield on Germany's 2-year bonds (r_{gt}) for that same year. The independent variables are budget surplus/deficit as a percentage of GDP (B_{it}), trade surplus/deficit as a percentage of GDP (T_{it}), a dummy for whether or not an observation has a trade and budget surplus (d_{it}), debt service ratio (DS_{it}), total debt as a percentage of GDP (D_{it}), GDP growth (GG_{it}), net inflows of foreign direct investment as a percentage of GDP (F_{it}), log of GDP in dollars (G_{it}), and a global risk factor (R_{it}).

The yield spreads might be affected by a change in the global appetite for risk. I control for this by using a proxy for global risk aversion. Codongo, Favero, and Missale (2003), Bernoth, von Hagen, and Schuknecht (2006), and Schuknecht, von Hagen, and Wolswijk (2009) all use the yield spread between low-grade US 10-year corporate bonds and 10-year US government bonds, and I use a slight variation of this variable. This measure of global risk does not vary by country. In times when investors prefer safe assets, this yield spread will increase as a result of lower US bond yields from the increased demand and higher low grade corporate bond yields as

investors ask for higher yields. Therefore, this global risk aversion variable is a good method for controlling for investor sentiment, which is difficult to quantitatively measure.

VI. Results

Out of the 9 explanatory variables in regression 3, three of them are significant, and their coefficients all have the expected sign. The budget account coefficient is negative and significant at the 95% level. What this tells us is that increasing the budget surplus (or decreasing the budget deficit) by 1% of GDP for a specific country will result in a 2.3 basis point decrease in the yield spread between that country's 2-year bonds and those of Germany. Since the standard deviation of the budget account variable is 3.32, increasing the budget surplus by one standard deviation will lead to a 7.64 basis point decrease in the yield spread.

Moving on, the coefficient for the log of GDP is significant at the 99% level. This coefficient shows that increasing the log of GDP by one will decrease the yield spread by 31.1 basis points. However, the standard deviation is only 0.195, so an increase in the log of GDP of one standard deviation will result in a 6.06 basis point decrease in the yield spread. Finally, the global risk variable is positive and significant at the 99% level. Since I am using a proxy for the global appetite for risk, I cannot make a clear connection between risk aversion and yield spreads. Nevertheless, the model predicts an 11.7 basis point increase in every country's yield spread when the yield spreads between low-grade US corporate bonds and US government bonds increases by 1%. This could be a sign of overreaction to perceived global risk that may not affect enough countries to warrant an overall increase in the yield spreads of the countries in the unbalanced panel. Overreaction is a common phenomenon in the stock market (Bondt and Thaler (1985 and 1987)), but little research has been done on investor overreaction in the bond market,

though there is no reason to assume that it does not exist in the bond market as well as the stock market.

These results suggest that a budget surplus, large GDP, and low global desire for risk will all decrease the yield a country must pay on its 2-year debt relative to Germany. In other words, these factors are all indicators of safe investments. The R-squared value for this regression is 0.522, so the model explains over half of the variation in yield spreads. Unfortunately, the coefficient on the error term is significant, which means that there are some factors that affect yield spreads that the model does not account for.

The country fixed effects model (regression 4) has similar results. In fact, the coefficient on the global risk term is only slightly different from that in regression 3. The budget account coefficient is now significant at the 90% level and indicates that a 1% increase in the budget account as a percentage of GDP will lower the spread by 1.94 basis points (6.44 points for one standard deviation). In this model, the current account coefficient is significant at the 90% level and negative. It indicates that increasing a country's trade surplus by 1% of GDP will decrease its bond yield spread by 1.23 basis points; a one standard deviation increase in the trade surplus will decrease the yield spread by 6.73 basis points. The debt service ratio is significant at the 99% level. This suggests that a 0.01 increase in the debt service ratio will result in a 2.54 basis point increase in the yield spread. In terms of standard deviations, there will be a 19.55 basis point increase every time the debt service ratio increases by one standard deviation.

