# Essays on Credit Rating Agencies and the Assessment of Sovereign Risk

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vorgelegt von

Bernhard Bartels, Magister Artium

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# 1 Introduction

The rating industry was born in the beginning of the 20th century resulting from the increasing use of bond markets by (initially) railroad companies and governments. At the time, investment banks and credit-reporting agencies were engaged as intermediaries between issuers and investors. Credit quality was mainly assessed by the use of personal relations among creditors (for instance by recommendation letters) or qualitative analyses (rating reports consisting of financial and operating statistics) (Sylla (2002)). In consequence of the increasing bond market, Moody's and Poor's introduced a more convenient quantitative measure by providing a letter-based rating. Later on, the breakdown of the Bretton Woods System led to the introduction of free-floating exchange rates and opening capital markets. Investors began to look for international investment projects and contributed to an ever increasing importance of the rating agencies who offered them an easily comparable measure of credit risk for various asset classes on a global level. In line with this development, regulatory authorities began to incorporate the ratings into regulation (Sylla (2002)).
Since then, a handful of credit rating agencies rate bond and security issues on a global level: In its Annual Report to Congress in December 2013, the SEC (U.S. Securities and Exchange Commission) stated that Standard & Poor's (S&P) alone had 1,143,300 ratings outstanding in the previous year being followed by Moody's (923,000) and Fitch (350,000). Thereby, the so called "Big Three" have accounted for 96.5% of all outstanding ratings in 2012 (SEC (2013)). This said, one should keep in mind that the overall dollar amounts of issuance - in particular on the market for structured finance products - collapsed dramatically after 2006 (the volume of Asset Backed Securities only in the United States dropped from a high of USD900 bn. in 2006 to USD200 bn. in 2011 (SEC (2012))).

Given their importance, the same three agencies have been exposed to a barrage of criticism, especially since the outbreak of the financial crisis in 2007. Policy-makers and public observers have called into question whether rating changes have been assigned in a timely, accurate and transparent fashion. Also, academics have paid particular attention to the role and behavior of the agencies: In particular, the industry has been accused

of insufficient competition and conflicts of interest (Eijffinger (2012)). Others blame the agencies for being subject to a home bias and for a pro-cyclical amplification of crises (Fuchs and Gehring (2013), Ferri *et al.* (1999), Gaertner *et al.* (2011)). The U.S. government and the EU Commission have responded to the criticism by rearranging regulatory frameworks and by trying to set more incentives for competition among agencies and thereby reducing the overall reliance on ratings (see chapter six for details).

However, the rating industry is linked to more fields of economic research than currently discussed. Aside from the recent academic response to the financial crisis, rating agencies have been in the focus of economists for many years. The major areas of economic research on credit rating agencies (CRAs) are presented below.

To begin with, their role as information intermediary between issuers and investors has often been studied in microeconomic theory. Specifically, the main proponents ask whether CRAs increase general economic welfare by reducing asymmetric information. The bulk of literature argues that an intermediary supports the flow of information by serving as a "focal point" and even without the need of providing any new information for investors (Boot *et al.* (2006), Parlour and Rajan (2014)). Contrary to their argument, Donaldson and Piacentino (2014) claim that the mechanistic use of (precise) credit ratings leads to less risk-sharing and therefore to a welfare loss among investors and fund managers because the latter will provide less insurance in the contract. The idea behind is that an investor (principal) delegates his funds to an asset manager (agent) who invests those funds in a certain project. If the projects are rated, the asset manager writes a contract with the pay-off being contingent on a later assigned credit rating instead of providing insurance. Thereby, the risk is redirected to the investor. Hence, the authors suggest that rating agencies should at least publish less accurate ratings in order to incentivize asset managers to provide loss insurance.

The same strand of literature has paid particular attention to the question which types of contracts between the different parties (and the government) may be welfare-enhancing for society, i.e. help to reduce conflicts of interest. The issues most widely discussed are whether investors or issuers should pay the agencies (Bolton *et al.* (2012), Jiang *et al.* (2012)) and which kind of regulation should be applied (Opp *et al.* (2013)). Also, au-

thors discuss the role of switching analysts between issuers and rating agencies ("revolving doors") (Bar-Isaac and Shapiro (2011)). In general, the majority of studies supports the view that the CRAs contribute to social welfare, however, at the same time they are critical of the current institutional setup.

Apart from the microeconomic focus, the credit rating industry is linked to the economics of industrial organization. The fact that only three large agencies have rated more than 90% of the world's issuers for now more than 80 years led to a series of research papers on potential market failure due to the oligopolistic market structure (Leland and Pyle (1977), White (2010), Mathis *et al.* (2009)). However, it is widely debated whether the oligopolistic market structure is a consequence of regulation (White (2010)), past reputation gains (Covitz and Harrison (2003)) or the issuer-pays structure (Bolton *et al.* (2012)). Other authors claim that increasing competition even leads to less efficient outcomes due to rating inflation and rating shopping behavior (Mathis *et al.* (2009), Bolton *et al.* (2012)) when agencies assign better ratings in exchange for a higher rating fee.

More recently, the rating industry has also attracted financial economists' attention. The latest studies seek to explore the contribution of rating agencies to the outbreak of the financial crisis (Opp *et al.* (2013), Kisgen and Strahan (2010), Ghent *et al.* (2014)). Other strands of the literature have tested the importance of ratings for a firm's cost of capital, the capital structure or the lending and investment activity of (financial) firms (Bruno *et al.* (2013) among others). Beyond that, the literature studies the relative performance of rating agencies in the corporate and financial sector. Performance is measured by comparing timeliness and anticipation of defaults (Hill and Faff (2010), Güttler and Wahrenburg (2007)) or by looking at the response to rating changes by investors and by a comparison of abnormal returns for the clients (Bruno *et al.* (2013)).

In this thesis, the major focus is on sovereign ratings. Apart from their impact on financial and non-financial firms, sovereign ratings are often at the top when CRAs create ratings for banks and other resident corporate issuers.[1] Also, sovereign rating changes receive critical attention by the media and by government officials of affected countries. Not least the sovereign debt crisis in Southern Europe has revived the debate on the

[1] Please refer to chapter 3 for details.

adequacy and timing of sovereign credit ratings when the peripheral members of the euro area were confronted with a series of downgrades (de Haan and Amtenbrink (2011)). Also, empirical studies claim that refinancing costs of governments are often affected by changes in the foreign currency rating (Hand *et al.* (1992), Afonso *et al.* (2012)). Finally, the rating decision on a sovereign is often shown to have repercussions on the creditworthiness of firms, regional states and local municipalities within the country and neighbors with strong economic or political ties to the affected country (Borensztein *et al.* (2013), Adelino and Ferreira (2014)).

This thesis begins with a summary of the literature on misleading incentives within the rating industry in chapter two. Following, I provide a review of the literature on determinants and the impact of sovereign ratings in particular. The fourth chapter explores the link between public debt and sovereign ratings. In chapter five, I test different explanations for disagreement towards sovereign creditworthiness. In the final part, I review the recently adopted reforms for the rating industry and discuss potential amendments.

Chapter two deals with misleading incentives in the rating industry. Against the background that the measurement of rating agency performance is only possible with a sufficiently long history of default in a particular asset class, it is challenging to put criticism against rating agencies on solid ground. However, the collapse of the market for structured finance products has led to a series of publications with a strong focus on rating agency performance. In this chapter, I provide a systematic summary of the mentioned flaws within the rating industry. The major finding is that potential flaws in the rating industry primarily refer to the rating market for structured finance products - and not to sovereign ratings - due to their complexity and high fees.

Chapter three is subdivided into three parts. It first gives an overview of the major raters of sovereign risk and their used methodology. In the second part, the literature on the importance of sovereign ratings for financial markets is presented. Finally, I review the impact of ratings on the real sector.
The main findings can be summarized as follows: Sovereign ratings have a crucial influence on financial markets and the real sector alike. The impact on financial markets is shown to be quite robust in the long-term and more disputed in the short-term. The literature

provides further evidence to suggest that the effects on the real sector are partly driven by self-imposed regulation of rating agencies (besides other factors such as access to foreign capital or a higher future tax burden).

Chapter four (co-authored work with Constantin Weiser) studies the relative importance of sovereign debt for a country's credit rating. Here, we use the Institutional Investor's Country Credit Rating (CCR) which is based on semi-annual surveys among major sovereign bondholders. We distinguish between three country groups: industrialized vs. emerging market countries, highly-indebted industrialized countries vs. other industrialized countries and members of the euro area vs. other industrialized countries. The empirical analysis is linked to previous research across the three country groups: Reinhart *et al.* (2003) find that as a consequence of structural weaknesses and a history of defaults industrialized countries are less vulnerable to surges in foreign debt than emerging markets and developing countries ("debt intolerance"). In this chapter, we test their result by employing Panel GMM and difference OLS methods. Our second group comparison builds on the findings by Ghosh *et al.* (2013) who show that industrialized countries with a high level of public debt are more likely to experience a high deficit in times of an economic slowdown which in turn leads them to suddenly reach a debt limit when public finances become unsustainable. We test whether sovereign ratings mirror these developments. The third group comparison is motivated by studies which find differences in sovereign creditworthiness for members of a currency union compared to countries with an independent national monetary authority. Here, the authors find that euro area members have suffered from a decline in creditworthiness (since the outbreak of the crisis) which cannot be fully explained by economic fundamentals (Gaertner *et al.* (2011), Dell'Erba *et al.* (2013)). In this chapter, we study whether this result is confirmed when we use differences instead of levels.

For the first group comparison, we find no significant difference in the reaction of ratings to changes in public debt between industrialized and emerging markets. We even observe a rating penalty for advanced countries when we control for the ability to issue debt in the domestic currency. For the second group comparison, our results reveal that countries with high deficits and high levels of public debt at the same time are subject to an additional

rating penalty. Our findings for members of the euro area suggest that sovereigns in the euro periphery benefited from the common currency until 2008 but experienced stronger downgrades than other countries (core economies and other advanced countries) during the crisis (controlling for other fundamentals).

Chapter five addresses the disagreement among four rating agencies towards sovereign risk. We test whether disagreement is determined by specific fundamentals, regions or by the type of rating agency (issuer- versus investor-paid). At first sight, this seems to be a difficult task since sovereign ratings often remain constant for a long period of time (especially in advanced economies) and sovereign default rates are low compared to corporate defaults. Besides few exceptions, as for instance Alsakka and ap Gwilym (2010) the literature only provides evidence for disagreement towards corporate issuers (see for instance Güttler and Wahrenburg (2007)). However, our descriptive data show that disagreement on sovereign ratings is more pronounced than one might assume. Specifically, we find that a small European rating agency (called Feri) disagrees with the Big Three in almost every second case (average country-year observation). Add to this, the Big Three agencies have often been accused of pro-cyclical downgrades and a tendency to assign the same rating to an issuer as their competitor (Ferri *et al.* (1999), Beck and Wienert (2010)). Thus, sovereign ratings are far from being non-controversial.
In this chapter, I first examine whether a rating agency rates particular regions better than others (controlling for other political and macroeconomic determinants). Next, I test whether the propensity to downgrade a country's rating significantly increases when a competitor has assigned a previous downgrade. Here, I control for other explanations such as publicly observable changes in creditworthiness during the previous months.
I find that Feri seems to put more weight on short-term variables than the Big Three. This observation can also explain why I observe a higher frequency of rating changes in the case of Feri relative to the Big Three. I do not find significant effects for the agencies assigning different ratings to their residency. Also, the home country's language and the business model has no significant effect on split ratings. However, in the case of the Big Three I find that the propensity to downgrade a country's rating significantly increases if one of the other two has assigned a downgrade in the previous months. In contrast to this, Feri

seems to be more independent in its rating decisions.

Chapter six discusses three possible amendments to the current regulation of the rating industry: First, an auction process is proposed in order to prevent potential conflicts of interest when issuers pay raters. Second, I suggest to promote a more decentralized supply side and third, I introduce a centralized publication of ratings in order to mitigate pro-cyclical announcements. Thereby, a clear distinction is made between sovereigns ratings and the ratings for structured finance products. Whereas the first two amendments seem to be particular relevant for the ratings of structured finance products, I consider the centralized publication process to be a relevant policy option for sovereign ratings in order to mitigate pro-cyclicality.

# 2 Misleading Incentives in the Rating Industry

## 2.1 Introduction

In principle, the role of a credit rating agency (CRA) is to serve as an information intermediary between borrowers and lenders: It collects, aggregates and distributes information about the creditworthiness of countries, firms and structured products such as Mortgage Backed Securities (MBS) or Collateralized Debt Obligations (CDO). This information is used by financial markets to form decisions about buying or selling debt from the rated entities. Boot *et al.* (2006) show that CRAs are important for financial markets because they serve as "focal points" by simplifying and accelerating the flow of information from issuers to investors. Thus, the rating industry exerts a considerable influence: Numerous empirical studies have observed that CDS spreads and bond yields are often driven by their underlying ratings.[2]

And still, the rating industry is often criticized: CRAs have been blamed for reacting too late and too harsh in times of crisis (Reinhart (2002), Ferri *et al.* (1999)), for being subject to imperfect competition (Bolton *et al.* (2012), Eijffinger (2012)) and for having incentives to assign better ratings when they are paid by the rated entities (issuer-pays model) (Mathis *et al.* (2009)). Also, analysts have been suspected to be subject to conflict of interests when they are potential candidates to be hired by the rated firms, i.e. investment banks (Cornaggia *et al.* (2013)). Finally, the inclusion of ratings in regulatory frameworks may lead to a rating bias and pro-cyclical behavior of CRAs (Opp *et al.* (2013)). Thus, it seems that neither the maintenance of the status-quo nor the proposal to completely forbid the publication of ratings is a reasonable idea.

