An Overdue Compromise

Proposal for a Sovereign Debt Mutualization and Reduction Scheme in the Eurozone

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Abstract

Since the beginning of the Eurozone Crisis in 2009, the question of sovereign debt sustainability has cast a shadow over the long-term prospects of the European project. On top of the risks of sovereign default, considerable differences in borrowing costs magnify real-economy divergence between the European North and South. This essay proposes a scheme for a gradual, partial, and dynamic mutualization of Eurozone sovereign debt. A portion of national debt from Eurozone member states would be phased into a communitarian institution, which would refinance it through the issuance of Eurobonds. Participation would be continually conditional on adherence to GSP rules and to a common debt reduction program. After detailing the mutualization mechanism, I evaluate the impact of the proposed institutional design on sovereign yields, taking into account first-order and second-order effects on mutual bond rates, national rates, and national debt. I then derive the dynamic distribution of costs and benefits of mutualization as the level of debt-to-GDP mutualized approaches the optimal X%, which is calculated to be between 40% and 55%.

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Contents[1]

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Introduction

The creation of the Economic and Monetary Union (EMU) ushered the inner-circle of Europe into a decade of apparent convergence of public finances across the continent. As member states undersigned the Treaty of the European Union of 1992, also known as the Maastricht Treaty, European governments subscribed to a program of fiscal and monetary restraint (Article 104c, Treaty of the European Union, 1992). In the following years, Europe enjoyed economic stability and prosperity[2]. At the same time, future Euro-area states agreed to tackle the problem of high sovereign debt, which in some cases exceeded 100% of GDP (Figure 1). As a result, in the sovereign debt market, academics and policymakers were left worrying about sovereign yield spreads of a few base points. Differences of 14 to 32 bps came to be considered "sizable" and worthy of investigation (Cotogno et al., 2003).

However, after the collapse of Lehman Brothers, in September 2007, European sovereign spreads began inflating. The ensuing instability marked the end of a decade of virtual co-movement of Eurozone sovereign yields. At the apex of the Eurozone crisis, in 2012, 10-year government securities sold on a range of thousands of basis points, with Greece paying over 25% in interest rates on its debt (Figure 2). The deterioration of European bonds prompted doom loops in banking systems exposed to sovereign risk, and the shock sparked a long and painful recession (Gros, 2014). The decade of convergence had stopped, and it seemed indeed that the continent was ready for reversal.

After the storm, it was clear that, if European debt had been a major culprit, it had also become a major casualty. In 2010, a report of sovereign credit risk across the world by Credit Market Analysts ranked Greece, Ireland, Portugal, Spain, and Hungary respectively as the first, third, fourth, seventh and ninth riskiest issuers. Germany took the ninth safest spot (CMA, 2010). Such difference is no mere statistics. Long-term rates on sovereign securities critically influence the general cost of borrowing in a country, that is, the cost of doing business. Consequently, substantial spreads impair the ability of European governments to assure long-term real convergence between member states. Instead, sustained spreads threaten to reinforce the trend of divergence between North and South, which – some argue – have characterized the Eurozone since its inception (Figure 3).

As sovereign spreads spiraled out of control in the summer of 2012, the responsibility to calm international markets fell on the shoulders, not of national governments, but of the European Central Bank. In July 2012, President Mario Draghi delivered the famed "Whatever it takes" speech, reassuring that the institution would open-endedly support the common currency. While the speech became the staple episode of the crisis, it only represented one occasion in which the central bank safeguarded the unity of the Eurozone (Figure 4). Through multiple securities purchase programs and constant forward guidance, the bank could calm European bond markets. However, if ECB activism could prevent the collapse of the euro, it did not address its underlying problems. Indeed, the bank's success is all but temporary (Enderlein, Letta

[2] Section 3.2 deals in depth with the substance and significance of the 1995-2005 decade of stability.

et al., 2016). The long-term stability of the EMU can only be assured by a renewed commitment of member states to solve the zone's structural shortcomings and, above all, to resolve the crucial matter of the sustainability of European sovereign debt.

In this paper, I precisely address this question, putting forward a proposal for a partial and gradual debt mutualization[3] and debt reduction between Eurozone countries. My aim is to provide a detailed, albeit theoretical, illustration of the mechanics of such scheme, and to evaluate empirically its potential impact on the public finances of member states.

Following the European Sovereign Debt Crisis, the academic literature on the topic of government debt has experienced a revival. This paper draws substantially from recent scholarship and engages at various points with many of the questions raised by academics, policymakers, and politicians in the past decade.

The boom of new research is easily explained. The historical experience from the 1980s on suggested that sovereign debt crises belonged to emerging economies. The general understanding was that debt sustainability issues emerged when markets perceived national economies as unstable or over-reliant on short-term debt and inflows of foreign capital (Eaton and Fernandez, 1995; IMF, 2003). Significantly, Reinhart and Rogoff introduced the celebrated notion of 'debt intolerance' and argued that the threshold for sustainable debt-to-GDP ratios was closely correlated with the overall perceived strength of a country, and thus substantially lower for emerging economies (Reinhart and Rogoff, 2003)[4]. What this narrative underestimated was the possibility of such crises in advanced economies.

As a result, since 2009, academics and policymakers have been reworking our basic understanding of sovereign debt dynamics. Research has moved in several directions, with new theoretical models and empirical studies of the determinants of sovereign debt; of the likelihood of sovereign default; of the mechanics of debt crises; and of pricing methods for bonds on the international market (Lastra and Buchheit, 2014: xix). The latter subject is particularly important for the empirical evaluation presented in this work. Additionally, the European Sovereign Debt Crisis has sparked an especially prolific investigation regarding financial contagion, flight to safety, and bailouts.

This essay is best contextualized within the policy-oriented branch of EU political economics (for a literature review on the topic, see: Lane, 2012). In dealing with both the notion of debt mutualization and debt reduction, my work has two souls. In the first half, I take a more economic approach to the issue of debt mutualization, which academic literature has primarily explored with the notion of Eurobonds[5] (Lastra and Buchheit, 2014: 26.70). Against previous works, my proposal offers a scheme with a much greater detail in both the institutional

[3] Throughout this paper, I use the notion of mutualization to indicate the pooling of sovereign debt and issuance of common sovereign debt obligations by a central institution.

[4] Reinhart and Rogoff later argued against this reading (particularly: Reinhart and Rogoff, 2011).

[5] The term Eurobonds can be misleading, as it also refers to international bonds issued in a foreign currency. For the whole of this paper, I use the term "Eurobond" to signify a sovereign debt security jointly issued by the member states of the Eurozone.

mechanics of mutualization and the evaluation of its impact on European public finances, benefitting from the advances in theoretical and empirical literature of sovereign debt dynamics.

The second half relies more heavily on the theoretical tools of comparative political economy. I examine the problem of European sovereign debt from the theoretical and historical perspective. After my analysis, I compare past and present efforts underway in the Eurozone to address the problem of high debt levels and real-economy divergence. I then contrast the theoretical/historical analysis with the policy efforts. Given the breath of the topic, my proposal on debt reduction is necessarily more qualitative and broad than the one for debt mutualization. However, it points out important lacking in the current policy stance of the EMU and joins the call of many academics for a more encompassing and far-reaching solution to the Eurozone dilemma.

The remainder of the paper is organized into three main sections:

In the first section, I outline the proposal for a debt mutualization system and a debt reduction plan. After describing the major goals of the scheme, I delve in its details. For the first part, I review the pertinent literature on European debt. I contextualize and illustrate the various proposals of Eurobonds advanced in the past years. In turn, I present my proposal for a scheme of debt mutualization in the Eurozone, characterizing its main features and mechanisms and highlighting the differences with the alternatives. In particular, I maintain that the gradual and dynamic nature of mutualization creates a system of positive incentives for real-economy convergence. Furthermore, I argue that mutualization would facilitate a pact of gradual debt reduction. The second half of the section deals with the debt reduction pact itself.

In the second section, I substantiate with empirical analysis my claims on the effects of debt mutualization. I break down the evaluation of my mutualization proposal between first-order effects and second-order effects, determining at each step: the upper bound (UB) and lower bound (LB) for Eurobonds issued under the mutualization scheme; the second-order effect of mutualization on the remaining national debt; the impact of debt reduction and of a potential 'confidence effect' of markets on national and European yields; the movement of the Eurobond rate between the LB and the UB. Finally, I combine all of the above calculations to illustrate the dynamic distribution of costs and benefits deriving from rate and debt reduction across member states, as the mutualization scheme approached the steady-state. I postpone the outline and discussion of the second half of the policy proposal to the third section of the study.

In the third section, I evaluate the prospects of debt reduction in the Eurozone from the perspective of comparative political economy. In doing so, I intend to substantiate my proposal with a theoretical framework that aims to consider as completely as possible to current state of affairs in the Eurozone. First, I present the competing theories that explain the dynamics and implications of the EMU. Second, I contextualize the different claims of these theories in the historical trajectory of the euro-area. The combined theoretical and historical/empirical approach provides the best lenses to assess the implications of the proposed policy proposal. In the final part of the section, I review the policy literature and the latest efforts by member states to tackle

the problem of high debt in the Eurozone. I evaluate the alternative approaches of fiscal consolidation ("austerity") and growth-targeting investment, concluding that they are not mutually excludable. Indeed, I argue that it should be possible to combine "smart austerity" together with a strategic, long-term growth plan.

In the conclusion, I summarize my empirical findings and consider avenues for future research. In turn, I build the complete case for the proposed scheme of debt mutualization and uphold that the present environment offers an ideal international setting. Indeed, I argue that European policymakers should seize the current historical conjuncture and move forward with the next step of economic integration, if they are to safeguard the long-term viability of the European project.

Section One – Theoretical Proposal

The proposal outlined in this paper is two-fold. On the one side, I put forward a system of debt mutualization. This would entail the creation of a common pool of European sovereign debt issued in the form of a common bond, a Eurobond. On the other side, I sketch a pact of debt reduction and real-economy convergence among Eurozone states. With such a pact, participating governments would agree to measures and guidelines to reduce the debt burden of the Euro area, as well as reduce the gap between different member states. Here, I outline the advantages of the proposed scheme, before presenting more in depth the details of the two-fold plans.

Sovereign debt mutualization would carry a number of benefits for Eurozone member states. These advantages fall into three main categories: fiscal expansion, financial stability, and convergence incentives (for a complete evaluation of the benefits of common bonds, see Claessens et al., 2012: 5-8).

First, mutualization would constitute, in the medium run, a fiscal boost to participating states. The basic objective of Eurobonds would be to reduce yield levels on sovereign securities across the Eurozone. Therefore, Eurobonds would lower the costs of refinancing for governments. This is the simplest effect: if governments issue part of their debt as Eurobonds, and the interest rate paid on Eurobonds is lower than that paid on national bonds, than states save in terms of savings on future interest spending. This decrease in future interest spending compares to creation of fiscal room (OECD, 2016: 2).

Second, Eurobonds would enhance the financial stability of the Euro-system, from both the public and the private side. From the public side, Eurobonds would be less prone to large fluctuations. Specifically, a pool of common debt would be much more resilient to speculation and would lower the risks of widespread panics in the sovereign debt market (as the default risk of the bonds is much lower). Intuitively, the larger the market, the more difficult it is for speculators to short it. As such, governments would benefit from lower fluctuation risk in the debt-refinancing routine. Additionally, greater resilience would avoid spread spikes in times of

uncertainty, when market panics can function as an echo chamber for instability. From the private side, the common government securities would create a large volume of very safe and liquid financial products. This input in the financial market would function as a stabilizer for the balance sheets of bondholders (banks and other firms).

Third, mutualization would improve the fiscal and financial conditions for real-economy convergence among Eurozone states. Equal interest rates would translate to equal access to international credit market for different European governments. As such, participating states would be on a leveled playing ground when it comes to debt refinancing.

In short, on the one hand, Eurobonds could be interpreted as crisis-prevention instruments. Through risk-pooling across participating states, they achieve greater financial resilience in both the public and the private markets. On the other hand, they would act as stabilizers and convergence incentives, as they guarantee, at least partially, the same refinancing rate across the Eurozone, leveling out the playing field between Northern and Southern economies. As a side note, by creating a large pool of very liquid, euro-denominated, financial products, Eurobonds would also increase the importance of the European currency in the global financial arena (European Commission, 2011).

The second part of the proposed scheme is more complex. Debt reduction involves much more than of the public finances of a state than does debt mutualization, which only concerns one element, that is, government bonds. Debt reduction has to do with the wider fiscal policy, which covers anything from basic public expenditure like health care or defense spending, to public-led infrastructure investment, to the costs of running the state itself. The upshot is that there is a much wider and long-standing academic literature to serve as backdrop to new studies. The concept of state debt is as old as the concept of the state itself. Academics have analyzed it through the lenses of history, policy, and economic theory (see for example, Dornbusch and Draghi, 1990; Reinhart and Rogoff, 2010). Luckily, the scope of this study needs not a complete review of such literature. Here, it will suffice to outline the motives of debt reduction given the current state of the Eurozone. In the later sections of this paper, I will delve deeper in the theory and practice of debt reduction, further contextualizing it in the European political economy.

A mainstream justification of the fiscal consolidation efforts undertaken by Euro states in the wake of the crisis was that it was necessary to regain market confidence. Reducing a country's debt will improve the sustainability of its long-term fiscal position, therefore increasing the confidence of investors, who then decide to accept bonds at a lower rate. Similar to Eurobonds, fiscal consolidation would be a way to reduce spreads across Europe, encourage convergence, and level the playing field. In a way, it would be spending less to be able to spend more – or to keep spending altogether (Alesina, 2015).

However, the theoretical literature identifies a number of additional problems associated with high debt levels, as thus advantages of debt reduction (for a complete review, see Checherita-Westphal and Rother, 2012). Indeed, a long-standing tradition associates high debt to weaker growth, especially on the long run. Classical economics equates public debt to a burden

on future generations, who have to pay for it with interests but also bear the consequences of the crowding out in private investment (Modigliani, 1961). This view has been refined by more recent studies that argue for a threshold after which the efficiency of public debt decreases and its negative impact on private investment outweighs the benefits (Aschauer, 2000). From the empirical side, a 2010 ECB study on high debt levels positions the negative-impact threshold around 90-100% of debt-to-GDP ratio. However, especially for the classical crowding-out effect, the negative consequences realize at much lower levels, which implies that the overall assessment of public debt depends on the efficiency of public investment (ECB, 2010). Since many Eurozone economies were either well past or approaching this level in 2015, the gains from debt reduction would likely be substantial (Figure 1).[6]

The proposal's two-fold framework could be interpreted as a carrot-and-stick system. Following the metaphor, debt mutualization would be the carrot. By pooling together debt across the Eurozone, weaker states would be relieved of some market pressure and would face more favorable fiscal conditions with respect to their debt position. In exchange, states would have to subscribe to a debt reduction plan that, albeit costly on the short run, would sustain growth in the long run. Similarly, one could see the proposed plan as a tradeoff or compromise between Northern European states and Southern European states. Where the former agree to pool together a part of sovereign debt, which would be beneficial mostly to Southern European states, the latter agree to strengthen their fiscal position and lower their debt levels.

In the end, the common goal is to create the conditions for real-economy convergence in the Eurozone. Debt mutualization would carry numerous advantages and protect the Euro area against future sovereign debt crises. However, greater integration comes at a cost. Indeed, expanding the European project requires governments to double their efforts to reduce the gap between nations. A closer union would become difficult to sustain, if not directly counterproductive, were the present trend of divergence to continue. The two parts of the proposed scheme – debt mutualization and debt reduction – become then crucial in completing as well as sustaining the integration project in the long run.

After having presented the general advantages and goals of the proposed plan, I now turn to the specifics of the more quantitative part of my policy proposal: the debt mutualization scheme, which is indeed the main contribution of this study. I deal with the second half of the proposal, regarding debt reduction, in section III of the study.

1.1 Eurobonds

The idea of a European common currency area was first mentioned in the Werner Report of 1970. The plan was drawn up by Luxembourgian Prime Minister Pierre Werner, in occasion of the summit of European heads of state at La Hague. However, the project was brushed aside,

[6] Note that these figures for debt-to-GDP ratio are taken from the OECD, which tends to have the highest estimates across international organizations.

as the Community entered a decade of deep political and economic difficulties. It resurfaced almost a decade later, with the Delors Report of 1989, with which the President of the European Commission Jacques Delors opened the way to the Economic and Monetary Union (EMU). Importantly, while both reports underlined the need of combining economic and monetary integration, they also acknowledged the challenge of such endeavor (Werner Report, 1970; Delors Report, 1989). Specifically, the Delors Report admitted that "the centrally managed Community budget is likely to remain a very small part of total public-sector spending" (Delors, 1989: 19). Already, the prospect of fiscal union seemed very slim, while the idea of communitarian debt was entirely off the table – the question of European sovereign bonds was not even mentioned in the reports.

Yet, the Delors Commission also remarked that if left unchecked, sovereign yield dynamics could potentially undermine the whole European project. Market discipline could be insufficient to incentivize real convergence, and could instead prove counterproductive. "*Experience shows that market perceptions do not necessarily provide strong and compelling signals […] market views about the creditworthiness of official borrowers tend to change abruptly and result in the closure of access to market financing. The constraints imposed by market forces might either be too slow and weak or too sudden and disruptive*" (Delors Report, 1989: 20).

The concept of common debt issuance was introduced shortly after the establishment of the common currency area. A 2000 report from the Giovannini Group, under the Directorate-General for Economic and Financial Affairs, underlined the appeal of a regime of common debt management (European Commission, 2000). The report began outlying the benefits of mutualization in terms of reduced market fragmentation, and smoother fiscal coordination. Still, despite the "sudden and disruptive" potential of independent debt management, the report recognized the lack of pressing incentives for immediate further integration. European countries were yet to experience how market forces can indeed be sudden and disruptive, to the point of bringing a country, Greece in the 2009 case, to the brink of default.

As the European Sovereign Crisis unraveled, notwithstanding stronger calls for integration, the chances of a fiscal union remained slim (Van Rompuy, 2012; Marzinotto, 2011). In contrast, those of jointly-issued sovereign debt securities improved. Indeed, the crisis underlined that not only does market discipline provide insufficient incentives for fiscal responsibility; it can also become itself a destabilizing force if sovereign spreads grow out of control. To address the latter issue, academics and policymakers began, starting in 2009, putting forward plans for the establishment of Eurobonds (De Grauwe and Moesen, 2009).[7] Jointly-issued sovereign bonds would guarantee at least some protection against market volatility, while not forcing member states into a 'one-size-fits-all' fiscal-policy framework, which would have dubious consequences for economic performance and national sovereignty alike. In 2012, at the

[7] Another type of proposal from the European Commission consists in the emission of "project bonds", which would not replace national debt but would rather create a fiscal space at the European level to supplement imbalances among members (European Commission, 2010).

height of the Eurozone debt crisis, the European Parliament approved a resolution calling for the establishment of Eurobonds (Europarl, 2012).

Past proposals of Eurobonds vary on several key issues: the amount of mutualized debt; the legal standing of the government securities; and the mechanics underlying mutualization. The most radical schemes call for a complete mutualization of national debt. However, authors generally recognize the impracticality of such drastic change. If they at all consider the option, they qualify it as an ideal end-state, rather than a credible policy objective (Yianni and Aggarwal, 2014: 438). Besides the issue of political viability, the sudden and full mutualization of sovereign debt would raise considerable moral hazard problems, removing all market pressures for discipline. Indeed, it would leave EU institutions with no clear instrument to leverage national governments (European Commission, 2012).

Most proposals offer a partial mutualization program, either putting a cap on the percentage of debt-to-GDP to be transferred or selecting a specific portion of national debt to mutualize. There are three main typologies of schemes that fall under this category (Yianni and Aggarwal, 2014: 439; Claessens et al., 2012: 9-10).

- *Blue-Bond / Red-Bond*
  Member states would mutualize up to 60% of their debt-to-GDP.[8] Eurozone countries would then issue 'blue bonds' for mutualized debt, and 'red bonds' for national debt. The system could allow for different 'blue-bonds rates', to be calculated on the basis of national yields (De Grauwe and Moesen, 2009). Alternatively, a Bruegel paper of 2011 suggested that the allocation of 'blue bonds' across countries could be managed based on fiscal conditionality (Delpla and Von Weizsäcker, 2011).

- *The Redemption Pact*
  Member states would pool together all debt in excess of 60% in a European Debt Redemption Fund (EDRF). Member states would have to gradually repay debt from the EDRF, which would be established as a temporary institution for debt reduction, rather than a permanent component of the EMU framework (Doluca et al., 2012; European Commission, 2014).

- *Eurobills*
  In 2011, Philippon and Hellwig put forward an alternative to the standard Eurobond. Their instrument would target short-term debt and would be capped at 10% of debt-to-

[8] The threshold of 60% is often used in the academic and policy discourse over sovereign debt. It derives from the Maastricht criteria, the conditions compiled in the Treaty of Maastricht required for entering the EMU. In the Treaty, it is taken as an ideal value of sovereign debt sustainable on the long-run. While there is a large literature that takes issue with the efficacy of such a standard, I do not deal with it, as it is not central to the institutional design proposed in this study.

GDP. The upshot of eurobills is their simplicity. They would retain part of the effectiveness of mutualization while decreasing its risks. (Philippon and Hellwig, 2011).

Finally, another set of proposals of common debt issuance puts forward a different legal status for Eurobonds. All of the schemes illustrated above offered bonds with several and joint guarantees by member states. Such guarantee would make every participating state liable for all mutualized debt. Instead, under a several-but-not-joint guarantee system, each state would only be responsible for its own share of debt in the common pool (Yianni and Aggarwal, 2014: 439).

- *ESBies*
  The main proposal with a system of several but not joint guarantees consists in ESBies, European Safe Bonds. Under this scheme, member states would also pool up to 60% of debt-to-GDP, creating a two-tranche system of senior bonds and junior bonds (Brunnermeier, 2011).

Additionally, the academic literature has often considered coupling the issuance of common sovereign securities with conditionality on fiscal integration, or debt reduction pacts (IMF, 2012: 12-13). Indeed, as was already clear to the Delors Commission, simple debt mutualization would be of little use if it didn't directly address the issue of fiscal responsibility and public finance. It would not resolve the real economy imbalances from which sovereign spreads arise in the first place. Without tools to directly encourage convergence on debt, competitiveness, and productivity, mutualization would only grant increased protection to the Eurozone from market volatility during crises. However, it may become counterproductive through moral hazard, reducing market pressures on national governments.

The proposals illustrated above offered combinations of conditionality on existing fiscal pacts (to name a few: the Stability and Growth Pact (SGP); the Six Pack and the Two Pack of 2011; the New Fiscal Compact of 2012[9]). However, the credibility of the latter fiscal regulation has been time and again weakened by the ability of governments to circumnavigate rules. The ultimate efficacy of the SGP has also been questioned through empirical research (Europarl, 2011: 6; Koehler and Koenig, 2015). While any fiscal conditionality should rely on the vast amount of work and coordination already achieved by the Eurozone, it would be short-sighted not to recognize the many limitations of European efforts so far. Above all, a clear and streamlined rule system is necessary to give the appropriate credibility to the overall scheme.

The proposal outlined in this paper mirrors some of the main features of past plans. However, it provides a more detailed system of enforcement and a clearer mechanism of incentives for convergence. I now turn to explain its main characteristics and contrast them with previous projects.

[9] These are just a few among the many pacts that Eurozone member states have agreed upon since 1998 in order to coordinate and harmonize the different national fiscal policies.