The coefficient on the debt as a percentage of GDP variable changes signs in the two regressions but is insignificant in both. One would expect a positive coefficient because countries with high levels of debt relative to GDP will have to make larger payments (as a percentage of GDP) on this debt, and this will increase their chance of default. Given this, it may seem odd that

the coefficient is not positive and significant in both regressions, but Bernoth, von Hagen, and Schuknecht (2006) found a similar result. In their model, the debt service ratio was a better predictor of creditworthiness than government debt, and my model confirms this.

A key difference between regressions 3 and 4 is the significance of the double surplus dummy coefficient. This coefficient should be negative to reflect the safety of countries that run both a budget and trade surplus, yet it is positive and significant at the 90% level in regression 4. This result may be due to the nature of double surplus countries. In the EU, the countries that run surpluses tend to be smaller and have a high GDP per capita. Therefore, the double surplus dummy variable probably suffers from multicollinearity with GDP.

I can reject my null hypothesis that bond yield spreads for double surplus countries accurately reflect their chance of default. As mentioned earlier, a positive coefficient on the double surplus dummy reflects an increase in a country's bond yield relative to Germany's for countries that run a budget and trade surplus. This should not be the case because a double surplus is an indicator of financial stability. Double surplus countries not only have the ability to pay off debt using tax revenue, but they also have net cash inflows into the country which show that the national economy is healthy and the government does not borrow relatively large amounts. Yet investors clearly do not share this opinion and, instead, believe that other factors are more important in determining government bond yields. Therefore, if you do believe that double surplus countries will not default on their near-term sovereign debt, then these bonds will have higher yields than their risk would imply.

VI. Robustness Checks

To ensure the validity of the model, I ran regressions several times with different dependent variables. First, I replaced the average yield spreads with opening yield spreads so that

the model was now measuring the effect that the independent variables have on yield spreads at the beginning of each year (regressions 5 and 6). The actual values of the independent variables for a given year are often unknown until after the year has ended, so one would anticipate that this would be a poor model. As expected, these regressions had smaller R-squared values than the primary model with average yields: smaller by 0.097 and 0.159 for the simple and country fixed effects regressions respectively. This indicates that my explanatory variables are not good predictors of open yield spreads. Furthermore, the weaker results of this robustness check suggest that investors do not use yields from the beginning of a period to make their investment decisions.

Then I changed the dependent variable to yield spreads from the end of each year. The simple regression (regression 7) has a higher R-squared than regressions 3 and 5, and the country-controlled regression (regression 8) has a higher R-squared value than all of the regressions except 4. While regressions 7 and 8 have some different statistically significant variables than the regressions with average yields, they are all of the right sign except for the debt service ratio coefficient. Therefore, the model is not drastically different from the primary model. While this robustness check adds to the validity of the model, it also shows that investors use average yields rather than closing yields when determining how to price the yields of sovereign bonds.

The coefficient for budget surplus/deficit is always negative, as expected, across all of the models. Increases in a country's trade surplus should result in a smaller yield spread because the country is less risky, and the coefficient reflects this expectation in three out of the four regressions. The significant positive trade coefficient in the fifth regression could be a result of variation between countries caused by some other variables as it is in the primary regression. All

of the country fixed effects regressions have negative trade coefficients, which is evidence of the same intra-country variation in each model. One would think the double surplus dummy coefficient would be negative because countries that run both a trade and a budget surplus are safer than those that do not. However, the coefficient is always positive in these robustness checks. This result is in line with what I set out to prove in this paper.

One coefficient that was consistently positive in the average and opening yield regressions, the debt service ratio coefficient, was not as significant in both of the closing yield spread regressions and negative in one of them. This result points out a weakness in the model. It could potentially be related to the date when the statistics for the recent year are released. If the factors that go into the debt service ratio are published in the beginning of the year, then the debt service ratio is not relevant at the end of the year because it was calculated with old data. In fact, this hypothesis is supported by the trend in the debt service ratio coefficient's sign and significance for the various regressions, which decrease from highs in regressions 5 and 6 to lows in regressions 7 and 8. The negative and significant coefficient in regression 7 could be due to incorrect investor estimates of the debt service ratio prior to the announcement of the new data, which could lead them to price bonds in a manner that is inconsistent with the other models.

