



**University of
Zurich** ^{UZH}

**An analysis of the European Sovereign Debt Crisis:
Did financial markets behave rationally?**

Master Thesis in
Corporate Finance

Author: Stefan Gartler

supervised by

Michael Reichenecker
Prof. Dr. Alexander Wagner

Department of Banking and Finance
at the University of Zurich

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Executive Summary

Sovereign bond yields of Portugal, Ireland, Italy, Greece and Spain (the PIIGS) have risen to unprecedented heights since the onset of the global financial crisis. Greece was hit first and hardest by the large increase in borrowing costs on sovereign bond markets, which put the country in serious danger of bankruptcy. However, Greece did not remain the only country that had to cope with increasing government bond yields. Soon after, when fears of a domino effect in the European monetary union began to spread, several other member countries were also confronted with soaring borrowing costs. In order to avoid a collapse of the euro, the European Union, the European Central Bank and the International Monetary Fund approved a rescue plan of more than EUR 700 billion in 2010. However, even this enormous rescue package could not calm financial markets for good; shortly afterwards, government bond yields rose again.

The purpose of this thesis is to identify reasons why sovereign bond yield of the PIIGS increased so dramatically between 2008 and 2010 and whether the increases were caused only by changes in macroeconomic fundamentals or also by changes in investors' risk assessments. Therefore, a regression analysis is conducted that investigates determinants of yield differentials between the PIIGS and the benchmark country Germany over the period January 1999 until September 2010. However, before the regression analysis is carried out, a brief summary of possible causes and their consequences is presented followed by a review of existing literature on this topic.

A detailed study of data between the foundation of the European monetary union (EMU) and the outbreak of the global financial crisis (1999-2007) reveals that it is not as straightforward to find causes for the rapid and substantial increases in government bond spreads as one might think. No clear evidence for faulty debt policies can be found over this time period which explains why the PIIGS were confronted with rapidly increasing borrowing costs in bond markets after 2007. While it is true that certain countries accumulated high amounts of debt, with two of them at even more than 100% of their GDP (Italy and Greece), this was certainly not the case for others (e.g. Ireland and Spain), who decreased their debt burden between 1999 and 2007 and had much lower Debt-to-GDP ratios than Germany. Yet, all of them could not refinance them on the sovereign bond market without agreeing to pay huge risk premia in the future. Additionally, statistics about countries' real GDP growth rates, external accounts or the labor market do not

provide sufficient reasons for bond market developments after 2007. The picture, however, changes drastically with the emergence of the global financial crisis.

The data indicate that the financial crisis changed countries' economic perspectives significantly and contributed a great deal to the current sovereign debt problems of the PIIGS. Yet, it is wrong to blame governments alone for the sovereign debt crisis since the analysis shows that the private sector is also to a large extent responsible for the poor economic situation in which the PIIGS and also other EMU member countries found themselves after 2007. In particular, financial and non-financial corporations increased their leverage significantly between 2002 and 2007, which made it costly for governments to provide guarantees or to recapitalize banks when the crisis hit the economy. These rescue measures strained public finances and deteriorated the PIIGS' economic outlook further.

However, several academics and experts are accusing not only governments and the private sector of having aggravated the European sovereign debt crisis but also the institutional organization of the European monetary union. In particular, the EMU has been criticized for poor policy coordination among member states and the non-existence of institutions or funds (e.g. a stabilization fund) that explicitly deal with sovereign debt problems in order to avoid the widespread uncertainty which could be observed after 2007 on financial markets. Finally, another possible cause for those unexpected high government bond spreads that has been discussed by economists and politicians alike are coordinated speculative attacks by large hedge fund investors. This cannot be proven with certainty; nevertheless, it should be still taken into consideration. The consequences of the sovereign debt crisis were not only approvals of rescue packages but also severe downgradings of sovereign bonds by rating agencies. This started a vicious cycle since downgradings deteriorated the economic outlook of the PIIGS, which in turn led to further spread increases and further downgradings. When it will be possible to break this vicious cycle and what will be necessary to do so is at the moment the topic of many discussions but so far still unclear.