1.2 An Institutional Design for Debt Mutualization

In short, I propose a system of partial sovereign debt mutualization under a new institution, here dubbed European Mutual Debt Fund (EMDF), which could be established either as a branch of the European Stability Mechanism (ESM) or as an independent entity. The EMDF would gradually take up to X% of GDP worth of national debt from participating members. It would then refinance this debt through national branches that would issue European Mutual Bonds (EMB), backed with several but not joint guarantees. EMB would have seniority over national sovereign bonds. Participation in the program would be dynamic and conditional on adherence to common fiscal rules and a debt-reduction plan.

Percentage of National Debt Mutualized

All member states would mutualize up to X% of debt-to-GDP ratio. The precise percentage should be determined as to maximize the positive impact of the program on yield spreads, taking into account both the first order effects and the second order effects of mutualization. In section two, I present a preliminary calculation of such optimal level.

Gradual Establishment

The mutualization of sovereign debt under the EMDF would be gradual and based on newly issued debt. In my empirical evaluation, I propose that 5% of debt-to-GDP would be re-issued every year with EMBs. Eurozone countries refinance their debt on a fairly frequent basis, and the yearly gross issuance of sovereign bonds is more than sufficient to cover this percentage (Figure 5). In a 2010 paper, the ECB calculated the average maturity profile of European debt, which included around 70% of long-term debt, while short-term securities accounted for around 9%, the rest consisting of loans and other instruments (Hartwig et al, 2010). Data from the European Central Bank's GST database on government statistics (updated to 2013) indicated that, over the past twenty years, average residual maturity of EZ debt has increased, reaching over 7 years in 2013 (Figure 6). Therefore, every seven years, EZ states renew their debt completely through roll-over of existing bonds or through the issuance of new bonds. This puts the average annual issuance rate at 14% of total debt[10].

Senior Bonds, Backed by Several but not Joint Guarantees

I propose that EMB be given seniority over national bonds, essentially setting up a system of tranches such as that proposed by Brunnermeier (Brunnermeier et Al., 2011). In the eventuality of sovereign default, states would have to first default on national bonds and only last on European ones. Such system would ensure greater safety, and thus higher quality, for EMBs. Additionally, it would make several but joint guarantees redundant. Joint guarantees are necessary only if investors fear that a participating member may not be able to repay its portion

[10] As explained, if the average maturity is 7 years, with a generally stable level of debt-to-GDP, the gross debt issued every year would be $1/7 = 0.01425 \approx 14\%$.

of debt. However, it is highly unlikely that a country default on all of its debt. Therefore, it is unlikely that, even if participating states incur in sovereign default, this should concern EMBs, which makes the seniority system a sound enough protection for Eurobond-holders. Crucially, this would increase the political viability of the program. Indeed, it may prove especially difficult to sell the joint guarantees to Northern European countries, where voters are unlikely to accept the idea of being liable for Southern European debt.

On the downside, the seniority of EMBs would aggravate adverse second-order effects on the yields of remaining national debt, triggering flight to quality. I examine the magnitude of these dynamics in section two.

Fiscal Conditionality and Dynamic Participation

Participation in the EMDF would be dynamic, and conditional on adherence to common fiscal rules and debt reduction efforts. Common fiscal rules are spelled out already in the Stability and Growth Pact (European Commission, 2016). However, the efficacity of the common rules has been put into question on several occasions, demonstrating how coordination in the fiscal realm is yet to reach a satisfactory level. Particularly, European policymakers are yet to address their key shortcoming: enforceability. With a dynamic participation mechanism, the EMDF could become an effective enforcement tool. Each year, member states' fiscal performance would be evaluated by the Commission, and countries would be categorized as: upstanding, partially upstanding, or delinquent, depending on the magnitude of their infringement of SGP rules. *Upstanding* countries would renovate all of their maturing debt in the EMDF and transfer up to 5% (if they haven't reached X% of mutualized debt-to-GDP). *Partially upstanding* countries would either only transfer up to 2% of their maturing national debt to the EMDF (if they haven't reached X% of mutualized debt-to-GDP), or only partially renovate their maturity debt (say, with a 2% decrease from the previous year). *Delinquent* countries would either not transfer new maturing debt to the EMDF, or renovate 5% less if they are at the steady-state. The various cases are illustrated in table 1.

The establishment of the EMDF would then have two main phases: transition and steady state. However, in both cases, participation would depend on adherence to fiscal rules. A perfectly upstanding country would gradually move out of the transition and into the steady state. A partially upstanding country would move towards the steady state more slowly, or hover below it. A chronically delinquent country would be gradually phased out of the system.

The gap between EMB yield and national yields would serve as a disincentive for infringement. Delinquency and phasing out of the program would provide strong negative signaling to markets, which would likely aggravate flight to quality dynamics and increase spreads on national debt. This dynamic system could function as an effective tool for fiscal discipline and convergence, increasing the costs of exit from the EMDF.

Table 1: Transition and Steady State

Transition[11]					
Status (t=0)	*National Debt (t=0)*	*EMDF Debt (t=0)*	*Transfer*	*National Debt (t=1)*	*EMDF Debt (t=1)*
Upstanding	100%	5%	5%	95%	10%
Par. Upstanding	100%	5%	2%	98%	7%
Delinquent	100%	5%	0%	100%	5%[12]
Steady-State					
Status (t=0)	*National Debt (t=0)*	*EMDF Debt (t=0)*	*Transfer*	*National Debt (t=1)*	*EMDF Debt (t=1)*
Upstanding	45%	60%	0%	45%	60%
Par. Upstanding	45%	60%	-2%	47%	58%
Delinquent	45%	60%	-5%	50%	55%

Debt Reduction Pact

The final component of the EMDF proposal is the debt reduction pact that would be stipulated alongside mutualization. As I showed above, most authors agree that the crucial issue of debt sustainability is not the divergence of yield spreads *per se* but debt levels themselves. In section III, I outline a more detailed and encompassing proposal for a pact of debt reduction. However, for the sake of the quantitative analysis of section II, I identify here a preliminary target of yearly debt reduction, based on the convergence efforts between 1995 and 2005, when EZ member states prepared for the establishment of the EMU. Over the span of a decade, the average national debt reduction was of 1.18% of nominal GDP, though there was large variance among states (Figure 7). Taking the formation of the EMU as historical precedent, I argue that a 1% annual reduction of debt-to-GDP ratio would be a feasible and sensible objective.[13] This reduction would ideally continue until the extinction of all national debt above 60%.

Rules versus Market Discipline

A major line of critique that I intend to address upfront is that the complexity of the institutional design would be redundant. Market discipline and rate spreads would effectively restrain government action in much the same way as the enforcement mechanism of dynamic participation. Given the reduced amount of national debt issuance, yields should better reflect the pricing of default risk and general economic performance of the country. As a result, countries would be strongly dis-incentivized from profligacy, as not to heighten flight to quality dynamics.

[11] I illustrate an example of transition vs. steady-state, with X% of mutualized debt-to-GDP at 60%, and the national debt-to-GDP of the country at 105%. For sake of simplicity, I do not account for debt reduction across periods.
[12] Eventually, as mutual debt would not be renovated for delinquent countries, this percentage would return to 0.
[13] In order to offset the potential procyclical nature of a tight yearly condition, the plan could instead consist in a 5-year average of debt-to-GDP reduction. For the sake of simplicity, in my empirical evaluation, I will consider a linear yearly decrease.

In response to this critique, I argue that relying on market discipline would be repeating the mistakes of the past. As already the Delors Commission underlined, and as the past financial crisis proved, market sentiments are prone to be "sudden and disruptive". A clear rule-based system would be useful in grounding market sentiments and in limiting adverse flight to quality dynamics to situations of actual increases in default risk and market profligacy. Spreads between EMB rates and national rates would increase as delinquent countries are phased out of the program, and decrease as upstanding countries benefit from both the risk-sharing of mutualized debt and the fiscal responsibility incentivized by the EMDF. In this sense, a rule-based system would function as controlled market discipline.

Concluding, the proposed design for a European Mutual Debt Fund, coupled with a debt reduction pact, would provide the Eurozone with a system of common debt issuance to reduce rate-spread risk, as well as with an enforcement mechanism to ensure discipline and convergence. The main contribution of the design is the latter part, which offers a more detailed scheme than those considered by academic literature thus far.

In the following section, I move to the second main contribution of this study: the empirical evaluation of the impact of the proposed program. This is indeed the main innovation presented by this paper, as academic literature hardly ever offered more than a qualitative discussion of the effects of debt mutualization. In contrast, I use modeling and data analysis to offer a quantitative, albeit preliminary, investigation of the implications of debt mutualization for interests rates and public finances.

Section Two – Empirical Evaluation of Debt Mutualization

The political and economic viability of debt mutualization hinges critically on the distribution of costs and benefits among Eurozone member states. In this section, I put forward a quantitative evaluation of this distribution, separating between first-order effects (FoE) and second-order effects (SoE). FoEs consist in the change of interest rates paid by governments on mutualized debt due to the different yield of European Mutual Bonds. In contrast, SoE cover the secondary impact of mutualization: flight to quality dynamics on the rates on remaining national debt; the impact of the debt reduction program associated with the EMDF; and the potential of 'confidence effects'. Finally, the dynamic evolution of such effects during the transition phase sheds light on the evolution of the scheme as more debt is pooled. The dynamic distribution of costs and benefits allows us to calculate the optimal level X% of debt-to-GDP to be transferred from the national pools to the European Fund.

My analysis of FoEs and SoEs draws from the prolific literature of asset pricing. Scholars of financial economics have long debated the determinants and predictors of bond yields, proposing a number of different models. The most widely used model is certainly the Capital Asset Pricing Model (CAPM). This is the main model of Modern Portfolio Theory, first

developed in the 60s by Sharpe and Lintner (Sharpe, 1964; Lintner, 1965). While initially devised to evaluate equity market pricing, it has also been used to investigate national bonds (see for example Frankel, 1982; Engel, 1994). In my determination of FoEs, I make use of the CAPM toolbox, specifically of portfolio risk and expected returns formulae (Sigman, 2005).

Additionally, since the Eurozone crisis, the academic literature has attempted to uncover the dynamics behind the market pricing of European bonds. My analysis of SoEs largely benefits from the research conducted in this field. In the past decade, driving questions have concerned the role of national fundamentals; the mechanics of contagion between Southern European states during the Eurozone crisis; and the impact of global risk aversion.

Studies have found that following the establishment of the EMU, sovereign yields became less exposed to international volatility and risk (Abad et al., 2009). However, most scholarship agrees that, during the crisis, countries experienced some degree of financial contagion and flight to safety (Grammatikos and Vermeulen, 2012; De Grauwe and Ji, 2013). According to a 2014 ECB paper, the impact of contagion was substantial for Southern European countries, though limited to a few key events during the crisis (Claeys and Vašíček, 2014).

Finally, a more complex, and politicized, debate arose on the influence of fundamentals on national rates. While some studies find a degree of dependence on fiscal and macroeconomic variables (Caceres et al., 2010; Baldacci and Kumar, 2010), others argue that during the crisis yields decoupled from such considerations and entered a bad equilibrium (De Grauwe and Ji, 2013). The studies that found a significant impact of fundamentals also confirmed the presence of forward-looking fundamentals analysis (Caceres et al., 2010).

Such literature findings underline the positive and adverse forces that could influence national sovereign rates under a mutualization scheme: namely, increased resilience – that is, less idiosyncratic risk, – and increased interdependence – that is, increased systemic risk. The importance of forward-looking expectations also suggests a possible 'confidence effect' of the mutualization scheme, as the institution could improve outlooks of future macroeconomic performance for member states.

As a final note, determining the impact of mutualization wholly depends on models of pricing of European bonds. However, the issuance of Eurozone bonds would be unprecedented in history for its political and economic implications. Therefore, any analysis of its potential trend is destined to rely on a number of assumptions. Throughout my study, I try to maintain the most conservative approach, only making choices necessary to retain a degree of forecasting power. At each step, I provide an argument for the assumptions I take.

2.1 First-Order Effects

I classify as first-order effect the impact of debt mutualization on the rates that countries would pay on EMBs. The reasoning is that most European countries would pay a lower rate on EMBs than on their regular national bonds. To the core, the design of an EMB resembles that of tranche securities. These pool together several underlying instruments and produce a system of prioritized claims (Coval et al., 2009: 6). However ominous the comparison to structured

financial instruments like CDOs may be, I argue that pooling together sovereign debt obligations would offer all the advantages of differentiation without many of its risks.

A first key change is that EMBs would not be structured into several seniority tranches. The only distinction would be between EMBs and national bonds. Moreover, as the program grows in scope and the amount of mutualized debt reaches high levels of X% of debt-to-GDP, seniority would matter less and less. Indeed, default risk would begin to concern the senior portion of mutualized debt as well.

Second, the EMB structure would be transparent and straight-forward, as opposed to the opaque nature of CDOs. Investors could easily evaluate the underlying components of mutual bonds, which are the traditional national bonds, weighted by national GDP. As a result, markets are less likely to incur in the pricing errors caused by complex and opaque instruments (Coval et al, 2009: 23).

The yield of EMBs would depend on two main factors: default risk and contagion risk. Default risk consists in the idiosyncratic risk of a member state incurring in sovereign default, and is directly transmitted by the individual national components of the structured European bond. For low levels of X% of debt-to-GDP transferred to the EMDF, the seniority of EMBs would offset this default risk. The lower X%, the less probable it is that sovereign default would impact EMBs. Therefore, in its early stages, EMBs would effectively be default-risk free.

Instead, contagion risk consists in the systemic risk that arises when pooling together correlated products. Indeed, as discussed above, EMU countries display a high exposure to internal shocks (Abad et al., 2009). A simple correlation matrix illustrates the high levels of co-movement between sovereign yields in the Eurozone (Table 2). The 2009 Crisis also showed the potential for financial spillover between member states, especially in the Southern region. Indeed, the yields of EMBs should reflect concerns about the systemic risk built in the common pool. However, this could be balanced by an opposite 'confidence effect'. As member states commit to a mutualization scheme and a debt-reduction plan, perception of the solidity of integration are likely to improve, as they did following the establishment of the EMU (which saw an alignment and general decrease of European sovereign debt yields, Figure 2).

To provide an estimate of FoEs, I calculate the potential range for the yield of EMBs, determining its lower bound and upper bound. For these computations, I rely on data from the European Central Bank Statistical Data Warehouse (Dataset 1). I refer to monthly long-term interest rate statistics, which measure the yield of sovereign bonds with a 10-year maturity. Finally, I consider the timeframe from January 2014 to October 2016. I choose this recent and limited interval to exclude the large and disruptive effects from the crisis and to best contextualize the evaluation of the proposed scheme in the present environment.

For the lower bound, I assume a European risk-free rate. As argued above, in the early stages of the EMDF, EMBs are effectively risk-free obligations. I take the German 10-year bond as the reference for the risk-free rate, adding 5 bps to the '14-'16 average to account for potential

market frictions such as recognition and adaptation delays on the side of investors (Hou and Moskowitz, 2005).

For the upper bound, I adopt the approach of Modern Portfolio Theory. The EMB is treated as a portfolio of Eurozone sovereign bonds. The expected return rate is given by the weighted average of the expected returns of its components. I take the '14-'16 average yield averages as a measure of national expected returns (r_n), and compute the national weights (w_n) from 2015 GDP data (Dataset 1).

$$r_{UB} = \sum_n r_n w_n \quad (1)$$

In the table below, I illustrate the preliminary range and magnitude of FoEs, that is, the distribution of costs and benefits of mutualization across member states.

Table 3: Preliminary Range of Costs and Benefits of EMBs, 5% of GDP mutualized[14]

UPPER BOUND			**LOWER BOUND**	
r(EMB):	1.32%		**r(EMB):**	0.65%
Country	*Rate Change*	*Expenditure Change (Mill)*	*Rate Change*	*Expenditure Change (Mill)*
Germany	-0.72%	-1087	-0.05%	-69
Luxembourg	-0.65%	-17	0.02%	1
Netherlands	-0.49%	-164	0.19%	63
Finland	-0.45%	-47	0.22%	23
Austria	-0.43%	-73	0.24%	41
France	-0.31%	-341	0.36%	391
Belgium	-0.29%	-59	0.38%	79
Slovakia	-0.14%	-5	0.53%	21
Latvia	0.05%	1	0.72%	9
Ireland	0.14%	18	0.81%	104
Malta	0.39%	2	1.06%	5
Lithuania	0.45%	8	1.12%	21
Spain	0.66%	355	1.33%	716
Italy	0.72%	589	1.39%	1140
Slovenia	0.79%	15	1.46%	28
Portugal	1.77%	158	2.44%	219
Cyprus	3.52%	31	4.19%	37
Greece	7.03%	617	7.70%	676
	TOT:	355	*TOT:*	716

Data: ECB; Computation: Author's.

[14] Expenditure values are calculated on the basis of 2015 GDP and government-debt data from the ECB Statistical Data Warehouse.

The percentage change refers to the difference between the average return on national sovereign bonds and the EMBs. I also provide the change for future interest expenditure given the gross volume of EMBs issued (5% of GDP).

$$Rate\ Change = r_{n,\ average\ 14-16} - r_{EMB} \quad (2)$$

$$Interest\ Exp.Change = \left(r_{n,\ average\ 14-16} - r_{EMB}\right) * Gross\ EMB\ issuance \quad (3)$$

The UB/LB analysis provides an initial indication of how the mutualization scheme would impact the public finances of participating nations. With 5% of debt-to-GDP mutualized, member states would benefit, or pay, the change from the national rates to the European rate. As expected, Southern European states would benefit the most from the reduced rate on national debt. In the upper-bound scenario, Northern European nations would instead lose out, given the higher rate. Significantly, in both scenarios the scheme provides a positive-sum game. Indeed, if states set up cross-national transfers to offset the adverse effect in Northern nations, the resulting design would still be Pareto efficient.

Although this preliminary analysis sheds some light on the expected impact of mutualization on public finances, it holds little explanatory power concerning the overall effect of EMBs. It does not take into account second-order effects, nor does it offer insight as to how the EMB rate would move between the upper and lower bounds.

2.2 Second-Order Effects

With my analysis of second-order effects, I intend to shed light on the full impact of debt mutualization in the Eurozone. I identify and analyze three main SoEs: the impact of mutualization on the rates on newly issued national bonds; the impact of the debt reduction program associated with the EMDF; and the potential impact of 'confidence effects', as the EMDF improves market perception of future EMU performance.

Yields of Remaining National Bonds

Under the proposed scheme of mutualization, countries would renew each year part of their debt under the EMDF, issuing EMBs instead of national bonds. The proposed maximum amount for such transfer is 5% of GDP. As illustrated above, the gross issuance of debt by Eurozone member states exceeds this level, with an average of 14% of debt. Therefore, together with EMBs, participating states would also still issue national bonds.

Given the senior status of EMBs, the default risk passes to the remaining national bonds, whose yields are thus likely to increase. This dynamic would consist in a flight to quality or to liquidity, as national bonds become riskier and their market volume shrinks. Indeed, the literature

on European sovereign bonds market finds flight-to-quality dynamics at play across European states, which provides the theoretical underpinning of my analysis (De Grauwe and Ji, 2013).[15]

To begin with, I take the assumption that current average returns on European sovereign bonds are a good indicator of the current market pricing of idiosyncratic sovereign default risk. I dub this average rate (taken between 2014 and 2016) the *underlying national rate* (r_n^u). Furthermore, I put forward a modified form of the Modigliani-Miller proposition of risk invariance, arguing that r_n^u is independent of the instruments used to finance the debt (Miller, 1988; Claessens et al., 2012: 12). As a result, the weighted average of the rate on EMBs and the rate on remaining national bonds should equal the underlying national rate.

$$r_n^u = \frac{D_n - D_{EMB}}{D_n} r_n + \frac{D_{EMB}}{D_n} r_{EMB} \tag{4}$$

From this equality, I derive the formula for the rate on remaining national bonds.

$$r_n = \frac{D_n}{D_n - D_{EMB}} r_n^u - \frac{D_{EMB}}{D_n - D_{EMB}} r_{EMB} \tag{5}$$

This formula essentially represents the flight-to-quality dynamic between national bonds and EMBs. As such, it is only appropriate for the countries whose yields would decrease under the mutualization scheme. The rates of countries whose yields are already below the EMB rate should not be affected by mutualization (given the several but not joint guarantees backing EMBs, they do not carry the default risk of other member states). They will instead be affected by other changes, such as the reduction in national debt.

Before I calculate the movement of national rates during the transition to the steady-state of the EMDF, I derive the formulae the movement of the EMB rate between the lower bound and the upper bound. The latter in turn depends on the evolution of the underlying national rate (r_n^u), which will be influenced by the debt reduction plan and eventual additional confidence effects.

Debt Reduction and Confidence Effect

The main objective of the debt reduction plan associated with the EMDF is to address the problem underlying sovereign spreads: debt itself. However, debt reduction *per se* has also the potential to impact bond yields. While the debate is open on the role of fundamentals during the Eurozone crisis, the literature has shown that fiscal performance has a strong impact on market rates (Caceres et al., 2010; Baldacci and Kumar, 2010). As the total level of debt-to-GDP decreases, the underlying national rates of Eurozone countries should decrease as well.

In order to measure the impact of gradual debt reduction, I perform an econometric analysis on a panel of European member states during the establishment of the EMU. In a 2010

[15] In this empirical evaluation, I focus on the flight to quality, disregarding the issue of liquidity. In academic literature, there is disagreement on the role of liquidity in the European sovereign bond market, and the debate transcends the scope of this paper (see for example: Beber et al., 2009; Favero and Missale, 2011).

IMF paper, Baldacci and Kumar published a similar study on a panel of 31 countries between 1980 and 2008, including both developed and emerging market economies. Their conclusion indicates an impact of around 30 basepoints for each additional 1% of debt-to-GDP (Baldacci and Kumar, 2010). My study partly reproduces their exercise, though with a more narrow scope. Other studies on similar panel data from other OECD and IMF datasets found effects ranging from 10 to 60 bps. (Ardagna, Caselli, and Lane, 2007; Dai and Philippon, 2005).

The key difference of the analysis presented in this paper is the specific time frame and geographical area it considers. This choice reduces the general explanatory power of the study in exchange for an increased focus, looking exactly at debt reduction in the Eurozone during a decade of large institutional change. I maintain that this dataset offers insight in the potential functioning of the EMDF, which would in many ways mirror the political and economic change introduced by the monetary union.

The data used for the analysis is taken from a paper published by the IMF in 2013 (Dataset 3). Reinhart and Rogoff recently presented an unprecedentedly large dataset on public debt in their manuscript "This Time is Different", and authored a number of studies on the data (Reinhart and Rogoff, 2009; Reinhart and Rogoff, 2010). However, the scope of their dataset does not satisfy the needs of this paper's investigation, as it does not provide data on the yields of sovereign bonds. The IMF also offers time-series starting in the 1800s. However, I reduced them to obtain a balanced panel that provides a full picture, albeit for a short span of time, of national public finances across EMU countries.

The resulting panel comprises of the 11 EMU countries[16] and covers the time period from 1995 to 2005. It includes information on GDP, debt-to-GDP, long-term real interest rates (based on the yields of 10-year sovereign bonds), primary expenditure, and government revenue. Additionally, with the available data, I constructed the indicators of worldwide debt, growth and long-term rates (all weighted by national GDP).[17]

The following equation expresses the simplified economic reduced-form specification for the fixed-effect and fixed-entity model used for the analysis:

$$r_{LT} = \alpha_1 + \beta_1 D_c + \beta_2 D_c^2 + \delta_1 g_c + \delta_2 \Delta r_{ww} + \delta_3 D_{ww} + \delta_3 g_{ww} + \varepsilon \qquad (6)$$

where D_c is country c's debt-to-GDP ratio. The control variables are the national growth (g_c) to account for the business-cycle component (after Baldacci and Kumar, 2010); Δr_{ww} is the change in the average world long-term real rate; D_{ww} is the average global level of debt-to-GDP ratio; and g_{ww} is the global average growth. The latter three controls address the issue of global financial and fiscal conditions, accounting for risk aversion trends and long-term real rate cycles.