The coefficient on the debt as a percentage of GDP variable was the most inconsistent variable in all of the models. In fact, across all eight regressions, it was negative in half of them and positive in the rest. As mentioned in the results section, this indicates that investors do not use levels of government debt as predictors of creditworthiness. Though the coefficient was significant in two of the robustness regressions, it was relatively small, so its effect on yield spreads was minor compared to the other variables.

GDP growth coefficients should be negative because economic growth is often a sign of good policy and growing developed countries are generating revenue at increasing rates. Accordingly, this coefficient is always negative in the robustness checks, despite never being significant. Large net inflows of foreign direct investment indicate that investors have faith in the long-term growth of a country; however, this coefficient is rarely negative (as it should be) and never significant. This indicates that foreign direct investment is not an important indicator of investor sentiment in developed economies. I expected the coefficient for the log of GDP to be negative because large countries are less likely to default due to their higher levels of production and larger taxable population, and, accordingly, the GDP coefficient is negative every time it is significant. Finally, the global risk coefficient should be positive, and, whenever it is significant, it is positive. The coefficient is negative in both opening yield regressions, which is probably due to the timing of the yields relative to the global risk factor. As each year progresses, bond yields change to more accurately reflect the average global appetite for risk. This trend manifests itself in the increasing significance and strength of the global risk variable.

For the most part, the significant coefficients have the proper signs, and, though the significant variables vary, there are always a few significant coefficients in every regression. In addition, several independent variables are consistent, even if they consistently have the wrong sign.

VII. Conclusion

This paper contributes to the literature in several ways. First of all, by looking at 2-year bonds and replicating some of the results found by Bernoth, von Hagen, and Schuknecht (2006) and Benczur (2001), who looked at 10-year bonds, I am able to generalize the effect of

macroeconomic factors across multiple bond maturities. I also find that the debt service ratios are better indicators of financial fortitude than budget deficits and debt as a percentage of GDP as Bernoth, von Hagen, and Schuknecht (2006) concluded. Furthermore, global risk played an important role in determining yield spreads. This demonstrates a flight to quality effect during times of economic uncertainty that even relatively safe European government bonds cannot avoid.

Most importantly, I am able to reject my null hypothesis that double surplus country bond yields are priced to correctly reflect their extremely low chance of default. The positive coefficient on the double surplus dummy variable indicates that these yield spreads are larger than those that do not have a double surplus. Though this could be due to other factors that exhibit multicollinearity with the double surplus dummy, I believe that these double surplus bonds yields do not have the economic strength and financial health that a double surplus requires priced into them. However, a positive double surplus coefficient could also occur because a double surplus is not actually a good predictor of creditworthiness. In order to make this conclusion, additional empirical research must be done to determine the effect of a double surplus on short-term and long-term probability of a sovereign default.

There are some important implications for both investors and policy makers that one can draw from these results. As far as policymakers are concerned, my research has not proven much that has not already been discussed in the literature. Clearly, investors pay attention to macroeconomic factors and punish countries that have poor fiscal discipline by forcing them to pay higher yields on their bonds. Therefore, countries should try to keep their debt service ratio and budget deficit low, so they can borrow at lower rates. Additionally, investors do not seem to pay attention to double surpluses, so, as long as this does not significantly affect other variables

that investors do take into account, governments can feel comfortable if they are not running a double surplus. For investors, the results of my paper are perhaps more interesting. Investors who are looking for an investment that has higher returns than its risk would imply should look at the 2-year bonds of countries that have a double surplus. This suggests a market inefficiency that investors may be able to profit from until the market corrects itself.

Figure 1
The yield spreads relative to Germany for 7 of the more typical countries.

