



Department of Economics and Finance – Economics and Business, Finance
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Course: The European Economy and European Economic Governance

**The Importance of Stability and Credibility on Investor Confidence: A
Case Study of Greece**

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CHAPTER I: INTRODUCTION

The topic of sovereign debt is quite fascinating as it encompasses complex interactions between governments, creditors, and financial markets, offering an interesting view through which to explore issues of fiscal policy, debt restructuring mechanisms, and the effectiveness of policy responses in addressing crises.

The attractiveness of sovereign debt to investors is influenced by factors such as economic fundamentals, political stability, institutional quality, and market liquidity, shaping risk perceptions and investment decisions. Moreover, literature seems to show how, despite some countries' frequent defaults and restructurings, on average sovereign bonds offered returns varying from 4% to 12% and so investors were compensated for the risks they took also when compared with other asset classes such as equities.

In the period of 2000-2009, Greece was able to borrow from the markets at relatively low spreads (less than 1 basis point); one might ask why considering that the Greek economic conditions were not particularly thriving. To be more precise, the literature shows how the deterioration of Greek economic fundamentals was one of the main reasons leading to its crisis; so why was this element perhaps “overlooked” by investors?

If we look at the data, since EMU accession in 2001 the country has experienced consistently higher inflation than the EMU average, resulting in pronounced competitiveness losses and record current account deficits; moreover, Greece was experiencing a slight decline in working age population and a lower labor force participation rate compared to other EU countries.

Some elements that require attention when trying to answer this question include currency strength (the Euro certainly increased Greece's perceived stability), the misreport of many economic statistics (which made it very hard to identify the Greek actual debt and deficit), sovereign risk sometimes being not so “sovereign” as thought, the importance of credit risk ratings and political stability and background.

In order to grasp better what shapes investors' confidence and appetite for risk, one must analyze the crucial role played by stability and credibility; for example, between 2009 and 2010, Greece went from a regime of credible commitment to future EMU participation under an implicit EMU/German guarantee of Greek fiscal liabilities, to a regime of non-credible EMU commitment without fiscal guarantees which was obviously reflected very substantially in Greek sovereign bonds yields.

These two key elements also play a crucial role in assessing a country's vulnerability to future crises, as also macroeconomic fundamentals do; however, the literature has often advanced the hypothesis that each generation of models seems to only able to explain the preceding wave of crises and must be adjusted when the next crisis comes.

Another key issue indeed lies in how a country can regain market trust and what elements play a role in assessment of policy effectiveness and actual recovering possibilities from the perspective of sovereign debt investors; there is a very interesting branch of literature dealing with the relationship between the type of government and its political ideology and the confidence perceived by investors in that given country.

The thesis aims at exploring the pivotal role of stability and credibility in shaping investors' confidence and expectations by taking Greece as a lens through which analyzing these elements.

Since its independence in 1829, Greece has experienced four major default episodes (respectively in 1843, 1860, 1894 and 1932) and a default on the 1.6 billion euros loan from the IMF in 2015. With historical parallels throughout its history, Greece constitutes a very good candidate to investigate the role of credibility and stability on investors' appetite for risk, effectiveness of macroeconomic policy and sovereign debt yields; this is especially true the period of the early 2000s, when Greece was hit particularly hard by the Eurozone Crisis and still faces repercussions.

Regarding the structure of the thesis, firstly, chapter II presents and analyses what the most important authors and scholars argue on the topics of sovereign debt, assessment of a

country's worthiness level, determinants of sovereign credit ratings and factors influencing the perceived stability and credibility of a government in both normal and crisis times.

Then, chapter III further elaborates on the topic of the determinants of sovereign risk and how much stability and credibility influence the market risk attitude and country risk rating by more specifically looking at Greece's entrance in the EMU in 2001: even though Greece misrepresented some economic fundamentals, still it was believed that the Greek economic condition was not compatible with long-term EMU participation. However, the new credibility perceived by markets thanks to EMU entrance was enough to make these factors be "overlooked" and allow Greece to borrow at a spread more than 3 basis points lower in comparison to the end of the 90s. I believe the reduction in spreads caused by EMU accession emphasizes how crucial is the perception investors have of the country's stability and credibility, especially considering that the discount Greece was able to borrow at was definitely *not* fundamental-based.

Moreover, chapter III addresses the topic of how what are the factors that play an important role in recovering and regaining market trust and credibility after a crisis, dealing with the IMF program's failure to "restore market confidence" in 2010 and the impact austerity had on the investors' perception of the country. In this context it is also interesting to look at Greece's current situation, since it recently regained investment-grade rating, and to see what are the key elements that lead markets to partially trust Greece again.

Finally, chapter IV presents an empirical model (an R time series regression analysis) that has the purpose of assessing what shapes and influences investor behavior and risk aversion when it comes to investing in sovereign bonds, with the aim of determining what role is actually played by government credibility and stability in these dynamics.

CHAPTER II: ANALYSIS OF THE LITERATURE

Sovereign bonds are an attractive asset class as they offer returns that are usually perceived as safer in comparison to other asset classes, such as equities for example, but in reality, there are multiple factors influencing how “safe” these assets are actually perceived to be by investors. Sovereign debt crises are events that happen quite seldom in wealthier, developed countries, however, history has shown how hard it can be to actually choose the right indicators and predict how the events will unfold, rather than just connecting the dots when the crisis has already happened; this problem mainly relates to the great amount of different factors intertwined in shaping the perception of a country’s financial and macroeconomic condition.

The literature finds that there are some variables that particularly affect the market premium of country risk, mainly liquidity, solvency and economic stability (IM Baek, 2005). However, also market’s attitude towards risk plays an important role in the determination of the market-assessed country risk premium, as research shows that countries that are not necessarily experiencing changes in economic fundamentals may find changes in their bond yield spreads because of fluctuations in the market’s risk appetite. Moreover, the market’s attitude towards risk does not affect published country risk ratings, which are based primarily on the economic fundamentals of the rated countries (however, on this last point, there are some contradicting pieces of literature).

Further literature on sovereign debt in advanced economies analyses the impact of political ideology and flexible policymaking on long-term government bonds interest rates. It’s important to stress the crucial role credibility of political systems plays for investors, as they cannot rely on a particular government to repay loans, as governments must face the electorate at least every 5 years, and the benchmark term for sovereign debt is 10 years. Therefore, investors need to estimate the general credibility of the political system (Breen and McMenamin, 2013). Credibility appears to be key even from the point of view of the borrowing government: literature has shown that, for instance, when budget plans are credible (as measured by how close professional forecasters’ projections are to official

announcements), borrowing costs can fall temporarily by as much as 40 basis points. This is applicable even for governments that do not borrow from markets, as fiscal credibility can attract private investment and foster macroeconomic stability.

Research also points out how investors' expectations about a country's repayment possibilities are influenced by the type of government security: a confidence crisis in public debt management is less likely if the average maturity of the debt is longer, if the rollover of the outstanding stock of debt is more evenly smoothed out over time, and if the government has better access to foreign credit lines in the event of a debt panic (Calvo, 1988).

Another key element for investors when making investment decisions is sovereign credit ratings, which can heavily influence a country's sovereign bonds yield; Cantor and Packer point out how six factors appear to play an important role in determining a country's rating: per capita income, GDP growth, inflation, external debt, level of economic development, and default history. But there seems to be no systematic relationship between ratings and either fiscal or current deficits, perhaps because of the endogeneity of fiscal policy and international capital flows. Moreover, the ability of ratings to explain relative spreads cannot be wholly attributed to a mutual correlation with standard sovereign risk indicators. A regression of spreads against variables used to predict credit ratings explains 86 percent of the sample variation and because ratings alone explain 92 percent of the variation, ratings appear to provide additional information beyond that contained in the standard macroeconomic country statistics incorporated in market yields.

Sovereign bond yields proved to be very susceptible to the channel of contagion of shifts in investors risk appetite, or risk aversion; under this form of contagion, investors share a common but changing appetite for risk (Kumar and Persaud, 2002). This may not be entirely inconsistent with the classical assumption that investors have different but fixed risk appetites, as they may not have a single preference function or a continuously changing one, but it may be that at any point of time investors' appetite for risk is in one of two states: risk loving and risk averse. When investors' appetite for risk falls, they immediately reduce their exposure to risky assets, which, consequently, fall in value together. When investors' appetite for risk rises, risky assets are in increased demand and rise in value together. This type of

contagion has been called "pure" contagion because it runs along the lines of risk, not shared fundamentals, trade, or exchange rate arrangements.

Following on this line, there is some piece of evidence arguing that sovereign risk is less "sovereign" than research assumes, namely that investors evaluate governments based not only on what they do, but also on investors' view "peer" countries (Brooks, Cunha and Mosley, 2015). Professional investors use investment categorizations (geography, sovereign credit rating market development) as a heuristic device. As a result, peer country effects, as well as country-specific and (booms, crises, or shocks), should explain sovereign interest rates.

Sovereign bond yields are influenced also by the composition of the investor base (Andritzky, 2012): the share of securities held by non-residents seems to be negatively correlated with bond yields, with this effect being stronger for euro area countries; the data also provides evidence that volatility increases in the presence of non-resident investors. However, the relationship between non-resident holdings and yields does not yet establish whether causality exists between the two.

Between mid-2010 and end-2011, foreign investors cumulatively reduced their exposure to high-spread euro area sovereign debt by about US\$ 400 billion; in those countries where outflow of foreign investors have been most severe (Greece, Ireland, and Portugal), domestic banks have had to take up most of the slack that was not taken by the foreign official sector (Arslanalp and Tsuda, 2014). Looking at the history, we observe that there are shifts in investors' risk appetite but, if we focus on the big picture, sovereign bonds constitute an attractive asset class as the history of external sovereign bonds is a history of "frequent investor profits and occasional losses" (Meyer, Reinhart and Trebesch, 2022). Defaults and haircuts have been a recurring feature in this market, but on average investors were compensated for the risks they took also when compared with other asset classes such as equity. This asset class offers indeed comparatively rich coupons.

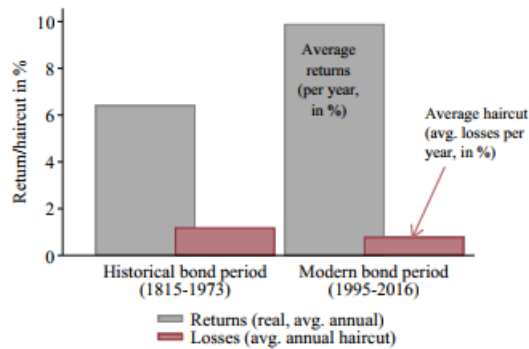


Figure 1 Returns vs losses on external sovereign bonds in the historical and modern period. *Sovereign Bonds since Waterloo*, Meyer, Reinhart, Trebesch, 2019 revised 2022

During periods of optimism and financial stability, creditors may become dismissive of the possibility of default and expect full repayment of the rich coupons offered in this asset class, resulting in lending booms (pattern of “market exuberance”). The returns look surprisingly high even for countries that have defaulted multiple times and over long periods, such as Argentina, Brazil, Ecuador, Greece, Mexico, Ukraine, or Venezuela. These countries feature long-run excess returns between 4% and 12%. These findings show why investors are so attracted to sovereign bonds, even in cases of riskier countries.