It is all the more interesting to determine what exactly drives government bond spreads. The literature on government bond spreads determinants is extensive, with first studies dating back to the 1990s. Results of the earliest investigations from the United States show that sovereign bond spreads are significantly influenced by states' debt and deficit levels. More recent studies conducted for EMU member states confirm these findings but also identify two additional important impact factors; the liquidity of a bond and investors'

risk aversion. Yet, while studies that analyze the period prior to the emergence of the global financial crisis find evidence that government bond spreads relate to macroeconomic fundamentals, this finding cannot be confirmed anymore in most recent studies which have a sample period that contains the years 2008 and 2009. Latest papers find that a substantial part of yield differentials remains unexplained by their regression equations, which indicates that a regime shift has taken place since 2008.

After the review, a regression analysis is carried out that uses a dataset which also contains data of the second half of 2009 and the first three quarters of 2010, a period none of the previous studies has analyzed so far. The estimation equation for this analysis has as a dependent variable the sovereign bond spread between the PIIGS and Germany. Furthermore, it contains as explanatory variables fiscal variables, a monetary and liquidity control variable as well as a risk aversion and a political climate indicator to measure changes in investors' risk appetite and changes in the political environment. Since autocorrelation is persistent in the data, an autoregressive model is selected that includes one or more lags of the dependent variable to ensure white noise residuals. Due to non-stationarity of several variables over the whole sample period, the obvious approach of running two regressions, one with pre-crisis data and one with data after 2007 in order to compare results afterwards is not possible. Therefore the impact factors for sovereign bond spreads are determined using a reduced estimation period that stretches from 1999 until 2007. These estimation results are then used to make an out-of-sample prediction for the period 2008 until 2010.

Estimation results show that prior to the financial crisis investors' risk appetite has a highly significant impact on movements in yield differentials for all countries that are analyzed. Fiscal variables, on the other hand, do not influence sovereign bond spreads as significantly as previous studies suggest. A country's debt level is still an important determinant, but results indicate that between 1999 and 2007 changes in government debt did not always lead to significant changes in yield differentials. Investors' trading behavior was more influenced by changes in the monetary control variable, the ECB deposit rate, and the overall level of risk aversion than by the country's economic outlook. This suggests that investors probably did not regard a default of the PIIGS as a very likely event prior to the financial crisis.

This perspective changes quite dramatically after 2007. Out-of-sample predictions deviate substantially from real sovereign bond spreads, which provides clear evidence that

increases in yield differentials are caused not only by changes in macroeconomic data, bond liquidity or the political environment but also to a great extent by changes in investors' risk assessments. This finding supports results of latest studies which suggest that a regime shift has occurred since 2007. Furthermore it shows that the attempts of the EU, the ECB and the IMF to calm financial markets were not successful (over the sample period). Three possible scenarios are proposed that could have brought about this rather strong regime shift. Scenario one, where investors reassessed existing bond spread determinants and concluded that they misjudged their impact on the likelihood of an investment loss; scenario two, where investors reassessed impact factors and arrived at the conclusion that one or more important factors had been neglected; and scenario three, where they did both at the same time. Why investors changed their risk assessment so drastically within such a short period of time cannot be answered with certainty given the available data. Yet, as it is outlined in this thesis, the literature on asymmetric information provides a theoretical basis that can explain certain behavioral patterns for which it is otherwise difficult to find meaningful explanations, e.g. herding behavior. This should be analyzed in more detail in further studies.

To conclude, the empirical analysis provides evidence that investors' risk perceptions significantly influences the sovereign bond spreads of the PIIGS and that changes in investors' risk assessments are to a large extent responsible for those sharp increases in yield differentials that could be observed after the onset of the global financial crisis. Recent developments on the European sovereign bond market have shown how harmful rapid and large changes in risk assessment can be. Therefore, it will be crucial for the European Monetary Union to improve their information policy and to have a clear stance on such important economic issues such as bailouts or the provision of state guarantees in order to mitigate the uncertainty that exacerbated the European sovereign debt crisis.