[16] These are: Austria, Belgium, Denmark, France, Germany, Italy, Netherlands, Greece, Ireland, Portugal, and Spain.
[17] Data from other 10 countries is used to compile worldwide statistics: United States, United Kingdom, Norway, Sweden, Finland, Switzerland, Canada, Japan, Australia and New Zealand. Given the size of available economies, I assume their sum to function as a sufficient proxy of worldwide values.

Table 4: Coefficient Estimates – National Debt Reduction[18]

	FE(1)[19]	*FE(2)*	*FE(3)*	*RE*	*OLS*
Debt	0.089*	0.065**	0.065**	0.067**	0.067**
	(0.04)	(0.023)	(0.023)	(0.020)	(0.020)
Debt^2	0.0001	-0.0002	-0.0002	-0.0004**	-0.0004**
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
National Growth			-0.024	-0.092*	-0.094*
			(0.069)	(0.038)	(0.038)
World r level		0.179***	0.167***	0.171***	0.172***
		(0.05)	(0.051)	(0.050)	(0.051)
World Debt Level		1.456***	1.435***	1.551***	1.552***
		(0.100)	(0.102)	(0.090)	(0.091)
World Growth			0.15	0.22*	0.22*
			(0.11)	(0.10)	(0.10)
R-squared	0.36	0.79	0.79	0.77	0.78

The standard R significance levels are adopted 0.05%(*), 0.01%(**), 0.001%(***)

The coefficient for the level of debt-to-GDP ratio results to be statistically significant at the 1%. The result is in line with the scatter plot of the long-term interest rate and debt-to-GDP ratio (Figure 8). The coefficients pass a number of robustness tests, including the Breusch-Pagan Lagrange-Multiplier test for cross-sectional dependence and the Breusch-Godfrey/Wooldridge test for serial correlation, both at the significance level of 1% (see Annex II for the full regression output) (Baltagi et al., 2012). The Breusch-Pagan test reveals a degree of heteroscedasticity in the data, and I account for this with an additional test on a heteroscedasticity consistent covariance matrix (HCCM). As suggested by Long and Ervin, given the small sample size (N<25), I use the HC3 procedure and test the robustness of coefficients (Long and Ervin, 1999). The coefficient for debt-to-GDP β_1 remains statistically significant after the HC3 t-test at the 10% level, with a p-value of 0.058.

One downside of the regression proposed above is that it does little to separate the effect of fiscal performance from general market confidence in the European project. The establishment of the EMU did more than simply encourage convergence; it also created an economic block with renewed commitment and global influence. In this sense, the step forward in integration might also have contributed with the gradual reduction in bond yields (Figure 9). While the three controls for global trends ($\delta_2 \Delta r_{ww} + \delta_3 D_{ww} + \delta_3 g_{ww}$) account for international market movements, they do not specifically address the effect of participation in the EMU.[20]

[18] The regression was run with R Statistica, using the plm package for panel-data analysis. The formulae for the robustness tests were derived from the plm and the lmtest packages (R Development Core Team, 2008; Croissant and Milo, 2008; Croissant et al, 2015).

[19] The various models compared are fixed-effect (FE), random-effect (RE), and pooling models (OLS).

[20] Indeed, to extrapolate the coefficient for Eurozone membership, the dataset should cover a wider range of economies and provide information for the probability of adhesion to the Eurozone preceding 1999 and a proxy for participation after 2000.

In a 1997 paper, Angeloni and Violi investigate this question. They argue that the substantial steps forward with the creation of the single currency in 1995 had affected market expectations and were partly responsible for the decrease in sovereign yield spreads (Angeloni and Violi, 1997). They devise a simplified model and apply it to data from three European countries. Their results indicate that the downward trend in yields was not primarily caused by perceptions of political dynamics, but rather on future forecasts of the countries' economy. If anything, they argue, the EMU served as positive signaling of future performance.

Concerning the confidence effect, I draw two conclusions. First, its presence is not relevant to the empirical evaluation of the proposed institutional design. Indeed, the β_1 coefficient might also express an omitted variable for EZ membership, but since the assumption is that the establishment of the EMDF would resemble that of the EMU, this issue does not invalidate the estimated impact on yields. Second, a confidence effect might anticipate part of the positive effect on yields, by boosting expectations of future fiscal discipline. I argue that this makes the enforcement mechanism of dynamic conditionality all the more urgent. Without credible enforcement mechanisms, market complacency could pose a problem of time-inconsistency and moral hazard. As rates decrease, countries may be less incentivized to actually follow through with difficult reforms and debt reduction programs, much like it happened with the EMU.

To conclude on the effects of debt reduction and renewed confidence, my regression indicates a statistically relevant impact for each 1% change in debt-to-GDP, which is in line with the values indicated by the literature. According to this result, under the proposed scheme, the underlying national rate should follow an average linear downward trend:

$$r^u_{n,t} = r^u_{n,t-1} - z \qquad (7)$$

where z is the average impact of each 1% change in debt-to-GDP. From the regression, I calculate this value to have been around 65 bps in the decade of 1995-2005 (table 5). However, the same trend may not apply for the case of the EMDF.

Convergence of Underlying Rates

The brief econometric analysis presented above is indicative of the general impact of debt reduction preceding and during the EMU. However directly applying its results would be an oversimplification. Indeed, there are at least two reasons why the trend of underlying rates would vary across member states and deviate from a simple downward trend as represented by (Equation 7).

First, most European states already sell their sovereign bonds at very low yields. Indeed, for the past two years, all other EMU states with the exception of Greece, Cyprus and Portugal have reported rates on long-term government securities fluctuating within a band of around 200 bps, between 0 and 2% (Figure 10). The low-rate environment leaves little room for further rate reduction, as some countries have even briefly entered negative territory. Therefore, it is likely

that the rate decreases induced by debt reduction would only affect states that still experience high levels of sovereign spreads.[21]

Second, market attitudes towards sovereign risk have probably changed after the Eurozone crisis. Before 2009, the issue of debt sustainability did not seemingly concern advanced economies. However, this viewpoint has now fundamentally changed. Indeed, studies have shown that since the 2008 Lehman collapse, investors have been more responsive to fiscal deterioration in European countries (von Hagen et al., 2011). Moreover, the levels of debt-to-GDP of member states are much higher today than they were in the 90s. Baldacci and Kumar consistently found that initial level of debt impacted market response to fiscal changes (Baldacci and Kumar, 2010: 17). In short, investors may be more cautious today in decreasing the risk premium on sovereign bonds. This would make for a more gradual decrease in underlying national rates than during the establishment of the single currency.

To account for these two elements, I propose that sovereign yields should follow a slower convergence to a band of around 40bps from the safest one (the German bond). I divide EMU countries in three categories: the Nordic/German area which would converge to a band of 10bps (Austria, Netherlands, Luxemburg, Finland); the southern states which would converge to a band of 40bps (Italy, Spain, Portugal, Greece, Cyprus); and the remaining states which would converge to a band of 25bps. However arbitrary this separation may seem, it serves to provide a preliminary differentiation between member states. Furthermore, it mirrors the European sovereign bond market in the 2000s, which reflected differences in national fundamentals with spreads of a few tens of basis points (Cotogno et al., 2003).

As such, the movement of underlying national rates would follow the following equation:

$$r^u_{n,t} = r^u_{n,t-1} - 0.32bps \quad \forall\, n \sim r^u_{n,t} \leq r^u_{DE,t} + b_c \qquad b_c \in \{10; 25; 40bps\} \qquad (8)$$

Where the condition $r^u_{n,t} \leq r^u_{DE,t} + b_c$ separates countries in the categories mentioned above with three levels of fluctuation bands. The impact of annual 1% decrease of debt-to-GDP is half of the coefficient calculated by my regression analysis, to account for the different financial environment. In this, it is in line with the average estimated impact of debt reduction by previous academic studies (Baldacci and Kamura, 2010; Ardagna, Caselli, and Lane, 2007; Dai and Philippon, 2005). Following this model, countries would gradually enter a fluctuation band above the German 10-year bond (Figure 11).

Dynamic Movement of Rates during the Transition

The final component of this empirical evaluation concerns the dynamic movement of the EMB rate between the lower bound and the upper bound as the amount of mutualized debt-to-GDP x% reaches the steady-state. Here, I take the same conservative approach adopted for

[21] This may lead to think that mutualization is not necessary. I take on this argument in the conclusion, maintaining that the low-rate environment makes the present day the perfect conjuncture to establish the EMDF.

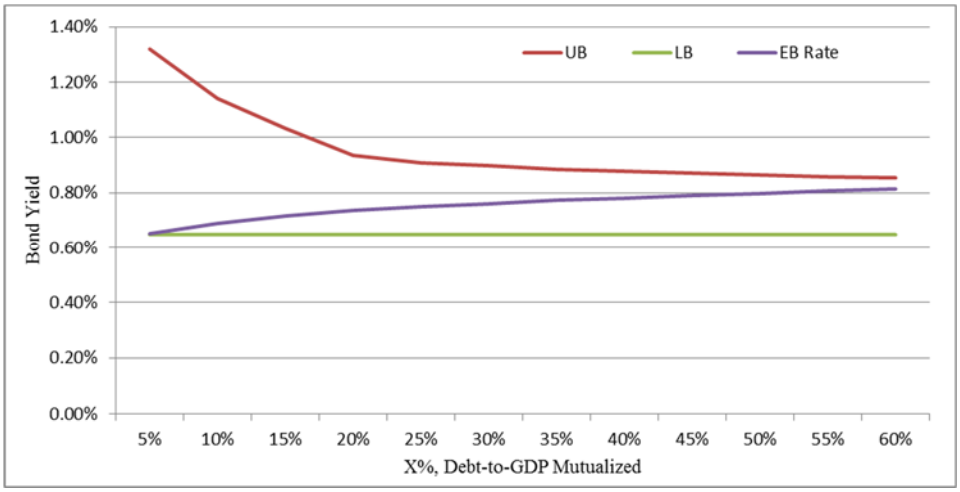
determining the movement of national yields (Equation 4). I argue that at each x% increment of mutualized debt, EMBs take on part of the default risk of national bonds, in a linear fashion. Therefore the resulting formula for the EMB rate is a step-wise linear function of the amount of mutualized debt-to-GDP x% and of the upper bound rate. The following equation expresses the EMB rate:

$$r_{EMB,t} = \begin{cases} r_{LB} & if\ x_t \leq 0.05\% \\ r_{EMB,t-1} + \frac{r_{UB} - r_{EMB,t-1}}{\frac{x_t - \bar{X}}{0.05}} & if\ x_t > 0.05\% \end{cases} \quad (9)$$

Where x_t is the amount of mutualized debt-to-GDP and $\bar{X}$ is the target steady-state level of mutualized debt. $\frac{x_t - \bar{X}}{0.05}$ expresses the behavior of investors, who reprices EMBs at each step of the mutualization towards the steady state. r_{UB} is the upper bound rate, as defined in (1), which is determined as the weighted average of underlying national rates (9). Therefore, with each 5% of debt-to-GDP transferred from the national pools to the European pool, the increased yield of EMBs reflects the marginal increase in risk premium of mutual bonds. This marginal risk premium is a fraction of the gap between the previous rate of EMBs and the upper-bound rate, which represents the pricing of the total risk of European debt.

Combining the formulae for the EMB rate (8), for the UB rate (1), and for the national underlying rates (9), I can illustrate the evolution of the EMB rate, as x_t increases:

Figure 12: Movement of EMB Rate during Transition

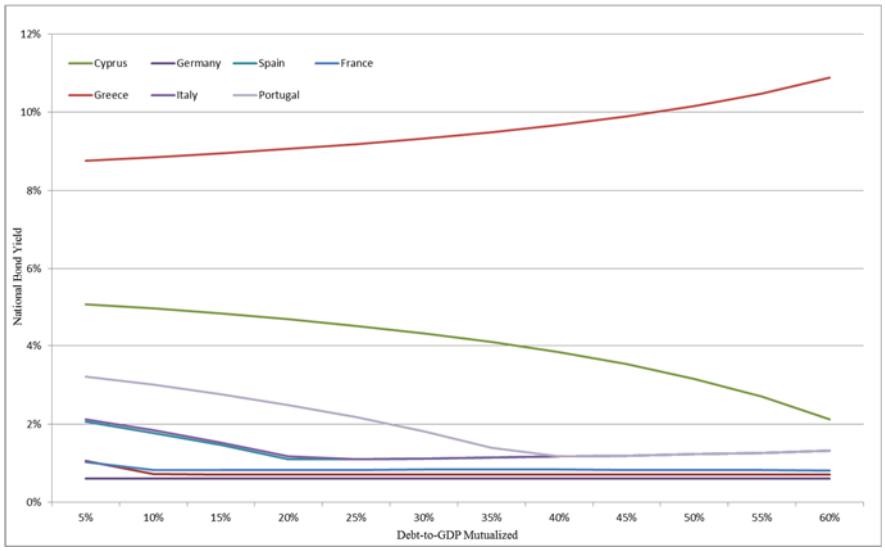


Author's Graph.

Additionally, having derived both the evolution of the underlying national rate, of the upper bound, and of the EMB rate, I can provide the same dynamic analysis for the yields on remaining national bonds. As shown in (4) and (5), these rates will depend on the linear transfer of sovereign risk, priced by the underlying national rate, from the national debt pool to the

mutualized debt pool. As such, it is expected that mutualization will have an adverse effect of flight-to-safety for countries with high national rates and a positive effect on countries with low national rates.

Figure 13: Movement of National Rates on Remaining National Bonds (Selected EZ States)



Author's Graph.

Indeed, Greece experiences severe flight-to-quality effects. As the default risk of their debt is borne primarily by a shrinking pool of junior national bonds, the default risk of these bonds increases substantially (for the full results on all EMU member states, see table 5). For other countries with high initial rates, the reduction of the underlying rate due to the debt reduction scheme is enough to offset the flight to safety dynamic.

By model design, for high underlying national rates, the rigid risk invariance proposition underlying the model causes in large flights to safety. There is reason to believe that this dynamic may not be as acute. Particularly for the weaker countries of the Eurozone, a renewed and credible commitment under the EMDF institutional design may gain the governments some confidence, thus easing sovereign spreads. Strong announcements in favor of the European project have proven before to have a strong positive impact on financial markets (the most notorious example being the "Whatever it takes" speech by Mario Draghi, see Figure 1). However, to a bearable degree, high spreads on the remaining national debt would serve the useful purpose of additional enforcement mechanism, incentivizing countries to follow through with fiscal discipline and debt reduction.

Finally, the loss due to augmented national yields would be partly balanced by the gains in diminished rates on EMBs. Indeed, the countries that would lose the most from flight to quality would save the most with the EMB rate.

2.3 Dynamic Costs and Benefits Distribution

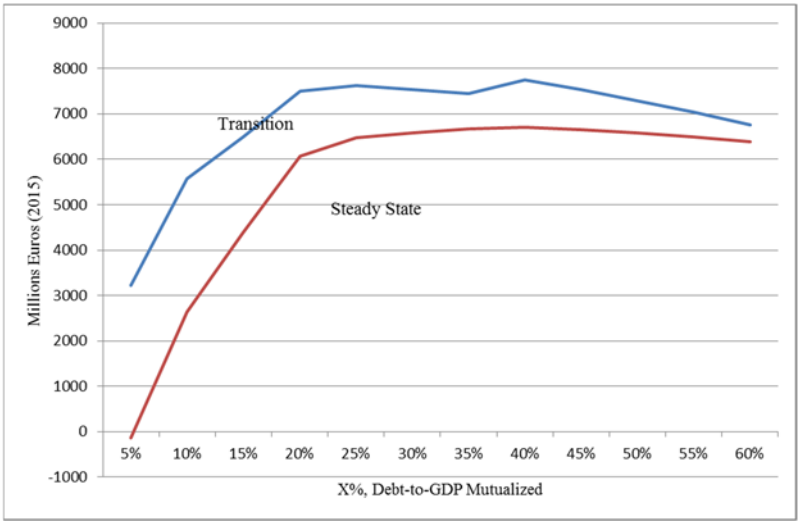
The last step of this empirical evaluation consists in calculating the overall costs and benefits of the EMDF scheme on the public finances of participating states. The objective is to provide a preliminary but illustrative picture of which states would lose or which would gain under the program, and on what order of magnitude.

I focus on the difference in nominal future interest spending (also known as apparent average cost of gross government debt: Eurostat, 2016). This represents the change in interests paid by future governments on the gross issuance of new debt. Under the EMDF, new debt would be partly issued through EMBs and partly with regular national bonds. The counterfactual scenario would be the current situation, in which countries only issue their own national bonds. In both cases, I maintain the average maturity of 7 years, a simplification of the actual scenario in the EZ (Figure 14). The yearly difference in spending is then calculated as:

$$\Delta S = \left[I_{EMB,x} r_{EMB,x} + \left(D_n - I_{EMB,x}\right) r_{n,x}\right] - D_n \bar{r}_n^u \qquad (9)$$

where $I_{EMB,x}$ is the annual gross issuance of EMBs as a fraction of GDP; D_n is the yearly issuance of national debt (equal to 14% of national debt); and $\bar{r}_n^u$ is the underlying national debt before any debt reduction. Note that the values of $I_{EMB,x}$, $r_{EMB,x}$, and $r_{n,x}$ depend on the amount x of national debt mutualized.

Figure 15: Annual Cumulative Difference in Future Interest Spending



Author's Graph.

As shown by the graph above, the first characteristic of the concrete impact of the EMDF on Eurozone public finances is that there are savings. Indeed, by design, most countries pay lower interests on their newly issued debt. At the same time, the comparison between the transition and the steady state portrays a seemingly counterintuitive contrast. Savings during the

transition are higher than during the steady state. This is because of the different composition of yearly gross debt issuance. During the transition, countries issue more EMBs because they are transferring national debt to the common pool, while in the steady state they only renovate an average of 14% of the mutualized debt. [22][23]

Importantly, the evolution of cumulative savings indicates the optimal level of mutualized debt. Savings peak at 40% of debt-to-GDP mutualized and then stabilizes on a plateau. The annual savings in future interest expenditure would amount to around 8 billion euros (table 6 in annex provides the complete values for Figure 15). The optimal value for the amount of debt-to-GDP to be mutualized should then be between 35% and 55%. This simulation puts it at 40%. At this level of mutualization, the state of the sovereign debt market would be the following:

Table 7: Eurozone Sovereign Debt Market at Optimal EMDF Steady State

Country	Mutualized Debt (%GDP)	National Debt (%GDP)	EMB Rate	National Bond Rate	Interest Savings (Mill)
Austria	40%	38%	0.75%	0.70%	69
Belgium	40%	58%	0.75%	0.70%	195
Cyprus	40%	60%	0.75%	3.84%	58
Germany	40%	23%	0.75%	0.60%	-250
Spain	40%	52%	0.75%	1.16%	1506
Finland	40%	16%	0.75%	0.70%	26
France	40%	48%	0.75%	0.83%	630
Greece	40%	129%	0.75%	9.68%	305
Ireland	40%	31%	0.75%	0.83%	193
Italy	40%	84%	0.75%	1.16%	3100
Lithuania	35%	0%	0.75%	n/a	23
Luxemburg	22%	0%	0.75%	n/a	-1
Latvia	36%	0%	0.75%	n/a	8
Malta	40%	16%	0.75%	0.83%	7
Netherland	40%	17%	0.75%	0.70%	66
Portugal	40%	81%	0.75%	1.16%	678
Slovenia	40%	35%	0.75%	0.83%	60
Slovakia	40%	4%	0.75%	0.83%	24

[22] The simulation does not include values for mutualization above 60% for both model limitations and other considerations. First, above 60% EMBs would begin taking on substantial default risk from member states, which is not accounted by this model. Second, Eurozone countries are unlikely to agree to a mutualization past 60%, which is the ideal level set by the Maastricht Criteria. Indeed, not only would a larger mutualization be unfeasible, but it may also be counterproductive. Mutualizing excess debt, the EMDF would take away incentives for debt reduction.

[23] For steady-state values, the graph takes into account the underlying rates with a debt levels at the final transition step. Therefore, it does not fully reflect the benefits of the debt reduction that would continue after the transition.

The distribution of costs and benefits of debt mutualization is essentially Pareto-efficient, with the exception of Germany and Luxemburg. A small system of internal redistribution could account for the minor losses of these states. The total yearly savings on future interest spending of the Eurozone would amount to almost seven billion euros (for a full breakdown of costs and benefits at different levels of X%, see table 8).

Annual savings at the steady state are not particularly large, in the order of a few billion euros. This, I argue, actually increases the political viability of the program, which could otherwise run the risk to be perceived as redistributive. Instead, during the transition up to 40% of mutualized debt-to-GDP, total savings would amount to a total of over 50 billion euros (table 6). Indeed, the lower rate on EMBs allows for more rapid nominal convergence, while under the debt reduction scheme states would converge on their fundamentals. This effect underlines how the low EMB rate would allow greater fiscal room to many participating states, supporting their debt reduction effort, which is indeed the topic of the next section.

Section Three – The Political Economy of Debt Reduction

Real-economy convergence has long been a European mantra. Not for nothing, the Maastricht criteria established in the Treaty of the European Union (TEU) were dubbed "Convergence Criteria" (Article 109j, Treaty of the European Union, 1992). It was clear that the increasing levels of economic integration required a greater homogeneity of economic performance across member states.

Already in the TEU, debt reduction was understood to be a major component of the convergence problem. Article 104c stated that the Commission should monitor "whether the ratio of government debt to gross domestic product exceeds a reference value [of 60% of gross debt-to-GDP]" (Article 104c, Treaty of the European Union, 1992). Given the conditions of public finances across Europe in the 90s, the target was indeed an ambitious one. However, the goal was relaxed with the caveat that considered it sufficient for states to have their debt-to-GDP ratio "sufficiently diminishing and approaching the reference value at a satisfactory pace." With the establishment of the criteria, academics criticized its lenience and over-reliance on nominal indicators. In particular, Paul De Grauwe argued that the treaty targeted the wrong indicators, and should have rather required *a priori* debt reduction (De Grauwe, 1996).

Since the Sovereign Debt Crisis, the attention on public debt has bourgeoned. Policymakers and academics from different sides essentially agree on the problem of unsustainable debt levels of some member states. In 2011, in the midst of the crisis, from the one side, German finance minister Wolfgang Schäuble maintained that "it is an undisputable fact that excessive state spending has led to unsustainable levels of debt" (Schäuble, 2011). From the other side, Paul Krugman also argued that "Even when countries successfully drive down wages, which is now happening in all the eurocrisis countries [sic], they run into another problem:

incomes are falling, but debt is not" (Krugman, 2011). Of course, while agreeing on the central problem of debt, the two vehemently disagreed on the policy prescriptions. Schäuble called for austerity. Krugman for debt restructuring.

As I hold in my modest policy outline, the answer to the European debt problem cannot come from a single instrument. Similarly, the Eurozone dilemma cannot be solved by the idiosyncratic measure of a single member government. What the Eurozone situation requires is an encompassing plan: one complete of diverse policy guidelines as well as the right framework of incentives – such as the carrot-and-stick system proposed by this study.

With such notion in mind, this section aims to contextualize the proposed debt reduction plan in the political economy of the Eurozone. The objective is to present as holistic as possible an understanding of the national and international dynamics that determine the impact of policies across countries. The complexity of fiscal plans and their implementation differences across states make it too onerous to devise a quantitative analysis for debt reduction similar to that put forward in Section II for debt mutualization. Instead, this section offers a combination of theoretical and historical arguments to construct a general qualitative evaluation of the policy proposal at hand. The procedure of the analysis is deductive and divided into three parts. First I present the theories and extrapolate, on a theoretical level, their predictions for the interactions between Eurozone member states. Then, I assess the theoretical predictions against the history of the EMU. Finally, I derive policy implications from the combined analysis.