Looking at the case of Greece, two centuries of debt crises highlight the pitfalls of relying on external financing. Since its independence in 1829, the Greek government has defaulted four times on its external creditors – with striking historical parallels. Each crisis is preceded by a period of heavy borrowing from foreign private creditors. As repayment difficulties arise, foreign governments step in, help to repay the private creditors, and demand budget cuts and adjustment programs as a condition for the official bailout loans. Political interference from abroad mounts and a prolonged episode of debt overhang and financial autarky follows. The relevant literature (Reinhart and Trebesch, 2015) concludes that these cycles of external debt and dependence are a perennial theme of Greek history, as well as in other countries that have been “addicted” to foreign savings.

But to which extent are crisis predictable? International reserves and real exchange rate overvaluation, the top two indicators identified in the review, stood out as useful leading

indicators of the more recent crisis. Several other variables appear as potentially useful leading indicators, such as lower past credit growth, larger current accounts and saving rates, and lower external and short-term debt, which were associated with lower crisis incidence. However, Readers of the Early Warning Indicators literature have often gotten the impression that each generation of models is only able to explain the preceding wave of crises and must be adjusted when the next crisis comes (Frankel and Saravelos, 2012). To bring a concrete example, Willems and Al Amine (2020) proved that countries that experience optimistic investor sentiment, and that are thus able to borrow more easily, are more likely to experience decreased growth and economic difficulties in the future. In terms of magnitude, their findings suggest that being able to borrow at a lower spread (than suggested by fundamentals) of one standard deviation will reduce GDP growth of 0.18% in the following two years. This appears to be particularly applicable to Greece, as the country found itself able to borrow at quite attractive conditions compared to its actual economic conditions. In this case it becomes significantly tempting for a country to finance its deficit through external borrowing, however, this “undue optimism” has been showed to be quite harmful for countries with high deficits. The question, however, remains, as to how actually predictable each crisis is, as all the models appear to identify patterns that could be connected to economic hardship only ex post.

Shifting again our focus to Greece, it can be observed that spreads were significantly below what would be predicted by fundamentals from end-2004 up to the middle of 2005 (Gibson, Hall and Tavlas, 2012); by contrast, since May 2010, actual spreads have exceeded predicted spreads by some 400 basis points. To be more precise, the literature (Arghyrou and Tsoukalas, 2011) again highlights the importance of confidence and stability, arguing that the crisis itself and its escalating nature are very likely to be the result of on one hand, a steady deterioration of Greek macroeconomic fundamentals over 2001-2009 to levels inconsistent with long-term EMU participation, and, on the other hand, a double shift in markets’ expectations, from a regime of credible commitment to future EMU participation under an implicit EMU/German guarantee of Greek fiscal liabilities, to a regime of non-credible EMU commitment without fiscal guarantees, respectively occurring in November 2009 and February/March 2010.

During the crisis default was thankfully avoided (at least until 2015) and the debt exchange set a new world record in terms of restructured debt volume and aggregate creditor losses, but the literature also shows that the “haircuts” suffered by creditors on average were considerably lower than the 75% widely reported in the financial press at the time of the debt exchange, namely, in the order of 59%-65%, depending on which methodology is applied (Zettelmeyer et al., 2013). Furthermore, these losses were not equally distributed across creditors, with much higher present value losses on bonds maturing within a year (75% or more), and much lower losses on bonds maturing after 2025 (less than 50%).

Restructurings, especially of high magnitude, obviously take a big toll on investors and also influence credit ratings, but in different ways relating to the type of restructuring (Marchesi, Masi and Bompreszi, 2021): as official deals are concerned, it is found, on average, an increase in ratings that peaks after 3 years; in the case of private agreements, the estimates indicate a persistent negative effect of a final restructuring on agency ratings (that peaks after four years with a 2.25 drop in agency ratings). During the crisis, most Greek bonds were held by banks and other institutional investors. This helped eliminating the problems, often faced in restructurings, of holdout (for better terms, by creditors) and free riding (incentive of each creditor not to participate while hoping that all other bondholders accept), as institutional investors were susceptible to pressure by their regulators and governments.

After the escalation of the crisis, Greece, with external help from the IMF, took on the quite difficult task of regaining credibility and market confidence. In 2010 the IMF combined the highest loan in its history with an “ambitious” policy package in order to restore confidence in markets; however, the outcome was disappointing: throughout the 22 months of the program duration, investors became increasingly reluctant to lend to Greece. They asked the Greek government for an interest rate of 7% at the beginning of the program, and it spiked to a whopping 29% in February 2012 when the program was eventually canceled and replaced with a new one. But why did the Greek bailout program fail to restore investor confidence despite the unprecedentedly large loan, coordinated support from the IMF and the European Union, and the government’s overt commitment to extensive economic reforms? To use an IMF term, the Greek program failed to trigger “catalytic effects” (Shim, 2022): it

did not catalyze private financing, which means that it did not spur private sector growth as the engine of economic growth. When private financing does not follow an IMF program, a borrower economy falls into a lengthened economic crisis, as was the case for Greece.

Another very interesting branch of literature is the one analyzing what have been the most relevant factors contributing to the escalation of crises. To bring a concrete example, Italy showed quite some similarities with Greece in the pre-crisis period: (Pagoulatos and Quaglia, 2013) their national financial systems have evolved as bank-based systems; they were latecomers in liberalization, subject to regionalization rather than globalization in their banking systems; and, as the analysis of the bank balance sheets reveals, relied to a limited extent on market-based banking, compared with the more advanced financial systems in the European Union; moreover, in 2008, both Italy and Greece had similar public debt levels close to 110 per cent of GDP and in both countries the large public debt levels were not a matter of huge private debt (as in Spain or Ireland) turning into public debt, but public debt to begin with. However, in opposition to Greece, Italy was impacted far less than Greece by the crisis and this can be probably traced back to the relatively higher competitiveness of the export sector, the amount of debt the country had to refinance on the market, the amount of debt held abroad and a much more consistent track record of fiscal discipline and credibility over the 2000s.

CHAPTER III: STABILITY, CREDIBILITY AND INVESTOR CONFIDENCE

1.1 Are Sovereign Bond Spreads Determined Solely by Macroeconomic Fundamentals?

Sovereign debt literature highlights how the main factors influencing the market premium of country risk seem to be liquidity, solvency and economic stability, measured through macroeconomic fundamentals such as GDP, inflation, deficit and debt levels. However, reality shows that there is a, sometimes quite significant, portion of spreads that cannot be fully explained by a country's fundamentals.

From 1997 onwards, Greece experienced a quite sharp decrease on sovereign bonds spreads. This phenomenon was part of a general convergence of yields (to the German Bund) that the EU countries experienced from the end of the 90s to the pre-crisis period. The main reasons behind this convergence were found in the complete free capital mobility within the EU starting from 1993, the implementation of the Maastricht Treaty (1993) criteria and the creation of the European Central bank in 1998.

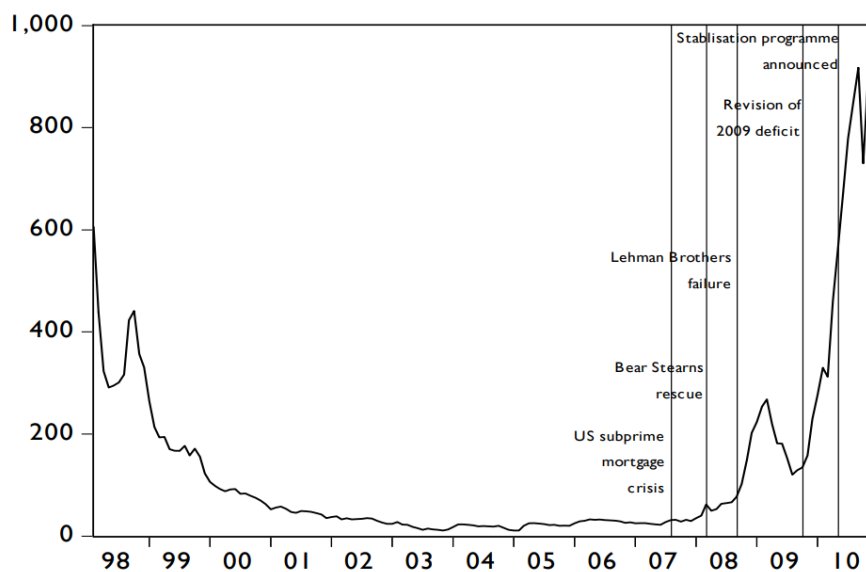


Figure 2 Yields on Greek over German 10-year benchmark bonds (in basis point) Gibson, Hall, Tavlás 2011

However, if we look at Greece’s macroeconomic fundamentals, we do not observe such a significant improvement that could fully explain the improvement of bond rates; to be more precise, *figure 4* does exhibit a decrease in inflation rate, however, *figure 3 and 5* do not show particularly favorable changes in debt levels and GDP growth rates during the years when Greece experiences a significant reduction in spreads. This “mispricing” of the Greek bonds led to a very high capital inflow in a country with deteriorating economic fundamentals.