The chapter is organized as follows: Section two summarizes the literature which investigates whether the oligopolistic market structure contributes to less accurate ratings. Afterwards, I present the "Issuer-pays" model and its potential weaknesses before the fear of reputation loss for CRAs is discussed. Finally, I summarize the literature on "revolving doors" in the rating industry and show why the use of ratings in regulation may lead to rating agency failure.

[2] A detailed literature review on the impact of ratings on financial markets is provided in chapter 3.3.

## 2.2 The Oligopolistic Market Structure

With the beginning of the 20th century, the first credit rating agency was founded by John Moody. It was followed by Poor's Publishing Company, the Standard Statistics Company and Fitch Publishing Company (White (2010)) shortly afterwards. Since then, the three agencies have controlled the market for ratings across all rated products and across all countries in the world. Despite a number of mergers and a shift of market shares between the so called "Big Three", more than 90% of the market is supplied by Standard & Poor's, Moody's and Fitch Ratings to the present day.

White (2010) mentions two natural entry barriers for potential competitors, namely economies of scale and reputation. Economies of scale emerge when a rating agency is established in a certain industry due to past acquisition of expertise. For this agency, the marginal cost of rating an additional firm in a specific sector should be lower than for competing newcomers with no experience in this particular area (Leland and Pyle (1977)). Also reputation prevents competition because investors are interested in reliable information. Consequently, they will choose those ratings that have a long-standing history. This makes it difficult for a newcomer with no opportunity of building up a reputation beforehand to enter the market.

With the beginning of the 21st century, the amount and complexity of rated products has increased strongly due to the emergence of structured finance products. Pagano and Volpin (2010) show that the issuance of MBS and CDO products has risen tenfold between 2001 and 2006. At the same time the number of rating companies and their staff remained almost constant (White (2010), Bar-Isaac and Shapiro (2011)). Not only did the established agencies retain their market shares but were able to expand their business activities simultaneously when they started to rate complex securities.

In principle, one can argue that a lack of competition does not necessarily lead to eroding rating quality as long as the agencies' behavior is driven by reputation. As soon as one agency starts to publish inaccurate assessments, it should lose its reputation and make lower profits when investors decide under rational expectations (Opp *et al.* (2013)). However, we will show in the following that other features of the current regulation prevent

the reputation channel to work properly in some cases.

## 2.3 The "Issuer-pays" Model

In the 1970s, the rating industry insisted on a change of its compensation structure. At the time, CRAs were striving for an alternative to the investor-pays model since they feared a decline in the willingness to pay on the side of investors. This anxiety was grounded in the increased availability of photocopy machines leading to an easier distribution of ratings and consequently to free-riding behavior (Jiang *et al.* (2012)). In addition, investors cannot observe the true value of the bought information (future performance of the asset/firm). This leads to the so called "lemon" problem, when the market is dominated by those agencies which offer poor information to investors. The latter have no possibility to identify the high-quality rating agency because they are not able to assess the provided information ex ante. Hence, they pay an average price for ratings. In this case firms offering high quality information do not receive adequate compensation and leave the market. Thus, rating quality will erode and finally the market collapses (Leland and Pyle (1977)).

The introduction of the issuer-pays model has led to other incentive problems, namely conflicts of interest for credit rating agencies. Mathis *et al.* (2009) find that CRAs inflate ratings when they face competition. This result has been confirmed by numerous studies: For instance, Jiang *et al.* (2012) observe that ratings are higher when an agency is paid by issuers compared to another agency that receives rating fees from the investor's side. Hau *et al.* (2013) study the determinants of bank ratings and find that better ratings are assigned to those banks that are potential customers for ancillary services (i.e. ratings for securities or structured products). In a theoretical framework, Bolton *et al.* (2012) show that rating inflation increases with the fraction of naive investors and low reputation risk. Finally, Skreta and Veldkamp (2009) find that firms begin to shop for ratings, when assets are sufficiently complex. Rating shopping occurs when bond issuers observe multiple ratings and choose the most favorable. Both phenomena - rating inflation and rating shopping - are the unintended consequence of the issuer-pays model in which the rating agency is economically dependent on the issuers.

In their empirical work Becker and Milbourn (2011) show that more competition does

not improve ratings when the issuer pays the rating agency. On the contrary, they find that the increasing market share by Fitch Ratings in the previous decade has led to even more rating shopping and rating inflation. This result has been confirmed by Bolton *et al.* (2012): The authors claim that incentives for rating shopping will only come up when more than one CRA exists because then firms have the possibility to choose the most favorable rating. From the perspective of social welfare, it would hence be more desirable for investors and issuers to have a monopolistic structure rather than free market competition (Bolton *et al.* (2012)). Thus, it seems that not insufficient competition is the foremost problem in the industry but a misleading incentive structure.

## 2.4 No Fear of Reputation Loss

As mentioned before, the fear of losing reputation should prevent rating agencies from inflating their ratings. If one CRA decides to assign better ratings without an observable decrease in credit risk, it has to take into account the future reputation loss when these issuers declare bankruptcy. Covitz and Harrison (2003) find that reputation concerns have indeed driven rating agency behavior: For a sample of corporate bond ratings from 1997-2002, they find no evidence for a delay of rating changes behind the market when controlling for the size of a firm or the downgrade from investment grade to speculative grade ("fallen angel").

However, Mathis *et al.* (2009) find that reputation loss plays a minor role when it comes to structured finance products. In their model, the authors show that rating agencies have strong incentives to use reputation gains from the past to inflate ratings. This leads ultimately to default. After a loss in confidence and a collapse of issuance, the cycle starts again. The result coincides with the findings of Bar-Isaac and Shapiro (2013): They consider reputation to be endogenously driven by business cycle developments. This leads rating agencies to publish less accurate ratings in boom periods than during recessions.

Empirical studies confirm the above results: Whereas Covitz and Harrison (2003) did not consider the emergence of structured products during the past ten years, more recent studies show that rating inflation is a rather young phenomenon, which is mainly observed on the market for sub-prime mortgage backed securities (MBS) (Ashcraft *et al.* (2011),

(Stanton and Wallace, 2010)). Bolton *et al.* (2012) point out that CRAs care even less about their reputation in the case of high entry barriers and when the issuer-pays model is used. This is in line with the findings of Goodhart (2009): The author claims that reputation is predominantly an issue on the market for structured finance products for two reasons: First, it is considered as a new business with high profit margins and second, the product is often rated by only one or two agencies (which are potentially subject to rating inflation/ rating shopping).

To sum up, it seems as if rating agencies took care of reputation in the past, but had less incentives to do so when they began to rate structured finance products. This seems to be a consequence of the increased opacity of bonds (uncertainty about underlying loans) and the higher profit margins.

## 2.5 The "Revolving Door"

When it comes to structured finance products, rating analysts may also be subject to conflicts of interest when the issuer of a rated product is potentially offering a more attractive contract to the analyst. Before the outset of the recent financial crisis, investment banks have often hired credit analysts from the rating agencies which were not able to offer a competitive salary (Bar-Isaac and Shapiro (2011)). If issuers are profitable enough to hire the best analysts, CRAs would be left with a lower quality of staff and they have less incentives to invest in training when the probability of losing the analyst increases. On the other hand, the analyst has more incentives to provide accurate ratings as a junior when trying to attract the attention of potential employers. Thus, Bar-Isaac and Shapiro (2011) conclude that the problem of eroding rating quality arises especially in boom phases when investment banks have more vacancies than during recessions.

When studying the revolving door effects on credit analysts, Cornaggia *et al.* (2013) find that rating agencies with a transitioning employee (the one using the revolving door) assigned better ratings to their new employer than non-transitioning analysts of competing agencies. They conclude that revolving door effects have an impact on credit ratings. Using a sample of 114 transitions, the authors find that issuers hire analysts from harsher CRAs, but that the rating differences to competitors is shrinking prior to the recruitment.

Again, it seems that this potential conflict of interest appeared primarily on the market for structured finance products before the recent crisis when incentives to earn higher salaries at an investment bank led to frequent job rotation (Bar-Isaac and Shapiro (2011). There is no good case to believe that the same effect holds when it comes to sovereign or corporate entities where rating fees are much smaller (or not even paid in the case of unsolicited ratings).

## 2.6 The Regulatory Inclusion

In the 1970s, the Securities and Exchange Commission (SEC) started to restrict the entry of new rating agencies by certifying only the Big Three as National Recognized Statistical Rating Organizations (NRSROs). During the subsequent 25 years, four other firms have received this status (White (2010)). The registration as a certified CRA is of major importance because only the ratings of NRSROs can be used for regulatory purposes (de Haan and Amtenbrink (2011)). In the previous decade, the U.S. Congress has responded to the restricted access for potential NRSROs by changing the statutes of the SEC in order to allow for more transparency (U.S. Government (2006)). Still, the dominance of the Big Three has not been touched considerably. If anything, the regulatory inclusion reinforced the dominant market position of the Big Three with their ratings having a rules-based influence on market participants (White (2010)). A similar regulation can be observed in Europe: Here, the requirements for equity capital ratios are also based on the ratings of certified agencies.[3] If a rating is downgraded to speculative grade status, pension funds and other institutional investors may short-sell funds in order to keep the share of risky assets in their portfolio according to internal or external risk management approaches. This may trigger fire sales leading to pro-cyclical developments and further downgrades (Purda (2011)).

Added to the pro-cyclical amplification and competition effects of ratings' inclusion into regulation, Opp *et al.* (2013) show that rating inflation may also be a consequence of their inclusion into regulation: In contrast to Bolton *et al.* (2012) they assume that

[3]The banking regulation of Basel II allows bank to choose between the standardized approach or the basis of the internal ratings based approach. When using the latter, banks are not required to use external ratings.

investors have rational expectations and anticipate rating inflation by the agencies. In their model, an increase in the rating from junk status to investment grade (defined as the regulatory advantage) diminishes incentives for CRAs to acquire costly information about the issuer's credit quality. Investors do not scrutinize inflated ratings because they also benefit from the regulatory advantage by the opportunity to acquire investment grade bonds. Irrespective of the true underlyling credit risk, the investor may use the opportunity to have a more diversified portfolio without additional capital requirements. This effect is especially pronounced for products with high information costs (i.e. CDOs, MBS). Kisgen and Strahan (2010) confirmed the theoretical result when they observed that the certification of a fourth rating agency, namely the Canadian rating agency "Dominion Bond Rating Services" (DBRS) led to a significant reduction of yields for those firms that received better ratings by DBRS than by the Big Three. The effect is stronger when firms are near to the investment-grade cut off towards junk status. However, when DBRS assigned a lower rating than other NRSROs, the authors found no change in the bond yields of the respective firm. It seems that investors only wait for one NRSRO to publish an investment-grade rating before starting to buy the respective asset.

## 2.7 Concluding Remarks

This chapter has summarized the literature on potential market failures in the rating industry due to misleading incentives. Two results are worth highlighting in the context of this thesis: First, the potential flaws seem to be linked with each other: For instance, the issuer-pays problem would be less severe if the fear of reputation loss determined the behavior of rating agencies. Also, the use of ratings in regulation creates an additional market entry barrier for newcomers which may further undermine the fear of reputation loss.

Second, the described flaws do not uniformly apply to the various asset classes: It seems that especially structured finance products have been subject to most of the incentive problems due to the fact that these products are especially complex and provided high profit margins. As opposed to this, corporate and sovereign issuers appear to be more transparent in terms of information availability and provide less incentives for "revolving

doors" and rating inflation- or rating shopping-behavior due to lower rating fees. Thus, a potential future regulation should focus primarily on the issuers and raters of structured finance products. A detailed review of the new regulation and remaining challenges - especially with regards to the inter-linkage of the aforementioned flaws - is provided in chapter six.

Although sovereign ratings are obviously less affected by the issuer-pays problem and "revolving doors", the Big Three agencies have often been criticized for being subject to a home bias. Also, their ratings are used in regulation which may lead to spillovers across rating agencies in the case of downgrades. In chapter five, I will discuss these issues in more detail by studying the determinants of sovereign rating disagreement across credit rating agencies.

The following three chapters deal specifically with sovereign risk. To begin with, I provide a rationale why sovereign ratings play in important role not only for the respective governments but also for financial markets and the real sector of an economy.

# 3 Determinants and Impact of Sovereign Ratings

## 3.1 Introduction

It seems impossible to imagine financial markets without the rating industry: By providing quality signals for traded bonds and securities, they not only give direction to the buying decision of investors but they also influence firm behavior by monitoring (and sanctioning) performance. If a rating agency expects a firm's credit quality to deteriorate, it may exert pressure on the management to change its strategy in order to prevent a downgrade (by imposing a credit watch or negative outlook). Moreover, regulatory authorities have distributed additional competencies to the rating industry by including the ratings of certified agencies into regulatory frameworks. Thereby, institutional investors may not be willing but are sometimes required to sell certain assets when rating decisions trigger a binding regulatory provision (for instance, pension funds may only hold a fixed share of speculative grade bonds). Facing the influence of CRAs through regulatory inclusion, White (2010) concludes that rating agencies have "*attained the force of law*". Taken together, the rating industry has an undisputed impact on the decisions of issuers and investors.