3.1 Theories of European Monetary Integration

The academic literatures of different fields have put forward theories to explain the economic dynamics and implications of integration in the Eurozone. These competing theories not only shed light on the working of the common-currency project. In doing so, they illustrate the challenges faced by member states in trying to achieve real-economy convergence, and the potential long-term culprits for high debt labels.[24] For each, I present its original formulation. Then I review the subsequent developments and major lines of criticism. Finally, I apply the theory to the Eurozone case, with a number of guiding questions: What dynamics have influenced convergence and divergence, and in particular debt accumulation, in the Eurozone? Did the common currency determine winners and losers among participating states? Did certain member states enjoy a comparative institutional advantage, that is, did they hold an initial competitive edge that helped their growth model prevail?

[24] It is important to stress that, although in the discussion, I characterize the different theories as 'competing', it would be a mistake to consider them as direct alternatives. The different perspectives that I try to bring together originate from different fields and analyze the problems of economics and political science at different levels. Additionally, this paper only considers theories and models that analyze the economic determinants and implications of integration. I do not review the large IR literature on European integration – such as the classical debate between intergovernamentalism and supranationalism or functionalism (for a review, see Spolaore, 2015).

I analyze three main theoretical approaches. From the realm of classical economics, I examine the Eurozone dilemma making use of the theory Optimal Currency Area (OCA), as first developed by Mundell and later developed in a large literature (Mundell, 1961). Taking the perspective of comparative political economy, I examine the theory of Variaties of Capitalism (VofC), born out of the seminal work by Hall and Soskice (Hall and Soskice, 2001). Finally, I group together a number of alternative theoretical arguments that combine elements from modern macroeconomics, financial economics, and comparative political economy. In the final part of the section, I compare the predictions of the various theories with regards to the functioning and long-term effects of the EMU.

The Theories of Optimal Currency Areas

The notion of Optimum Currency Areas was first introduced in a pioneering article by Mundell (Mundell, 1961) and shortly thereafter expanded in seminal pieces by McKinnon, on the national economic openness (McKinnon, 1963), and by Kenen, on the diversity of national output, fiscal, and financial integration (Kenen, 1969). The basic theory of OCAs put forward by this triad of scholars flourished in the subsequent years, giving birth to a long-standing academic tradition (for a complete and reasoned literature review on OCAs, see Mongelli, 2002, on which this section relies heavily).

In its original formulation, the central element of the theory of OCAs is to investigate the response to asymmetrical external shocks across countries and regions and evaluate how such response would interact with monetary dynamics. In particular, would a group of countries be able to respond effectively to external shocks while being constrained by a single currency? (The latter translating into a single monetary policy for all participating states).

The original paper by Mundell enumerated a number of conditions for OCAs. In Mundell's analysis, the foremost factor was the mobility of factors of production across countries. A higher rate of mobility for labor and capital would make for a faster rate of adjustment to shocks. For example, if following a shock the demand for labor falls in region A and rises in region B, how efficient is the system in moving labor from A to B? (Mundell, 1961). The second component of Mundell's theory builds on a borrowed concept from Friedmann: the focus on price and wage flexibility (Friedmann, 1953). Again, considering shocks to the economies, downward flexibility is crucial to ensure a smooth adjustment. For example, do wages fall if a shock causes a drop in demand or productivity of labor? The remaining 'original conditions', as already mentioned, came from ensuing contributions by Mckinnon and Kenen and focus on the diversification of member states' economies and their openness to trade (the higher, the better). In a later article, Mundell relaxed some of the conditions of OCAs by introducing the role of international risk-sharing through financial integration and private portfolio diversification, which interlinks countries' economies in complex ways (Mundell, 1973; McKinnon, 2001).

As the Theory of OCAs developed and established a large academic tradition, it was also criticized for certain of its features. It is relevant for our purposes to mention at least two such lines of critique. First, the nature of Mundell's conditions for OCAs is problematic. Indeed, each condition requires additional specification and comparative studies. There is no absolute, fixed level of wage flexibility that determines whether a country qualifies on not for currency integration (Robson, 1987). Similarly, Tavlas added that Mundell's conditions are neither inclusive nor consistent. Countries' preferences may change vis-à-vis different trading partners, and different conditions for OCAs may be mutually exclusive in specific cases (Tavlas, 1994). These critiques are not merely theoretical, but rather have deep empirical implications. In short, the Theory of OCAs is difficult to test. As Eichengreen put it in a 1992 article, there is no yes and no answer in the Theory, no test to pass for countries to qualify for monetary integration (Eichengreen, 1992).

Indeed, this is the reason for the second weakness of the OCAs literature underlined by authors, which is its lacking empirical confirmation. As Goodhart noted, the theory of OCAs displays little explanatory power when put to the test of numbers (Goodhart, 1995). Moreover, most studies are backward-looking and carry little implications for policy recommendations or future outlooks (Mongelli, 2002). Perhaps for this reason, when the European Commission began producing research material to substantiate the projects of monetary integration, it discarded the Theory of OCAs as "limited and outdated" for the empirical evaluation of costs and benefits of the EMU (European Commission, 1990).

Building on the speculation of the "One Market, One Money" Report by the European Commission of 1990, scholars elaborated a new version of the Theory of OCAs. As Frankel and Rose spells out in their seminal paper of 1995, even if countries do not satisfy the classical OCA conditions ex ante, they may develop in time to satisfy them ex post (Frankel and Rose, 1995). Following Frankel and Rose's proposition, this alternative has been dubbed the "Endogenous OCA Theory". The core idea is that by joining a currency union, states gradually synch their business cycles, as a result of closer trade ties. In this sense, currency unions naturally evolve to become optimal, given enough time.

While the endogeneity of OCAs gained traction in the 90s, it also was criticized as being politically-motivated. Mundell's theory did not offer strong foundations for the EMU and thus the European Commission and the European governments needed a different theory to legitimize its policy-making efforts. In this sense, Wagner argues: "The reason for this refocusing and hence deviation from classical OCA Theory was mainly political" (Wagner, 2014: 4).

In contrast, a second line of critique points at the empirical validation of the Endogenous OCA Theory (Mongelli, 2002). Empirical studies have shown more promising results than in the case of the classical OCA theory, making use of trade gravity models on panel data (Frankel and Rose, 2000). However, the data often results heavily skewed because of the small number of countries in currency unions (chiefly EMU members), which partly invalidates the econometric results. Moreover, the direction causality is not clear. As Mongelli put it, the question is

"whether countries are in a currency union because they trade a lot, or start trading more because they are in a currency union" (Mongelli, 2002: 30).

Despite the qualifications required, both the classical and the endogenous Theories of OCAs provide with important insight in the economic dynamics at play in monetary unions. While scholars of OCAs do not provide clear predictions or policy recommendations, it is still possible to infer the long-term implications of monetary integration according to the two different theories.

Considering the classical Theory of OCAs, it is possible to conjecture the effects of a currency union where the conditions for optimality are not met. In the case of the EMU, there is ample reason to doubt the actuality of a number of optimality conditions. First, labor mobility across member states is likely small, given language and cultural barriers (European Commission, 1990). Similarly, wage flexibility is likely to be more sticky than flexible, this was especially likely to be the case before the labor-market liberalization reforms of the late 2000s. As Eichengreen argues, in his 1992 paper, the data analyzed pointed unambiguously that the EMU qualified "less" for an OCA than its American counterparts (Eichengreen, 1992).

In the case of a suboptimal currency area, problems would arise in the case of an adverse shock. Specifically, the union would be ill-equipped to respond to the asymmetrical needs of member states. The policies implemented would inevitably result too accommodating for some members, or too contractionary for others. In turn, external shocks would create a divide between participating nations, with high unemployment on the one side or high inflation on the other.

Does this perspective predict whether some countries would enjoy and advantage over the others? Not directly. The Theory of OCAs only identifies the potential for contention or friction among countries, that is, the union's response to asymmetric shocks. Following this idea, we can postulate that the winners of an incomplete OCA would be those countries who are better equipped to resist asymmetric shocks and/or to manipulate the common policy response to their favor. Nonetheless, Mundell's approach does not provide us with the tools to explore further the predicted power struggle among member states.

Turning instead to the endogenous Theory of OCAs, its predictions are far simpler, especially on the long run. According to this view, member states would endogenously converge to a common level of economic performance, where they would respond homogenously to shocks, therefore allowing for a one-size-fit-all policy response. Importantly, this view does not exclude the possibility of temporary shocks and 'fluctuations' in the convergence trend. However, on the long run, the monetary union would naturally arrive at a point of optimality.

Varieties of Capitalism

The Theory of Varieties of Capitalism (VofC) was first introduced by Hall and Soskice in a 2001 volume (Hall and Soskice, 2001). The aim was to combine different approaches, from institutional theory to firm/business theory, in order to construct a holistic view of the different models of capitalistic societies. Hall and Soskice's approach then differs fundamentally from

Mundell's, as it seeks the micro-foundations of countries' economic models and focuses on firm-level interactions, rather than on the macro scale.

Indeed, the VofC Theory takes as centerpiece element of its analysis the "way in which firms resolve the coordination problems in these five spheres": industrial relations; vocational training and education; corporate governance; inter-firm relations; employee relations (Hall and Soskice, 2001: 8). The coordination problem refers to the Olsonian notion of collective action problem, in which a group of agents faces a problem that requires cooperation, and thus incur in the basic three transaction costs: information, bargaining, and enforcement (Olson, 1965). To solve the problem, agents, in our case firms, need first to manage their transaction barriers, to ensure for example that no free-riding takes place. In addition to considering the issue at firm level, Hall and Soskice expand their narrative to include countries' institutional framework, which acts as a catalyst for firm relations, and culture, which reinforces specific firm practices through informal rules and shared beliefs.

The original VofC argument identified two main ideal-types of capitalistic societies: coordinated-market economies (CMEs) and liberal-market economies (LMEs). In CMEs, firms rely on "strategic interactions" and collaboration to build and integrate their business model in the economy. Therefore, market conditions are determined through the structured bargaining and coordination among agents. The institutional framework facilitates this through a high level of unionization, especially at the employers' level. In contrast, LMEs display a much more competitive business environment. Firms rely on market interactions rather than structured coordination. Economic outcome is thus determined as illustrated by neoclassical models of supply and demand (Hall and Soskice, 2001).

Based on this reading of capitalist societies, Hall and Soskice argue that LMEs and CMEs perform differently in different fields. They dub this disparity the "comparative institutional advantage", after the classic trade theory notion of comparative advantage. In particular, they focus on the performance vis-à-vis innovation. LMEs will be more effective at radical innovation (e.g. in high-tech industry), while CMEs will perform relatively better at incremental innovation (e.g. in the automobile industry). Similarly, the two models will develop different policy preferences, and respond differently to external shocks. For example, in their response to globalization, LMEs will be more likely to resort to internal liberalization to increase market size and international competitiveness (Hall and Soskice, 2001).

Since its first formulation in 2001, the VofC school has produced a large volume of studies, which expanded the scope of Hall and Soskice's original proposition, and dealt with the criticisms moved to their approach. For our purposes, it is useful to review briefly such developments (for a complete review, see Hall, 2016; Hancké, Rhodes, Thatcher, 2007). A line of critique that seems to overarch all others is moved by Crouch and concerns the methodology, and perhaps even the epistemology, underlying the VofC Theory (Crouch, 2005). Hall and Soskice build their model based on concrete observations of two countries, Germany and the United States. While their analysis covers other nations too, it is clear that most examples and

reasoning stem from the contrast between the Anglo-Saxon world (specifically the American one) and the German world. Such tailoring risks to be extractive rather than deductive, which jeopardizes the applicability of the theory. Unsurprisingly, most critics maintain that the VofC is static or limiting (Hancké, Rhodes, Thatcher, 2007). Similarly, some noted, the VofC approach seems ill-suited to analyze countries that do not fit the LMEs-CMEs dichotomy. In the case of the Eurozone, this is the case of most Southern European nations.

If these criticisms held in the case of the original formulation of the VofC, the large literature that followed tried to addresses the main points of concern. Most importantly, scholars have since tried to expand the VofC dichotomy between coordinated and liberal economies. In a 2003 paper, Hall and Gingerich term a third model, the mixed market economies (MMEs), which includes the Southern European countries (France, Italy, Portugal, and Spain, in their 2003 analysis) (Hall and Gingerich, 2003). While this might strike as an 'odd-ball basket', subsequent literature strengthened the definition of MMEs (Molina, Rhodes, 2007). MMEs are characterized by fragmentation of the market and a stronger role for the state, though do not fit a single model as neatly as their LMEs and CMEs counterparts.

From the perspective of VofC, the Eurozone mostly brought together CMEs (the Northern European States) and MMEs (the Southern European States). With the expansion of the Euro area to the east, countries with different models joined. For example, the Baltic states have been described in the literature as closer to the LME model (Hall, 2016; Adam, Kristan, Tomšič, 2009). However, these states were not as central during the Euro Crisis, and in general are yet to hold enough economic and political weight to impact significantly the development of the currency union. For these reasons, the analysis here will focus on MMEs (Southern Europe) and CMEs (Northern Europe).

The VofC Theory has been used before as an analytic lens to examine the process of European monetary integration. For example, in a 2016 article, Iverson, Soskice, and Hope revisit the establishment of the EMU as the product of converging economic interests between MMEs and CMEs (Iversen, Soskice, Hope, 2016). They argue that, with the common currency, Northern European countries aimed to constrain their Southern competitors, removing the tool of currency devaluation. At the same time, Southern European states sought to reduce long-term interest rates, and to use the common currency as an external constraint to achieve price stability. Iverson, Soskice, and Hope exemplify what the European branch of the VofC literature identifies as the different policy preferences and institutional capacities of MMEs and CMEs.

European CMEs are characterized as export-led economies. Their propensity for coordination in wage bargaining and vocational training creates a positive feedback effect between industries and the knowledge economy (Iverson, Soskice, Hope, 2016). While the importance of wage bargaining has decreased in the past decade, following the waves of labor-market liberalization, the German model remains well-suited for exports (Hall, 2016). This determines a policy stance with restraint in real-wage increase and a complementary policy mix: tight monetary policy with strong anti-inflationary preferences and a limited fiscal policy.

In contrast, European MMEs are generally understood as demand-led economies. Despite the heterogeneity that marks this group of countries, Southern European states share a set of policy preferences geared towards accommodating measures: loose monetary policy and a more substantial fiscal presence of the state (Hall, 2016).

Considering the different growth models and policy traditions of European CMEs and MMEs, the VofC indicates the potential for a large divide in the Eurozone. While, on the one side, Northern economies work well with a tight policy mix, on the other side, Southern economies were traditionally supported by a loose one. However, on the monetary side, the policy of the European Central Bank can only accommodate one of the two alternatives. Which one this should be is determined by the balance of political power among governments. On the fiscal side, members of the EZ maintained full sovereignty over national policy (conditional on the common rules of the Stability and Growth Pact). Therefore, countries could theoretically still pursue their respective growth models. However, the absence of the complementary policy tool (that is, monetary policy) could eventually lead to imbalances. For example, if demand-led economies cannot stimulate their export sectors by devaluing their currency, they may end up over-relying on internal demand, which is liable to negative shocks and to the growth of bubbles (through over-borrowing). In short, a common monetary stance should ideally force CMEs and MMEs to find a compromise on a commonly sustainable growth model. However, the VofC analysis seems to point at an incentives structure which instead reinforces national traditions of reliance on internal demand, for MMEs, and on exports, for CMEs.

Alternative CPE/Economic Theories

The academic literature on European integration and on the Eurozone crisis has produced a large number of theoretical and empirical analyses. While the Theory of OCAs and the Theory of VofC represent two major theoretical backdrops of this field, they by no means capture its entirety. Individual academics or smaller schools of inquiry have proposed alternative explanations for the Eurozone dilemma, and have advanced just as many alternative policy proposals. Here, I review the most relevant of these alternative theories, which either take a more direct approach or single out one element of the Eurozone dilemma: the "trade specialization hypothesis" (Mongelli, 2002); the "new view of monetary integration" (De Grauwe, 1996a); and the more general institutional shortcoming narrative.

The trade specialization hypothesis derives from Paul Krugman's pioneering work on intra-industry trade and his subsequent scholarship on the interplay between geography and trade (Krugman, 1981; Krugman, 1991). The foundation of this hypothesis is the notion of a positive relationship between proximity and trade integration. The costs of trading decrease due to greater vicinity, which is assumed to be correlated not only with decreased costs of transportation, but also with lower barriers due to political, cultural, historical differences. In turn, greater integration will lead to greater specialization, as firms seek to exploit the comparative advantages of different regions (Krugman, 1991).

In the European context, monetary integration causes a sharp increase in "trade proximity", that is, a large lowering of remaining barriers between member states. Indeed, proponents of the common currency argued that the EMU would give an additional boost to the common market and increase efficiency in economic partnerships between members (European Commission, 1990). However, following Krugman's reasoning, monetary integration would create incentives for greater specialization within countries. In this sense, the trade specialization hypothesis predicts the opposite than the endogenous OCA theory: a drop in diversification and a greater divergence in the type of economic activity across member states (Mongelli, 2002).

In short, the prediction of this theory for the development of the Eurozone is that industries would tend to concentrate in certain countries, creating regional hubs of production to exploit fully the comparative advantage of the region. This scenario carries risks for the long-term sustainability of the project. If member countries specialize in different fields and reduce the diversity of national economic activity, the group could become more exposed to asymmetric shocks. Additionally, it is not clear whether the distribution of industries would be equal among countries, that is, the theory predicts the potential emergence of winners and losers. Certain national could benefit more because of a more attractive starting position. Additionally, the specialization could be self-reinforcing for positive-feedback cycles. The more industries move to a country, the larger the positive externalities of industrial concentration – for example, on the vocational side of the labor market, – the more industries want to move to that country (A required qualification here is that the literature on these dynamics is large and does not reach a consensus, Peltzmann, 1977). Without mechanisms or strategies to control these dynamics, industrial developments could lead to large divide between member states.

The "new view of monetary and budgetary integration", as termed by Paul De Grauwe, refers to a view of currency unions based on the national inflation preferences (De Grauwe, 1996). The theoretical backdrop is the Barro-Gordon model of credibility and policy commitment for central banks (Barro and Gordon, 1983). In this framework, a country's reputation is central to its inflation strategy and determines the success of its monetary policy. In a monetary union, the credibility of the common central bank will be determined by the union's institutional framework, as well as by the set of commitments taken by member states. Negotiations will then focus on these points and the outcome will determine the development and implications of monetary integration. The key insight of the "new view" is that low-inflation countries would have the strongest demands in these negotiations and would require strict anti-inflationary conditions (Alesina and Grilli, 1993).

As illustrated by previous theories, the Eurozone brought together countries with different growth models and policy traditions. With respect to inflation, Southern European states were more prone to high inflation regimes and their institutions had lower credibility. Conversely, Northern European countries had lower-inflation preferences and greater credibility. As Alesina and Grilli noted, "to 'keep Germany in' concessions have to be made to this country,

which can make the most credible threat of leaving the union. These concessions may become hard to bear for other countries, especially in hard times" (Alesina and Grilli, 1993: 19).

Therefore, the prediction of the "new view" was that, under a common currency, low-inflation countries would be the policy winners and impose their regime to other members. This could be achieved through a highly independent central bank modelled after the Bundesbank, as well as a pact to ensure convergence in the budgetary realm (De Grauwe, 1996). This regime might become untenable especially in times of large shocks to high-inflation countries, which would be left without the tools to sustain their old model.

The final approach to the Eurozone dilemma is the "institutional lacking narrative". This does not consist in a single model or proposition. Rather, I group under this umbrella term a number of arguments that pointed at the structural weaknesses of the EMU institutional setup. These are diverse theories but all identify as major culprit for the Eurozone dilemma the incomplete common institutions themselves. Given their limited scope, these theories are not suitable for theoretical predictions on the development of the Eurozone. Indeed, some are backward-looking and analyze the Eurozone crisis *ex post*. However, they are helpful completing our theoretical investigation of the Eurozone problems.

On the side of monetary integration, shortly after the height of the Sovereign Debt Crisis, De Grauwe developed an argument that criticized the lack of a lender of last resort (LoLR) mechanism in the ESM (De Grauwe, 2011; De Grauwe and Ji, 2013). By statute, the ECB is prohibited from lending directly to governments in crisis – with the (in)famous no-bailout clause (Art 125, TFEU). This creates the conditions for multiple equilibria to emerge in the market for sovereign debt. If doubts arise that a country may not be able to repay its debt, rates on new bonds will spike, thus weakening the fiscal stance of the government, thus increasing the doubts in a negative-feedback loop (De Grauwe, 2011). In the case of panics, speculation, or contagion, countries may fall into this trap even without real debt-sustainability problems. Absent real fiscal imbalances, member states are still vulnerable to such shocks, which could potentially spark further instability and larger economic crises.

On the budgetary side, the Werner Report of 1970 on the Economic and Monetary Union already established the need for a parallel development of fiscal and monetary integration (European Commission, 1970). Still, European states chose instead to pursue the common currency project alone, without substantial pacts on fiscal coordination. Academics have since stressed the negative consequences of a "half-build house", that is, monetary union without fiscal union, banking union, political union (Spolaore, 2015). The example most often brought up in the literature is that of the USA (Fatas, Andersen, Martin, 1998). In the United States, the currency union is supported by an interregional system of automatic fiscal transfers, handled through the federal budget. Such a system allows unions to combat asymmetric shocks. Without a transfer system, or at least a tax insurance system, member states are constrained in their counter-cyclical policy action, especially under strict fiscal rules such as those of the SGP (Fatas, Andersen, Martin, 1998).

Conclusion: Competing Theories

While by no means complete, this review aimed to provide a satisfactory picture of the theoretical underpinnings of Eurozone studies. The different theories presented take different analytical approaches to analyze the economic and political implications of monetary integration in Europe. In turn, they identify different potential issues or points of conflict among member states. Table 9 summarizes the findings and predictions of these competing theories. It is noteworthy that most theories point at a potential divide between different groups of countries. In particular, they point at different models of growth and how the incompatibilities of policy stances would result in one side losing out. The losing side would be constrained by a different policy regime and would thus need to adjust its growth strategy. As indicated by the theoretical analysis, this change, or its failure, could bring about substantial debt accumulation.

Table 9 – Competing Theories of European Monetary Integration

Theory	Prediction on Eurozone	Factors for High Debt / Low Performance
Traditional OCA	Suboptimal currency area. Vulnerabilities in case of asymmetric shocks.	High unemployment in weakest members. Difficult adjustment to shocks without monetary policy independence.
Endogenous OCA	Gradual convergence on optimality conditions. Synchronization on business cycles. Shocks only temporary.	No significant long-term debt imbalances. Only temporary product of crises.
Trade Specialization Hypothesis	Gradual specialization of different members. Potential for high asymmetric shocks.	Unequal distribution of industrial production. Some states stuck with lower added-value industries.
VofC	Potential growing divide between CMEs and MMEs. Reinforcement of countries' growth model.	Over-reliance of MMEs on fiscal stimulus for demand-led growth. Increase in access to credit.
"New View" on Monetary Integration	Low-inflation countries impose tight policy mix. Central bank very conservative.	High-inflation countries need to adjust to different monetary regime, which is difficult especially during crises.

3.2 The Macroeconomic History of European Monetary Integration

The next step for this study is to analyze the historical trajectory of the EMU, trying to focus on each of the problems highlighted here. The goal is to contrast then the theoretical/deductive approach with the historical/empirical one and to tease out the most relevant issues to be included in the proposed debt reduction plan at the end of the section.