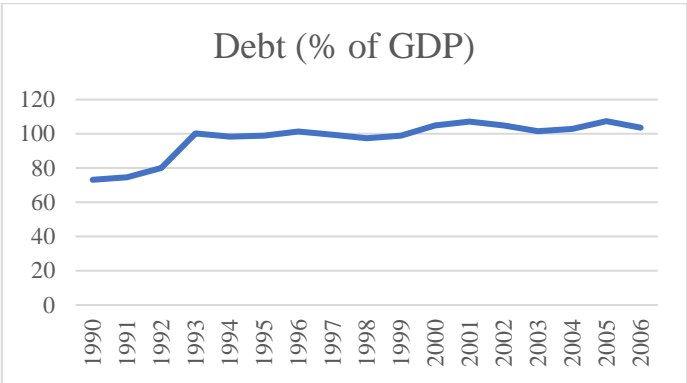


Figure 3: Debt as percentage of GDP (data from the IMF Database)

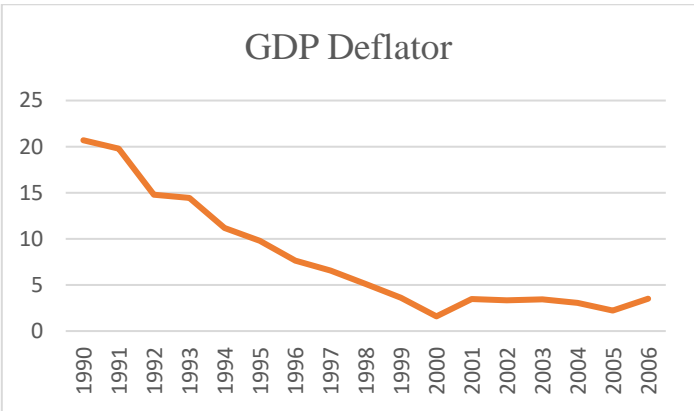


Figure 4: GDP deflator as a proxy of inflation rate (data from the World Bank Database)

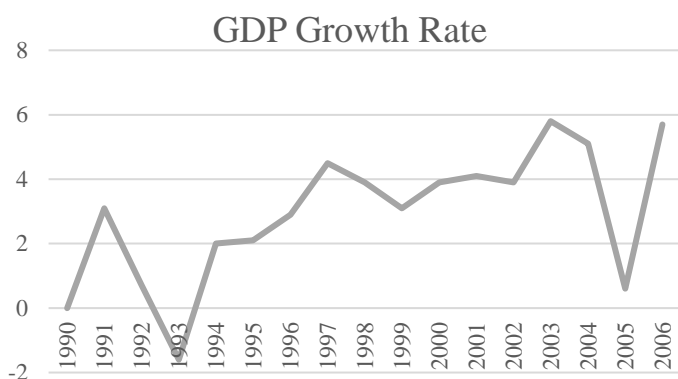


Figure 5: GDP growth rate (data from the World Bank Database)

1.1.1 Information Overload and Investors' Response

The answer to this apparent contradiction lies in the importance that the perceived - rather than the actual - stability and credibility of a country has on investor risk appetite. It's quite interesting to observe how in the span of 4 years some very important events happened: in June 1997 the European council adopts the Stability and Growth Pact in order to ensure budgetary discipline, in June 1998 the European Central bank is created, and on January 1st 2001 Greece joins the third stage of the EMU introducing the euro. Now, inferring causality can be a difficult task, however, it is quite interesting to reflect on how these events surely made Greece appear more "reliable" and "trustworthy" in the eyes of market participants.

Relating this matter, Brooks, Cunha and Mosley (2015) argue that investors evaluate countries not only by looking at macroeconomic fundamentals but also at "peer countries" (which could facilitate contagion during a crisis). Their argument lies in the fact that countries with "responsible, risk-free" peers will be evaluated quite differently, thus leading to better credit access, that countries with riskier peers. Interestingly enough, the premium demanded by markets to the Greek government was deeply affected by Greece's shift from "emerging Europe" in the 90s with a spread over German bonds of more than 600 bp, to "Eurozone" in the 2000s with less than 100 bp, and then to a "PIIGS" country after the crisis with more than 800 bp. Even if it might sound trivial, investors tend to treat differently developed and developing countries even when their fundamentals are not that different, just because

developed countries are thought to be free for the “original sin” that taints emerging market’s sovereign debt (Eichengreen et al. 2005).

Social psychologists have explained this behavior to be a response to the information overload of international bond markets: this categorization serves as a cognitive shortcut that accentuates perceived differences between groups and minimizes perceived differences within groups (Tajfel and Wilkes 1963; McGarty and Penny 1988) with the purpose of making sense of a complex environment and trying to increase the efficiency of international bond markets.

These categorizations usually reflect geographical closeness, market development and perceived creditworthiness and, very surprisingly, literature has shown that they appear to be largely exogenous to government action. This emphasized once more how a country’s perceived creditworthiness is linked to much more than macroeconomic fundamentals and gives a nice interpretation as to why Greece was able to borrow at such favorable conditions during the 2000s and as to why, in the midst of the Eurozone crisis, the Spanish finance minister took effort to distinguish his country from Greece, with the sentence “Spain is not Greece”. This might seem a too obvious of a statement, however, even though the “GIPSI” countries were hit quite differently by the crisis, they were still placed in the same group by investors, which facilitated contagion of the Greek sell-offs of sovereign debt to the rest of peripheral Europe. That is specifically why, not only Spain, but also Italy, Portugal, Ireland and even Greece itself really tried to distinguish themselves from the other “GIPSIs” and to convince investors that this categorization was inaccurate in assessing their actual creditworthiness. Brooks, Cuhna and Mosley actually measured empirically this relationship and found that each 1-point increase in average risk peer spread is associated with a 0.4 basis point increase in the reference government’s spread, with emphasis on how also short-term changes bring significant and persistent movements in spreads.

1.1.2 The Role of Sovereign Credit Ratings

Greece's migration from "emerging Europe" to Eurozone can be also observed through the sharp change in credit ratings, as shown by *figure 6*.

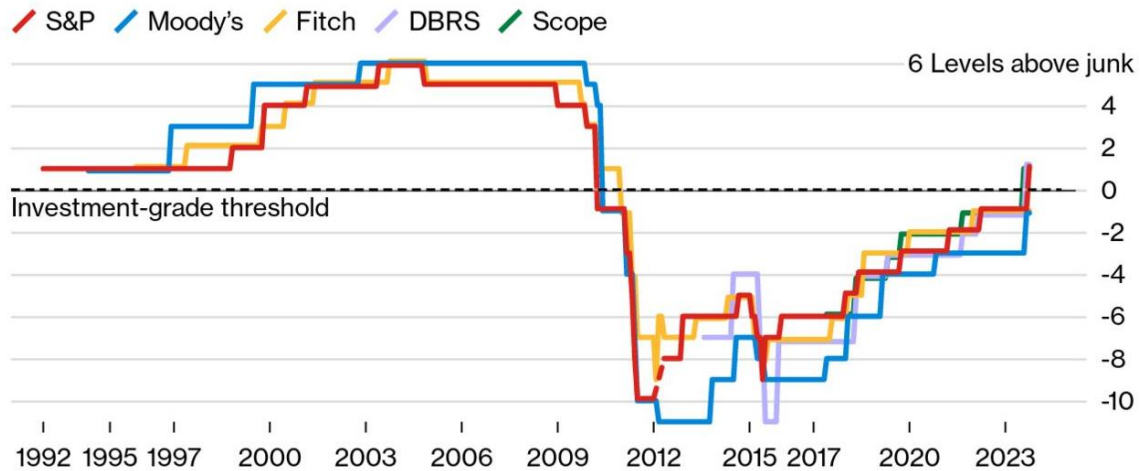


Figure 6: Greek Sovereign Credit Ratings 1992-2023. Source: Bloomberg

From 1997 (to approximately 2010), Greece experienced a quite sharp increase in credit ratings going from 1 to 6 levels above junk. There are some opposing views in sovereign debt literature about the factors influencing ratings; Baek (2005) argues that the market risk attitude does not affect published country risk ratings, which are mainly determined by macroeconomic fundamentals. However, others (Cantor and Packer, 1996) argue that a country's fundamentals can only partially explain ratings; the study is conducted by regressing spreads of 49 countries against 8 variables (GDP per capita, inflation, fiscal balance, GDP growth, external balance, external debt, default history, economic development) used to predict ratings for the year 1995. The results are quite interesting, as these variables appear to predict around 86% of spread variations, however, by regressing spread on ratings alone it can be observed that ratings predict around 92% of sample variation; this might show that ratings actually appear to provide additional information beyond what is already contained in fundamentals incorporated in market yields.

This argument might be useful in understanding why Greece experienced such positive ratings, appearing as a much more credible and trustworthy country despite its economic condition did not substantially improve. In addition, it has been showed that there is a procyclical bias for credit rating agencies. Lang and Presbitero (2018) argued that they pay insufficient attention to fundamentals during economic booms: in fact, when investor sentiment is positive, financial institutions and rating agencies might not want to “rock the boat” and might decide to fuel the optimistic consensus view instead. However, when discussing investor decisions and credit rating we might incur in endogeneity issues, as it can be quite challenging to assess whether investors react to a change in rating or to a change in some underlying fundamental that is observed by both the agency and the investors themselves.

1.2 Austerity on Investor Confidence

However, between 2009 and 2010, Greece lost all its not-fundamental-based credibility when the newly elected PASOK government announced that some statistics had been altered in order to make Greece suitable for EMU participation and that Greek debt actually stood at 113% of GDP; this led to Greek sovereign debt being downgraded to junk and to investor demanding a much higher interest, which also worsened its deficit and put the Greek government in danger of defaulting. In May 2010 the Troika launched a €110 billion bailout program to rescue Greece. The program had the purpose of avoiding default and ultimately making markets trust Greece again. However, it was conditional on the adoption of austerity measures, structural reforms, and privatization of government assets.

More recently, lots of literature has argued and proved that austerity was not the most efficient of measures and that actually ended up worsening the already very grim Greek economic situation; however, at the time it appeared to be the best situation for several reasons.

First of all, the crisis was partly attributed to a loss of competitiveness of many EU countries, which, in single currency union, could be solved through an internal devaluation that would lower the unit labor cost and make the country’s exports more attractive to foreigners, which is what austerity measures are designed for.

Secondly, we should turn to analyzing the moral side of the crisis; markets did not trust Greece anymore, and now that all the budget alterations had been revealed it was thought by the more frugal countries that Greece should purge its sins in order to be considered trustworthy again.

1.2.1 The Role of Morality on Austerity

This “morality play” (De Grauwe, 2011) was particularly observed in Germany: the public opinion thought that a country who is in debt is not just out of money, but it is lazy and opportunistic and should receive “tough love” to acquire fiscal discipline (Rathbun, Powers, Anders 2018). This is exactly what was thought of Greece, a “sinner” country, unworthy of financial help that had to suffer through austerity measures in order to regain its credibility. Sadly enough, many German economists, instead of focusing on the numbers, were also taking part to this “morality play”, arguing that Greece needed to be taught a lesson for its past indulgences. This public opinion view is underlined by *figure 7*:

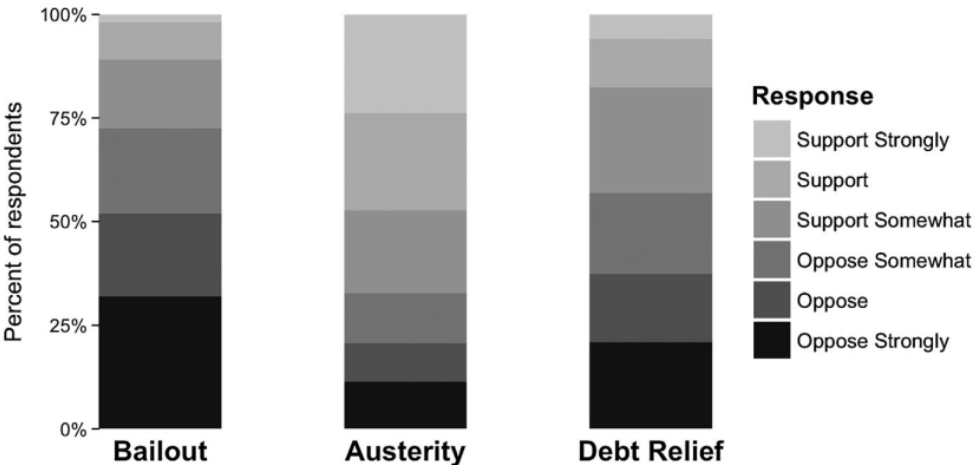


Figure 7: Moral Hazard: German Public Opinion on the Greek Debt Crisis (Rathbun, Powers, Anders 2018)

The authors constructed a poll in which participants had to state their gender, age, education, and state of residence; as it appears to be clear, the majority of respondents oppose a bailout

and debt relief and support austerity, worrying that that resources given to Greece must be taken away from Germany.