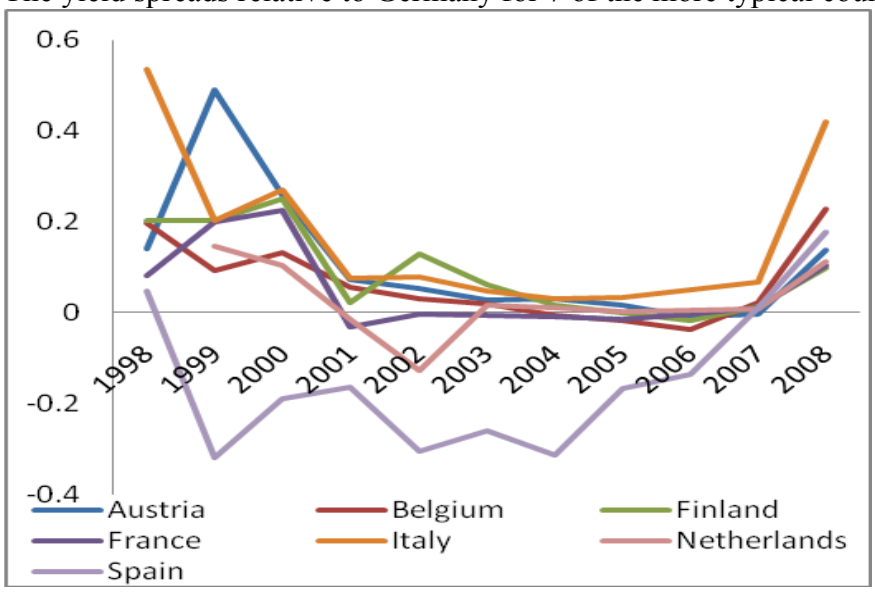

Figure 2
The yield spreads relative to Germany for the remaining 4 countries that exhibit more unusual returns.

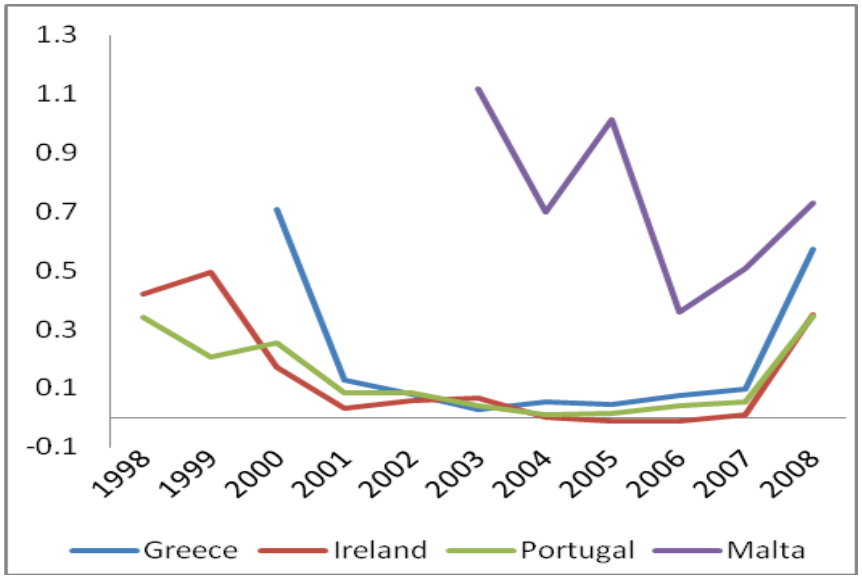

Table 1
Summary Statistics for all of the variables used in the regressions.