It is an enormous task to evaluate empirically the competing theories of Eurozone integration, considering the diverse and large number of dynamics underlined by different theoretical approaches. Indeed, to provide a full quantitative account of the issue at hand is beyond the scope of this study – and likely beyond any individual study. However, it is possible to conduct a quantitative investigation of the general economic trends in the Eurozone.

In this section, I then choose to use a reasoned macroeconomic approach, presenting data series of the main economic indicators for EZ member states during the past twenty years of integration (1995-2015). I examine eleven out of the twelve original countries – excluding Luxemburg and including Greece, despite the slightly delayed entrance in the monetary union. In many cases, I consider two groupings, along the general categorization used in the European Studies literature. I group Germany, Austria, Belgium, and the Netherlands in the cluster of "Northern States" and Italy, Greece, Spain, and Portugal in the cluster of "Southern States". France, Ireland, and Finland are left in an intermediary – and admittedly awkward – intermediary space, as they do not neatly fit either geo-economic construction. Categorizations are always limiting, but I maintain that the Northern-Southern distinction adopted in this study is useful to engage in the academic and public debate on the Eurozone.

Concerning the methodological approach, macroeconomic trends rarely identify central issues with much clarity. However, they can function as "robustness tests" for competing theories, highlighting the emergence and relevance of imbalances that brought to high debt levels. Therefore, this analysis can inform us on the probable culprits for economic divergence and sovereign-debt accumulation. To corroborate our analysis, we rely on studies done for the different facets of European integration and economic development that we analyze. In this sense, this section functions as a bridge between the theoretical debate on the dynamics of Eurozone integration and the policy discussion on the way forward for member states.

By means of historical context, the first conception of the EMU as it exists today dates to 1989, when the Delors Commission published the "Report on Monetary and Economic Union in the European Community", commonly known as the Delors Report. Twenty years had passed since the Werner Report of 1969, which had first outlined the idea of a monetary and economic union. The Delors project for monetary integration prescribed a currency union associated with a loose framework for budgetary coordination. Participating states agreed to a three-phase process: initiation, convergence, and establishment (European Commission, 1989). With the Treaty on the European Union (or Treaty of Maastricht) of 1992, European governments jump-started the more substantial phase-two, which supposed a rapid convergence of members' economies. The

process culminated in 1999, when the euro was officially introduced as legal tender in financial markets and in 2002 as the euro replaced the circulating national currencies.

Therefore, while the idea of monetary integration had been formulated relatively early, only in the middle 90s did member states begin working substantially towards the project. The past twenty years of Eurozone integration can then be split in three phases. The first phase is initial convergence: from around the Madrid Council of 1995, when the state officially agreed on the euro, to the early 2000s, when the Euro was introduced. The second phase corresponds to the first years of actual monetary union, from 2001 to 2007. The third phase coincides with the financial and economic crisis of 2007, the subsequent sovereign debt crisis and the recovery to the present day.

Given this historical framework, a question guiding our "imbalances analysis" becomes whether the macroeconomic trends reflect at all this historical division. Do different indicators show clear discontinuities or gradual trends across different phases? One hypothesis is that with monetary integration, EZ member states entered a positive cycle of convergence, which was interrupted by the 2007 crisis, which pushed the Eurozone into a "bad equilibrium" (De Grauwe and Ji, 2013). The alternative view is that instead the convergence registered by the main indicators, if present, was only nominal. Instead, the group had already begun accumulating imbalances before the crisis, which was magnified by those vulnerabilities.

Furthermore, the theories analyzed in the previous section inform us on the specific indicators that can be analyzed to find real convergence or rising imbalances. I classify economic indicators in two broad categories: government and markets. These represent two sides of the same coin – the national economy – and provide us with a double perspective on the issue of debt accumulation. Put in the simplest terms, debt-to-GDP is a ratio and, algebraically speaking, its increase can either be caused by an increase in debt-taking, the numerator, or a decrease in national economic output, the denominator.

As a preliminary observation, the broadest macroeconomic indicator, GDP/capita at purchasing power parity, show a sign of slight convergence between North and South (Figure 15 and Figure 16). This goes to show that, at least on the short-term, the Southern European economies registered a net catching up with respect to their Northern European counterparties (especially visible in Figure 16). The question is whether this gain was achieved at the expense of other imbalances and longer-term vulnerabilities.

Government indicators should hint at the strategies adopted by national governments vis-à-vis the new economic condition of monetary integration: for example, whether Southern states relied excessively on fiscal stimulus to replace the instrument of competitive monetary adjustment. Figure 17 shows the trend in public expenditure. Since 1995 until before the crisis, Southern European states maintained a lower expenditure than Northern European states, hovering at 45% of GDP. Since the crisis, the two groups have converged at a higher level of above 50%, with much of the jump being reflected, unsurprisingly, in changes in expenditure on social protection (Figure 18). The breakdown of expenditure in its main components also reveals

differences in the composition of spending. Southern states spend relatively more for general public services, which indicates a more expensive state apparatus, and on defense; since the beginning of the crisis, instead, they have cut back, with respect to Northern states, on health and education (Figure 18).

In short, while public expenditure in Southern states has increased in the past decade, this seems to be more a direct consequence of the economic crisis. Indeed, there seems to be no clear macroeconomic evidence of a significant boost in public spending to support the national growth model, which was a prediction of the VofC theory. Fiscal policy remained relatively constant. However, this came at a different cost to the two groups, with the South running a larger deficit to sustain its budget (Figure 19). The gap in deficit was around 2% before the crisis and grew to over 4% after the crisis and during the recovery. The larger deficit gap since 2007 could be accounted partly by the growth in public expenditure and partly, for the total deficit, by the increased spending on debt servicing, due to higher bond yields (Figure 19). In any case, this trend could lend itself to the view that the European South has been "living above its means". In turn, this would point at high spending as the main culprit for high debt, which is part of the so-called "Frankfurt consensus", which I discuss in a later section.

In regard with the evolution of the policy mix in the EMU, southern states did not seem to start over-relying on fiscal policy. At the same time, monetary policy too did not evolve according to theoretical predictions. As maintained by the "New View" of monetary integration, the ECB was set up as a highly independent central bank (Hayo, 1998). However, this did not translate in automatically conservative and contractionary policy. Indeed, especially after the crisis, the ECB has engaged in particularly loose monetary policy (Weber and Forschner, 2014). With historically low rates for several years, quantitative easing, and support in the sovereign debt markets, the bank's policy seems more catered towards the preferences of Southern European states rather than the Northern group. Enderlein, Letta et al. (2016) argue that monetary loosening remained the only option to counter the crisis in the strict fiscal framework put in place by the SGP and subsequent intergovernmental pacts. If this were the case, the evolution of the policy mix in the EMU would be the opposite of what the theoretical literature had foreseen.

Market indicators shed additional light on the dynamics of monetary integration of the past twenty years. The labor market signals an important dimension of the divide between North and South. Unemployment in the two groups was set on a convergent path before the crisis. After 2007, however, Southern European countries experienced spikes in unemployment, while their counterparts did not see significant fluctuations (Figure 20). This difference constitutes precisely the kind of asymmetric shock that, according to the theoretical literature, the EMU would be ill-suited to handle. This could explain for a large part the average 5% increase in spending for social protection displayed by Southern Europe (Figure 18). Furthermore, a sustained fall in employment can lead to a depression of domestic demand, as household income and expectations

decrease. As predicted by the VofC theory, this can have particularly harsh effects on southern economies, which rely on domestic demand rather than on exports.

The weaker labor-market performance in the South was accompanied by a similar trend in labor productivity (Figure 21). Labor productivity growth was a central component of the growth cycle in Western countries in the 20th century (Iversen and Wren, 1998). According to the "Service Economy Trilemma" formulated by Iversen and Wren, with lower productivity growth, countries struggle to maintain wage equality and full employment in a setting of fiscal discipline. Southern European states did experience lower productivity growth, and given the fiscal restraint under SGP rules, their struggle with unemployment fits Iversen and Wren's model. Indeed, Southern European states also consistently lagged in the growth of the industrial sector (Figure 22), which fits Iversen and Wren argument about the expanding service economy. Taking a neutral stance in the debate on the extent of the idiosyncrasy of the service economy, the greater reliance of Southern economies on services could explain part of the lower productivity growth registered by the latter. For example, tourism accounts for a greater share of GDP in the south than in the north (Figure 23). It seems uncontroversial to hold that tourism would contribute less to productivity gains. The efficiency of tourism can only improve so much compared to how much an industrial line can be revolutionized by technology. Moreover, D'Agostino et al. (2006) argue that the expansion of the service sector in Europe has been accompanied by rising unemployment because the higher rigidity of the labor market impedes a smoother reallocation of jobs across sectors (e.g. from a closing industrial plant to a retail store).

Another strand in the empirical literature on the European North-South gap identifies as additional key issue competitiveness. A 2010 ECB paper argues that the loss in competitiveness experienced by Southern European states cannot be ascribed to a gap in productivity, which indeed does not seem large enough to explain the difference in unemployment (ECB, 2010). The paper's findings instead point to a relevant role on non-price competitiveness. From the macro perspective, trends in R&D investment show a persisting gap between Northern and Southern countries (Figure 24). Since 1995, the South has been spending between a half and a third in R&D. Importantly, a greater proportion of total expenditure has been public, with a lower involvement of the business sector. This could express a less innovative or entrepreneurial business environment in Southern states, which could have both institutional, economic, or cultural roots. Regardless of the origin of this gap, recent empirical studies have estimated it to have a large impact on the lower productivity and competitiveness of the European south (Makris, 2015).

In conclusion, several macroeconomic indicators signal growing imbalances within the Eurozone. Certain divergence trends have been at play since the establishment of the EMU, such as the productivity gap, while other convergence or stable trends seem to have been reversed by the crisis, government spending and unemployment. While in terms of GDP at PPP Northern and Southern states have managed to reduce the gap, the catching-up process has been slow. Furthermore, to support the national economy after the crisis, Southern states have had to run

consistently higher budget deficits, which has weighted on the debt levels. The summarizing indicator is perhaps the balance of payments and the net international investment position of the two groups (Figure 25). The clear divergence that began in 1999 shows that Northern states became the creditors of their Southern counterparts. While some debt-taking is inevitable, and indeed welcome, in phases of catching-up, the question lingers on whether these respective roles have become structural within the Eurozone. European policy efforts need to take into account both the evolution of government spending and of the national economies, as they both part of the equation of sovereign debt.

3.3 Policy Implications

As the theoretical and empirical review have largely shown, the Eurozone economic conundrum is no easy policy challenge. Different theories agree on the difficulty in managing different growth models in the same currency area. The empirical side shows a growing competitiveness gap between North and South, which is further burdened by onerous legacy debt. Focus too much on reducing the debt, and competitiveness and growth gap might widen further. Focus too much on investment, and debt will increase even more. Unsurprisingly, for the past few years, European governments and international institutions have kicked the can down the road, in a routine that follows the Greek schedule of loan repayments (Taylor, 2017). In the meantime, scholars and observers – who, admittedly, do not have to face voters – call for a more comprehensive policy response.

The theoretical framework that has led policy in the Eurozone for the past decades has sometimes been labelled the Brussels-Frankfurt Consensus, though admittedly more so by its critics (de Grauwe, 2006; Fitoussi and Saraceno, 2004). This consensus is inspired by neoclassical economics and focuses on the structural, long-term determinants of growth and stability. Its key insight is that, within SGP rules, a balanced budget on the medium run provides governments with enough flexibility to respond to shocks – that is, the possibility of running a deficit of up to 3% (de Grauwe, 2006). According to this view, imbalances in the Eurozone should be addressed by fiscal adjustment and structural reform to bring about real convergence among member states. In popular terms, this approach has been dubbed “austerity”. The basic prescription vis-à-vis the high levels of debt in times of crisis is that consolidation will restore market confidence and, in the long run, ensure a normalization of debt accumulation across the currency union. Indeed, during the crisis, European governments addressed at multiple times the revision of the SGP framework, tightening the requirements imposed on national fiscal policy (Feld et al., 2016). Through all the common initiatives (such as the “Six Pack”, the “Two Pack”, and the Fiscal Compact), the focus remained fiscal restraint and national consolidation, improving surveillance and coordination at the European level.

However, a growing literature questions the validity of this approach. In an IMF paper, Eyraud and Weber argue that the dynamics of fiscal tightening on the short-term may be counterintuitive. Indeed, in the presence of a high fiscal multiplier, a cut in spending may cause

an increase in the debt-to-GDP ratio. While they argue that the decline is only temporary, this effect could become more relevant: "a combination of high and persistent multipliers, repeated tightening, and high debt would make debt reduction more challenging" (Eyraud and Weber, 2013: 9). This is further complicated if financial markets react to short-term debt positions, which could create additional headwind for countries undergoing consolidation. In contrast, Alesina et al. (2015) analyze the narrative that "austerity" has accentuated the crisis finding little evidence for it. They argue that, compared to previous debt-reduction efforts, the last few years of austerity have not caused exceptional losses in output. However, they qualify their finding distinguishing between spending-based and tax-based consolidation, claiming that spending cuts are more efficient in reducing the debt burden (Alesina et al, 2015; Alesina and Giovazzi, 2012).

Given the gap in debt levels and in budget deficits between Northern European and Southern European countries, it is difficult to argue that fiscal responsibility should not be a part of the policy response. Yet, the question is open on the degree, duration, and centrality of austerity measures. Charles Wyplosz (2012) argues precisely that the European policy response ought to be more nuanced and not solely focused on fiscal consolidation. Fiscal discipline is a long-term concern to ensure stability, not an instrument to stimulate growth (Wyplosz, 2012). Cottarelli adds that spending cuts should not be bundled together but rather spread out over a longer period, to allow for economic adjustment (Cotterelli, 2012).

Indeed, I would argue that austerity measures are an awkward crisis-response tool. While they serve to reassure the markets, they do so at the cost of a clear procyclical effect, as any contractionary policy would. In this sense, they help with the long-term stability of the system, but they slow the recovery. Reworking Keynes' famous statement "on the long run, we're all dead": if we want to get to the long run, we should also worry about surviving the short one. Indeed, several international organizations have begun voicing the need to focus on the growth side of the Eurozone equation, that is, the denominator of the debt-to-GDP ratio (for a recent example, see OECD, 2016).

The possibility of a more comprehensive approach to the European economic conundrum hinges on the question of how to reconcile fiscal restraint with more growth-oriented strategies. Southern European states need to create fiscal space within the limits of SGP rules. One way of doing this is through structural reforms, which theoretically better allocates the states' resources (OECD, 2016). Another is through debt mutualization, as argued in section II, which levels the playing field across member states with respect to newly issued bonds. However, debt mutualization only affects new debt and does nothing for the large overhangs of the South. In the past few years, debt servicing in the South has cost on average 2% of GDP more than in the North (Figure 19). This gap determines a lower capacity for fiscal action in those states that may need it the most. As a response, several authors have argued that to deal with high levels of legacy debt, the Eurozone may need to perform some degree of debt restructuring.

As Eichengreen and Wyplosz argue, the debate on debt restructuring consists in two positions: high-debt countries would prefer restructuring, low-debt countries fear the

consequences for reputation in the markets and for fiscal irresponsibility (Eichengreen and Wyplosz, 2016). However, the two major negative consequences of restructuring – reputation and profligacy – may be lower than expected. Within the current structure of SGP, fiscal dominance is an unlikely development of the European policy mix (GCEE, 2013). The framework of the debt mutualization plan proposed in section II would further strengthen the constraints on national spending. Similarly, the issue of reputation can be obviated through a centralized system, which could remove the stigma associated with restructuring. Several authors have identified this problem with the ad-hoc approach to partial restructuring which has characterized European policy thus far (for an analysis of the Greek case, see Zettlemeyer et al., 2013). "The general point is that this kind of comprehensive restructuring is easier and less costly when carried out collectively" (Eichengreen and Wyplosz, 2016: 43). A comprehensive and open approach to debt restructuring as a European problem could instead function as a "clock-reset" for European governments, levelling the playing ground and granting states the needed fiscal space.

There are many ways in which debt restructuring could be achieved. There are three policy designs: haircuts, rescheduling, and conditional-additional lending (Picarelli, 2016). Haircuts is the costliest policy design, as it imposes a net loss on market participants. Indeed, given the large amounts of legacy debt of some European states, relevant haircuts would trigger doom-loops with national banking sectors, which hold a substantial portion of government bonds (Fahri and Tirole, 2016). Rescheduling consists in striking an agreement between lenders and borrowers to perform a transformation through which the bond is reissued with a longer maturity. Conditional-additional lending instead entails the issuance of more debt from the borrower, which in exchange agrees to conditions set by the lender. The additional liquidity grants respite to the borrower and thus lowers default probability, which is also ensured, on the long run, by the terms of the new contract. Combining these different elements, authors have put forward solutions to European debt restructuring with various levels of intricacy.

Paris and Wyplosz (2014) propose a system of swaps of European government bonds. A common agency, either the ECB or the ESM, would buy large portions of sovereign debt at face values and then reconvert it into longer-term instruments. Participation would be weighted by the contributions of member states in the agencies. The plan then essentially consists in rescheduling overseen by common institutions to avoid negative feedbacks in the market. Paris and Wyplosz argue that the plan would be painless and essentially translate into an intergenerational transfer within each country – from future to present generations (Paris and Wyplosz, 2014).

Along these lines, Corsetti et al. present similar institutional designs for debt reduction. Debt overhang could be absorbed by some form of buyback and maturity transformation, either through a common agency or through national institutions – both of which would avoid transfers between countries. Additionally, they envisage a "solidarity tax" across member states to provide some respite to the weakest members – which would introduce a form of conditional-additional lending in the scheme. Different "menu options" would associate the buyback to different

national variables, such as seigniorage income from participation in a common agency (similarly to Paris and Wyplosz) or VAT taxes (Corsetti et al., 2015).

Moreover, in the case of private-debt overhang, especially in commercial banks such as the Spanish one, some authors have argued for debt-reduction policies modelled after the interventions in South America in the 1980s, with Brady-bonds instruments (Gros and Micossi, 2008). In short, while institutional designs proposed vary, their component remain the same. The issue does not seem the question of economic or institutional structure, but rather the plan's general viability.

Indeed, the chief obstacle to debt reduction through restructuring is a political one. In the present narrative, agreements on debt issues are a tough sell for Northern and Southern governments alike. Part of this problem derives from the different public and academic analysis of the Eurozone economic dilemma. Particularly in the North, the blame of the crisis is shifted on Southern European borrowers, who are criticized for living above their means (de Grauwe, 2011c; Moravcsik, 2012). In the South, the opposite narrative turned against instead the blame on the Nordic lenders. In Greece and Italy, protesters were quick to draw a parallelism between Angela Merkel and the Third Reich, in the most extreme displays of the North-South cleavage (DW, 2013). The political environment created by strong popular sentiments is clearly not conducive to smooth cooperation.

Resolving the European debt problem may require a shift in the discourse on the crisis towards a diagnosis of zero-sum blame game. If Southern states may need to take responsibility for fiscal profligacy and a lag in structural reform, Northern states may instead need to check their involvement in excessive credit. Similarly, Moravcsik underlines how Nordic present competitiveness may be the fruit of excessive wage suppression, especially in the case of Germany, which exceeded European standards not in negative but in positive (Moravsik, 2013). In the end, a neutral position may be the most productive stance to take in the normative diagnosis of the Eurozone debt crisis.

Given this political and normative clarification, debt reduction in the Eurozone seemingly requires a combination of several policies: "smart austerity", debt restructuring, and growth investments. First, fiscal consolidation should continue, especially in countries that still experience consistently large budget deficits. However, this should be understood as a long-run stability tool, rather than a short-term crisis management approach. The updated SGP provides the correct framework to deal with fiscal coordination across member states. Moreover, from the national perspective, governments should choose spending cuts rather than tax increases as means to achieve budget balance. In short, "smart austerity" should achieve medium-run stability through slow and spending-oriented reforms.

Second, regarding legacy debt, European governments should open the discussion on restructuring. Academic and policy literature have proposed several potential designs to achieve partial restructuring without incurring in direct transfers between states. Together with debt

mutualization, debt restructuring would provide fiscal room for countries to pursue much needed growth strategies.

Third, a mounting consensus maintains that the Eurozone should now start focusing on growth strategies as much as fiscal consolidation (OECD, 2016; Enderlein, Letta, et al., 2016). Together with structural reforms, investment strategies should aim at bridging the gap in employment, productivity, and competitiveness between Northern European and Southern European states. Once growth makes its way back in Europe, the issue of debt reduction and long-term sustainability ought to become much less pressing.

Conclusions

In this study, I sought to approach the European debt conundrum. In the first part, I proposed and evaluated an institutional design for a debt mutualization and debt reduction scheme in the Eurozone. In the second part, I dealt with the issue of debt reduction – legacy debt rather than new debt.

Regarding mutualization, my work offers two main contributions to the literature on Eurobonds. From the theoretical perspective, I have detailed a system of dynamic conditionality to address the enforceability problem of the European fiscal framework. Under the proposed plan, the EMDF would provide incentives for long-term fiscal discipline and convergence. From the empirical standpoint, I have devised a model to forecast the functioning of the proposed institution. This represents a first quantitative examination of the concrete impact of debt mutualization on sovereign yields and public finances. The results of the simulation suggest that a mutualization scheme, coupled with a debt reduction plan, would have sizable positive effects in terms of nominal convergence, incentives for fiscal discipline, and reduction in future interest spending. I find that the optimal amount of debt-to-GDP mutualized would be 40%, though realistically this value could vary between 35% and 55% (table 8).

Regarding debt reduction, I have provided as holistic as possible an evaluation of Eurozone economic convergence. From the theoretical standpoint, I considered and contrasted the main theories put forward in the academic literature. From the empirical viewpoint, I offered a macroeconomic analysis of the historical trajectory of EMU states, focusing on the divide between Northern European and Southern European members. While the historical evolution of European dynamics contradicts some of the theoretical predictions, in general it underlines the presence of a divide and the struggle to combine different growth and economic models within the same currency area. In the final policy section, I offered a rapid review of the vast scholarship on the European crisis and on debt restructuring. My conclusion, in line with the most recent studies, is that the European dilemma calls for a comprehensive solution that combines “smart austerity”, debt restructuring, and growth-targeting policies.

Although the empirical section of this paper provides an innovative and useful contribution to the debate on Eurobonds, it still holds room for great improvement. As it stands, the model used to assess the EMDF rests on a number of assumptions and disregards a number of secondary effects of mutualization that may have a considerable impact on participating states. Further research on several key issues would increase the model's explanatory power. First, a more complex approach could better account for flight to safety dynamics on national rates. The risk invariance proposition makes a valid and straightforward case for low levels of mutualized debt. Yet, as the pool of EMBs grows larger, common debt obligations take on more and more idiosyncratic default risk, which should affect their yield. Similarly, my model does not currently account for the systemic risk element underlying EMBs, which may also be an important element considered by investors. Additional econometric work may shed light on the dynamics of contagion and its implications for pricing.

The evaluation of costs and benefits also hinges critically on the estimated impact of debt reduction. The current simulation relies greatly on the historical precedent of the 1995-2005 decade and the establishment of the EMU. As I have already argued, there are reasons to believe that the comparison may have limitations, especially considering the impact of the recent crisis. A more inclusive econometric project could couple the large dataset from Reinhart and Rogoff (2010) with data on yields and other macroeconomic variables, to better gauge the effects of debt reduction. Finally, this study does not provide a quantitative evaluation of the liquidity effect that EMBs could benefit from. With the establishment of the EMDF, the Eurozone would issue a security that would rival in volume the US Treasury bonds. This may have implications beyond the sovereign yields and could impact all euro-denominated financial instruments, reinforcing the position of the euro on the international currency arena (Angeloni et al., 2011).