As already mentioned, the IMF program had the purpose of making Greece regain market's confidence by causing an immediate credibility shock (McMenamin, Breen, Portillo, 2015), which in the midst of the crisis, when the Eurozone was in "survival mode" was far more important than promoting long term growth, as the most determining factor became tomorrow's "interest rate, not economic growth in 3 years' time".

1.2.2 Has Austerity Improved Investors' Trust?

However, austerity was pushed as the best response not only because of the morality factor, as there also many economists in favor. The main supporter of austerity was probably Alberto Alesina: he acknowledged that, while in the short run government retrenchment reduces demand, in the medium run, it would reduce debt and increase growth through the "confidence channel"; austerity should have the effect of increasing the stability of the government perceived by investors because if markets infer a credible commitment, then the interest rate demanded be reduced (Drazen, 2000: 197–192). This theory, explaining why markets should actually welcome austere budgets, has been widely criticized (Krugman mockingly named it the "confidence fairy") for two main reasons:

Firstly, markets could reject the existence of the confidence fairy and view austerity as a measure that will just worsen an already spiraling economic situation.

The second reasoning accepts the existence of this "confidence channel" but comes to the opposite conclusion, arguing first that the expectation of future monetary growth will induce an increase, rather than a decrease, in inflation today and secondly, that the more extreme the measures a government has to take, the less likely it will be able to commit to them in the future.

Empirical research tends to agree more with the latter view of austerity. McMenamin et al. investigated whether austerity announcements would create a positive credibility shock in markets. They conducted an event study to first estimate the market's reactions to a given

budget and afterwards they used the estimated market reaction as a dependent variable in treatment effects regression, where austerity is the treatment. They computed the abnormal return on sovereign bonds after austerity announcements:

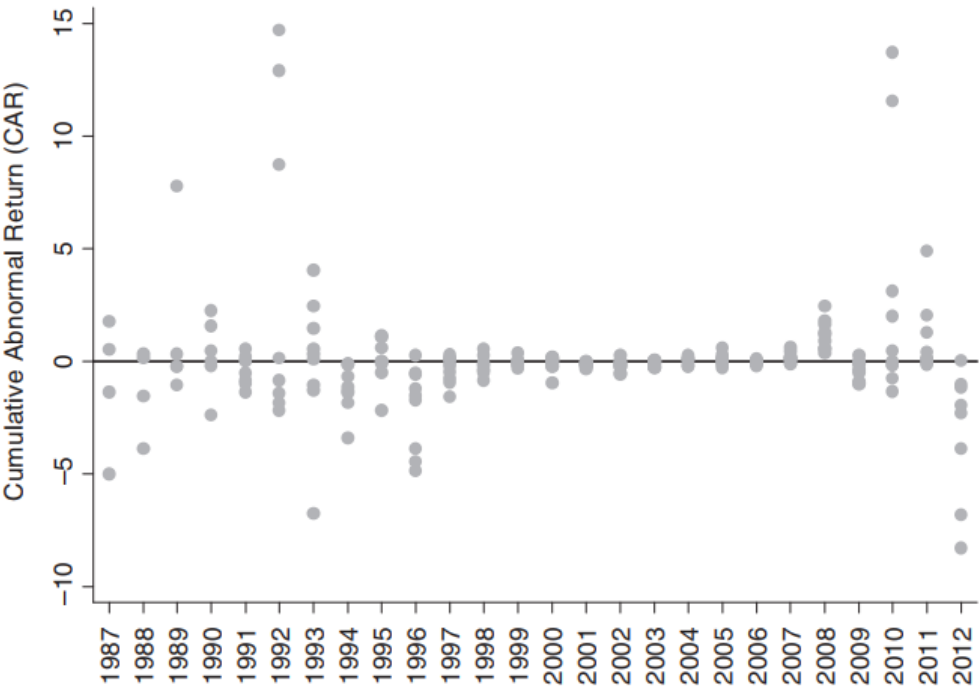


Figure 8: Austerity and credibility in the eurozone (McMenamin, Breen, Portillo, 2015)

In figure 8 a positive value is associated with an increase in interest rates following the announcement and a negative one is associated with a decrease in interest rate (the data for the years before 2000 are more related to a devaluation rather than austere budgets). As we can observe, the results are mixed, with some negative values and some positive ones, especially in 2010-2011, indicating that in these two years market did not buy the “confidence fairy” argument. Moreover, the results of the regression analysis speak even more clearly:

	Model 1	Model 2	Model 3	Model 4
Stage 2: CAR				
Austerity	1.62*** (0.484)	1.72*** (0.464)	1.74*** (0.492)	1.81*** (0.466)

Figure 9: Austerity and credibility in the eurozone (McMenamin, Breen, Portillo, 2015)

An austerity announcement is associated with a positive increase in interest rates on sovereign bonds in all the four models took into consideration, and the results are quite robust. The results appear to be clear: austerity does not boost a government's credibility, nor investor confidence in that given government; on the contrary, austerity measures appear to be strongly associated with increases in interest rate demanded.

1.2.3 The Effects of Austerity on the Greek Economy

These results were also observed in practice on the Greek economy; the measures of the first austerity regime in 2010 were, among others, 30% cuts in Christmas, Easter and leave of absence bonuses, a further 12% cut in public bonuses, a 7% cut in the salaries of public and private employees, a rise of the value added tax from 4.5% to 5%, from 9% to 10% and from 19% to 21%, a rise of the petrol tax to 15%, a rise in the taxes on imported cars of up to 10%–30%. Not surprisingly, these measures had quite strong distributional effects on the Greek population, especially on the already more fragile share, with an increase in suicides in a country that was traditionally immune to this phenomenon (Austerity's Failure in Greece: Time to Think the Unthinkable, 2013).

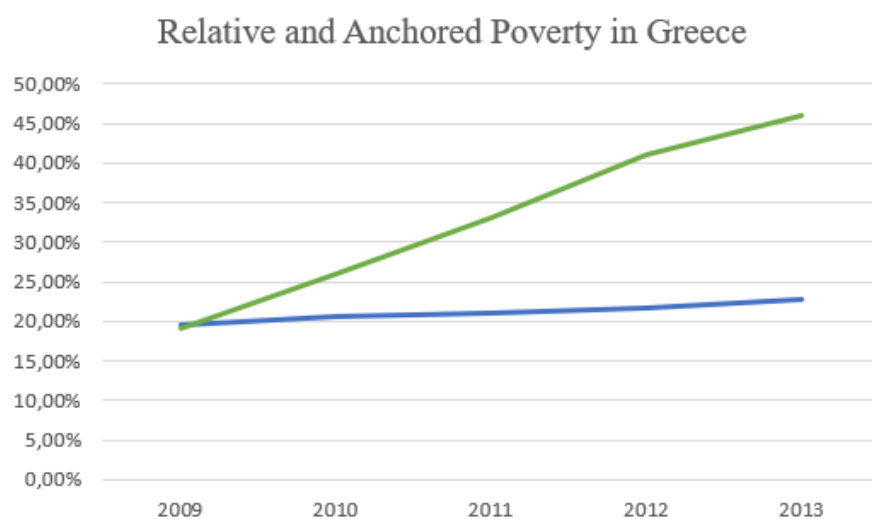


Figure 10: Relative and Anchored Poverty in Greece 2009-2013 (Data from *The Distributional Impact of Austerity*, Matsaganis, 2014)

By measuring relative and anchored poverty (M. Mtsaganis, 2014), it appears clear that austerity brought a great impoverishment to Greece. Specifically, relative poverty measures the population proportion with a disposable income below 60% of the median, while anchored poverty measures the population proportion that was unable to purchase in 2010–13 the goods and services that were just affordable to those with poverty line incomes in 2009. Moreover, unemployment raised steadily throughout the crisis period: going from less than 10% in 2009 to a whopping 27% in 2013.

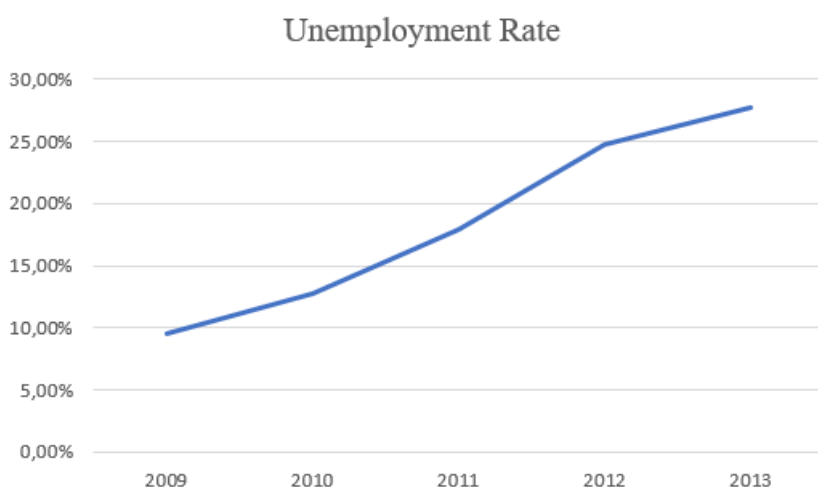


Figure 11: Unemployment rate in Greece 2009-2013. Data from *Macrotrends.net*

1.3 What Shapes the Effects of an IMF Adjustment Program?

So, why did the IMF loans fail to restore market confidence in Greece despite it being the largest loan in IMF's history? Indeed, if we look at the numbers, the outcome was quite disappointing, as during the 22 months of the program investors became more and more skeptic about lending to Greece and if in the beginning of the program the interest rate demanded to the Greek government was of 7%, by the beginning of 2012 it had reached 29%; the program was subsequently canceled and replaced by a new one. The literature points out two more possible explanations.

1.3.1 The Importance of the “Catalytic Effects”

Firstly, the program apparently failed to trigger “catalytic effects”, meaning that it did not attract private financing. In a 2023 paper, Krahnke analyses what the possible causes of the lack of catalytic effect could be, arguing that a possible explanation for the rather inconclusive already existing empirical evidence is the neglect of the size of the IMF program as explanatory variable. The methodology employed is a panel data regression for 103 countries over the period 1990-2018. The results of this model are rather surprising but constitute a quite fitting explanation of why an IMF program might be ineffective. The conclusion of the analysis is that the catalytic effect of an IMF program are weakened and, potentially reversed, if the amount of the loan exceeds a certain threshold. More specifically, the model concludes that the positive catalytic effect will be reversed if the amount of the IMF program exceeds 5% of the country’s GDP. In the case of Greece, the first bailout program actually amounted to 37% of GDP whilst the second one to around 38.5%.