Despite the fact that observers agree on the rating industry's influence, it is still widely debated whether rating decisions add value in providing new information to financial markets which is not already reflected in market prices (bond yield spreads, CDS spreads, stock market indices or exchange rates). In other words, CRAs are influential but they do not necessarily contribute to an efficient matching between issuer and investor. In particular, during times of crises the rating industry has been accused of being responsible for delayed downgrades which led to pro-cyclical amplifications of recessions.

Apart from this, the literature has also discussed the range of rating decisions by exploring potential spillover effects to other countries. For example, the European sovereign debt crisis has shown that a downgrade of one country quickly led to rising yield spreads in other member states of the currency union. The same phenomenon has already been discussed during the Asian Crisis in the 1990s when CRAs were blamed for having aggravated the economic situation by being overly conservative (Ferri *et al.* (1999)). The literature

also emphasizes the fact that regulatory provisions may even amplify a potentially wrong decision by inducing fire sales (Reisen (2002), Ellul *et al.* (2011)).

In this chapter, it is first explained what sovereign credit ratings are and how they are formed by the agencies. In this context, the thesis summarizes the literature on determinants of sovereign credit ratings in order to highlight the most prominent variables used by the agencies to form their decisions.

The second part of this chapter addresses the impact of rating decisions on the economy. Thereby, I distinguish between two types of influence: First, I explore the ratings' impact on sovereign interest rates, bond yield spreads and CDS spreads. Whereas it is not controversial that sovereign ratings are negatively correlated with market prices, it is more difficult to identify causation in either direction. Thus, one needs an empirical model accounting for omitted variable bias when ratings and markets respond to the same underlying fundamentals. Next, it is asked whether sovereign downgrades spill over to the real sector, for instance by affecting the bank lending channel, stock markets and corporate spreads. This question also requires the use of good instruments because both a rating downgrade and a decline in corporate risk are often driven by the same economic fundamentals. Thus, one has to account for potential endogeneity.

## 3.2 Determinants of Sovereign Credit Ratings

In general, sovereign credit ratings are supposed to "*pertain to a sovereign's ability and willingness to service financial obligations to non-official (in other words, commercial) creditors.*" (Standard and Poor's (2013)). This statement by Standard & Poor's is similar in kind across all Big Three rating agencies. However, each agency uses a different set of political and economic performance criteria to reflect the ability and willingness to service public debt.

First, they all agree on three key rating factors, namely the institutional and political stance, the economic strength, and public finances. Fitch Ratings and Standard & Poor's add an external score and S&P's alone also uses a monetary score. Moody's uses an event

Table 1: Empirical Literature on the Determinants of Sovereign Credit Ratings

| (1) Authors | (2) Sample | (3) Methodology | (4) Expl. variables |
|---|---|---|---|
| Cantor and Packer (1996) | 49 countries in Sep. 1995 | Cross-Section, OLS | GDP p.c (+), GDP growth (+), inflation (-), external debt (+), industrialized country (IMF definition) (+), default history (-)[4] |
| Haque *et al.* (1996) | 60 developing countries (1980-1993) | OLS with fixed effects | reserves to imports (+), current account balance (+), export structure, international interest rates (+) |
| Mulder and Montfort (2000) | 20 emerging markets (1995-1999) | Dynamic specification (error correction model) | crisis indicators (-), exports (+), real effective exchange rate (+) in the long-run, random walk in the short-term |
| Borio and Packer (2004) | 52 countries (1996-2003) | OLS with fixed/random effects | Original Sin (-), Currency Mismatch (-), Debt intolerance (-) |
| Butler and Fauver (2006) | 86 countries (2004) | Cross-Section, OLS | legal environment variables (political stability(+), rule of law (+), regulatory quality (+), corruption (-)) |
| Afonso *et al.* (2011) | 78-130 countries (1995-2005) | OLS with random effects + ordered probit | Gov. effectiveness (+), reserves (+), EU membership (+) |
| Celasun and Harms (2011) | 65 countries (1980-2005) | Panel GMM, OLS (with fixed effects) | private share of external debt (+) |

risk score which entails risk assessments in the financial, external, and political sector.[5] Second, the agencies emphasize that their ratings always consist of a quantitative and qualitative component. This said, it is not possible to only refer to the quantitative score models but one has to take into account that the agencies give ample scope for flexibility. Accordingly, broad literature on the determinants of sovereign credit ratings is available (see Table 1 for a summary of the main findings).
Third, the agencies distinguish between a local and a foreign currency rating whereby the former refers to debt issued in local currency and the latter to debt issuance in foreign currency.[6] In the following chapters, the thesis will always relate to the "foreign currency rating" when using the term "sovereign rating". Local currency ratings are of minor importance, especially in emerging markets where governments often do not even have the ability to issue bonds in domestic currency.

The first empirical study on determinants of sovereign credit ratings has been published by Cantor and Packer (1996). Their most important finding has been that most of the cross-country variation in rating levels can be explained by few macroeconomic factors.[7] Later studies have confirmed that GDP per capita, inflation, public debt and a country's default history remain among the most important determinants of ratings when expanding the sample size (across years and countries) and when exploiting within country variation. Building on these results, Mulder and Montfort (2000) conducted a panel analysis and showed that ratings also reveal a high degree of inertia and often follow a random walk apart from their reaction to structural factors. Besides, the authors emphasize that countries have been often downgraded during times of crisis when they performed below expectations. In line with Reinhart (2002) and Ferri *et al.* (1999), the authors claim that ratings decline when the real effective exchange rate depreciates although it is usually considered to be an indicator for external recovery whereas the real appreciation was meant to be an early warning signal for an upcoming crisis.

[5] For details, please refer to the most recent publications on the used methodologies by Standard and Poor's (2013), Moody's (2013), Fitch (2014).

[6] A third category of sovereign ratings refers to specific bonds which depart from the ordinary bond issued, for instance by the fact that they often entail a third-party guarantee in case of default (for instance the IMF, EU).

[7] A more confined review of the determinants of sovereign credit ratings will be provided in chapter 4 of this thesis.

On the contrary, Afonso *et al.* (2012) find that one year previous to default no such country has ever enjoyed an investment grade rating. Also Reinhart (2002) shows that rating agencies have done a much better job in predicting sovereign debt crises in emerging markets than in forecasting currency crises. The author claims that CRAs have ignored indicators of liquidity, currency misalignment, and asset price behavior. Still, lagged downgrades of emerging markets' ratings should not only be regarded as a late response but also as an anticipation of a sovereign default which often has been preceded by currency crises. Kaminsky and Schmukler (2002) find that the impact of ratings during crises on the Emerging Markets Bond Index spread (EMBI) is almost twice as large as in non-crisis periods. Also changes in outlook which have shown to be insignificant in tranquil times became significant in a crisis (see also Hill and Faff (2010)). Mora (2006) presents a different view by emphasizing the long-term orientation of CRAs which leads them to adjust a rating only when the difference between the estimated and the actual creditworthiness has become sufficiently large. For instance, the author shows that the rating of a country in default has often not even been rated as such. In line with the late reaction in a crisis, CRAs continue to assign relatively low ratings in the aftermath of crises. Mora (2006) considers this behavior to be an indication for rating agencies to serve merely as providers of long-term risk assessors than as predictors of crises.
The Big Three themselves have rejected the criticism of reacting too late during times of crisis by emphasizing their policy of providing stable assessments of future credit risk independent of business-cycle developments. For instance, Fitch Ratings uses a sovereign rating model which is stated to be "*a sovereign default model, which generates a predicted Long-Term IDR [Issuer Default Rating; note by the author] rather than a probability of default.*" (Fitch (2014)). Moody's also emphasizes that they give more importance to the long-term stability of a rating than to its short-term accuracy (Moody's (2006)).

In a more recent study by Afonso *et al.* (2011) the authors differentiate between short-term (contemporary) and long-term (3-year-average) determinants of ratings and find that either explain part of the variation across the Big Three. Whereas changes in GDP per capita, GDP growth, government debt and the fiscal balance are found to have a short-run impact, government effectiveness, external debt, foreign reserves and the default history

determine ratings in the long-run. Their models correctly predict the ratings of 40% of their sample and 75% of the up- and downgrades. Hence, the authors consider this a good model performance in the light of the agencies' statements to also use qualitative assessments and forecasting models for future economic performance.

Taken together, it seems that ratings are usually very stable for a long period of time which makes them at the same time rather weak indicators for an upcoming crisis (in terms of observing a previous downgrade). Also, most studies agree that ratings reflect the institutional and economic performance across countries quite well. Thus, it seems that on the one hand, ratings do not serve as a good short-term predictor of crises but on the other hand they are a well-performing tool to study sovereign risk differences across countries in the long-term. In the following, it is to be explored how much attention sovereign rating changes receive from markets.

## 3.3 The Impact of Sovereign Ratings on Financial Markets

Empirical studies on the relationship between sovereign ratings and financial market variables are generally motivated by two separate questions: One strand of the literature asks whether the markets or the rating agencies are better informed about the underlying credit risk of sovereigns or the other way around (see for instance Cavallo *et al.* (2013)). Others put emphasis on the question whether sovereign rating assignments have spillover effects on financial market variables of related sovereign entities (Gande and Parsley (2005)). This issue has recently attracted even more attention with globalization having led to enhanced integration, especially regarding financial and capital flows. International portfolios and investment strategies thus depend on adequate information regarding the range and coverage of a rating (for instance, how much importance is given to idiosyncratic components relative to (international) market conditions).

Empirical evidence with respect to the question of causality is mixed: First, the majority of studies finds that causality runs in both directions (see Table 2). It appears that CRAs often lag behind markets during times of crisis (in particular the Asian crisis and the European sovereign debt crisis). Nevertheless, the rating actions (although appearing often late) still lead to abnormal returns of sovereign CDS spreads and bond yield spreads:

Table 2: Empirical Literature on the Impact of Ratings on Sovereign Bond Markets

| (1) Authors | (2) Dep. Variables | (3) Sample | (4) Methodology | (5) Results |
|---|---|---|---|---|
| Cantor and Packer (1996) | relative sovereign dollar yield spreads | 79 announcements (1987-94) | Event Study | Bi-directional |
| Reisen and Von Maltzan (1999) | relative sovereign dollar yield spreads | 152 announcements (1989-97) | Event Study & Granger test | Bi-directional |
| Kaminsky and Schmukler (2002) | EMBI spreads, yield spreads | 16 emerging markets & 103 announcements (1990-2000) | Panel & Event study | Spillover effects & bi-directional |
| Gande and Parsley (2005) | Sovereign yield spreads of other countries | 155 rating events in 34 countries (1991-2000) | Event Study | Spillover effects in the case of DG |
| Kräussl (2005) | emerging markets interest rates (among others) | 302 rating events in 28 countries (1997-2000) | Event Study | Significant effects of DG on spreads |
| Ismailescu and Kazemi (2010) | CDS spreads | 161 rating events & 22 emerging markets (2001-2009) | Event Study | Spillover effects in the case of UG |
| Arezki *et al.* (2011) | CDS spreads, banking & insurance sub-indices | 71 announcements in European countries (2006-10) | VAR analysis | Spillover effects (mostly) in case of DG |
| Afonso *et al.* (2012) | Sovereign bond yields, CDS spreads and stock returns | 167-252 rating announcements in EU countries (1995-2010) | Event Study & Granger test | Bi-directional, spillover effects (stronger for DG) |

Cavallo *et al.* (2013) show that they do contain new information for markets. Also Afonso *et al.* (2012) find that rating announcements in the EU have been anticipated 1-2 weeks before the event. In general, it remains difficult to assess the performance of CRAs with respect to sovereign ratings because of the limited number of sovereign defaults relative to corporate default rates. Therefore, most analyses of sovereign rating performance are restricted to crisis periods (with few or even no defaults on debt). Hill and Faff (2010) find that negative watch and outlook decisions have a large negative and significant effect on spreads prior and independent of the occurrence of a later crisis. However, the effect fails to be significant when only downgrades are considered and crisis periods are excluded.

The literature also concludes that the impact of negative announcements on markets has been stronger than that of positive assignments. Afonso *et al.* (2012) assume that this difference is driven by the loss aversion of investors or the fact that good news are often leaked by governments before the rating change occurs whereas the same officials are more reluctant to do so in the case of bad news (Hand *et al.* (1992)). On the contrary, Boot *et al.* (2006) argue that the reaction is due to the different information content. They show that the information contained in upgrades is typically smaller than the added value for investors if negative credit watches interact with subsequent rating changes. This is mainly due to the fact that firms receive a signal by rating agencies encouraging them to undertake more effort and thereby enhancing the credit quality within a fixed period of time (period between credit watch assignment and final rating decision) which is only observable by the rating agency. This theoretical idea has been tested empirically by Bannier and Hirsch (2010) who find that especially lower rated issuers are put under pressure to improve their credit quality after a negative watch assignment. This also explains why outlooks and credit watches lead to more accentuated responses on financial markets than changes of the rating itself (Kaminsky and Schmukler (2002)). However, by using a different methodology to identify the information content of ratings, Cavallo *et al.* (2013) find no significant difference between up- and downgrades.