Average Yield Spread		*Budget (% of GDP)*		*Trade (% of GDP)*	
Mean	0.235242	Mean	-1.97892	Mean	-1.45312
Standard Deviation	0.727496	Standard Deviation	3.316475	Standard Deviation	5.468022
Count	128	Count	132	Count	132
Global Risk		*Debt Service Ratio*		*Debt (% of GDP)*	
Mean	1.611089	Mean	0.096418	Mean	72.31685
Standard Deviation	0.607831	Standard Deviation	0.07713	Standard Deviation	28.10802
Count	12	Count	132	Count	115
GDP Growth		*Log of GDP*			
Mean	2.351795	Mean	4.40207		
Standard Deviation	2.741473	Standard Deviation	0.195145		
Count	130	Count	130		

Table 2
Regression results for the basic model without the double surplus dummy. The independent variable is the average yield spread. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

	1	2
budget	-0.0198**	-0.0164
	(0.00847)	(0.00985)
trade	0.00642*	-0.0117
	(0.00378)	(0.00716)
debtserviceratio	0.503	2.257**
	(0.538)	(0.927)
debtas%ofgdp	0.00078	-0.00022
	(0.00129)	(0.00237)
gdpgrowth	0.00488	0.0185*
	(0.00973)	(0.0107)
fdias%ofgdp	-0.00053	-0.00015
	(0.00157)	(0.00146)
log10gdp	-0.270***	-0.0806
	(0.0349)	(0.157)
global risk	0.122***	0.115***
	(0.0286)	(0.0256)
Constant	2.906***	0.575
	(0.424)	(1.865)
Country Dummies	no	yes
Observations	112	112
R-squared	0.519	0.692

Table 3
Primary regression results for average yield spread observations. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

	3	4
budget	-0.0227**	-0.0194*
	(0.0093)	(0.00987)
trade	0.00529	-0.0123*
	(0.00407)	(0.00708)
doublesurplusdummy	0.0426	0.114*
	(0.0571)	(0.0622)
debtserviceratio	0.484	2.535***
	(0.54)	(0.928)
debtas%ofgdp	0.000757	-0.0013
	(0.00129)	(0.00241)
gdpgrowth	0.00456	0.0135
	(0.00976)	(0.0109)
fdias%ofgdp	-0.00031	0.000147
	(0.0016)	(0.00146)
log10gdp	-0.262***	-0.078
	(0.0366)	(0.155)
global risk	0.117***	0.105***
	(0.0295)	(0.0259)
Constant	2.812***	0.6
	(0.443)	(1.842)
Country Dummies	no	yes
Observations	112	112
R-squared	0.522	0.703

Table 4
Robustness checks: dependent variable is open yield spreads in regressions 5 and 6, and close yield spreads in regressions 7 and 8. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

	5	6	7	8
budget	-0.0106	-0.00377	-0.0221*	-0.0242
	(0.013)	(0.0156)	(0.013)	(0.0151)
trade	0.0107*	-0.00826	-0.00763	-0.0212*
	(0.00571)	(0.0112)	(0.00569)	(0.0108)
doublesurplusdummy	0.00432	0.0773	0.0985	0.0276
	(0.08)	(0.0985)	(0.0798)	(0.0953)
debtserviceratio	2.825***	7.378***	-1.336*	0.311
	(0.757)	(1.47)	(0.755)	(1.421)
debtas%ofgdp	-0.00254	-0.00807**	0.00414**	0.000839
	(0.00181)	(0.00382)	(0.0018)	(0.0037)
gdpgrowth	-0.0224	-0.0241	-0.0199	-0.0212
	(0.0137)	(0.0172)	(0.0136)	(0.0167)
fdias%ofgdp	0.00281	0.00294	-0.00168	0.00197
	(0.00224)	(0.0023)	(0.00223)	(0.00223)
log10gdp	-0.348***	0.049	-0.127**	0.299
	(0.0513)	(0.245)	(0.0511)	(0.237)
global risk	-0.0157	-0.0436	0.310***	0.280***
	(0.0413)	(0.041)	(0.0412)	(0.0397)
Constant	4.097***	-0.497	0.954	-3.854
	(0.62)	(2.916)	(0.619)	(2.821)
Country Dummies	no	yes	no	yes
Observations	112	112	112	112
R-squared	0.425	0.544	0.551	0.665

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