	2010	2011
Loan Size (in billion €)	110	109
GDP (in billion €)	297,12	283
Loan size as % of GDP	37,0221	38,5159

Table 1: Loan size as percentage of GDP for the two first Greek Bailout Programs. Data on GDP from the Worldbank database. Data on loan size from Wikipedia, Greek Government-Debt Crisis.

Moreover, there might be several mechanisms through which an IMF program could fail to trigger “catalytic effects” (Krahnke, 2023); firstly, it’s quite important to point out that an IMF economic adjustment does reduce the probability of default of a country by improving its future capacity to repay liabilities and its balance of payments. However, the program might discourage private creditors from lending as it increases their loss given default since their claims are junior to those of IMF; this effect might be especially strong if the size of the IMF loan is quite big, as for Greece.

Secondly, the IMF could lose part of its bargaining power, thus reducing the perceived credibility boost, if it has large claims vis-à-vis the country and expects large repayments due in the short/medium term; this could be the case if the IMF were to issue one more subsequent adjustment program if the country’s balance of payments problem remains unsolved. As for

Greece, who accepted two very hefty bailout programs in two subsequent years. In such a scenario, investors might lose confidence in the ability of the IMF program to help the country exit a financial distress situation and in making sure that the country adopts sound policies, also posing a time inconsistency problem if the terms of the loan are short enough.

Thirdly, an IMF financing package could also an opportunity for private creditors to exit, which leads to the replacement of private debt with official debt. Restructuring official debt could actually be even harder, in fact, on the one hand in is true that official debt poses much less hold-out (for better terms) and free-riding (incentive not to participate hoping that other bondholders will instead) problems, however on the other hand big official creditors might possess more bargaining power. To this matter, it's important to notice that, in the years of the crisis, most of Greek debt was held by banks and other institutional investors.

Moreover, it's quite fascinating to notice how the share of debt held by private or public investors might influence the country's credit rating after the restructuring; Marchesi, Masi and Bomprezzi (2023) empirically proved some quite intriguing results: they found that official deals, on average, bring about an increase in ratings peaking after 3 years, whilst in the case of private deals, they observed a persistent negative effect, peaking after 4 years after the restructuring with a 2.25 points drop in agency rating.

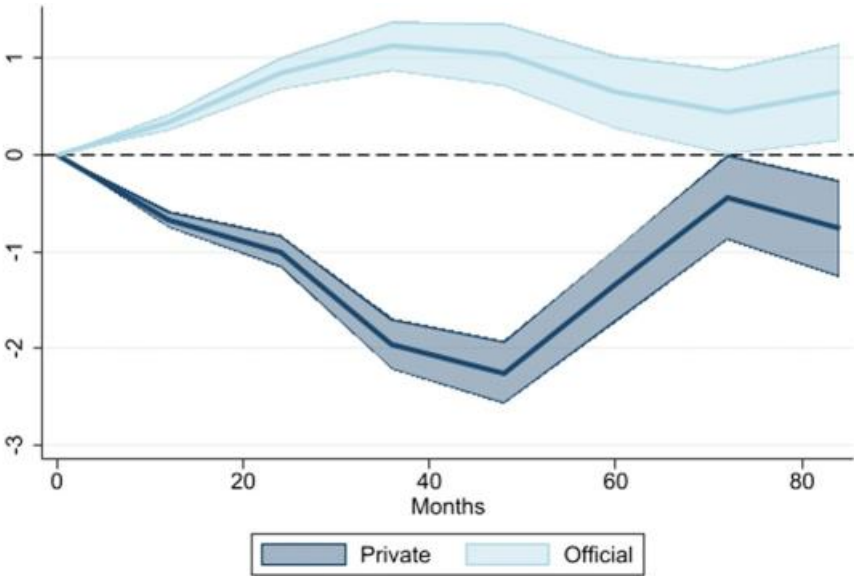


Figure 12: Is to Forgive to Forget? Sovereign Risk in the Aftermath of Private or Official Debt Restructurings, Marchesi, Masi, Bomprezzi, 2023.

1.3.2 Public Support on Program Effectiveness

A further reason why the IMF program failed to restore market's confidence in Greece can be found in the importance of the country's government and the amount of public support to the program. Specifically, investors might find it hard to process all the information associated with austerity and economic reforms, so they might rely on pieces of information that are more easily available and understandable, such as government popularity. Since it can easily be assessed through polls and media, investors will rely on the government's popularity in order to assess whether an IMF program is credible or not (Shim, 2022).

Many studies confirm that the key to trigger the desired catalytic effects is the country's government showing credible commitment in fixing whichever problem caused the country to need the IMF's support in the first place. From this reasoning stems a very obvious time-inconsistency problem: after being granted the IMF loan, the borrowing government might steer away from the austerity commitment and use the funds for government spending instead; not by chance, it has been observed that “[the overall] *compliance with IMF conditionality is rather low*” (Dreher, 2009, p. 249); specifically because of this low implementation records, investors will react positively only if they are able to infer a credible commitment from the borrowing government. However, it is important to emphasize that the argument focuses on the public's support for the country's government itself and not for the IMF program and moreover, the public's perception of the IMF program is explained by a much wider range of factors rather than just the conditionality. As an example, in 2015 a referendum was held in Greece to decide whether the Greeks would accept the austerity measures conditional to the IMF loan and the result appeared to be heavily influence not only by the austerity measures themselves, but mainly by whether they supported “Grexit” or not; to this matter Walter et al. (2018) argued that “*voters expecting that a noncooperative referendum outcome would force Greece to leave the eurozone were substantially more likely to vote cooperatively than those believing that it would result in renewed negotiations with the country's creditors*”.

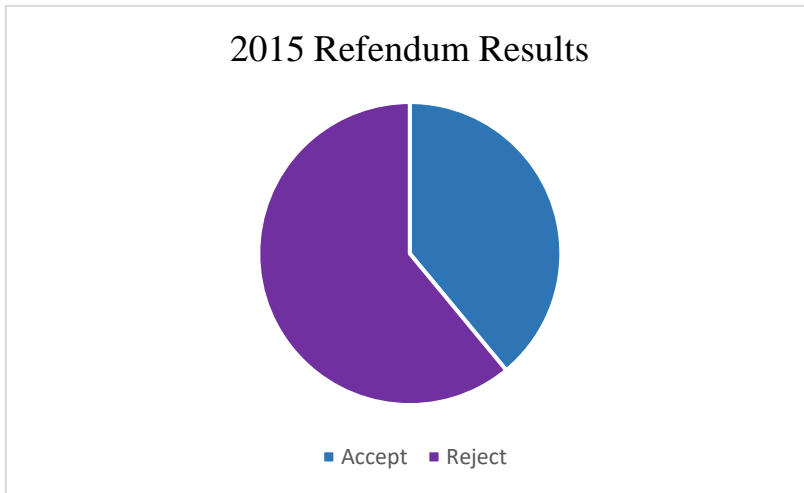


Figure 13: Results of the 2015 Greek Bailout Referendum. Data from Wikipedia.org

To be more precise, pertaining literature (Shim, 2022) measured empirically the effect on spreads of a change in public’s support to the government during an IMF program; the results show that for governments with approval ratings above 60%, the IMF program can lead to a decrease in spreads, specifically a 1% increase in popularity leads to an immediate 28.5 bp decrease and a further 2.3 bp decrease in the following year. However, for governments without a strong public support, the IMF program seems to not yield a significant change in spreads, whilst for the case of governments with extremely low approval rating, the program actually widens spreads.

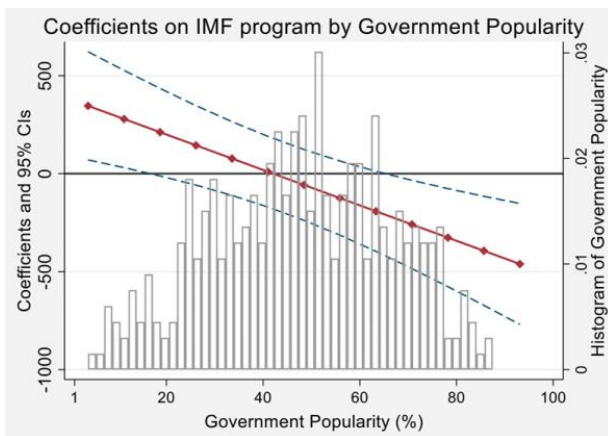


Figure 14: Effects of a change in government popularity on spreads. “Who Is Credible? Government Popularity and the Catalytic Effect of IMF Lending” Shim, 2022.

One of the key insights from the literature is that IMF conditionality appears to have a non-linear effect on investor confidence, as extra conditionality leads to higher investor confidence only as long as it does not hurt the borrowing government's public approval.

However, for the case of Greece, the prospects of austerity measures caused many protests by citizens and even the rise of anti-austerity movements.

1.3.3 The Role Played by Contagion

A further insight to take into account when trying to understand what went wrong and why the IMF intervention failed to restore the confidence of markets lies in the non-negligible effects of contagion. Literature (Camba-Méndez and Serwa, 2014) has shown that during the Eurozone crisis, macroeconomics and institutional developments correlated only weakly with sovereign risk perceived by the market, whilst contagion seemed to have played a significant role in shaping investor's perspective. However, even though the media showed contagion to have spread from Greece to the other Euro countries, it was not as unidirectional as it has been portrayed to be. More in depth, the authors empirically measured some significant inter-linkages in probability of default changes across countries; however, the probability of default residuals of Greece (and Ireland too) seemed to not correlate with those of the other countries, emphasizing once more how the contagion effect was not as unidirectional as the media portrayed it to be. Moreover, contagion seemed to be a response to the higher levels of uncertainty, the low quality of available information and the increased risk aversion of investors during the period of the crisis.

One could also argue that, in such turbulent times, making Greece regain its credibility has been such a difficult task since also the credibility of the ECB itself was at stake. Euro citizens' trust in the ECB appeared to decline during the crisis: a poll conducted on over 27'000 individuals from the whole EU showed that more than one third of respondents exhibited "no trust" in the ECB.

		Total
Full sample	Trust	62.8
	No trust	29.5
	Don't know	7.8
Pre-crisis	Trust	63.8
	No trust	27.6
	Don't know	8.6
Crisis	Trust	58.8
	No trust	36.5
	Don't know	4.7

Figure 15: Poll results on citizens' trust of the ECB. "Explaining EU citizens' trust in the ECB in normal and crisis times", Ehrmann, Soudan and Stracca 2012.