Third, the literature offers empirical evidence towards spillover effects of sovereign announcements to other countries. Kaminsky and Schmukler (2002) were among the first to assess the spillover effects of sovereign announcements on other emerging market economies.

They find that spillover effects are more likely at the regional level and during times of crisis. Also, less transparent countries are more affected by rating changes to a related sovereign than transparent ones. Afonso *et al.* (2012) state that the size of the spillover depends on the respective financial market variable (no effect on CDS but strong effect on yield spreads) and on the distance in relative credit quality. If a country enjoys better credit quality than the event country, it is more vulnerable to experience a rise in spreads than a country with a lower credit quality. Finally, countries with weak fiscal positions have a higher probability to be affected by spillovers. Kräussl (2005) and Arezki *et al.* (2011) find that spillover effects are more likely to be observed in the case of negative announcements whereas Ismailescu and Kazemi (2010) show exactly the opposite. Moreover, Arezki *et al.* (2011) and Hill and Faff (2010) show that the size of the spillover also depends on the type of announcement and the rating agency from which the announcement originates. For instance, Arezki *et al.* (2011) argue that outlook revisions have negative spillovers to other countries whereas a downgrade has positive spillovers. They explain these contradicting findings with regulatory provisions: Whereas a downgrade can trigger a binding regulatory provision, the outlook revision has no such consequences. Of course, the influence of a rating change is contingent on whether it has a regulatory consequence. Besides the capital adequacy ratios from the Capital Requirements Directive (CRD) in the EU, pension funds are required to hold a fixed share of investment grade rated assets and the European Central Bank only accepts bonds as collateral if these are rated above BBB-. By contrast, Cavallo *et al.* (2013) find no supportive evidence for different market reactions to rating changes at the gap between investment- and speculative grade status.

The empirical studies also present results on the relative impact CRAs have on markets. Afonso *et al.* (2012) find that in the case of negative decisions S&P's rating announcements have the largest significant impact on sovereign yield spreads. They claim that this is due to the fact that the agency in most cases precedes Fitch's and Moody's downgrades. However, if it comes to the persistence of the reaction to a rating change, Moody's has the strongest influence. Hill and Faff (2010) come to similar results: S&P's provides most timely ratings and has the largest influence in times of crisis. They are also more active outside crisis periods towards IMF non-advanced countries whereas Moody's is shown to lead among

IMF advanced countries.

## 3.4 Real Effects of Sovereign Rating Announcements

Apart from the direct influence of ratings on sovereign yield spreads and spillovers on other countries' creditworthiness, the literature has also studied the impact of sovereign ratings on the real economy. This section begins by identifying the main channels through which rating changes may spread to (non-financial) firms. Kaminsky and Schmukler (2002) argue that a sovereign downgrade adversely affects stock markets in the respective country due to imminent tax increases for the traded firms in order to re-balance the public budget. Brooks *et al.* (2004) motivate their study by the increased globalization of markets which has led investors and fund managers to focus more on the understanding of the underlying country risk when they hold stocks of local companies. When motivating their analysis, the authors do not present a channel which links sovereign to corporate risk within the country. Instead, they argue that the higher share of foreign investors gives more importance to the sovereign rating when deciding about the holding of a local stock than national investors. Ferreira and Gama (2007) add that a sovereign downgrade often leads to a tightening of foreign borrowing conditions which also affects domestic firms negatively.

Another important channel has first been investigated by Borensztein *et al.* (2013) who study the effect of a country's downgrade on (non-financial) firm ratings at the sovereign ceiling. For a long time, the rating agencies have followed a policy that has restricted the best possible rating of a firm by the rating of its home country. Although rating agencies have gradually been moving away from such a policy (for instance S&P in the case of Argentina) the authors claim that the rating industry still considers the sovereign rating to be an important signal for corporate ratings. That is to say, if this effect remains when one controls for the macroeconomic environment, firm-level indicators of risk and the above-mentioned channels, the corporate sector is subject to a negative externality induced by the rating industry or regulation.[8]

The main findings of the literature on the influence of sovereign ratings on the cor-

[8] Ferreira and Gama (2007) mention the standardized approach in the Basel II accord as an example for financial institutions being obliged to receive a risk weight one rating category below that of its country of residency.

Table 3: Empirical Literature on the Impact of Sovereign Ratings on the Corporate Sector

| (1) Authors | (2) Sample | (3) Methodology | (4) Expl. variables |
|---|---|---|---|
| Kaminsky and Schmukler (2002) | 16 countries (1990-2000) | Event study | regional stock markets (only DG) (-), stronger during crises & in non-transparent countries |
| Brooks *et al.* (2004) | max. 69 countries (1973-2000) | Event study | national stock market (only DG) (-) |
| Ferreira and Gama (2007) | 29 countries (1989-2003) | Event study | spillover on other countries' stock markets, stronger when close neighbor and emerging market country |
| Trebesch *et al.* (2010) | 1828 firm-year observations in major emerging markets (1993-2007) | OLS with fixed effects | positive effect of ratings on external corporate borrowing and equity issuance |
| Almeida *et al.* (2013) | (non-financial) 55,422 firms in 80 countries (1990-2012) | OLS with fixed effects, difference-in-differences | firms at the sovereign ceiling receive higher bond yields and investment contraction than lower-rated firms |
| Borensztein *et al.* (2013) | 478 (non-financial) corporations in 29 countries (1995-2009) | OLS with fixed effects, non-parametric analysis | corporate ratings depend on sovereign ratings (when firms are rated at the sovereign ceiling) |
| Adelino and Ferreira (2014) | 53 banks in 25 countries (1989-2012) | OLS with fixed effects, logit estimation, Two-Stage Least Squares | sovereign downgrades leads to lower growth and level of (domestic and foreign) loans given out by banks (which are downgraded at the sovereign bound) |

porate sector can be summarized as follows: First, the impact on national stock markets is found to be significant in cases of downgrades and especially in emerging markets and non-transparent countries. Also the presence of a crisis amplifies the negative effect of a sovereign downgrade on stock markets (also across regions and neighbor countries) (see Table 3). Further, the effect is shown to be more pronounced in traded-goods sectors and small industries (Ferreira and Gama (2007)). In contrast to the other studies, Brooks *et al.* (2004) do not find a stronger effect of downgrades on resident stock markets in emerging markets than in advanced economies. Whereas the above mentioned studies use event-study methods to identify the impact of ratings on stock markets, Trebesch *et al.* (2010) instead focus on the volume of external corporate borrowing and equity issuance directly. By applying OLS with fixed effects the authors find that ratings for emerging markets have a positive impact on both indicators.

The above literature mainly uses the event-study methodology in order to identify the impact of rating changes on stock markets. This procedure seems to be adequate in order to control for omitted variable bias but on the other hand, it is difficult to identify the channels through which the transmission is released. More recent studies try to fill this gap by exploiting the sovereign ceiling policy (Borensztein *et al.* (2013), Adelino and Ferreira (2014)). Firms are divided into two groups according to whether they enjoy a rating at the sovereign ceiling or below. If now a sovereign downgrade is assigned, the rating agency is supposed to downgrade all those firms which previously received the same rating as the sovereign regardless of the perceived credit risk. Borensztein *et al.* (2013) show that this policy is still widely applied with the effect being pronounced in emerging market economies and for firms producing non-tradable goods. Besides, the influence of sovereign ceiling policies is stronger in countries with capital account controls and high political risk. This in turn speaks in favor of an abolition of sovereign ceiling policies since globalization has led to a constant reduction of capital account controls worldwide (Borensztein *et al.* (2013)). Adelino and Ferreira (2014) build on these results by asking whether the sovereign ceiling policies are also relevant for banks. Beyond that, they explore whether affected banks give out a lower amount of loans. By splitting the sample of banks into two groups (treated banks are rated at the sovereign ceiling) the authors find that treated institutions

reduce lending by 30% more than their counterparts in the control group. They also show that these banks charge higher prices for giving out loans than control banks (17-45 basis points). This result is worth highlighting because it shows that a reduction in bank lending is not necessarily driven by the demand side or by deteriorating macroeconomic conditions. When ignoring the sovereign ceiling, one should expect that the lower rated banks (below the sovereign ceiling) experience at least the same decline in lending as the better rated banks. Here, the authors show that the sovereign downgrade alone has an independent negative effect on initially better rated banks (and thereby indirectly on the real economy).

## 3.5 Concluding Remarks

The previous literature review on rating criteria and their impact on markets has shown that ratings primarily serve for long-term assessments of credit risk and not as short-term indicators of crises. This finding seems to be surprising against the background that CRAs define their ratings as a measure of the respective country's default risk. However, their long-term orientation leads them to put more weight on variables which do not serve as early warning signals for an upcoming crisis. Then again, the rating industry has never rated a defaulting entity with an investment-grade rating at the time of the default. This said, one may consider a sovereign credit rating as a rather rough measure of credit risk with a long-term focus. Institutional investors may then limit their sovereign exposure after (at least) one agency considers a country to perform below investment-grade.

After all, most studies confirm that sovereign ratings are considered to be important by financial markets. Whether this is due to their inclusion in regulatory frameworks or the provision of new information remains however unclear. Over the course of this thesis, I seek to contribute to the above results of the literature by shedding more light on this issue by addressing the disagreement of rating agencies towards sovereign risk. Before, the next chapter deals with the sensitivity of sovereign ratings towards changes in public debt.

# 4 Public Debt and Sovereign Ratings - Do Industrialized Countries Enjoy a Privilege?[9]

## 4.1 Introduction

In the past, advanced economies have enjoyed continuous access to capital markets, never scrutinizing their general creditworthiness. This has been reflected by credit ratings which remained virtually unchanged on a high level. On the contrary, emerging markets were relatively often confronted with a sharp decline of their ratings leading to restricted access to capital markets and eventually to sovereign debt crises.

In this chapter, we contribute to the literature about the relation between sovereign creditworthiness and public debt. By using historical survey data from the Institutional Investor magazine, we ask three questions: First, do industrialized countries enjoy a debt privilege relative to emerging markets? Second, are advanced countries with high public debt ratios treated differently than those with low and medium debt levels? And finally, do euro area members receive a debt privilege or a debt penalty compared to non-euro area members?

The first question has already been asked 10 years ago by Borio and Packer (2004) who found that emerging markets' credit ratings are more sensitive to changes in public debt than those of advanced economies. Most prominently, Reinhart *et al.* (2003), Eichengreen *et al.* (2007) concentrated on the phenomena of debt intolerance, the original sin and currency mismatches to explain the difference between ratings in developed and emerging economies/ developing countries. Whereas debt intolerance is often considered as a measure for country risk, the original sin and currency mismatches are rather considered as currency risks.

The original sin hypothesis maintains that the lack of capital flows from advanced to developing countries is a result of the poorer countries' inability to issue debt in their own currency. As a consequence, they are vulnerable to exchange rate depreciation making it

[9] This chapter is based on co-authored work with Constantin Weiser (Doctoral Researcher at the Chair of Applied Statistics and Econometrics at the Johannes Gutenberg-University Mainz Jakob-Welder-Weg 4, 55128 Mainz/Germany, Email: weiserc@uni-mainz.de) and has been published as a Working Paper in the IPP Discussion Paper Series of the Gutenberg School of Management and Economics (GSME).

hard for the affected countries to service foreign currency denominated debt. This in turn leads to lower capital flows ex ante (Eichengreen *et al.* (2007)).
Further, sovereigns suffering from original sin may become vulnerable to currency mismatches when they use the same funds to lend in local currency. During more turbulent times, the exchange rate depreciates and the value of liabilities quickly exceeds the value of assets, leading to financial and sovereign debt crises. Alternatively, the sovereign may hold foreign assets in form of reserves in order to prevent currency mismatches. However, in every case the economy has to incur additional costs compared to a situation in which it can borrow abroad in its own currency and invest those funds in productive activities (Eichengreen *et al.* (2007)).
The idea of debt intolerance offers a different approach: Reinhart *et al.* (2003) explain the inability of emerging markets and developing countries to accumulate high levels of public debt (comparable to the indebtedness of advanced countries' governments) with their history of defaults and high inflation. Due to weaker institutions the governments often experience external defaults after surges in debt ratios during a boom phase. The authors argue that internal factors like corruption, policy-induced macroeconomic stability or less developed financial systems prevent access to foreign debt markets (Reinhart *et al.* (2003)).
To sum up, it seems to be non-controversial that governments of advanced countries enjoy better ratings than emerging markets. However, the dynamics of this rating advanatage have not yet been thoroughly discussed.

Likewise, the heterogeneity of sovereign creditworthiness across advanced countries has been rarely examined. In the following, we provide two rationales why the relation between creditworthiness and public debt might have changed within the industrialized world.