To conclude, I want to focus briefly on the present international monetary and economic environment. Current global conditions may provide a prime conjuncture to establish a sovereign debt mutualization scheme at low economic and political costs.

As I already showed, European sovereign yields have re-entered a situation of relative calm, after the mayhem during the height of the Eurozone Crisis. For the past two years, most 10-year government bond rates have fluctuated in a range of 200 bps (Figure 10). This lowers the impact of the mutualization, making for smaller gains from rate reduction. Therefore, one might argue, there are fewer incentives for mutualization; much like was the case with the early proposals of Eurobonds in the Giovannini Report (European Commission, 2000).

At the same time, somewhat counterintuitively, this may be a positive feature. To begin with, a low-rate environment may limit extreme flight to safety, as investors are more prone to risk-taking and demand instruments with higher returns (Lian et al., 2016). Moreover, in a hypothetical high-spreads scenario, mutualization would entail greater winners and greater losers. Southern countries would have more to gain from a common diminished rate. However, given higher underlying national rates, the upper bound of the EMB rate would increase. In turn, this would lead to Northern countries losing out when switching to the common debt pool.

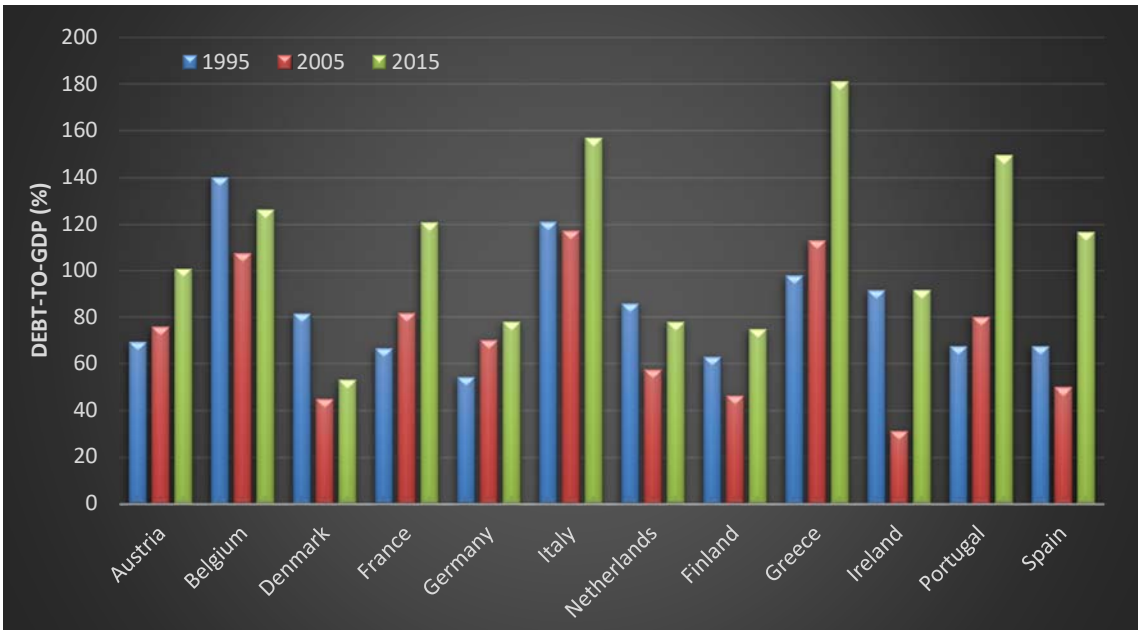
Finally, under such scenario, the EMDF would take on a more redistributive character, which would also be a tough sell for Northern-European politicians.

In short, I argue that the current low-rate environment presents the ideal setting to establish an institution like the EMDF. Debt mutualization would have the lowest political costs and may help to lock sovereign yields at favorable levels against future fluctuations.

On top of that, European policymakers might not have much time left to seize these advantageous conditions. The current environment is sustained by various undergoing dynamics that are likely to revert in the near future. To name just two: in Europe, the ECB's quantitative easing program has had a large dampening influence on sovereign rates (Gerba and Macchiarelli, 2015). The program is slated to terminate in March 2017. In the US, the FED began a gradual rate hike starting in December 2016, which would also bear consequences for the sovereign bond market. Indeed, the window of low rates might soon close (Mutkin, 2016). If European policymakers are to move ahead with plans of debt mutualization and debt reduction, the optimal moment to do so would be, quite simply, today.

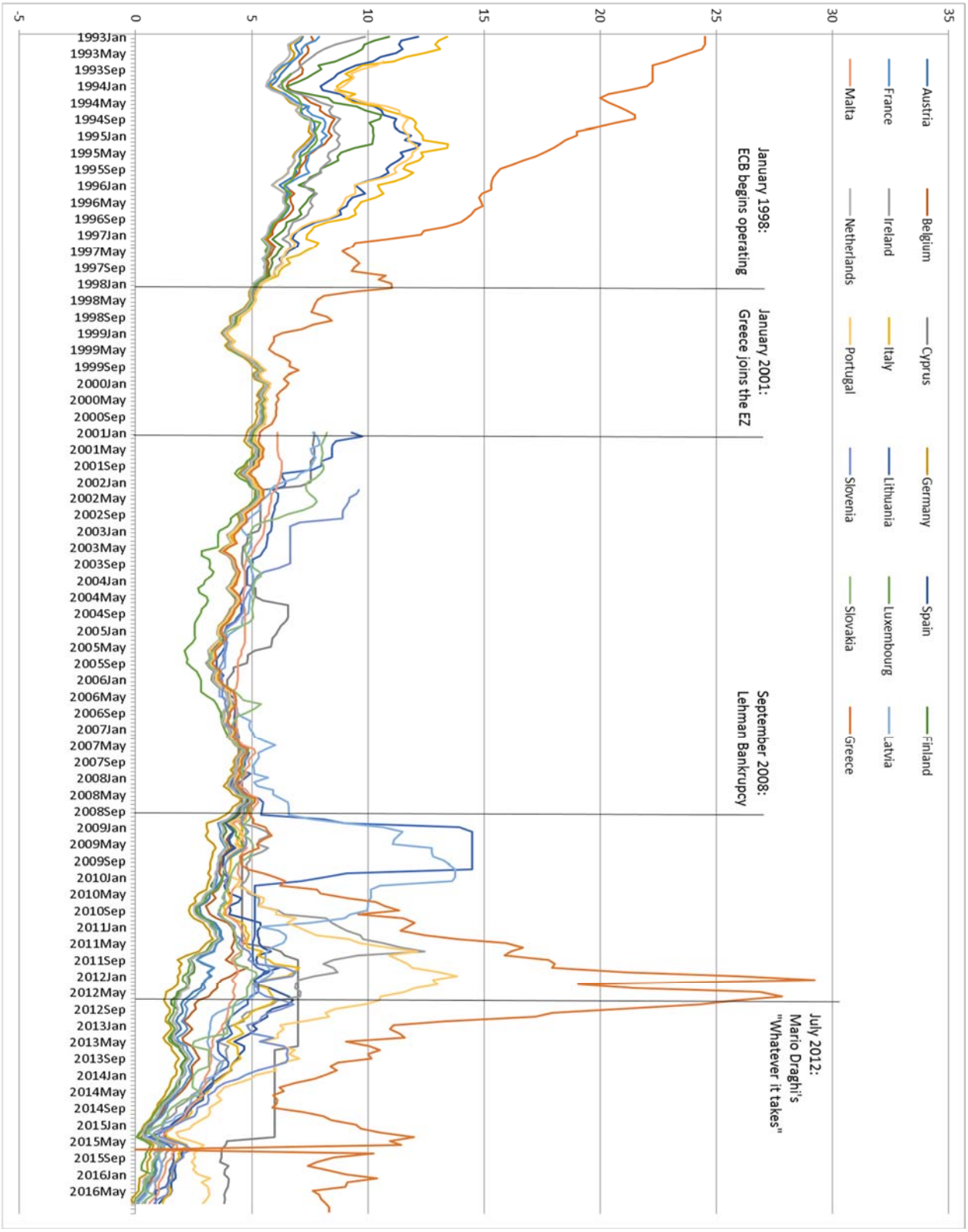
Annex I – Figures and Tables

Figure 1 – Debt-to-GDP, European Countries (1995, 2005, 2016)



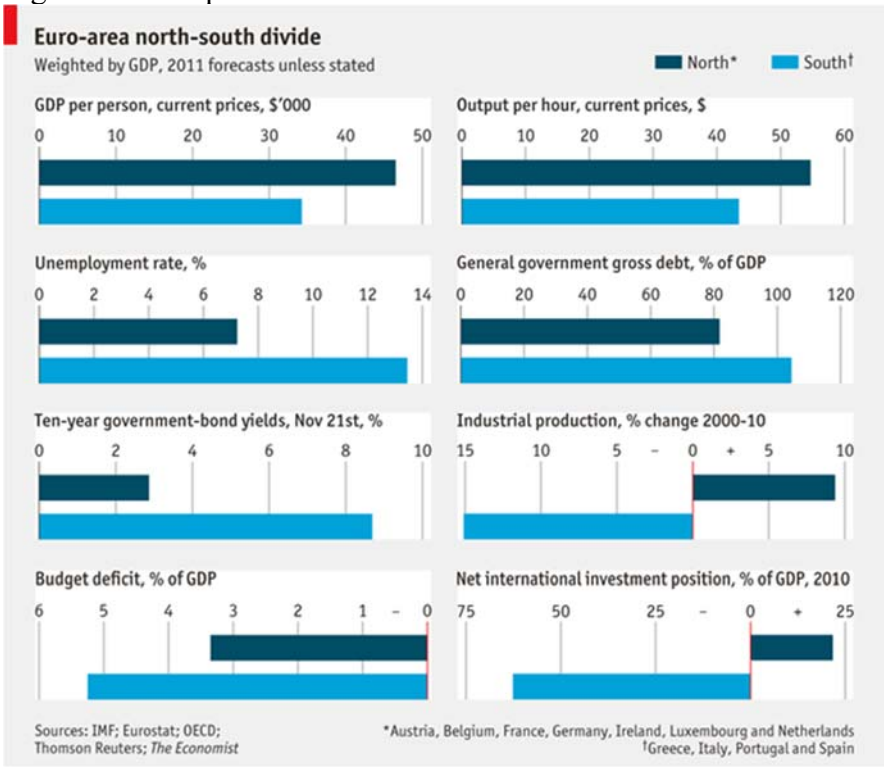
Data: OECD; Graph: Author.

Figure 2 – Eurozone Sovereign Yields, Monthly 1993-2016



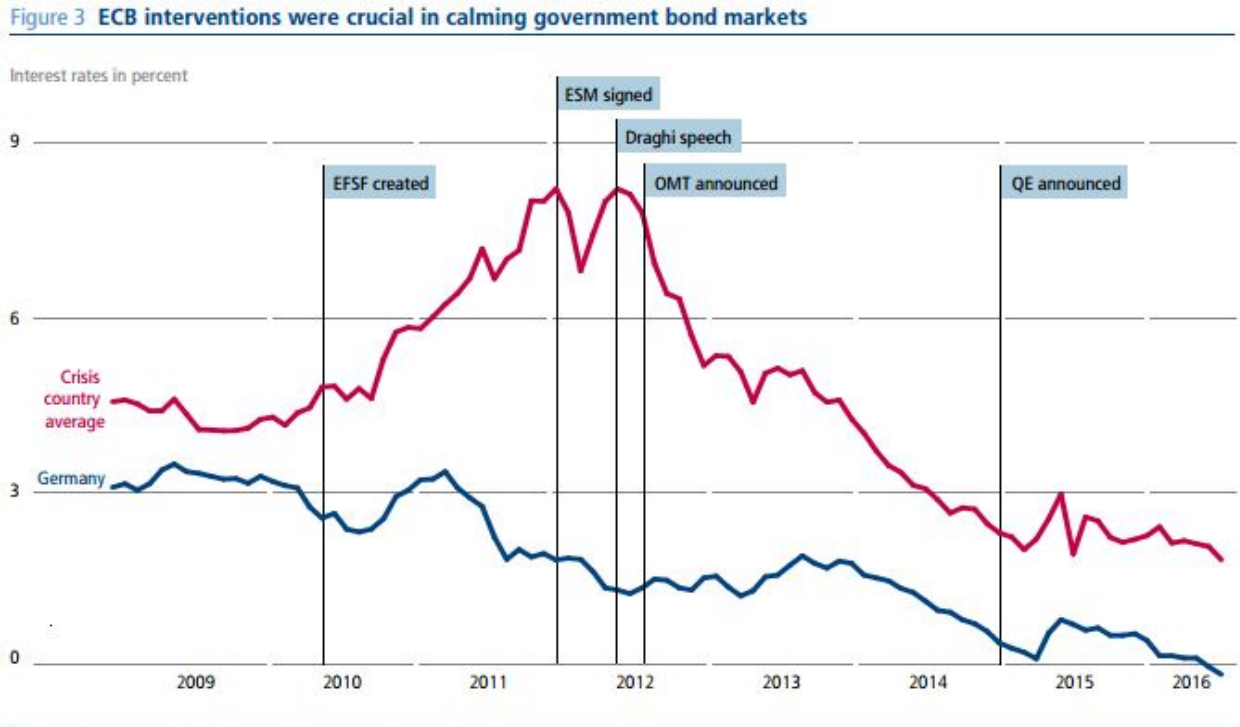
Data: ECB; Graph: Author.

Figure 3 – European North-South Divide



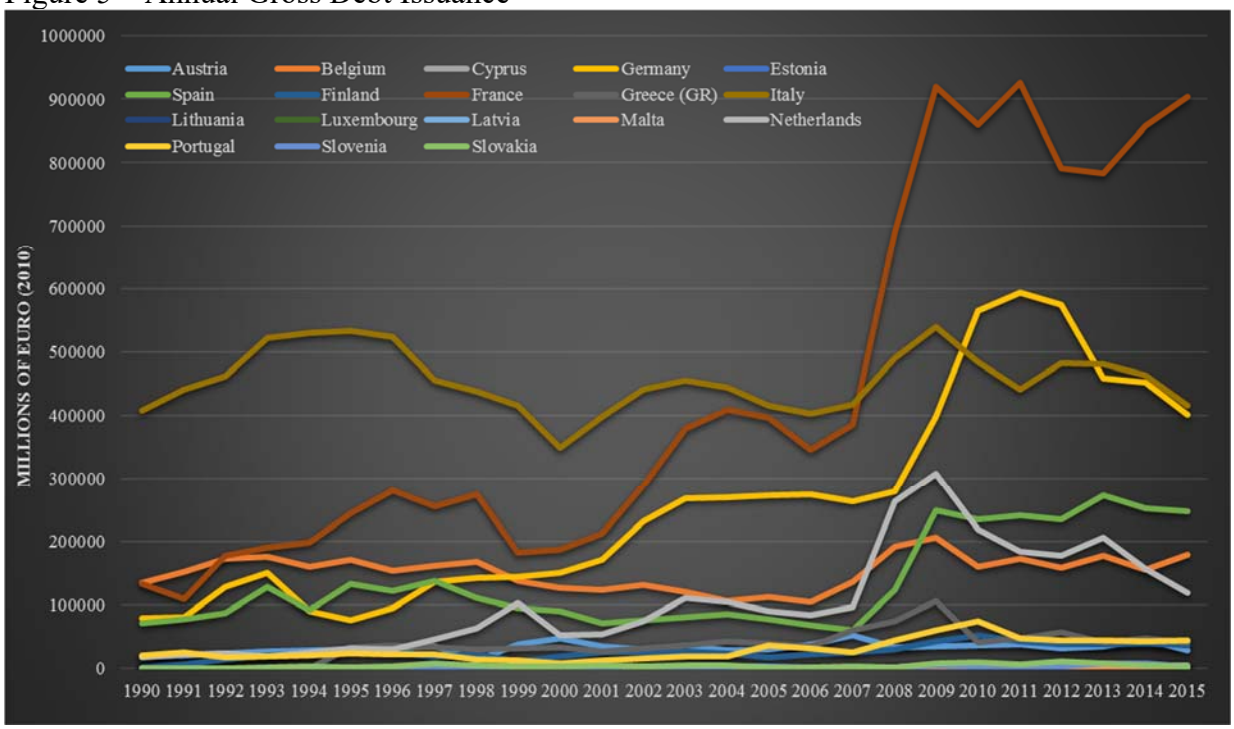
Source: (Economist, 2011)

Figure 4 – ECB and European Sovereign Spreads



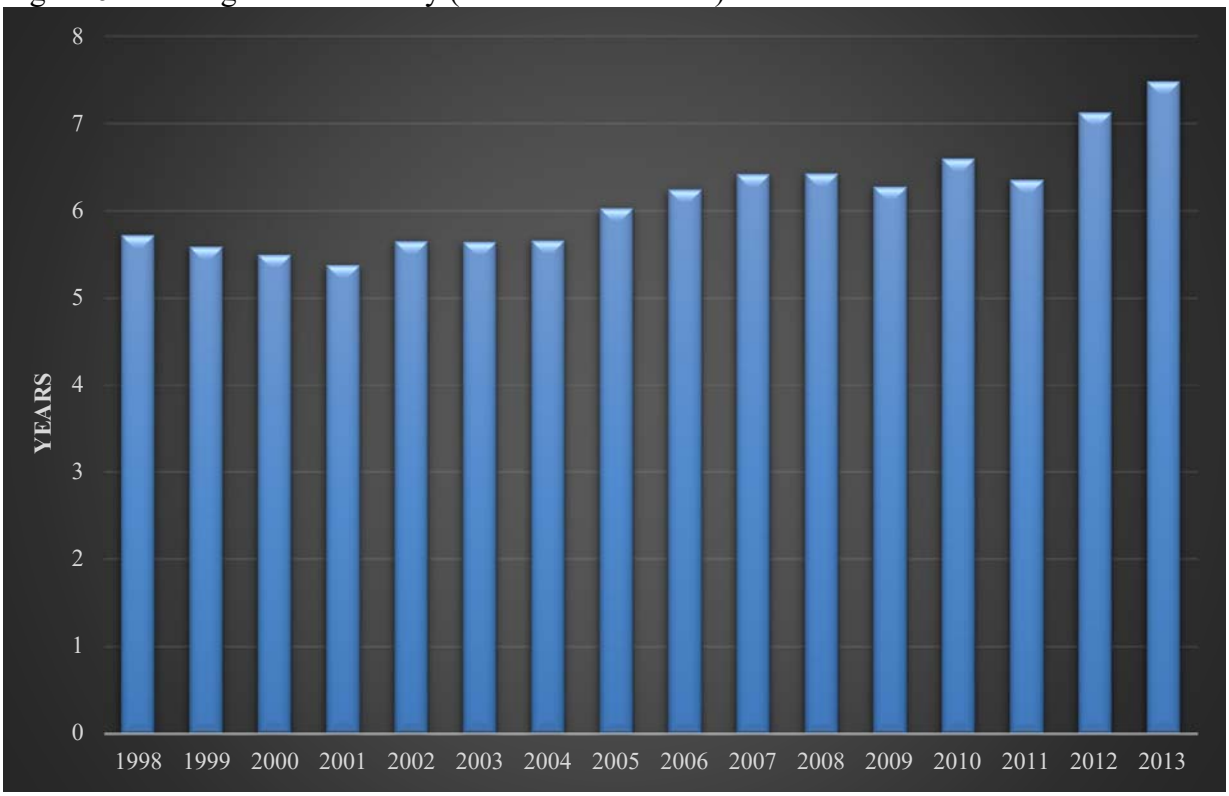
Source: (Enderlein, Letta et al., 2016)

Figure 5 – Annual Gross Debt Issuance



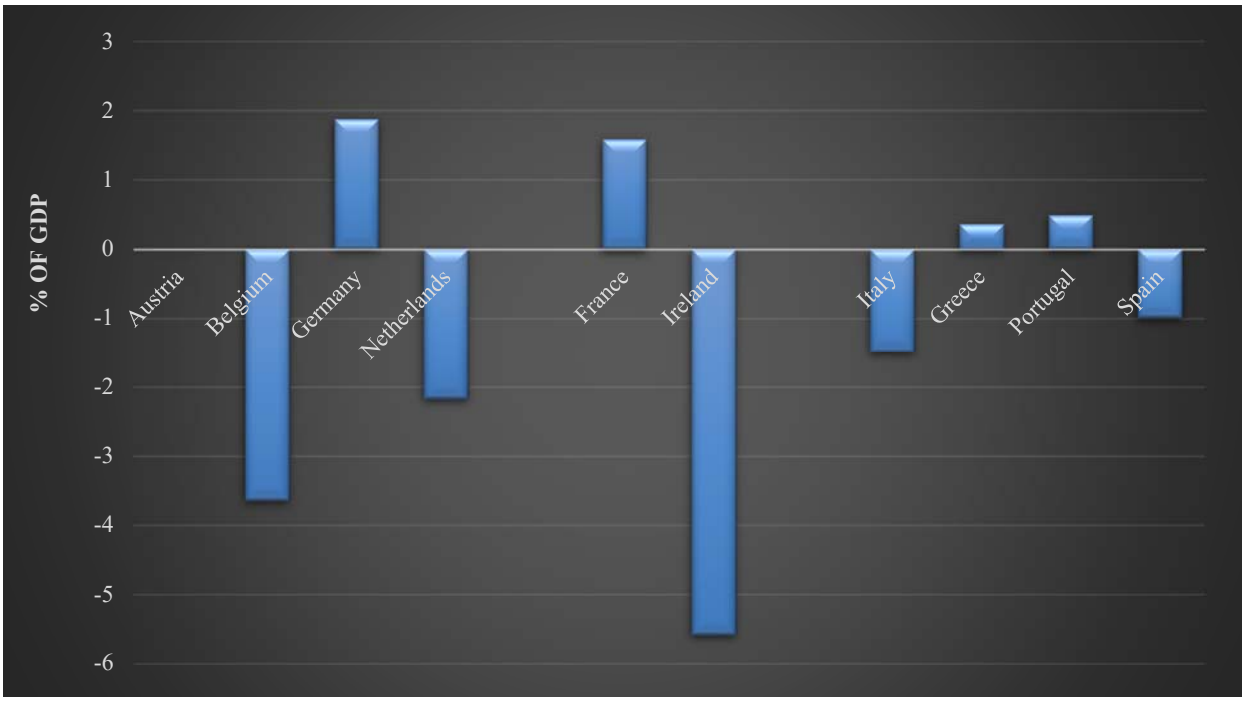
Data: ECB; Graph: Author.