1.4 The Eurozone Crisis as a Credibility Crisis

Specifically because of the facts just established, many have defined the Eurozone crisis as a credibility crisis, relating the credibility of the European institutions.

The loss of credibility was accompanied by a decrease in overall trust in the EU by citizens, especially in countries where austerity measures have been implemented. The latter being based on the assumption that austerity measure, especially very strict ones, are unpopular among citizens (Ponticelli & Voth, 2020). Moreover, it has been showed that the decrease in citizens' trust towards the EU is dependent on to the extent to which citizens believe the EU is responsible for said measures (Biten, Kuhn, van der Brug, 2023).

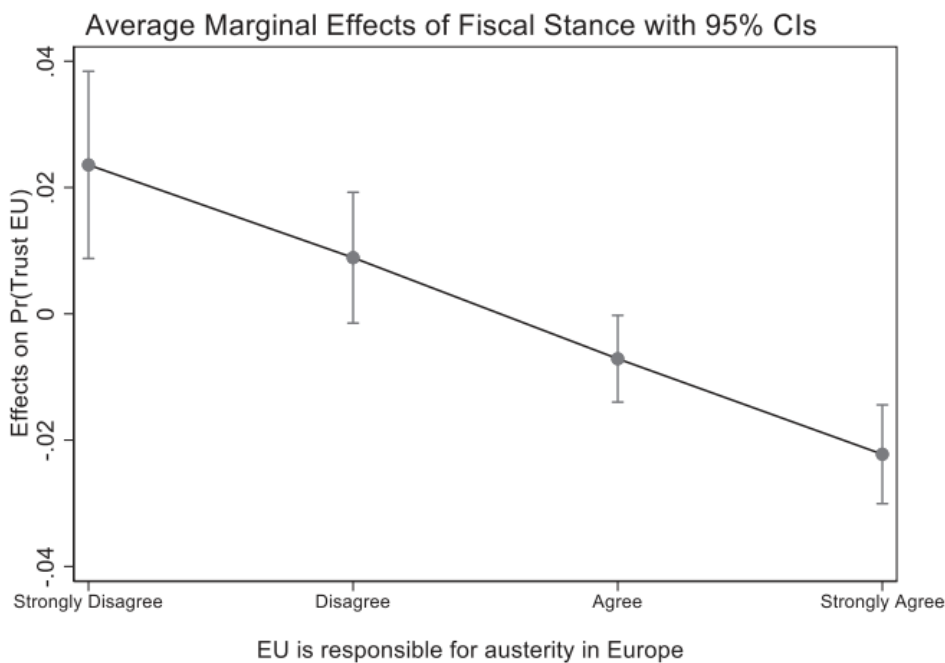


Figure 16: Merve Biten, Theresa Kuhn & Wouter van der Brug (2023) *How does fiscal austerity affect trust in the European Union? Analyzing the role of responsibility attribution.*

More specifically, there is significant negative effect (as observable in fig. XX) of austerity on the trust level of citizens who believe the EU to be responsible for these measures, while this effect appears to be insignificant or even slightly positive among other citizens. These findings suggest that, on the one hand, national governments could actually shift the austerity blame to the EU and, on the other hand, the EU institutions could “get away” with imposing very strict austerity measures because a minority of citizens did not hold them responsible for said measures.

1.4.1 How Do News Influence Investors?

Not by chance, the event that gave a positive confidence shock to markets was the famous sentence pronounced in July 2012 by Mario Draghi: [the ECB] *"is ready to do whatever it takes to preserve the euro. And believe me, it will be enough"*. His speech, which was followed by unconventional monetary policy reforms in September of the same year, gave a

very strong signal to everyone who was speculating on a possible fall of the Euro, which has been strongly reflected in a sharp decrease in sovereign bond spreads.

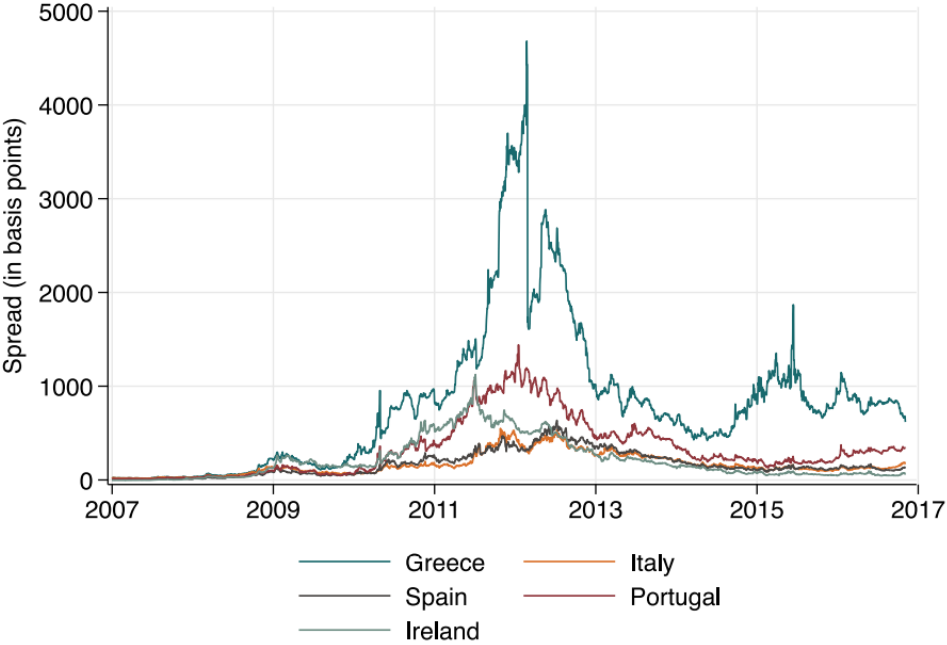


Figure 17: Spread over German Bund of Greece, Spain, Italy, Portugal and Ireland, 2007-2017. “Whatever It Takes!” How tonality of TV-news affected government bond yield spreads during the European debt crisis, Hirsch et al., 2018

Hirsch et al. empirically observed the importance of media news before and during the crisis; the methodology employed is a panel estimation technique that regresses the spread of “GIPSI” countries vis-à-vis Germany on economic related news. The dataset comprises 25,276 news items on economic topics related to both the Eurozone and the “GIPSI” countries themselves from January 2007 to November 2016. Their results are quite interesting as they show how a higher share of positive news is associated with a decreasing “GIPSI” yields spread. This is perfectly in line with the market’s reaction to Mario Draghi’s speech, which emphasizes another quite relevant finding of this paper: the magnitude of this effect is heightened for Eurozone news, rather than for country-specific news. This shows that one of the purposes of the Eurozone is serving as a form of insurance for member’s bonds, emphasizing the importance that a joint liability of Euro Member States has on the credibility of the Union itself and on that of the single Members.

1.5 Has Greece Regained Investors' Trust?

The third Greek Economic Adjustment Program officially ended on August the 20th 2018, and around 5 years later Greece showed to finally have regain the trust of the markets when Standard & Poor's Global Ratings rated Greek sovereign debt as investment grade for the first time since 2010.

Indeed, the Greek economy is improving: inflation is forecasted to decrease during the current year to 2.4% (compared to 4.2% in 2023), unemployment is expected to de-escalate slightly in 2024 to 11.8% (from 12.2% in 2023), the public debt-to-GDP ratio is expected to decelerate to 160.2% and the current account deficit in the first quarter of 2023 decreased by €3.1b in comparison to the first quarter of 2022.

The performance of the Greek economy and the recent upgrade by credit rating agencies give Greece quite a significant opportunity to attract foreign investment; this goal will be achieved by fostering market's trust though increasing transparency in the public and private sectors. Not by change, transparency is quite a key factor for investors, especially in uncertain times, that have to make a decision in a very information-saturated environment; that is also why being upgraded to investment grade again is such an important event for Greece, as investors rely quite heavily on ratings as they provide a very easy to understand and straight forward categorization of a country's trustworthiness.

This quest for transparency by the Greek government might actually be oriented towards a good path as shown by the convergence of perceptions of companies already established in Greece and of companies with no investment presence in the country; in previous years, the first group tended to have a much more positive perception of the country's attractiveness compared to the second group, this largely due to the fact that local companies tend to have a more comprehensive understanding of the country's situation. However, this phenomenon has been observed to be decreasing in the last years, demonstrating that the efforts done by the Greek government to provide markets with more and better information are yielding positive outcomes.

CHAPTER IV: EMPIRICAL ANALYSIS

2.1 The Model and the Dataset

The literature tends to confirm the already empirically observed fact that sovereign bond yields incorporate much more than just information on the country's macroeconomic fundamentals. This model has the purpose of gaining a better understanding as to what extent macroeconomic fundamentals *can* explain fluctuations in spreads and what is the role of a country's credibility and stability in causing said fluctuations. Regarding this, I would like to point out that, as further explained below, the variables used as proxies for these two factors are both some of the macro fundamentals themselves and also some less easily quantifiable variables; this has the purpose of better analyzing to what extent spread fluctuations are rationality-driven.

The dataset consists of 4 variables observed across 17 countries¹ of the EU zone in the years between 2000 and 2010. The dependent variable is the interest rate on long-term (10 years) government bonds²; while the independent variables are GDP growth³, deficit⁴, government debt maturity⁵ (as "STLiab" in the model, short-term liabilities) and Corruption Control⁶. The indicators for stability are GDP growth rate, deficit and government debt maturity; while Corruption Control is the proxy for credibility, as it represents the perception of the extent to which public power is used for private gain, it is a number ranging from -2.5 (high level of corruption) to 2.5 (low level of corruption).

¹ List of countries: Austria, Belgium, Croatia, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Portugal, Slovenia, Spain.

² Data from the Österreichische Nationalbank database.