First, public debt ratios in industrialized countries have been considered as sustainable for a long time. According to Bohn (1998), the United States have followed a path of sustainable fiscal policy between 1916-1995 by satisfying a predefined intertemporal budget constraint. This result has also been confirmed for European countries by Afonso and Rault (2010). However, in a more recent study, Ghosh *et al.* (2013) show that fiscal space - defined as the difference between the current debt ratio and the debt limit - does not decrease proportionally with higher levels of government debt but rather follows a cubic

trend. A sovereign may be able to finance high debt ratios with low interest rates for some time before refinancing costs suddenly increase when a negative fiscal shock occurs. This phenomenon is triggered by the so called "fiscal fatigue" when the primary balance of a country responds more slowly to rising debt ratios than the interest-growth differential. Besides, empirical findings on the impact of debt on growth are still contradictory: Whereas Reinhart and Rogoff (2010) find that economic growth is negatively affected when debt ratios exceed 90% of GDP, Panizza and Presbitero (2014) observe no causal relation when they control for endogeneity. Add to this, the current debate about the introduction of a Sovereign Debt Restructuring Mechanism in the euro area points to a general change in the perception of default risk in advanced countries (Buchheit *et al.* (2013)). In line with the idea of "fiscal fatigue" by Ghosh *et al.* (2013), we will study how ratings respond to deficits at high ratios of public debt to GDP.

Second, the privilege might emerge as a consequence of the membership in a currency union. The monetary unification in Europe has led to significantly lower interest rates in some member countries who have benefited from the import of a credible monetary policy and the common bond market has also contributed to a higher liquidity of the issued bonds (Pagano and von Thadden (2004)).[10] Thus, it has become more attractive for governments to issue new debt, in particular for those with large stocks of public liabilities.

Otherwise, one could argue that the membership has led to lower overall ratings for its members with countries being no longer able to issue debt in domestic currency (original sin hypothesis). Dell'Erba *et al.* (2013) test this hypothesis and find that EMU members experience higher interest rates with increasing debt ratios compared to other advanced countries. Bernoth *et al.* (2012) use data of primary market spreads for European government bonds between 1993 and 2009 in order to explore whether euro members have to incur an additional risk premium on public debt because they lost monetary independence. In contrast to Dell'Erba *et al.* (2013), the authors find no significant increase of interest rate spreads after the start of EMU. Thus, it is yet an open question whether the membership in the euro area has led to a debt privilege or a penalty.

[10] Although interest rates have converged strongly in the early years of EMU, bonds have never become perfect substitutes due to small differences in liquidity and risk perception (Christiansen (2007), Ehrmann *et al.* (2011)).

Our results point to the non-existence of a debt privilege relative to emerging markets. We even observe a debt penalty for the industrialized world when we control for their ability to issue debt in the own currency. Further, advanced countries with high ratios of public debt are subject to an additional penalty when debt ratios exhibit a negative trend. Finally, we find that members of the euro area periphery enjoyed an (albeit insignificant) debt privilege before the crisis which turned into a penalty after 2008.

The remainder of this chapter is organized as follows. Section two gives an overview of the data and presents some stylized facts. Section three presents the empirical framework and discusses the results. Section four concludes.

## 4.2 Data & Stylized Facts

In the empirical analysis, we use country-level data of 18 advanced and 17 emerging market economies ranging from 1993-2012 (unbalanced panel, see Table 10 in the Appendix of this chapter). Following Reinhart *et al.* (2003) and others (Haque *et al.* (1996), Celasun and Harms (2011)), the Institutional Investor's country credit rating (CCR) is our dependent variable and serves as a proxy for the perceived creditworthiness of investors. The index is based on weighted survey data of senior economists and sovereign-risk analysts of the 75-100 leading financial institutions being reported twice a year (in March and September).[11] Ratings are running on a scale from 0-100, with 0 representing the least creditworthiness of a sovereign.

In our view, the survey variable offers three considerable advantages compared to other measures of sovereign creditworthiness: First, the country credit ratings provide a more segmented scale compared to the CRAs' ratings. The fact that the ratings of the Big Three have remained constant for many years makes it difficult to measure (smaller) changes in perceived creditworthiness especially in the industrialized world. For instance, it is impossible to study small changes to the perception of credit risk in countries like Germany which have enjoyed a AAA rating (or slightly below) by the Big Three agencies for many years. However, the sovereign debt crisis in Europe has shown that initially investment-

[11] The responses are weighted according to the institutions' global exposure (for details see the description by the Institutional Investor magazine).

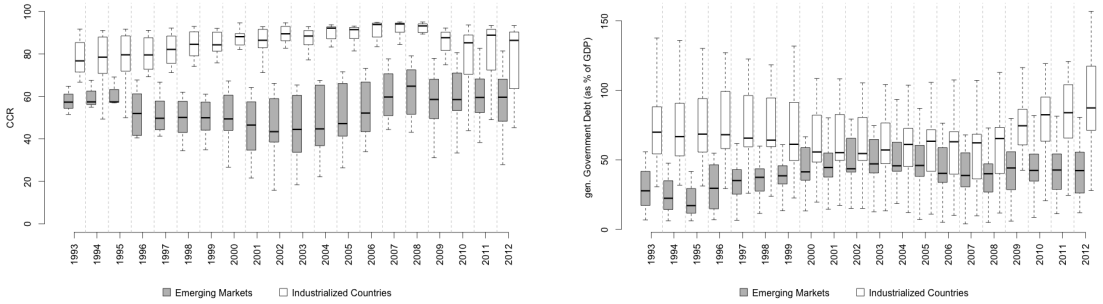
grade rated countries may experience a sudden decline to speculative grade status within a few months (Greece, Portugal, Ireland). Overall, we find a strong correlation of the CCRs with the Big Three agencies in our sample when using Spearman's rank correlation coefficient (with a $\rho$ of 0.94-0.96).

Second, credit rating agencies (CRAs) are currently subject to a lot of criticism regarding their business model and timing with regards to sovereign ratings (Eijffinger (2012), de Haan and Amtenbrink (2011)). By studying the condensed assessment of sovereign risk analysts, one may consider the CCR as an unbiased credit risk assessment of the countries' creditors. Also, rating decisions by the Big Three receive more attention by financial markets and therefore may often initiate market reactions (changes in interest rates) and thereby cause problems of endogeneity.[12]

Third, the survey data used in this study are not biased by the application of a specific rating algorithm and it is not skewed by inclusion into regulatory frameworks (Opp *et al.* (2013)).

Figure 1: The Debt Privilege

(a) Sovereign Ratings across Country Groups (b) Government Debt across Country Groups



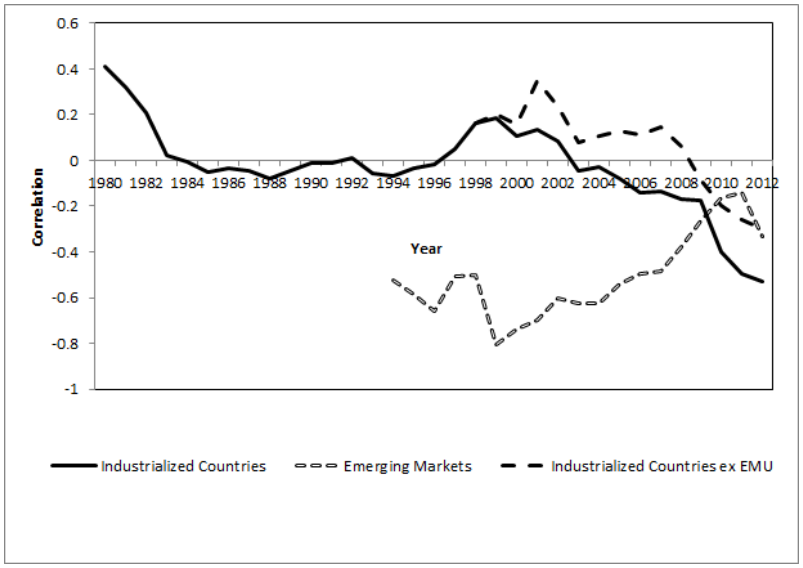

Data Source: International Monetary Fund (IMF), Institutional Investor

In the left-hand panel of Figure 1, we show the development of CCRs over time and compare it with the dynamics of public debt across advanced and emerging economies (right-hand panel). Obviously, economic fundamentals declined strongly especially in the industrialized world during the financial crisis: Public debt ratios have increased by 30%

[12]Chapter 2.3 of this thesis provides a detailed discussion of the literature on sovereign ratings and financial markets.

in advanced economies whereas emerging markets were able to reduce their debt ratios by 20% during the past ten years. Still, advanced countries have received considerably better ratings by investors until recently.

Figure 2: Correlation between Debt and Country Credit Ratings




Data Source: International Monetary Fund (IMF), Institutional Investor

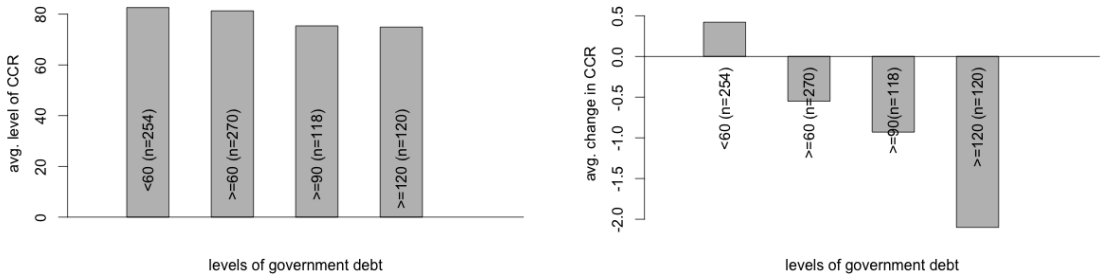
However, if we compare the correlation between general government debt to GDP with the CCRs across country groups and time (see Figure 2) it appears that the perception of sovereign creditworthiness across the two groups has changed. Clearly, one can observe that higher debt ratios are always related to lower ratings for emerging markets whereas industrialized countries enjoy only a slight negative or even positive correlation between public debt and creditworthiness. This result is in line with previous findings in the literature (see for instance Dell'Erba *et al.* (2013) and De Grauwe and Ji (2013)). However, this relationship has changed during the previous ten years: The correlation became negative for the industrialized world in 2003 and has strongly decreased since then (to -0.3 in 2012). Euro area economies seem to have been even stronger affected than other industrialized countries (gap between the solid and the dashed black line). The more recent literature provides also empirical support to this finding: Greenlaw *et al.* (2013) show that debt levels of more than 80% of GDP in advanced economies lead to strong fiscal deterioration and rising yields when interest rates are not held constant. The opposite is true for emerging

markets: They have experienced a positive trend in the correlation between public debt and ratings although heterogeneity across countries remains substantial. In the following empirical analysis, we will study whether this relationship also holds when we test the relationship by using a multivariate framework.

In the second part of the analysis, we focus on debt sustainability by exploring whether highly indebted countries experience an additional rating penalty compared to other advanced economies. The left-hand panel of Figure 3 shows that CCR levels are on average six points lower when countries' debt ratios increase from 60% to 90% of GDP. However,

Figure 3: CCRs at Different Levels of Debt

(a) CCRs at high levels of debt (b) Changes in CCRs at high levels of debt



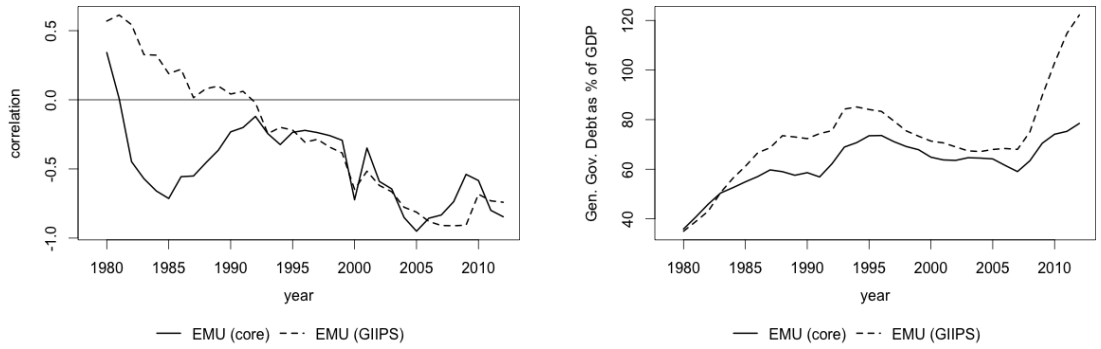

Data Source: International Monetary Fund (IMF), Institutional Investor

some countries seem to be able to increase their debt ratios even further (more than 120% of GDP) without any additional downgrades. The right-hand panel of Figure 3 shows that countries with debt levels above 60% are facing an average decline in CCRs by -0.5 rising to -0.9 (-2.1) points with debt ratios being equal and above 90% (120%) of GDP. Taking the two pictures together, it seems surprising that the highest indebted countries still enjoy favourable ratings but at the same time they are subject to the largest downgrades. Thus, we seek to shed more light on the relationship between debt levels and their momentum in the following analysis.

As a third step, we study whether monetary integration in Europe has led to a debt privilege compared to other industrialized countries. In Figure 4, the left-hand panel shows the correlation between debt and ratings over time for the GIIPS countries and the rest of

Figure 4: Debt and Ratings in the EMU

(a) Correlation between Debt and CCR (b) Debt levels




Data Source: International Monetary Fund (IMF), Institutional Investor

the euro area.[13] The descriptive picture leads us to suggest that with the initiation of the European integration process, correlation has converged with a common negative trend despite a decreasing or at least stable public debt ratio until the onset of the crisis (see right-hand panel). However, in order to analyze this relationship in more detail we have to proceed with a multivariate analysis.