Figure 6 – Average Debt Maturity (Eurozone Countries)



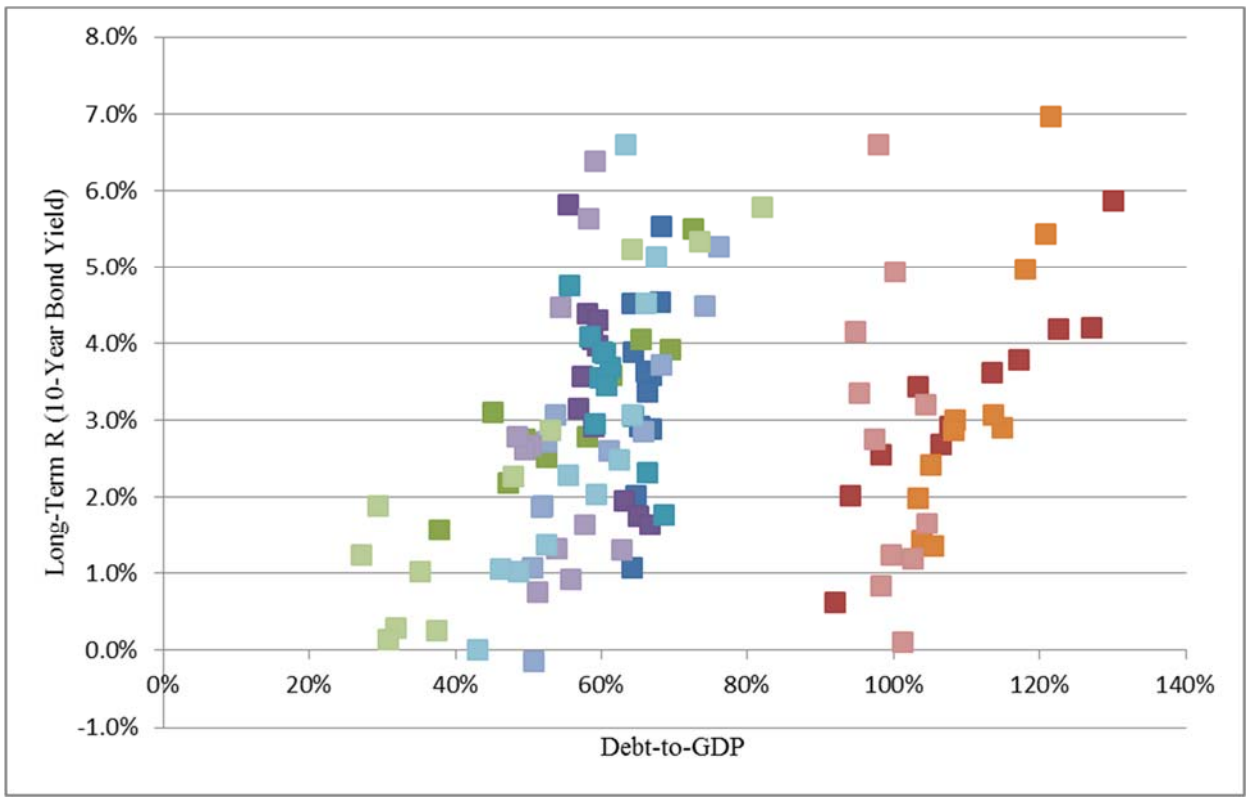
Data: ECB; Graph: Author.

Figure 7 – Average Yearly Debt Reduction (1995-2005)



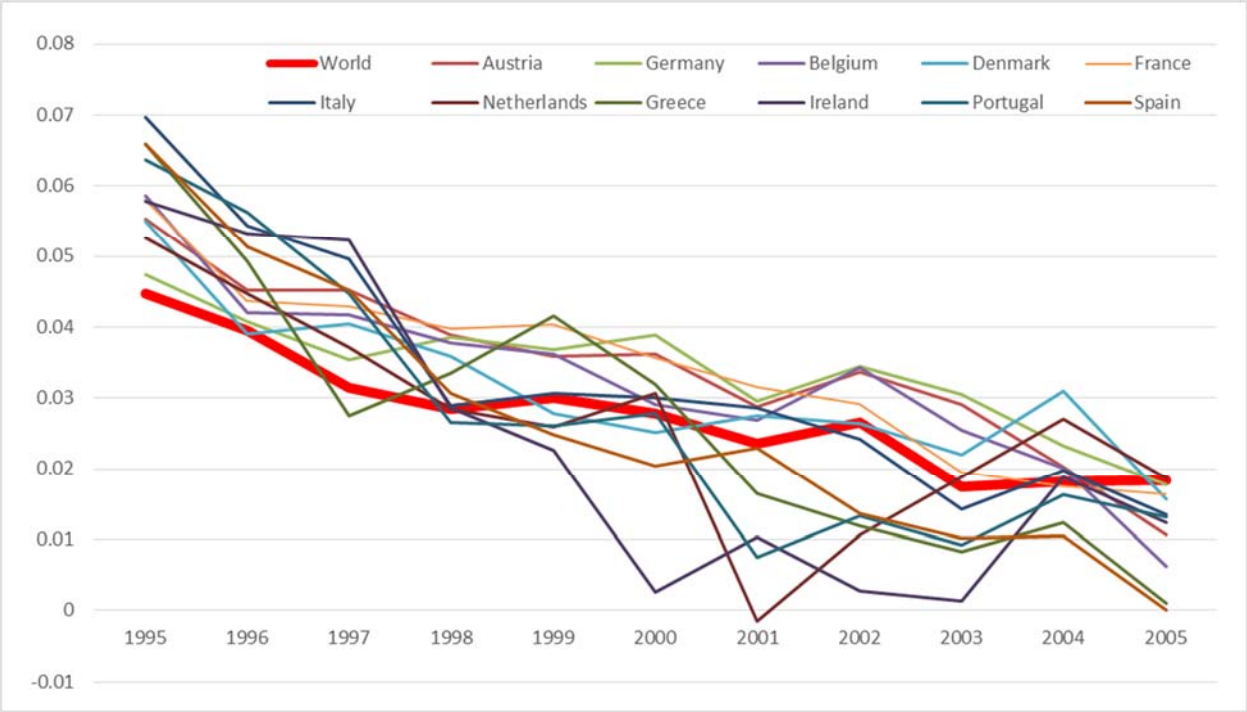
Data: ECB; Graph: Author.

Figure 8 – EMU Countries: Long-Term Interest Rate and Debt-to-GDP (1995-2005)



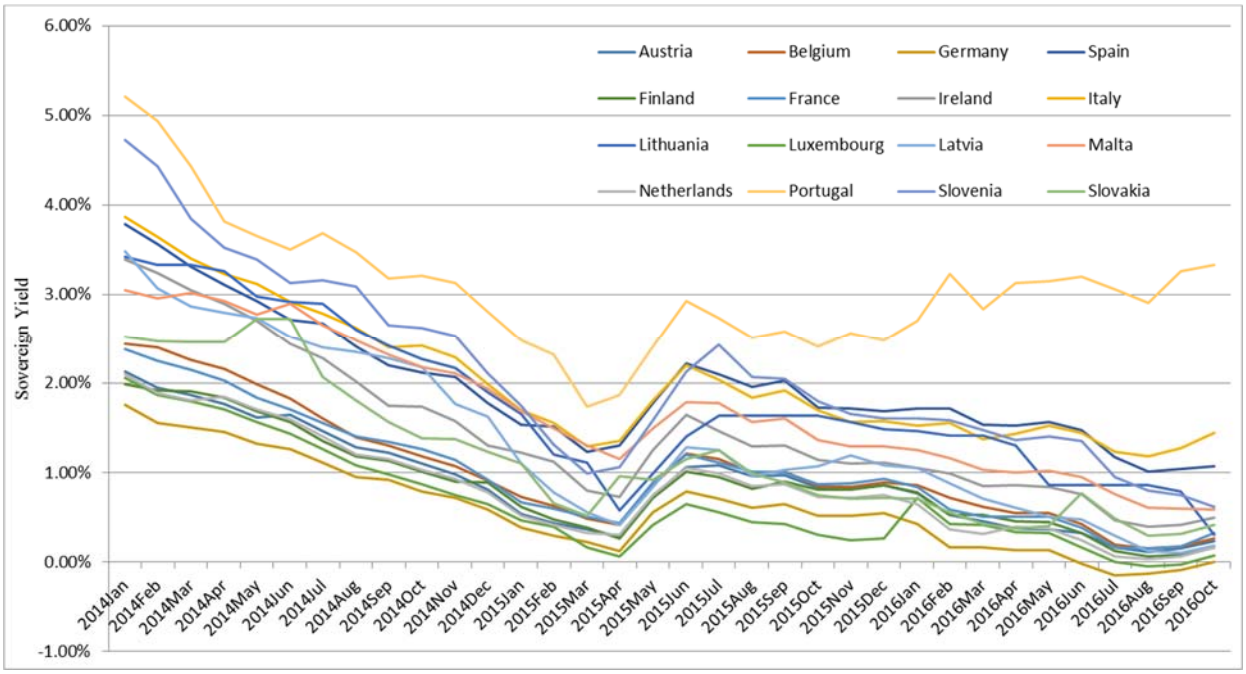
Data: IMF; Graph: Author.

Figure 9 – EMU Countries: LT Interest Rates (10-year Gov. Bond Yields)



Data: IMF; Graph: Author.

Figure 10 – Eurozone Sovereign Yields (excl. Greece and Cyprus)



Data: ECB; Graph: Author.

Figure 11 – Evolution of Underlying National Rates

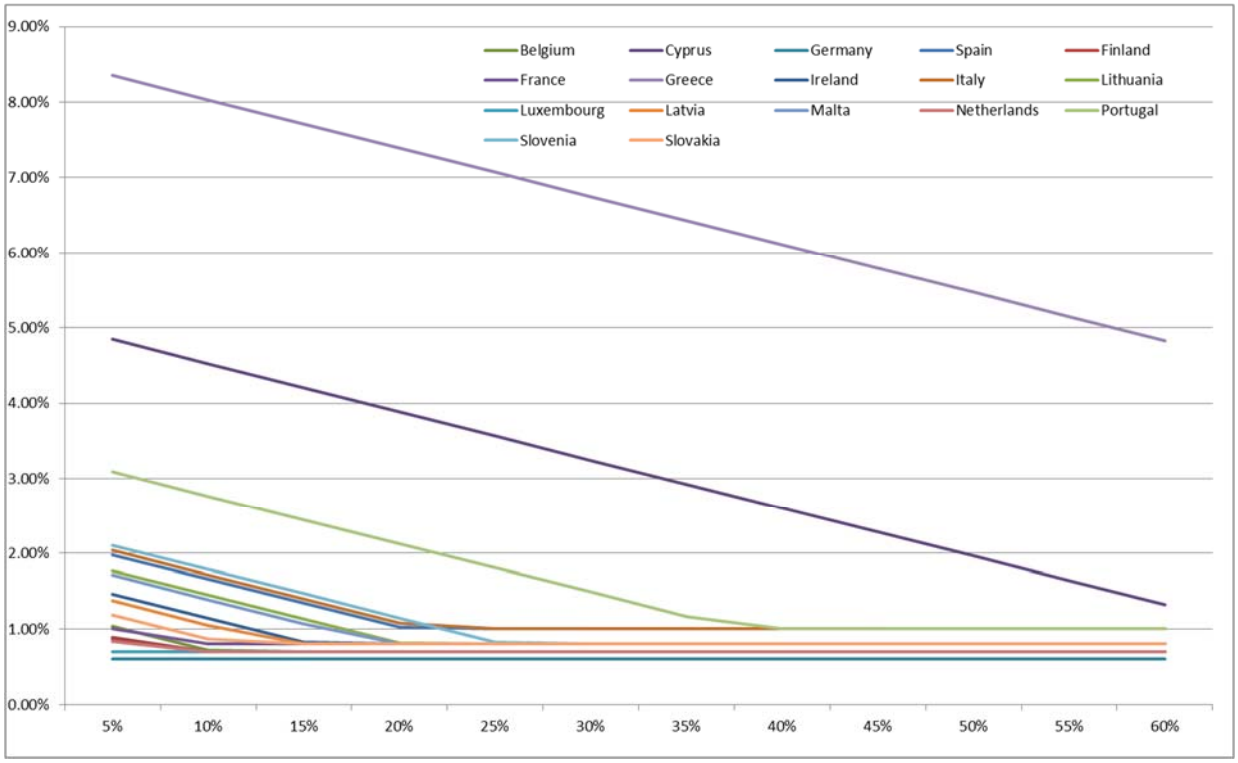
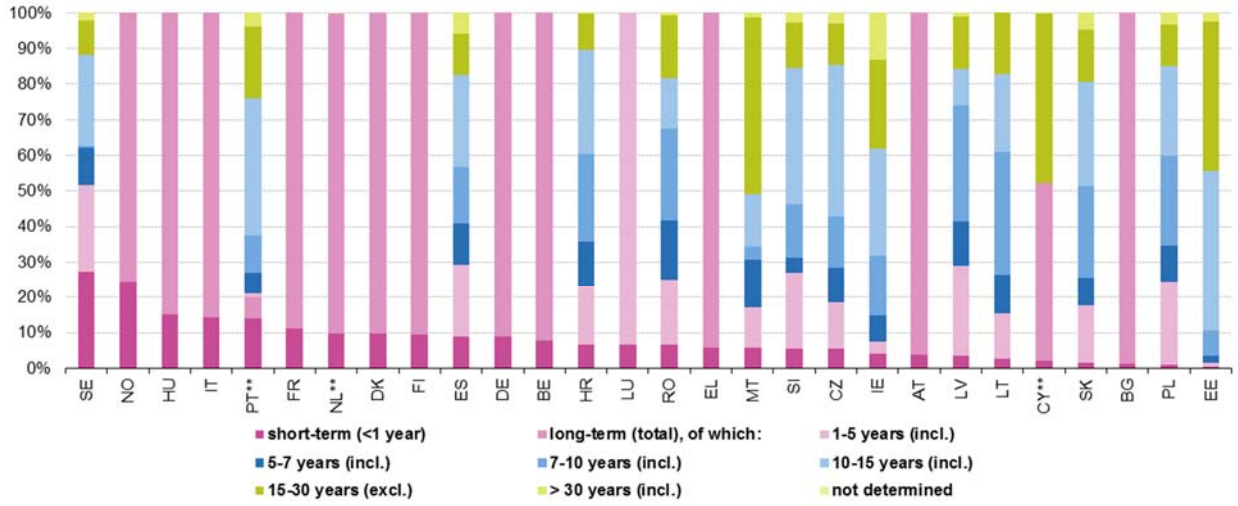


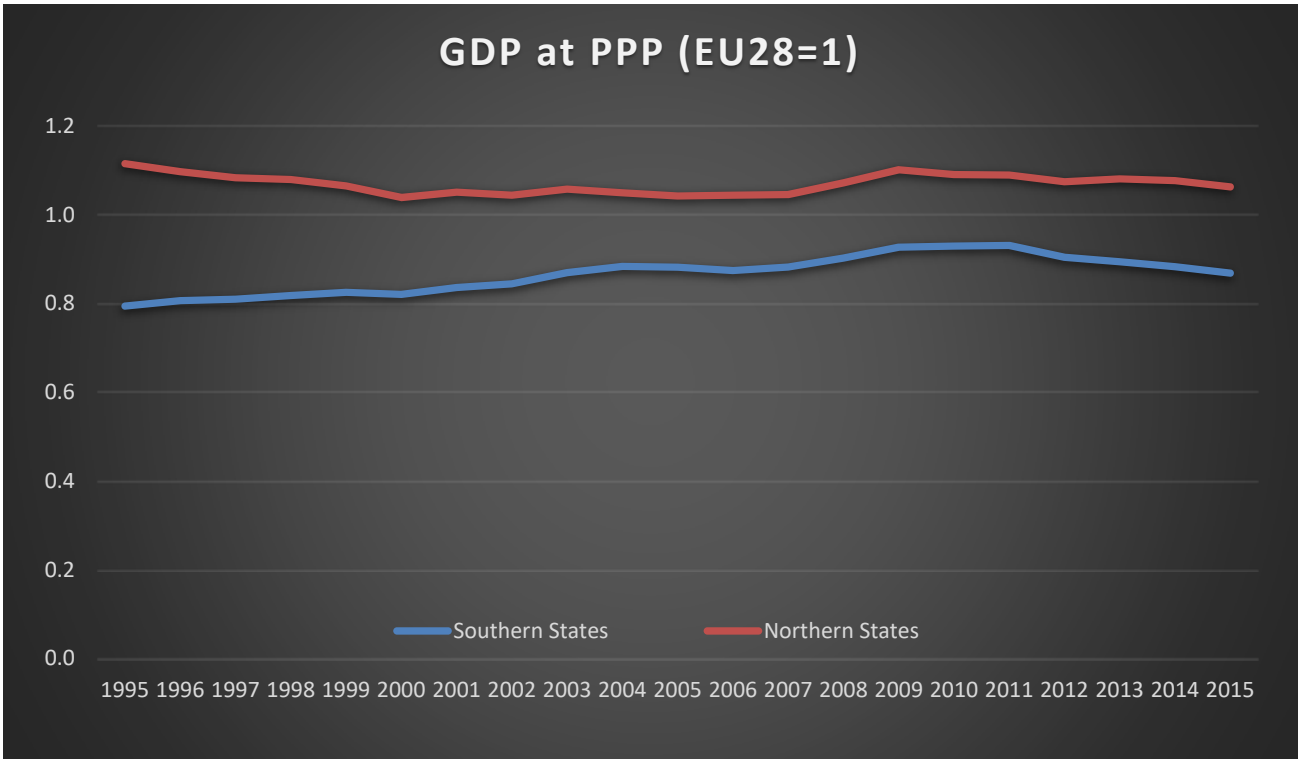
Figure 14 – European Government Debt by Initial Maturity, 2016



UK: missing information
PT,NL,CY: partially missing information

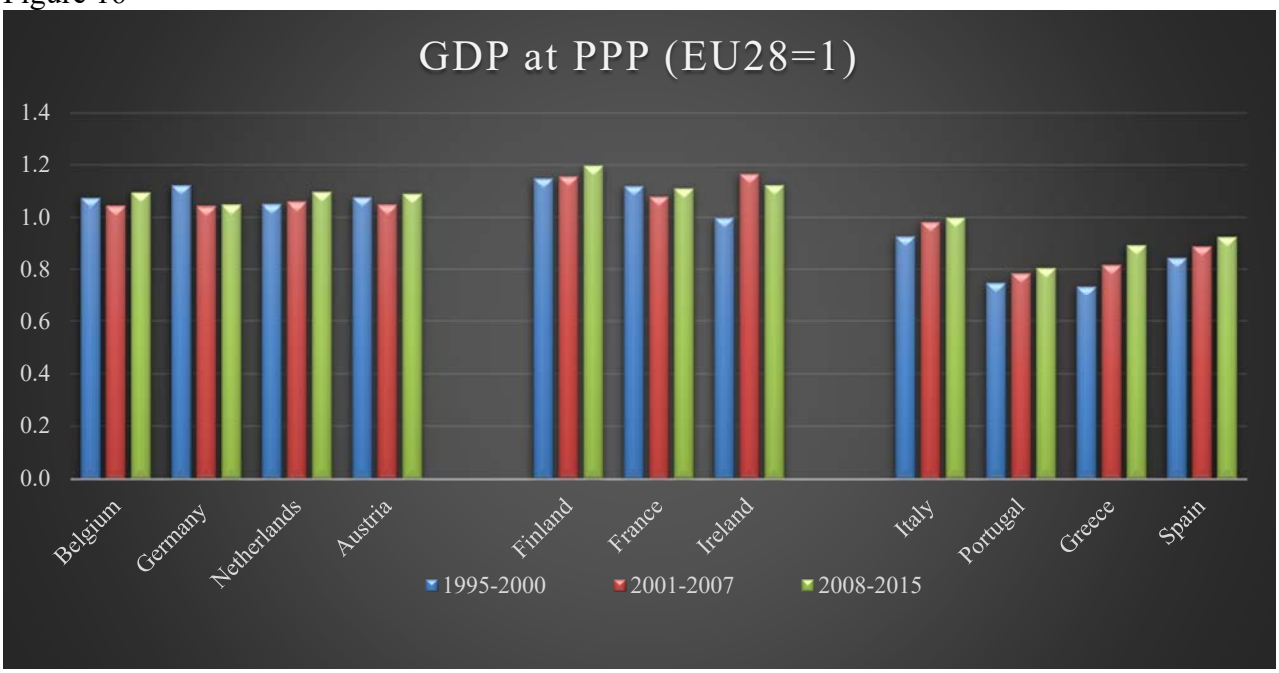
Source: Eurostat, 2016.

Figure 15



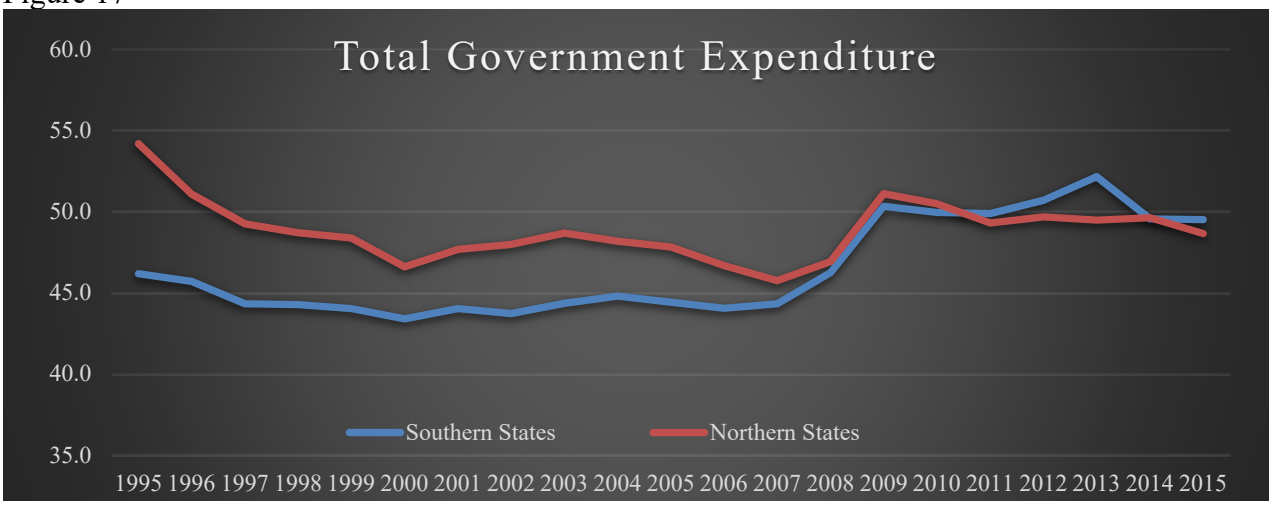
Data: Eurostat; Graph: Author.

Figure 16



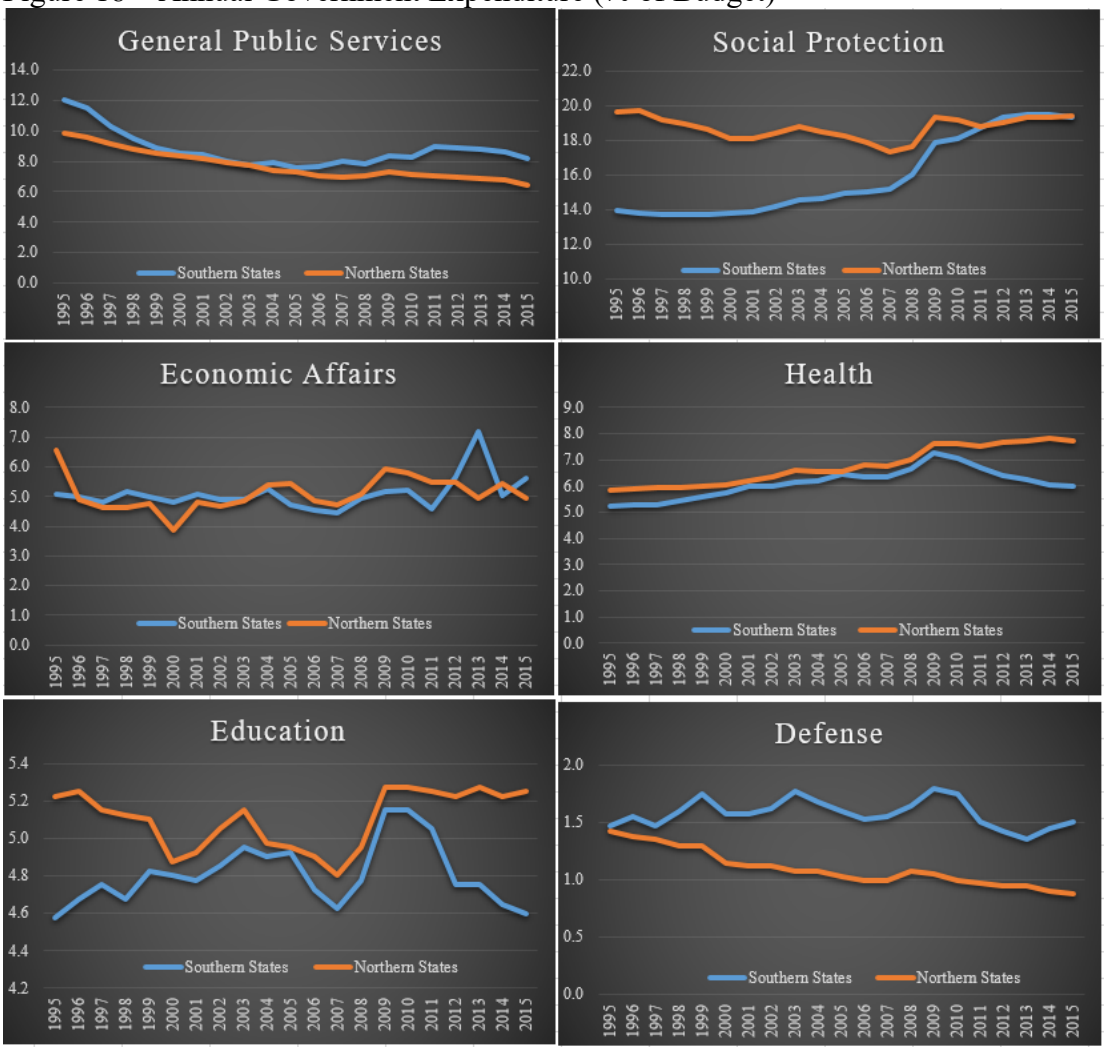
Data: Eurostat; Graph: Author.