<https://www.oenb.at/isawebstat/stabfrage/createReport;jsessionid=E9798E29A1127F410B9973128E9FD9E0?lang=EN&original=false&report=10.6>

³ Data from the Worldbank database. <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG>

⁴ Data from OECD database <https://data.oecd.org/gga/general-government-deficit.htm>

⁵ Data from the OECD Data Explorer [https://data-explorer.oecd.org/vis?df\[ds\]=dsDisseminateFinalDMZ&df\[id\]=DSD_NASEC20%40DF_T710GOV_A&df\[a_g\]=OECD.SDD.NAD&df\[vs\]=1.1&pd=2000%2C2010&dq=A..ESP%2BSVN%2BSVK%2BPRT%2BNLD%2BLUX%2BLTU%2BLVA%2BITA%2BIRL%2BGRC%2BDEU%2BFRA%2BFIN%2BBEL%2BAUT..S13..L...S.XDC.....&to\[TIME_PERIOD\]=false&vw=tb](https://data-explorer.oecd.org/vis?df[ds]=dsDisseminateFinalDMZ&df[id]=DSD_NASEC20%40DF_T710GOV_A&df[a_g]=OECD.SDD.NAD&df[vs]=1.1&pd=2000%2C2010&dq=A..ESP%2BSVN%2BSVK%2BPRT%2BNLD%2BLUX%2BLTU%2BLVA%2BITA%2BIRL%2BGRC%2BDEU%2BFRA%2BFIN%2BBEL%2BAUT..S13..L...S.XDC.....&to[TIME_PERIOD]=false&vw=tb)

⁶ Data from "The Worldwide Governance Indicators: Methodology and Analytical Issues". World Bank Policy Research Working Paper No. 5430. Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi (2010). <https://data.worldbank.org/indicator/CC.EST>

The methodology employed is a time series random effects regression analysis, which is able to account for variabilities between the different entities, since it could be the case that each independent variable might have a different effect on the interest rate of each country because of some country specific characteristics. The regression employed is the following:

$$\text{interest_rate} \sim \text{deficit} + \text{Corruption_control} + \text{GDP_growth} + \text{STLiab}$$

2.2 The Results

Dependent variable:	
interest_rate	
deficit	0.014 (0.029)
Corruption_control	-0.617*** (0.212)
GDP_growth	-0.215*** (0.037)
STLiab	-0.00001*** (0.00000)
Constant	5.970*** (0.354)
Observations	75
R2	0.477
Adjusted R2	0.447
F Statistic	63.481***

Note: *p<0.1; **p<0.05; ***p<0.01

The results of the regression analysis show that there seems to be a statistically significant relationship between interest rates on government bonds and GDP growth, Corruption Control and debt maturity. This confirms that fluctuations in yields can be driven both by changes in macroeconomic fundamentals and by changes in the investors’ perception of the borrowing country.

2.2.1 The Effect of Deficit on Interest Rates

The regressor “deficit” seem to not have statistical significance. However, this might be attributed to the fact that research (Akitobi and Stratmann (2008); Peppel-Srebrny (2017)) has shown that its breakdown between government consumption and government investment matters quite substantially, however, this is not present in the data.

2.2.2 The Effect of Control of Corruption on Interest Rates

The relationship between interest rate and Corruption Control appears to be negative (as observable in *figure 18* below), with a 1-unit increase in Corruption Control being followed by a 0.617 decrease in the interest rate demanded by investors; this makes intuitive sense as an increase in the Corruption Control Index shows that a country is perceived to be less “corrupted” and thus more reliable and safe; moreover, the result appears to be statistically significant at the 99% confidence level.

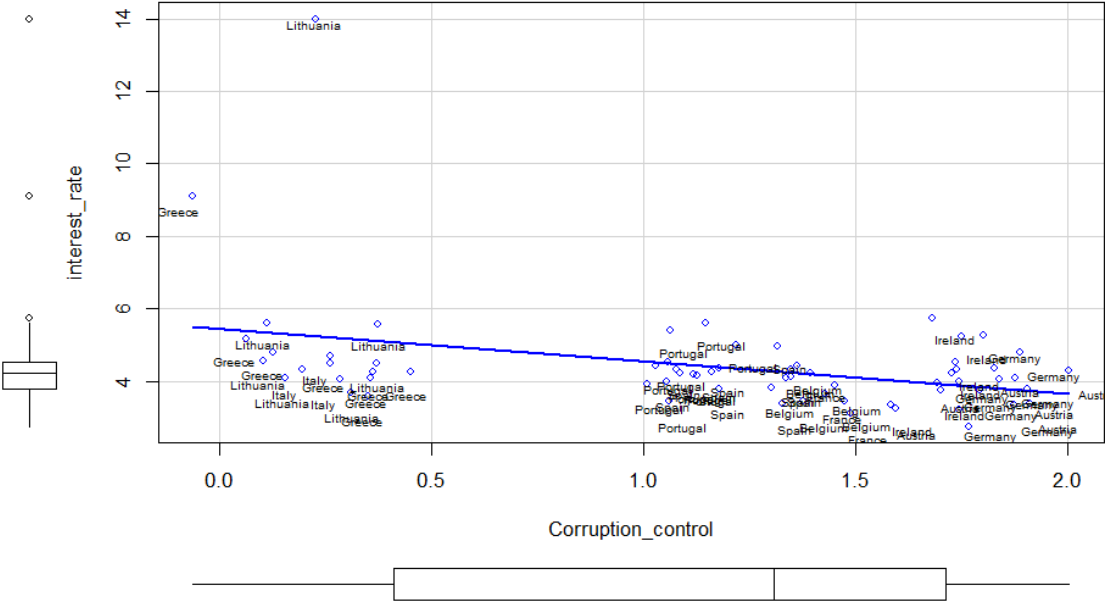


Figure 18: Relationship between Control of Corruption and interest rate on sovereign bonds.

The result was already confirmed by some pieces of existing literature: Breen and McMenamin found how credibility is key even from the point of view of the borrowing government as research has shown that, for instance, when budget plans are credible (as measured by how close professional forecasters' projections are to official announcements), borrowing costs can fall temporarily by as much as 40 basis points.

2.2.3 The Effect of GDP Growth on Interest Rates

GDP growth seems to exert a negative influence on interest rates, as a 1-unit increase in GDP growth is associated with a -0.215 decrease in interest rate demanded to the borrowing government. This relationship makes intuitive sense as a growing GDP might improve the perception the markets have of that given country; this link (which is significant at the 99% confidence level) is shown in the following graph:

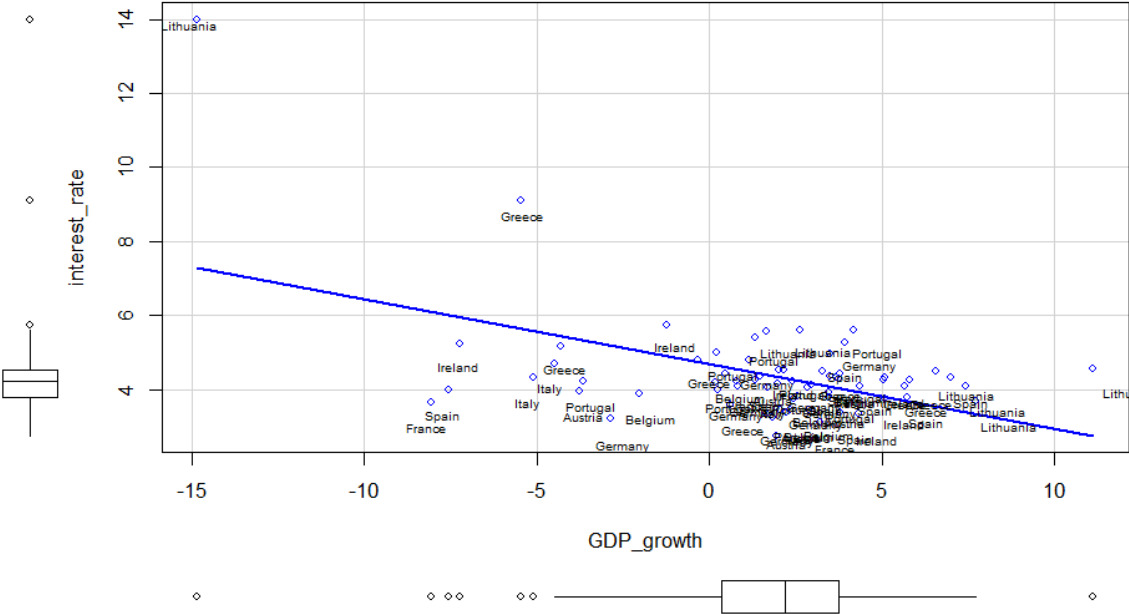


Figure 19: Relationship between GDP growth rate and interest rate on sovereign bonds.

2.2.4 The Effect of Debt Maturity on Interest Rates

The relationship between the interest rate and the share of short-term debt liabilities appears to be negative (as showed in *figure 20*), with a 1-unit increase in short-term liabilities being followed by a very small (-0.00001) decrease in the interest rate; this result is statistically significant at the 99% confidence level. However, the result seems to contradict some of the existing literature: Calvo argued that a confidence crisis in public debt management is less likely if the average maturity of the debt is longer, meaning that a government might then have more time to refinance its debt, which makes intuitive sense. The result of the model might then be better explained observing that, for example, in times of economic uncertainty or crisis, investors may prioritize safety over yield and government bonds, particularly those of stable countries, are considered safe-haven assets. In such situations, higher short-term liabilities might not significantly impact demand for government bonds, leading to lower interest rates. This reasoning can explain the apparent contradiction with the literature, especially considering the fact that in the data the country with the highest amount of short-term debt is Germany (the furthest dot on the right, even though the label does not appear).

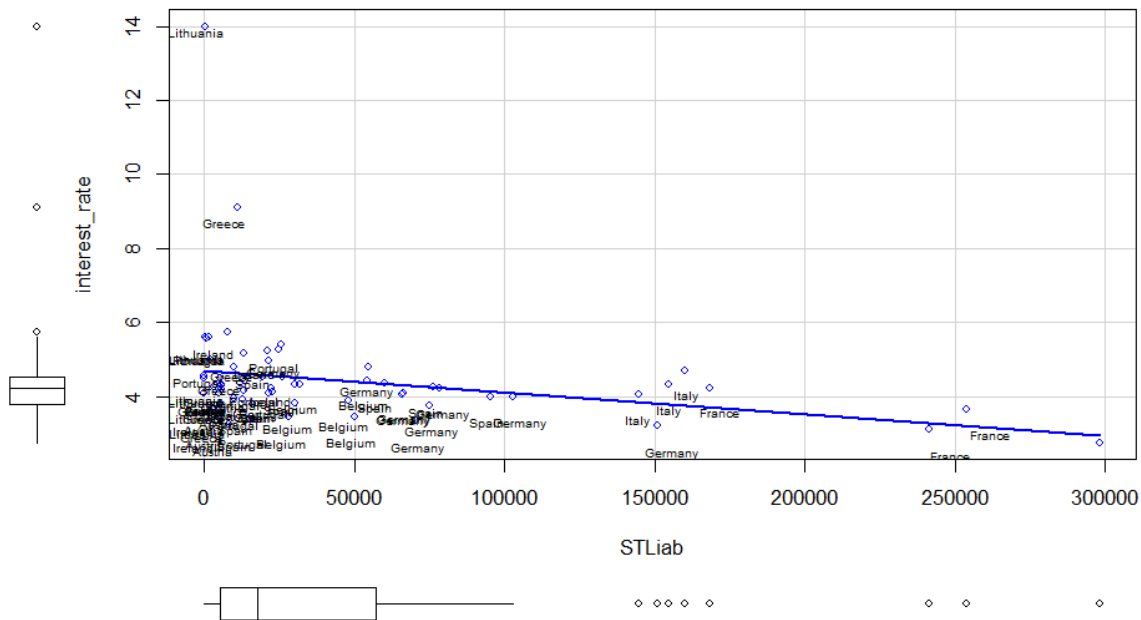


Figure 20: Relationship between short-term Government liabilities and interest rate on sovereign bonds.