In order to control for heterogeneity across countries, we will now present an overview of important macroeconomic determinants of sovereign creditworthiness to be included in our models.

In the empirical analysis, we only find a limited correlation (0.1-0.6) between the macroeconomic variables which leads us to assume that multicollinearity is of minor importance. We decided to refrain from using political variables in our sample due to the fact that the indices usually remain stable for a long period of time and can therefore be interpreted as a part of the country fixed effect. Moreover, political stability and government effectiveness are highly correlated with GDP per capita.

Our choice of controls largely follows the studies by Cantor and Packer (1996) and Afonso *et al.* (2011). Stated below, we provide summary statistics of our set of exogenous variables (see Table 4). Apart from the variable of main interest - general government debt ($GOVDEBT$) - we use the gross domestic product per capita ($GDPPERCAP$) as a proxy

[13] The core economies are Austria, Belgium, France, Germany and the Netherlands.

Table 4: Summary Statistics of Control Variables

| | (1) Mean | (2) Std dev. | (3) Min | (4) Max | (5) No. obs |
|---|---|---|---|---|---|
| **Advanced Countries (18 countries)** | | | | | |
| **Full sample 1993-2012** | | | | | |
| *Country Credit Rating* | 84.4 | 10.6 | 19.4 | 98.2 | 347 |
| *GDP per Capita* | 31874 | 11784 | 9381 | 67305 | 347 |
| *Government Debt* | 72.6 | 36.4 | 9.7 | 238 | 347 |
| $Inflation - 4$ *year avg* | 2.2 | 1.4 | -0.8 | 13.8 | 347 |
| $Growth - 4$ *year avg* | 2.0 | 1.8 | -6.4 | 10.5 | 347 |
| *Net Public Balance* $- 4$ *year avg* | -3.0 | 3.5 | -16.2 | 4.6 | 347 |
| *Current Account* $- 4$ *year avg* | -0.2 | 4.3 | -13.0 | 10.1 | 347 |
| *Unemployment* | 7.9 | 3.7 | 2.5 | 25 | 347 |
| *Original Sin* | 0.18 | 0.31 | 0 | 0.98 | 347 |
| **Emerging Markets (17 countries)** | | | | | |
| **Full sample 1993-2012** | | | | | |
| *Country Credit Rating* | 53.9 | 13.6 | 16.5 | 81.8 | 250 |
| *GDP per Capita* | 5895 | 3674 | 467 | 15410 | 250 |
| *Government Debt* | 43.5 | 23.0 | 3.9 | 165.0 | 250 |
| $Inflation - 4$ *year avg* | 7.8 | 6.7 | -0.9 | 47.7 | 250 |
| $Growth - 4$ *year avg* | 4.5 | 3.0 | -4.9 | 13.0 | 250 |
| *Public Balance* $- 4$ *year avg* | -2.1 | 2.8 | -16.6 | 7.0 | 250 |
| *Current Account* $- 4$ *year avg* | -0.4 | 5.2 | -7.8 | 16.0 | 250 |
| *Unemployment* | 9.0 | 4.9 | 2.2 | 28.2 | 250 |
| *Original Sin* | 0.73 | 0.37 | 0 | 1 | 250 |
| *Currency Mismatch* | -0.6 | 1.0 | -5.2 | 0.8 | 250 |

for the tax base and the degree of vulnerability to external shocks of a country. Inflation ($INFLATION$) serves as an indicator for monetary and fiscal prudence. The coefficient is assumed to take either a positive or negative sign because inflation may on the one hand reduce the amount of outstanding government debt but can also be an indicator for unsustainable fiscal policy. We further include the unemployment rate ($UNEMPLOYMENT$). The coefficient is expected to be negative with higher social contributions leading to an additional fiscal burden. In addition, we control for the medium-term economic development by including $GROWTH$, the $FISCAL\ BALANCE$, and the $EXTERNAL\ BALANCE$. Whereas the first two should contribute to a good reputation of the government and increase the government's ability to repay debt, the external balance is expected to have an ambiguous impact on ratings: If a current account deficit is driven by net foreign investment, it is expected to contribute to the growth of a country. Otherwise, the deficit might also be signaling over-consumption and a lack of international competitiveness.

We also control for original sin ($OSIN$) and currency mismatch ($MISMATCH$). Given the limited data availability for international debt securities from the BIS, our estimations only cover the period 1993-2012. Original sin and currency mismatch serve as indicators for a country's vulnerability towards external indebtedness. $OSIN$ is constructed as one minus the share of international debt securities issued in domestic currency over total issues of international debt securities by country i. A high value for $OSIN$ signals that the country is unable to issue domestic debt. For those industrialized countries with a higher amount of securities issued in domestic currency than their total amount of international debt securities, we bound this variable at zero.[14] $MISMATCH$ is defined as the share of international reserves minus external debt over exports times original sin (see Eichengreen *et al.* (2007)). Here, increasing positive values indicate a lower vulnerability of the country to run out of reserves.

Moreover, we account for times of extreme events like stock market crashes, inflation crises, currency crises, and sovereign debt crises by using the dataset by Carmen Reinhart.[15] Three of the crises never occurred in industrialized countries within our sample. Hence, we

[14] For a detailed discussion of the definition see Eichengreen *et al.* (2007)).
[15] see `http://www.carmenreinhart.com/data/browse-by-topic/topics/7/`

set the dummy variable equal to zero in these cases. The crises events are included in our models because high debt ratios may not necessarily be the consequence of unsustainable fiscal policy but rather the outcome of a banking or a currency crisis.

### 4.3 Empirical Analysis

We now turn to explore the determinants of Country Credit Ratings across time and countries. As a first step, we examine the differences between advanced and emerging economies.[16] Next, we analyse the dynamics of sovereign ratings in highly indebted countries. As a third step, we compare the credit risk between members of the European Monetary Union and other industrialized countries.

We use three specifications for each of the three questions. Thereby, we can exploit both the between- and within-variation of ratings. In Figure 1, we illustrate that the within-variation is relatively small in advanced economies compared to emerging markets but has increased strongly since the outbreak of the financial crisis. However, although the Figure shows a converging trend between the two country groups, a persistent gap between the ratings in advanced and emerging economies remains.

We begin with a static fixed-effects model (see equation 1). The cross-sectional dimension is at the center of our analysis in order to test whether a difference in the impact of public debt on ratings between the respective country groups exists when we control for differences in the macroeconomic stance (captured by $x'_{i,t}$).

$$ccr_{i,t} = \alpha_i + x'_{i,t}\beta + \gamma govdebt_{i,t} + \varepsilon_{i,t} \tag{1}$$

This model covers both dimensions (between-country and within-country variation) but may be biased: Due to the fact that most of the variables seem to be non-stationary the estimated coefficients can be the result of a spurious correlation. Further, we are subject to a potential bias when estimating the coefficients or computing the t-statistics. At the

[16] Our classification is based on the IMF classification in 2014 and covers only OECD countries. According to the definition of the World Bank, we should have also included Poland, Russia and Uruguay in the group of advanced economies. Here, we follow Ghosh *et al.* (2013) and Cantor and Packer (1996) by using the IMF/OECD classification.

same time, the advantage of this model is that it uses all information in contrast to the next model.

The model in differences accounts for the non-stationarity of the variables (see equation 2). However, the explanatory power is considerably reduced compared to the model in levels because the difference operator drops all of the between-variation and 50% of the within-variation of the *ccr*-variable in our data sample.[17] Therefore, the interpretation of the coefficients differs somewhat from the other models.

$$\Delta ccr_{i,t} = \alpha_i + x'_{i,t}\beta + \gamma \Delta govdebt_{i,t} + \varepsilon_{i,t} \tag{2}$$

Here, $\Delta$ denotes the first differences operator. In comparison to the original time series the country-fixed effect $\alpha_i$ can be interpreted as a country specific time trend. The vector $x_{i,t}$ contains the controls, with most of them also included in first differences (except for economic growth). This model is the most conservative, since it includes only stationary time series and therefore we expect neither the occurrence of spurious correlation nor a bias for the estimates or the inference. This model also takes into account the path dependency of ratings by assuming a maximum of persistence.

As a third approach, we use a dynamic panel-data specification related to Arellano-Bond (Difference GMM) (equation 3). In order to study the level effects (see the large distance between ratings of advanced and emerging economies in Figure 1) and to avoid endogeneity problems, we pursue with a dynamic panel estimation by using lagged levels as instruments. Thereby, we can combine the merits of the first two models (namely exploiting both dimensions and to prevent spurious regressions) by including the lagged dependent variable as an additional regressor (high explanatory power and robust estimates).[18]

$$ccr_{i,t} = \alpha_i \delta_1 ccr_{i,t-1} + \delta_2 I \times ccr_{i,t-1} + x'_{i,t}\beta + \gamma govdebt_{i,t} + \varepsilon_{i,t} \tag{3}$$

[17] For details see the variance decomposition in Table 12 of this chapter's Appendix.

[18] Our Difference GMM estimator may be inefficient because this sample entails a large number of periods relative to the number of countries. Further information about this problem can be found in Figure 10 and Figure 11 where we present Monte Carlo simulations for both the Difference and the System GMM estimator in comparison with the performance of the fixed effects estimator.

### 4.3.1 Industrialized Countries vs. Emerging Markets

We begin by exploring the size of a potential debt privilege for industrialized countries against emerging markets. The analysis consists of three different specifications: In order to identify the debt privilege relative to emerging markets, we first interact the level of general government debt with the industrialized country dummy ($Debt * Ind.\ Country$) and include our set of macroeconomic controls. In the second specification we account for various types of crisis in order to control for situations in which a rating is affected by country-specific shocks. Here, we use dummies for banking crises, inflation crises, currency crises, stock market crashes, external and domestic debt crises. Crises dummies take the value one in all years when the respective country is in a crisis and zero for all other periods. In our third specification we also include $OSIN$ and $MISMATCH$ in order to study whether a potential privilege is merely driven by the ability of countries to issue debt in their own currency than by the accumulation of debt in general.

Column 1 of Table 5 shows the results without controlling for crises and original sin/ currency mismatch. We report standardized coefficients in order to illustrate the relative impact on ratings across the determinants and include country fixed effects and robust standard errors clustered on the country level.

All coefficients have the expected sign and we can explain between 80-95% of the variation in ratings. Still, this result has to be taken with caution, since we observe a high persistence of ratings across time and countries and we do not yet control for trend behavior which might drive large parts of the correlation.
Together with GDP per capita, the public debt to GDP ratio explains most of the variation in ratings. As expected, the coefficient for government debt is significant and negative. If the debt ratio increases by 1 standard deviation, CCRs will be between 0.28-0.43 standard deviations lower.
The interaction term for government debt in industrialized countries is positive but not significant. We find no indication for multicollinearity between the interaction term and the other control variables. (correlation ranges between -0.48 and 0.39 and the variance inflation factor ranges with 0.659 clearly below the critical value of 10). That is to say,

Table 5: Industrialized vs. Emerging (OLS)

| | (1) Baseline | (2) incl. crises | (3) incl. debt burden |
|---|---|---|---|
| GDP per capita | 0.219*** | 0.225*** | 0.199*** |
| | (0.0392) | (0.0393) | (0.0369) |
| Inflation, 4y avg. | -0.241*** | -0.274*** | -0.230*** |
| | (0.0386) | (0.0495) | (0.0530) |
| Unemployment | -0.245*** | -0.250*** | -0.255*** |
| | (0.0468) | (0.0508) | (0.0481) |
| External Balance, 4y avg. | -0.0217 | -0.0234 | -0.0230 |
| | (0.0473) | (0.0437) | (0.0418) |
| Growth, 4y avg. | 0.0379 | 0.0362 | 0.0413 |
| | (0.0508) | (0.0496) | (0.0510) |
| Fiscal Balance, 4y avg. | 0.0716** | 0.0490 | 0.0580* |
| | (0.0314) | (0.0323) | (0.0301) |
| Gen. Gov. Debt | -0.243** | -0.296** | -0.278*** |
| | (0.119) | (0.122) | (0.0977) |
| Gen. Gov. Debt * Ind | 0.000787 | 0.0452 | 0.0618 |
| | (0.213) | (0.200) | (0.172) |
| Stockmarket Crash | | 0.0221 | 0.0283 |
| | | (0.0393) | (0.0352) |
| Currency Crisis | | 0.0997* | 0.111** |
| | | (0.0523) | (0.0475) |
| Inflation Crisis | | 0.197* | 0.157 |
| | | (0.113) | (0.112) |
| Domestic Debt Crisis | | 0.189 | 0.128 |
| | | (0.235) | (0.204) |
| External Debt Crisis | | 0.109 | 0.109 |
| | | (0.202) | (0.153) |
| Banking Crisis | | -0.0941 | -0.0387 |
| | | (0.0635) | (0.0516) |
| Original Sin | | | -0.494*** |
| | | | (0.0916) |
| Curr. Mismatch | | | 0.0102 |
| | | | (0.0693) |
| Constant | 0.911** | 0.917*** | 0.398 |
| | (0.358) | (0.318) | (0.323) |
| Observations | 597 | 597 | 597 |
| Adjusted $R^2$ | 0.924 | 0.926 | 0.937 |
| Country FE | Yes | Yes | Yes |

Clustered Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

industrialized countries receive no rating advantage relative to emerging markets in levels. One should keep in mind that the inclusion of country fixed effects is of crucial importance for this result. Here, we capture variables such as the default history and other political and socio-economic characteristics of a country, which usually remain in place for a long period of time. If we ignore the country fixed effect, our model will lead to a significant debt privilege for the industrialized countries. The inclusion of crises and original sin/ currency mismatch in columns (2) and (3) do not affect this result.