Figure 17



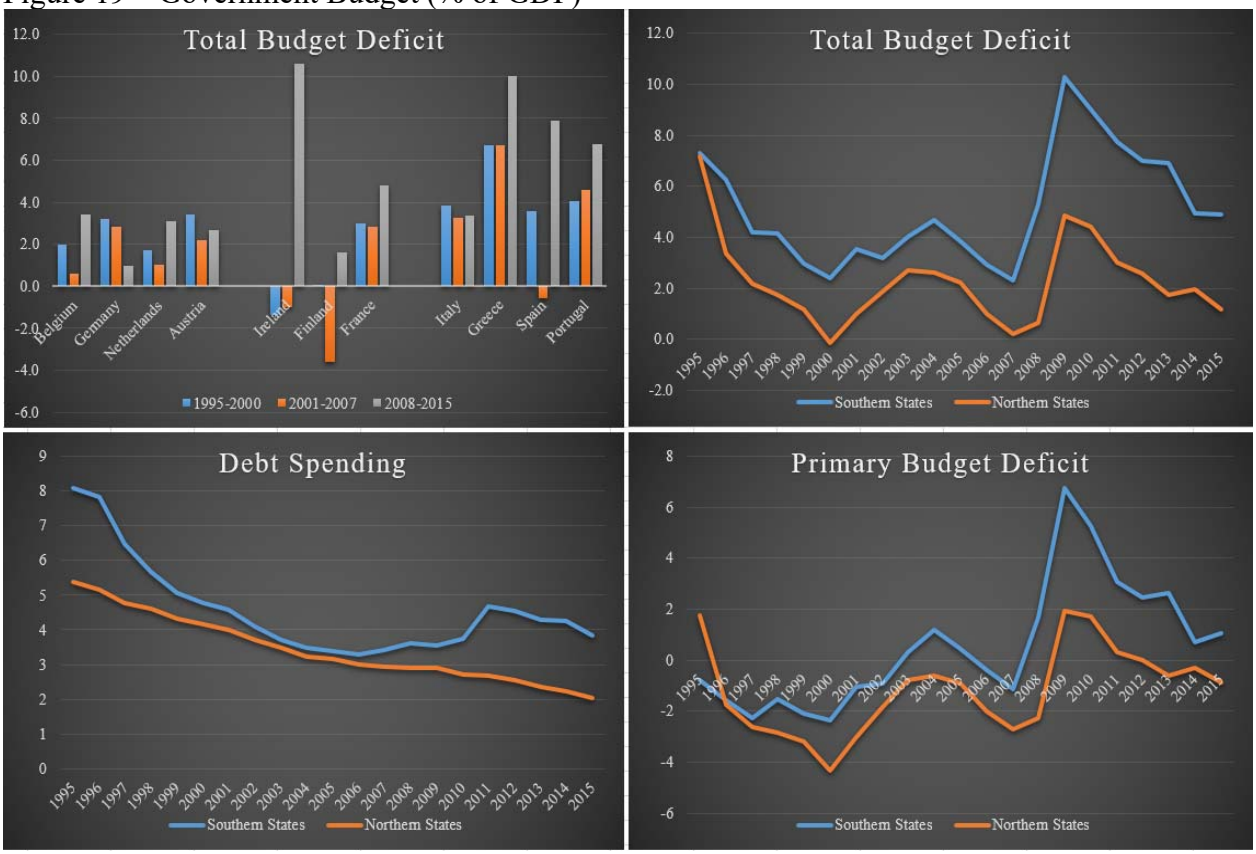
Data: Eurostat; Graph: Author.

Figure 18 – Annual Government Expenditure (% of Budget)



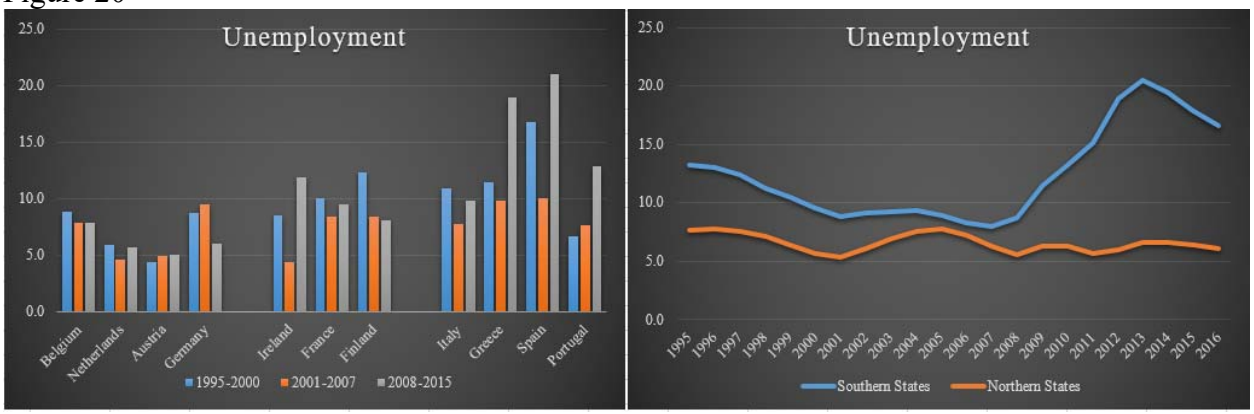
Data: Eurostat; Graph: Author.

Figure 19 – Government Budget (% of GDP)



Data: Eurostat, ECB; Graph: Author.

Figure 20



Data: OECD; Graph: Author.

Figure 21

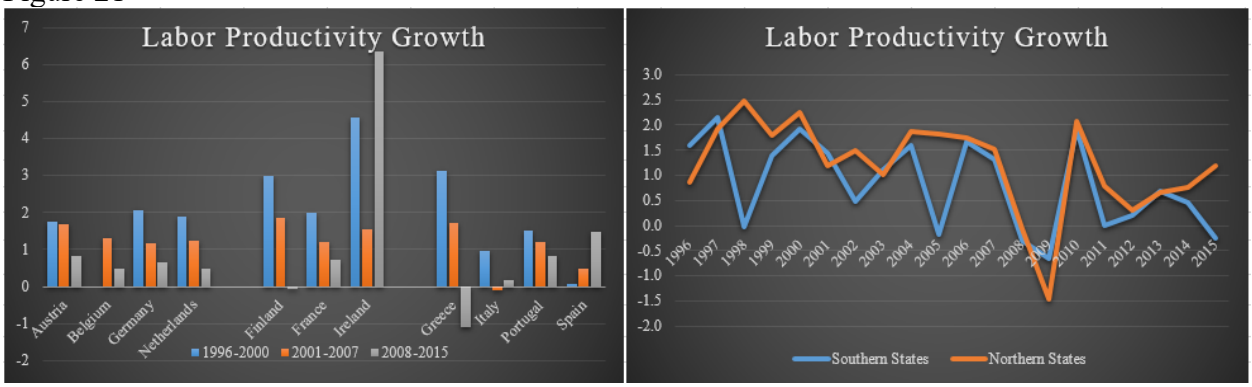


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Figure 22

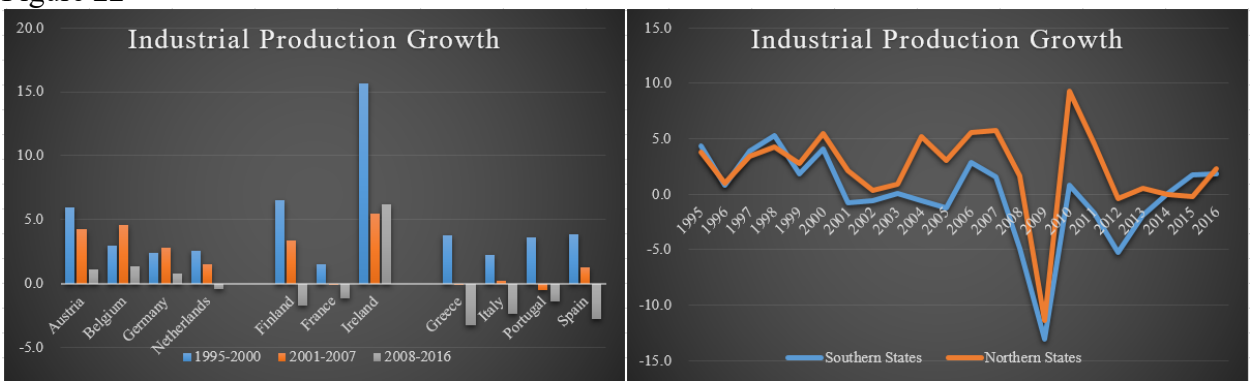

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Figure 23

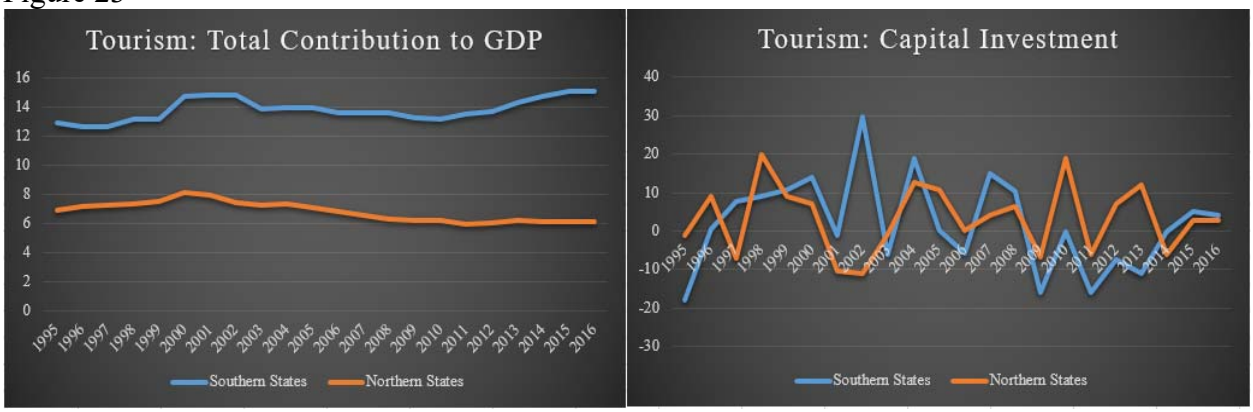

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Figure 24

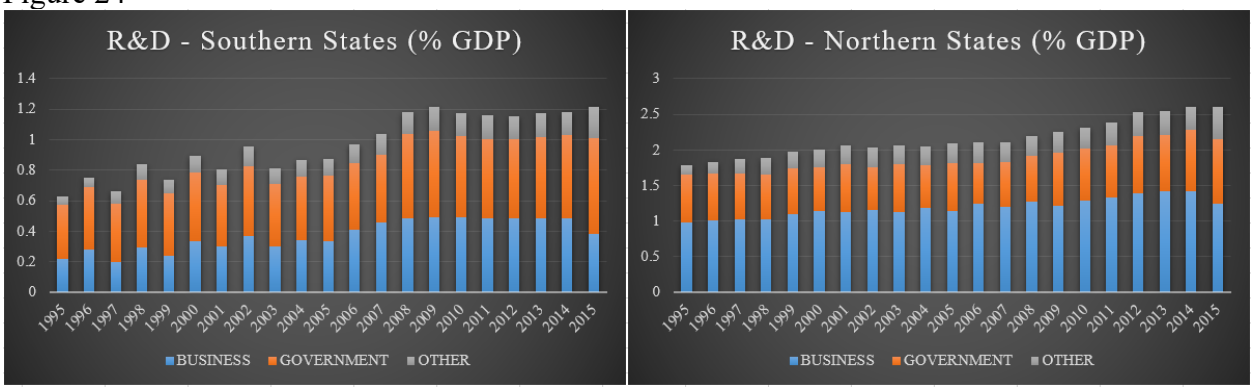

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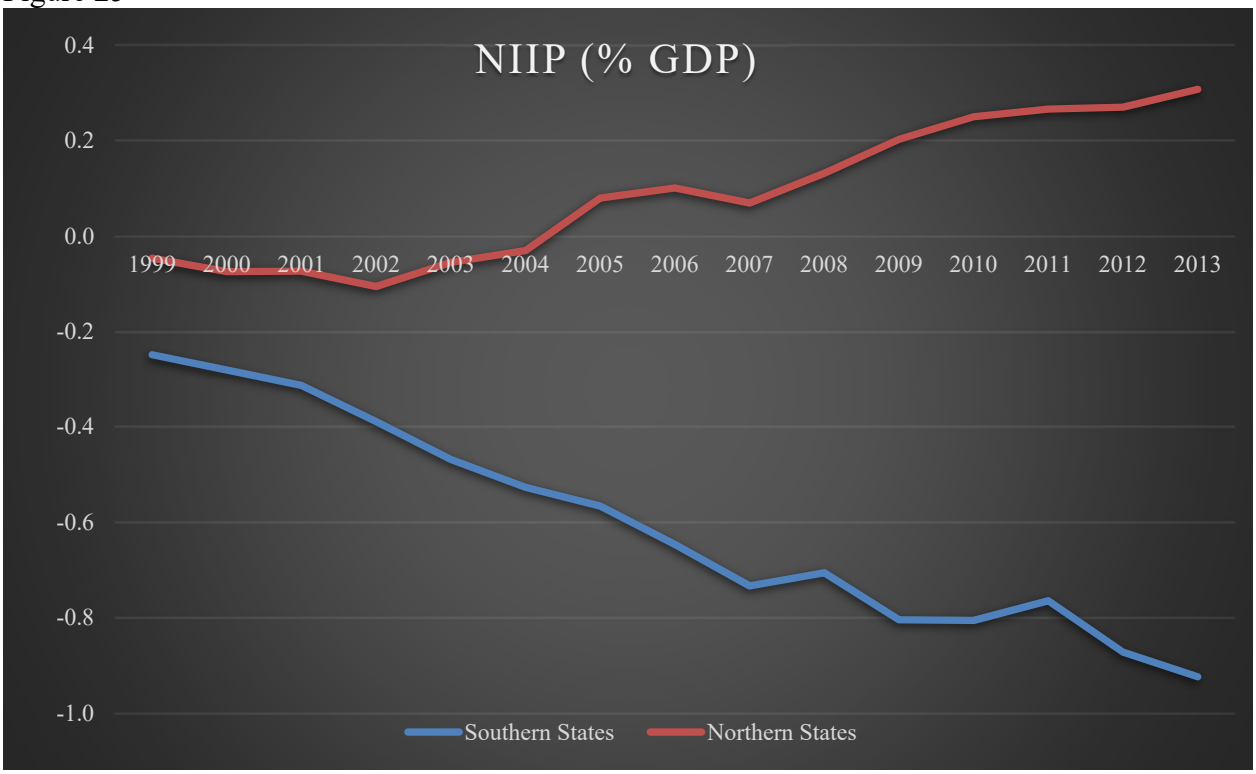
Figure 25



Data: OECD; Graph: Author.

Table 2 – Correlation between EZ Sovereign Yields (monthly data, 2014-2016)

	AUS	BELG	CYP	GMN	SPA	FIN	FRA	GRE	IRL	ITA	LITH	LUX	LATV	MALT	NDT	PORT	SLV	SLK
AUS	1.00																	
BELG	0.99	1.00																
CYPR	0.55	0.58	1.00															
GMN	0.99	0.99	0.61	1.00														
SPA	0.98	0.99	0.55	0.97	1.00													
FIN	0.99	0.99	0.57	0.99	0.98	1.00												
FRA	1.00	1.00	0.59	1.00	0.99	0.99	1.00											
GRE	-0.48	-0.46	-0.35	-0.45	-0.44	-0.49	-0.46	1.00										
IRL	0.98	0.99	0.64	0.98	0.99	0.98	0.99	-0.47	1.00									
ITA	0.97	0.98	0.63	0.97	0.98	0.96	0.98	-0.51	0.99	1.00								
LITH	0.95	0.95	0.67	0.95	0.94	0.96	0.95	-0.60	0.96	0.94	1.00							
LUX	0.96	0.98	0.65	0.96	0.97	0.97	0.97	-0.51	0.98	0.98	0.96	1.00						
LATV	0.97	0.97	0.70	0.97	0.96	0.97	0.97	-0.57	0.97	0.97	0.98	0.97	1.00					
MALT	0.96	0.96	0.75	0.97	0.94	0.96	0.96	-0.49	0.97	0.96	0.96	0.95	0.98	1.00				
NDT	1.00	0.99	0.58	1.00	0.98	0.99	1.00	-0.47	0.99	0.97	0.95	0.96	0.97	0.96	1.00			
PORT	0.70	0.74	0.32	0.67	0.78	0.70	0.72	-0.56	0.76	0.80	0.72	0.80	0.73	0.64	0.69	1.00		
SLV	0.98	0.98	0.61	0.97	0.99	0.97	0.98	-0.49	0.98	0.98	0.96	0.97	0.98	0.96	0.97	0.77	1.00	
SLK	0.94	0.95	0.70	0.94	0.93	0.94	0.94	-0.53	0.96	0.96	0.93	0.95	0.95	0.96	0.95	0.69	0.93	1.00

Data: ECB; Graph: Author.

Table 5 – Evolution of National Rates

Debt Mutualized	**Austria**	**Belgium**	**Cyprus**	**Germany**	**Spain**	**Finland**	**France**	**Greece**	**Ireland**
5%	0.91%	1.06%	5.07%	0.60%	2.05%	0.88%	1.03%	8.76%	1.51%
10%	0.71%	0.72%	4.95%	0.60%	1.77%	0.71%	0.82%	8.85%	1.20%
15%	0.70%	0.70%	4.83%	0.60%	1.46%	0.70%	0.82%	8.95%	0.85%
20%	0.70%	0.70%	4.68%	0.60%	1.10%	0.70%	0.83%	9.06%	0.83%
25%	0.70%	0.70%	4.51%	0.60%	1.09%	0.70%	0.83%	9.19%	0.83%
30%	0.70%	0.70%	4.32%	0.60%	1.12%	0.70%	0.83%	9.33%	0.83%
35%	0.70%	0.70%	4.10%	0.60%	1.14%	0.70%	0.83%	9.49%	0.83%
40%	0.70%	0.70%	3.84%	0.60%	1.16%	0.70%	0.83%	9.68%	0.83%
45%	0.70%	0.70%	3.53%	0.60%	1.19%	0.70%	0.83%	9.90%	0.83%
50%	0.70%	0.70%	3.15%	0.60%	1.23%	0.70%	0.83%	10.16%	0.83%
55%	0.70%	0.70%	2.69%	0.60%	1.26%	0.70%	0.82%	10.48%	0.82%
60%	0.70%	0.70%	2.12%	0.60%	1.31%	0.70%	0.81%	10.88%	0.81%
Debt Mutualized	**Italy**	**Lithuania**	**Luxemb.**	**Latvia**	**Malta**	**Netherl.**	**Portugal**	**Slovenia**	**Slovakia**
5%	2.04%	1.77%	0.70%	1.37%	1.71%	0.84%	3.09%	2.11%	1.18%
10%	1.72%	1.45%	0.70%	1.05%	1.39%	0.70%	2.77%	1.79%	0.86%
15%	1.40%	1.13%	0.70%	0.80%	1.07%	0.70%	2.45%	1.47%	0.80%
20%	1.08%	0.81%	0.70%	0.80%	0.80%	0.70%	2.13%	1.15%	0.80%
25%	1.00%	0.80%	0.70%	0.80%	0.80%	0.70%	1.81%	0.83%	0.80%
30%	1.00%	0.80%	0.70%	0.80%	0.80%	0.70%	1.49%	0.80%	0.80%
35%	1.00%	0.80%	0.70%	0.80%	0.80%	0.70%	1.17%	0.80%	0.80%
40%	1.00%	0.80%	0.70%	0.80%	0.80%	0.70%	1.00%	0.80%	0.80%
45%	1.00%	0.80%	0.70%	0.80%	0.80%	0.70%	1.00%	0.80%	0.80%
50%	1.00%	0.80%	0.70%	0.80%	0.80%	0.70%	1.00%	0.80%	0.80%
55%	1.00%	0.80%	0.70%	0.80%	0.80%	0.70%	1.00%	0.80%	0.80%
60%	1.00%	0.80%	0.70%	0.80%	0.80%	0.70%	1.00%	0.80%	0.80%

Table 6 – Annual Cumulative Difference in Interest Spending

X%	Transition (Mill €)	Steady State (Mill €)
5%	3222	-130
10%	5572	2643
15%	6488	4391
20%	7498	6061
25%	7627	6475
30%	7534	6578
35%	7449	6671
40%	7755	6698
45%	7530	6649
50%	7294	6583
55%	7040	6495
60%	6759	6382

All values expressed in 2015 euros.

Table 8 – Annual Difference in Interest Spending, Steady State (Million, euros)

X%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%
Austria	1	80	80	80	78	75	73	69	66	62	57	53
Belgium	-1	198	207	207	205	202	199	195	191	186	181	175
Cyprus	0	8	16	25	33	41	50	58	67	76	85	94
Germany	-1	-7	-36	-72	-110	-152	-199	-250	-304	-362	-422	-485
Spain	0	491	982	1473	1505	1505	1506	1506	1506	1506	1507	1507
Finland	1	33	33	32	31	30	28	26	24	21	18	16
France	3	627	628	629	629	630	630	630	630	630	630	629
Greece	-79	-17	44	103	159	212	261	305	343	372	390	393
Ireland	4	96	186	193	193	193	193	193	193	193	192	192
Italy	-57	904	1891	2909	3152	3136	3119	3100	3078	3054	3025	2990
Lithuania	2	10	17	23	23	23	23	23	23	23	23	22
Luxemb.	0	0	0	0	-1	-1	-1	-1	-1	-2	-2	-2
Latvia	1	5	8	8	8	8	8	8	8	8	7	7
Malta	0	3	5	7	7	7	7	7	7	7	7	7
Netherl.	4	88	87	86	82	78	72	66	58	50	42	32
Portugal	-10	88	189	291	397	505	618	678	676	674	671	668
Slovenia	1	16	31	45	59	60	60	60	60	60	60	60
Slovakia	2	20	24	24	24	24	24	24	24	24	24	23
Total EZ	-130	2643	4391	6061	6475	6578	6671	6698	6649	6583	6495	6382

All values expressed in 2015 euros.

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