2.3 Concluding Remarks

The model doesn't seem to show multicollinearity issues between regressors, as the values obtained through the "vif test" are all between 1 and 1.5.

=====			
deficit	Corruption_control	GDP_growth	STLiab

1.407	1.062	1.499	1.147

As a robustness check, I tried to consider more control variables, such as unemployment rate, inflation and trade balance. However, these variables don't seem to add any explanatory power to the model. In the case of inflation, this could be explained by the fact that the element that plays a crucial role for investors is expected future inflation, rather than current inflation. On the other hand, adding unemployment to the model actually worsens its explanatory power, as the adjusted R squared decreases from around 45% to around 20%. This could be explained by the fact that unemployment is highly correlated with some of the other explanatory variables, specifically with GDP growth; this relationship is well observed and known as Okun's law: unemployment is inversely related to the GDP growth rate. Even by replacing GDP growth with unemployment, thus trying to eliminate the multicollinearity problem, the model still appears to be less useful, explaining only 22% of the variation observed in the data. This could be attributed to the fact that, if on the one hand unemployment rate is indeed a key statistic when evaluating a country, on the other hand however, its effect on government bond yields might be less direct than the one of GDP growth and for a series of reasons.

First of all, a decrease in GDP sends a much quicker signal to investors rather than an increase in unemployment, despite it being still important.

Secondly, higher GDP growth will surely improve the government's capability to service its debt, while lower unemployment will definitely cause a decrease in government spending on social service, however, it is also influenced by other factors. In fewer words, GDP growth sends a much stronger signal to investors about the country's stability compared to the

unemployment level. The same reasoning goes for the trade balance, namely that it constitutes a more indirect measure of a country's wellbeing.

To conclude the discussion of the model, I believe it's important to notice how it is able to explain around 45% of the variation in sovereign bonds yields, to be more precise GDP growth seems to be the variable explaining most of the variation, as adding it to the model makes the adjusted R squared almost double.

Moreover, I would like to once more point out how 3 out of the 4 explanatory variables employed as proxies of stability are actually some of the countries' fundamentals; this emphasizes again that, it is true and observed that macro fundamentals are important in assessing a country's stability and thus trustworthiness, however, there are many more factors behind it. Half of the variation in the model remains unexplained, which could be associated with variables that could be more difficult to quantify, such as overall investor sentiment, risk aversion and contagion, that on their own appear to influence yields and government's perceived credibility in ways that are quite exogenous to the government's actions.

The key takeaway from this model lies in the fact that a country's perceived stability and credibility play a very important role in determining the premium the borrowing country has pay to the markets. Moreover, investors will assess a country's trustworthiness based both on macroeconomic fundamentals and on other credibility determining factors (in this specific model, how well the country is able to keep corruption, both public and private, at bay); however, part of the model's variation (approximately half) is explained by other variables. These said variables could be identified both in fundamentals that were not here included and in factors appearing to be quite exogenous to government's action, such as shifts in investors' appetite for risk caused by contagion.

CONCLUSION

Using Greece as a case study, we've observed how sovereign bond yields incorporate much more than just macroeconomic fundamentals, and fluctuations in the former have explanations that go far beyond changes in the latter.

The events that culminated in the introduction of the Euro in the monetary union strongly contributed to increasing the perceived credibility of the eurozone countries' governments, which made it possible for countries like Greece to borrow from the markets at a discount (in comparison to its macro fundamentals). This high degree of trust by investors was also fueled by the overall optimistic environment of the beginning of the 2000s, supported even by Credit Rating Agencies, which, however, showed to sometimes be biased by being quite reluctant to "rock the boat" and not fuel the consensus view.

Moreover, the perceived credibility and stability of a country turns out to be one of the key elements for assessing the country's trustworthiness and thus, the premium it has to pay when borrowing from the markets. However, from time to time, the country's perceived stability and credibility have proven to be quite exogenous to the government's actions and strongly influenced by the investors' degree of risk aversion. Sudden shifts in risk appetite are a recurring element of economic crisis and have been showed to not be fully rational, in addition, contagion plays a key role in the spreading of a crisis.

Credibility and stability play such an important role in shaping investors' decisions as they constitute pieces of information that are quite easy to gather, which highly facilitates the investor's understanding of the complex and information-saturated environment of financial markets.

Moreover, this interpretation is confirmed by looking at how difficult it has been for Greece to regain the market's trust, despite the hefty IMF Bailout Packages, as the austerity reforms did not have the desired effect, but worsened an already grim economic situation and made citizens lose their trust in the Government and in the EU institutions.

The empirical analysis of the importance of stability and credibility further confirms how these two elements are quite crucial in explaining sovereign bond yields' fluctuations. However, it also emphasized that there are other factors, which are significantly more difficult to quantify, influencing these fluctuations, such as risk aversion.

REFERENCES

- Al-Amine, R., & Willems, T. (2023). Investor Sentiment, Sovereign Debt Mispricing, and Economic Outcomes. *The Economic Journal*, 133(650), 613-636.
- Andritzky, M. J. R. (2012). *Government bonds and their investors: What are the facts and do they matter?*. International Monetary Fund.
- Argyrou, M. G., & Tsoukalas, J. D. (2011). The Greek debt crisis: Likely causes, mechanics and outcomes. *The World Economy*, 34(2), 173-191.
- Arslanalp, S., & Tsuda, T. (2014). Tracking global demand for advanced economy sovereign debt. *IMF Economic Review*, 62(3), 430-464.
- Baek, I. M., Bandopadhyaya, A., & Du, C. (2005). Determinants of market-assessed sovereign risk: Economic fundamentals or market risk appetite?. *Journal of International Money and Finance*, 24(4), 533-548.
- Biten, M., Kuhn, T., & van der Brug, W. (2023). How does fiscal austerity affect trust in the European Union? Analyzing the role of responsibility attribution. *Journal of European Public Policy*, 30(6), 1033-1050.
- Breen, M., & McMenamin, I. (2013). Political institutions, credible commitment, and sovereign debt in advanced economies. *International Studies Quarterly*, 57(4), 842-854.
- Brooks, S. M., Cunha, R., & Mosley, L. (2015). Categories, creditworthiness, and contagion: How investors' shortcuts affect sovereign debt markets. *International studies quarterly*, 59(3), 587-601.
- Bulow, J. I., & Rogoff, K. S. (1988). Sovereign debt: Is to forgive to forget?.
- C. J. Polychroniou, Austerity's Failure in Greece: Time to Think the Unthinkable, August 2013.

Calvo, G. A. (1988). Servicing the public debt: The role of expectations. *The American Economic Review*, 647-661.

Camba-Méndez, G., & Serwa, D. (2016). Market perception of sovereign credit risk in the euro area during the financial crisis. *The North American Journal of Economics and Finance*, 37, 168-189.

Cantor, R., & Packer, F. (1996). Determinants and impact of sovereign credit ratings. *Economic policy review*, 2(2).

Côté, D., & Graham, C. (2004). *Convergence of government bond yields in the Euro Zone: The role of policy harmonization* (No. 2004-23). Bank of Canada.

De Grauwe, Paul (2011) : The eurozone as a morality play, *Intereconomics*, ISSN 1613-964X, Springer, Heidelberg, Vol. 46, Iss. 5, pp. 230-231, <https://doi.org/10.1007/s10272-011-0388-1>

Ehrmann, M., Soudan, M., & Stracca, L. (2012). Explaining EU citizens' trust in the ECB in normal and crisis times.

Frankel, J., & Saravelos, G. (2012). Can leading indicators assess country vulnerability? Evidence from the 2008–09 global financial crisis. *Journal of International Economics*, 87(2), 216-231.

Gibson, H. D., Hall, S. G., & Tavlas, G. S. (2012). The Greek financial crisis: Growing imbalances and sovereign spreads. *Journal of international Money and Finance*, 31(3), 498-516.

Greece goes the distance, continuing to win investors' trust. EY Attractiveness Survey, Greece, October 2023.

Hirsch, P., Feld, L. P., Köhler, E. A., & Thomas, T. (2024). "Whatever It Takes!" How tonality of TV-news affected government bond yield spreads during the European debt crisis. *European Journal of Political Economy*, 82, 102511.

<https://data.worldbank.org/indicator/CC.EST> Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi (2010). "The Worldwide Governance Indicators: Methodology and Analytical Issues". World Bank Policy Research Working Paper No. 5430 (papers.ssrn.com/sol3/papers.cfm?abstract_id=1682130)

[https://www.esm.europa.eu/blog/greece-investment-grade-again-why-it-matters-keep-it#:~:text=Greece%20has%20achieved%20an%20important,Poor's%20Global%20Ratings%20\(S%26P\).](https://www.esm.europa.eu/blog/greece-investment-grade-again-why-it-matters-keep-it#:~:text=Greece%20has%20achieved%20an%20important,Poor's%20Global%20Ratings%20(S%26P).)

Krahnke, T. (2023). Doing more with less: The catalytic function of IMF lending and the role of program size. *Journal of International Money and Finance*, 135, 102856.

Kumar, M. S., & Persaud, A. (2002). Pure contagion and investors' shifting risk appetite: analytical issues and empirical evidence. *International Finance*, 5(3), 401-436.

Matsaganis, M., & Leventi, C. (2017). The distributional impact of austerity and the recession in Southern Europe. In *Economic Crisis and Austerity in Southern Europe* (pp. 111-130). Routledge

McMenamin, I., Breen, M., & Muñoz-Portillo, J. (2015). Austerity and credibility in the Eurozone. *European Union Politics*, 16(1), 45-66.

Meyer, J., Reinhart, C. M., & Trebesch, C. (2022). Sovereign bonds since Waterloo. *The Quarterly Journal of Economics*, 137(3), 1615-1680.

Pagoulatos, G., & Quaglia, L. (2013). *Turning the crisis on its head: Sovereign debt crisis as banking crisis in Italy and Greece* (Vol. 197). Oxford: Oxford University Press.

Rathbun, B. C., Powers, K. E., & Anders, T. (2019). Moral hazard: German public opinion on the Greek debt crisis. *Political Psychology*, 40(3), 523-541.

Reinhart, C. M., & Trebesch, C. (2015). *The pitfalls of external dependence: Greece, 1829-2015* (No. w21664). National Bureau of Economic Research.

Shim, S. (2022). Who is credible? Government popularity and the catalytic effect of IMF lending. *Comparative Political Studies*, 55(13), 2147-2177.

Walter, S., Dinas, E., Jurado, I., & Konstantinidis, N. (2018). Noncooperation by popular vote: Expectations, foreign intervention, and the vote in the 2015 Greek bailout referendum. *International Organization*, 72(4), 969-994.

Zettelmeyer, J., Trebesch, C., & Gulati, M. (2013). The Greek debt restructuring: an autopsy. *Economic Policy*, 28(75), 513-563.