We assume that rating analysts assess the current economic performance and fiscal stance of governments. Thus, we use the contemporaneous values of the independent variables. However, in order to make sure that our results are robust to the lagged or updated publication of macroeconomic data, we check whether our results change when independent variables in levels are lagged by one year. We find that the sign and significance of our main variable of interest (government debt) is not affected (see Table 14 of this chapter's Appendix).

When we use differences instead of levels (Table 6), the debt coefficient for emerging markets is reduced to -0.1-0.2 standard deviations. Again, industrialized countries do not enjoy a debt privilege in the first two specifications. However, we even find a significant debt penalty when we control for original sin and currency mismatch. Thus, if a country does not have the ability to issue debt in its own currency, an increase in public debt will lead to higher downgrades.

The inclusion of crises does neither affect the debt coefficient nor the gap between industrialized and emerging market economies to a significant extent. Surprisingly, stock market crashes and currency crises have a positive and significant effect on a country's rating. However, if we only include the first year of the crisis, the coefficients become negative. One may conclude that the quick recovery of ratings after the first crisis year drives this result.

In the dynamic panel, we use difference GMM in order to explain the variation among CCRs. The coefficients in Table 7 have the same sign, albeit they are smaller in size compared to the OLS model in levels. This is due to the inclusion of the lagged CCR

Table 6: Industrialized vs. Emerging (OLS Diff)

| | (1) Baseline | (2) incl. crises | (3) incl. debt burden |
|---|---|---|---|
| D.GDP per capita | 0.0956*** | 0.0961*** | 0.0969*** |
| | (0.0238) | (0.0234) | (0.0233) |
| D.Inflation, 4y avg. | -0.0168 | -0.0181 | -0.000351 |
| | (0.0610) | (0.0642) | (0.0661) |
| D.Unemployment | -0.176*** | -0.193*** | -0.217*** |
| | (0.0525) | (0.0587) | (0.0566) |
| D.External Balance, 4y avg. | -0.0305 | -0.0147 | -0.0185 |
| | (0.0243) | (0.0285) | (0.0296) |
| Growth, 4y avg. | 0.374*** | 0.362*** | 0.295*** |
| | (0.0902) | (0.0877) | (0.0806) |
| D.Fiscal Balance, 4y avg. | 0.0259 | 0.0328 | 0.0269 |
| | (0.0522) | (0.0534) | (0.0561) |
| D.Gen. Gov. Debt | -0.184*** | -0.182*** | -0.127*** |
| | (0.0335) | (0.0352) | (0.0296) |
| D.Gen. Gov. Debt * Ind | -0.0488 | -0.0232 | -0.131** |
| | (0.0509) | (0.0523) | (0.0588) |
| Stockmarket Crash | | 0.113* | 0.155** |
| | | (0.0660) | (0.0597) |
| Currency Crisis | | 0.250** | 0.261** |
| | | (0.0979) | (0.101) |
| Inflation Crisis | | -0.0804 | -0.212 |
| | | (0.388) | (0.337) |
| Domestic Debt Crisis | | -1.018** | -1.159** |
| | | (0.390) | (0.432) |
| External Debt Crisis | | -0.214 | -0.365 |
| | | (0.595) | (0.600) |
| Banking Crisis | | -0.161 | -0.138 |
| | | (0.113) | (0.107) |
| D.Original Sin | | | -0.847*** |
| | | | (0.235) |
| D.Curr. Mismatch | | | 0.673*** |
| | | | (0.155) |
| Constant | -0.173*** | -0.207*** | -0.116*** |
| | (0.0429) | (0.0535) | (0.0397) |
| Observations | 578 | 578 | 559 |
| Adjusted $R^2$ | 0.363 | 0.377 | 0.419 |
| Country FE | Yes | Yes | Yes |

Clustered Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

values which explain a large part of the contemporaneous rating. Here, the debt coefficient becomes insignificant in the third specification when we include the coefficients for original sin and currency mismatch. We suppose that this is due to the inefficient estimator (see Tables 10 and 11 in the Appendix of this chapter). The interaction term does not show a significant difference between both country groups in our third specification, whereas it is negative and significant in (2) and (3).

To sum up, we find that general government debt ratios explain a large part of the overall variation in ratings compared to other macroeconomic determinants such as growth or the fiscal balance. This is true for both country groups. Also, being exposed to original sin seems to be an important predictor of low creditworthiness. These results confirm earlier studies which find that some industrialized countries have a considerable advantage of not being exposed to original sin. Apart from this, we do not find evidence for a debt privilege in advanced countries versus emerging economies across all three specifications. Hence, it seems that the macroeconomic differences between the two country groups can fully explain the rating differential. This result stands in contrast to the findings by Borio and Packer (2004) who show a debt privilege for advanced countries. However, they used a different estimation strategy, they did not control for times of crises and their data miss the last ten years.
As an additional robustness check, we have included a structural break in the year 2003 to replicate the sample period used by former studies. We find that the debt privilege is positive but not significant before 2003 and turns negative afterwards.[19]

All three empirical models show that institutional investors do not differ significantly in their response to changes of government debt across the two country groups. Still, we have only accounted for cross-country heterogeneity by distinguishing between the two groups and by including country fixed effects. Thereby, one cannot exclude that single country-year observations or particular countries have a relatively large impact on the debt coefficient compared to the rest of the sample. In order to account for these potential biases we perform two robustness checks.[20]

[19] The results including the structural break for the three specifications are available on request.

[20] Here, we only discuss the results for the fixed effects specification. However, the other robustness checks are not materially different and available on request.

Table 7: Industrialized vs. Emerging (Panel GMM)

| | (1) Baseline | (2) incl. crises | (3) incl. debt burden |
|---|---|---|---|
| L.Rating | 0.660*** | 0.713*** | 0.253 |
| | (0.0373) | (0.0778) | (0.160) |
| L.Rating * Ind. | -0.299** | -0.363 | 0.00991 |
| | (0.143) | (0.333) | (0.523) |
| GDP per capita | 0.0824*** | 0.0841*** | -0.0696 |
| | (0.0206) | (0.0221) | (0.0757) |
| Inflation, 4y avg. | -0.0822*** | -0.0648 | -0.0987 |
| | (0.0141) | (0.0458) | (0.0783) |
| Unemployment | -0.108*** | -0.116*** | -0.167*** |
| | (0.0228) | (0.0297) | (0.0402) |
| External Balance, 4y avg. | 0.000140 | 0.0301 | -0.0747 |
| | (0.0242) | (0.0382) | (0.0537) |
| Growth, 4y avg. | 0.0655*** | 0.0827*** | 0.000826 |
| | (0.0148) | (0.0209) | (0.0313) |
| Fiscal Balance, 4y avg. | 0.0474** | 0.0149 | 0.0279 |
| | (0.0206) | (0.0330) | (0.0391) |
| Gen. Gov. Debt | -0.120*** | -0.0820* | -0.0562 |
| | (0.0201) | (0.0472) | (0.0750) |
| Gen. Gov. Debt * Ind | -0.158* | -0.199* | -0.332 |
| | (0.0917) | (0.117) | (0.234) |
| Stockmarket Crash | | 0.0255** | 0.0217 |
| | | (0.00990) | (0.0149) |
| Currency Crisis | | 0.0248 | 0.0464** |
| | | (0.0175) | (0.0237) |
| Inflation Crisis | | -0.0788 | -0.0724 |
| | | (0.145) | (0.234) |
| Domestic Debt Crisis | | -0.145 | 0.243 |
| | | (0.183) | (0.240) |
| External Debt Crisis | | 0.0215 | -0.0240 |
| | | (0.0924) | (0.0968) |
| Banking Crisis | | -0.0349 | -0.00249 |
| | | (0.0242) | (0.0263) |
| Original Sin | | | -0.318 |
| | | | (0.414) |
| Curr. Mismatch | | | 0.296* |
| | | | (0.165) |
| Constant | 0.0375 | 0.0732* | -0.000550 |
| | (0.0340) | (0.0422) | (0.0408) |
| No. of Observations | 521 | 521 | 521 |
| Sargan Test (p-values) | 1.000 | 1.000 | 1.000 |
| AR1 (p-values) | 0.000 | 0.000 | 0.063 |
| AR2 (p-values) | 0.840 | 0.848 | 0.182 |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 5: Cooks's Distance for Fixed Effects Estimates

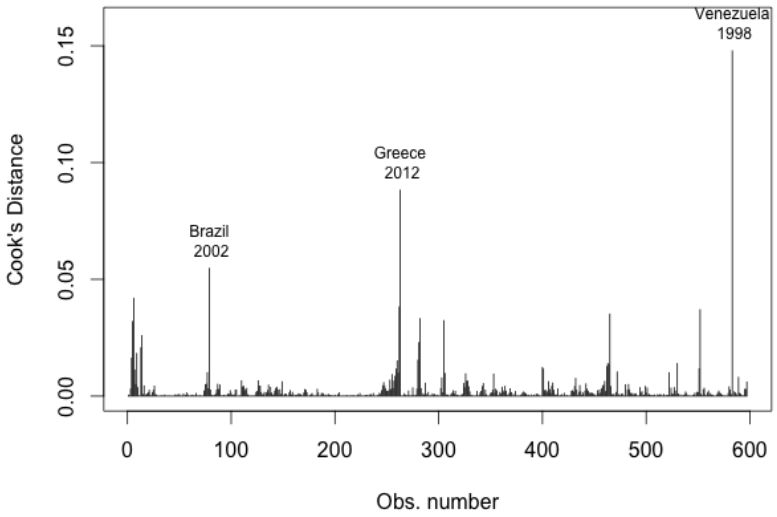
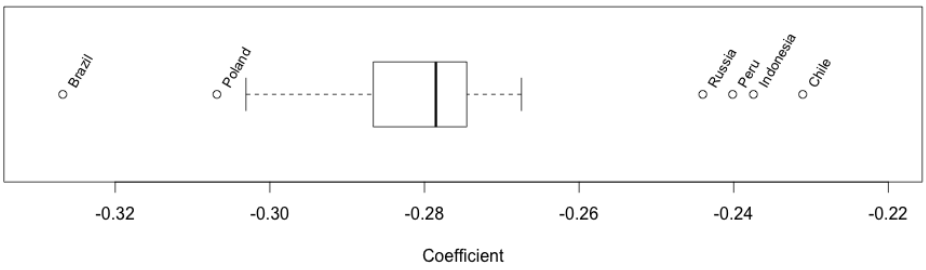



Figure 6: Jackknife Resampling for Fixed Effects Estimates



First, Cook's distance measures the relative impact of a data point on the entire model (see Figure 5). Here, we find that three observations have a relatively large influence. Due to the fact that all three countries (Greece, Brazil and Venezuela) were involved in a debt crisis during the respective year and we control for debt crises, the abnormality should be usually captured by the model. Also, the exclusion of the three outliers from the sample neither has a strong effect on the size nor on the sign of our debt coefficient.

Second, we use the Jackknife procedure as a re-sampling technique to control for the relative influence of a country on the debt coefficient. Figure 6 shows that our estimated coefficient is robust to the exclusion of single countries. The largest deviation is driven by Chile which leads to a small overestimation of the debt coefficient (by 0.06 standard deviations). To sum up, the overall results neither seem to be biased by single observations nor by a particular country.

### 4.3.2 Rating and Debt Dynamics in Industrialized Countries

We now turn to study the dynamics of ratings in industrialized countries. According to our descriptive findings in Figure 3, CCRs decline at debt ratios above 90%. However, no further downgrades are observed at ratios beyond 120% (albeit heterogeneity across countries increases). In Figure 3, we also displayed the change in ratings for countries with high levels of public debt. It shows that economies with debt ratios below 60% receive an average increase in creditworthiness by 0.4 CCR points annually. With debt ratios rising further, changes in CCRs turn negative and lead to more pronounced penalties up to an average of 2 points annually.

Taken together with the findings in levels, it seems that some highly-indebted countries still enjoy favorable ratings but the downgrade probability increases with further rising debt. These findings are confirmed when we sort the observations according to the above/below median values of changes in the CCR (+0.4 points), government debt (64.4%), and changes in government debt (+0.02 percentage points). The contingency tables (see Table 13 in the Appendix of this chapter) confirm that countries with a debt level above 64% do not experience stronger downgrades than lower indebted ones. The same holds if we consider (isolated) changes in government debt. However, when interacting high debt

levels with positive changes in debt, we find that the share of country-year observations with a downgrade of at least -1 percentage point ($\Delta CCR = p(25)$) doubles from 9% to 18%. Corresponding to our descriptive results in section 4.2, we find no relationship between the change in CCR and the change in debt among the 50% percentile of countries with lower debt levels. This observation is complementary to the work by Ghosh *et al.* (2013) who find that governments with high debt levels also tend to have larger fiscal deficits resulting in higher interest rates or even the exclusion from capital markets.

In the following, we turn to our multivariate framework in order to account for the macroeconomic stance across countries. In the analysis, we only consider the year-on-year change in the CCR, since we are primarily interested in the change of ratings at different levels of debt and its momentum.
In Table 8 (column (1)), squared changes of public debt are used as an additional regressor (again with country fixed effects and including macroeconomic controls) in order to test whether changes of high debt lead to an additional penalty by investors. The sample is restricted to positive changes in debt levels in order to ensure that only increases in debt enter the squared term. We observe that the descriptive findings are confirmed: In general, changes in public debt to GDP led to a lower rating across industrialized countries but we find no additional rating penalty for countries with large changes in debt (the coefficient for squared debt is even positive). In column (2), we look at the reaction of CCRs when the levels of debt ratios are interacted with their annual change. The resulting coefficient suggests that indeed those countries receive an additional penalty whose debt level is associated with a growing one.

Figure 7 illustrates our results in column (2) by showing the rating change for different combinations of debt levels and changes in debt. The isoquants based on the interaction term in Table 8 (column 2) reveal that high debt levels interacted with a growing one lead to additional rating penalties. The convex shape of the isoquants supports the hypothesis that both high debt levels in combination with high deficits lead to larger downgrades than situations in which a government faces either a strong debt increase or has only a high (but stable) level of debt. For instance, a country with a debt level of 90% of GDP receives a penalty of -0.86 CCR points whereas a country with 60% receives a penalty of only -0.46

CCR points given it experiences the same rise in public debt of 3%. A sovereign with a debt level of only 20% does not receive a penalty at all.

The results presented in Table 8 are based on a restricted sample which excludes Greece and Japan. When using the full sample of industrialized countries, our results basically remain the same, however, the Jackknife re-sampling (see Figure 8) shows that both tend to be outliers in the debt dimension - albeit in different directions. Whereas Japan leads to an underestimated coefficient (investors seem to be very debt-tolerant in the case of Japan), the inclusion of Greece leads to an overestimation of the coefficient (Greece receives a strong penalty relative to other countries). The Jackknife results for the interaction term excluding both countries are shown in Figure 9.

Table 8: Ratings in Highly-Indebted Countries (OLS-Diff)

This Table shows the OLS results for the effect of changes in government debt on CCRs. The first column presents the coefficient for large increases in government debt and its effect on ratings. The second column presents the coefficient for the interaction between high debt levels and changes to government debt. We include country fixed effects and a set of macroeconomic controls. We exclude Greece and Japan because they tend to be outliers in the debt dimension.

| | (1) | (2) |
|---|---|---|
| | D.Rating | D.Rating |
| D.Gen. Gov. Debt | -0.302 | 0.114 |
| | (0.176) | (0.134) |
| Gen. Gov. Debt | | -0.0172 |
| | | (0.0237) |
| D.Gen. Gov. Debt sq. | 0.00674 | |
| | (0.00652) | |
| Gen. Gov. Debt * D.Gov. Debt | | -0.00447*** |
| | | (0.00141) |
| Constant | -0.314 | 1.019 |
| | (0.747) | (1.737) |
| Observations | 137 | 290 |
| Adjusted $R^2$ | 0.321 | 0.419 |
| Country FE | Yes | Yes |

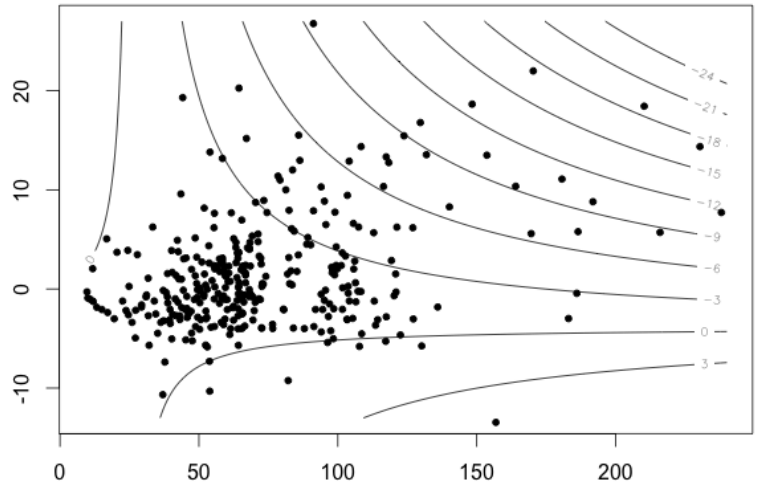
Clustered Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

To sum up, we do find that countries with high levels of public debt are subject to

Figure 7: Link between Level and Change in Public Debt and the Effect on CCR

This Figure illustrates the reaction of ratings to changes in government debt (vertical axis) in industrialized countries at different levels of indebtedness (horizontal axis). The distance between the isoquants and their convex slope indicate that countries are most vulnerable to downgrades when they increase their debt if initial debt ratios are already high (upper right area). High debt ratios alone or public debt surges at low initial debt levels are not sufficient conditions for a downgrade. The calculation of the isoquants is based on the empirical results in Table 8, column (2).




Data Source: International Monetary Fund (IMF), Institutional Investor

Figure 8: Jackknife Resampling for the Interaction Term Full Sample

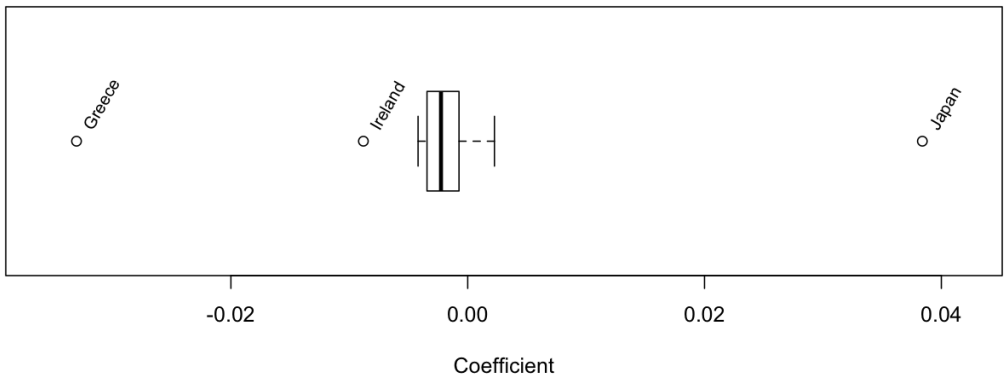
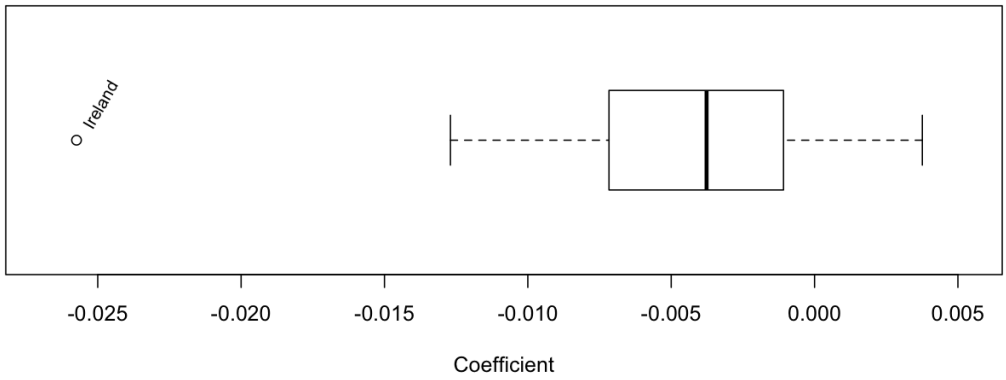


Figure 9: Jackknife Resampling for the Interaction Term excl. Greece/Japan




an additional penalty when the debt level increases further. However, highly-indebted advanced economies do not necessarily receive lower ratings: It depends on the momentum of debt ratios whether a government is subject to an additional penalty. Overall, investors seem to worry about the dynamics of debt with one exception, namely Japan.

### 4.3.3 Debt and Ratings in the European Monetary Union

Finally, we study the relationship between changes in public debt and ratings in the European Monetary Union compared to other industrialized economies. We build on the work by Dell'Erba *et al.* (2013) who show that bond spreads are more sensitive towards rising debt levels in the EMU than elsewhere. However, we depart from their analysis in three respects: First, we use the assessments of investors instead of government bond spreads in order to exclude variations in the dependent variable which are not necessarily driven by the creditworthiness of a respective sovereign (for instance the search for yield or liquidity). In particular, one can think of changes in yields determined by changes in general risk-aversion and the flight to safe havens (Bernoth and Erdogan (2012)) which have an effect on sovereign spreads but are not necessarily driven by a country's economic fundamentals. Here, we are only interested in the investors' reaction to a change of a sovereign's public debt ratio.

Second, we distinguish between two groups within the euro area, namely the core countries and the GIIPS economies which have experienced the strongest recessions during the sovereign debt crisis. With this separation, we follow Gaertner *et al.* (2011) who find

Table 9: Debt Coefficients EMU and Crisis using Difference OLS

This Table displays the resulting coefficients of linear combinations of debt coefficients across time and country groups. We explain the change in ratings with a change in the public debt ratio across three country groups and two periods based on the regression results in Table 15.

| | (1) Non-EMU | (2) Core EMU | (3) GIIPS |
|---|---|---|---|
| **1999-2008** | -0.048 | 0.046 | 0.295 |
| | (0.520) | (0.627) | (0.194) |
| **2008-2012** | -0.019 | 0.075 | -0.308*** |
| | (0.653) | (0.539) | (0.008) |

standard errors in parentheses, coefficients for other macroeconomic controls are not displayed
Non-EMU countries: Australia, Canada, Denmark, Japan, Sweden, UK, USA
EMU core: Austria, Belgium, Finland, France, Germany, Netherlands
GIIPS: Greece, Ireland, Italy, Portugal, Spain

that large parts of the recent downgrades assigned to the GIIPS cannot be explained by economic fundamentals. The separation further allows us to make a statement about the perception of credit risk in the core EMU. If sovereign risk analysts had expected these countries to become responsible for the bail-out of defaulting members, they would have assigned a debt penalty to these economies. In addition, we include the years between the entry to the common currency area and before the onset of the crisis (1999-2008) in order to identify how analysts assessed changes in public debt ratios relative to countries outside the euro area during the Great Moderation. Thereby, we seek to identify whether the entry to the common currency has already changed the perception towards credit risk before the financial crisis.

Our third innovation is grounded in methodology: We build our analysis on interaction terms in order to measure the quantitative difference in the response to changes in debt across the three country groups (EMU core, GIIPS, other advanced countries). This is not possible with two separate models where the coefficients do not measure the difference in the reaction of debt on ratings across groups, but account for the relative strength of effects on ratings within the respective country group.

Table 9 displays the resulting coefficients of linear combinations of debt coefficients across time and country groups. We explain the change in ratings with a change in the public debt ratio across the three country groups and two periods based on the regression in Table 15 of this chapter's Appendix.[21] First, the model shows no statistically significant difference in the credit risk perception for changes in the debt ratio of countries outside the euro area and core EMU economies. This is true for both periods before and during the financial crisis. Second, the coefficients for the GIIPS in column (3) show that these countries have received a privilege between 1999-2008 (albeit not significant) which turned into a (significant) penalty after 2008. As shown in Table 15 of the Appendix, our model explains more than 40% of the variation in ratings which is remarkable when considering the conservative approach of using differences instead of levels.

In line with our previous analyses, we proceed with a robustness check in order to account for country-driven coefficients. Again, the results of the Jackknife procedure reveal that Japan and Greece have a relatively large influence. However, their exclusion does not affect the (in-)significance of our coefficients and the size of the crisis coefficient for the GIIPS is only slightly reduced.

To sum up, we observe that the euro area periphery received a strong debt penalty during the crisis. The core member governments neither seem to benefit nor to suffer from their membership with regard to the treatment of their public debt. One may argue that the higher liquidity is balanced by the inability to issue debt in a national currency and that a change in bailout expectations explains the coefficients for the GIIPS countries.

The analysis does not include a study of level effects due to the fact that we have already sorted countries within the EMU according to their level of public debt. Also, the coefficients will be difficult to interpret if we add another interaction term including the level of debt. We also abstain to report dynamic panel estimates for the crisis, since we cannot exploit enough variation for each country during the four years between 2009 and 2012 to report a robust estimation result.

[21] The coefficients in Table 15 can only be interpreted as linear combinations of the interaction terms as illustrated in Table 9.

## 4.4 Concluding Remarks

This chapter has studied the effect of public debt on ratings across specific country groups. Our results can be summarized as follows: First, we do not find a debt privilege for industrialized versus emerging markets. When we include the ability to issue debt in the home currency, our results even point to a penalty towards industrialized countries. The difference to previous findings can be explained by the time dimension (earlier studies consider only periods until 2003) and our choice of different estimation methods (static fixed effects, Difference OLS, and Panel GMM). When using OlS without fixed effects, our results reveal a positive and significant debt privilege in industrialized countries.

Next, we tested whether ratings respond to high debt ratios and fiscal deficits or a combination of both. The findings suggest that the rating reaction to an increase in the public debt ratio is up to three times larger at high ratios of government debt compared to the reaction at low levels of debt to GDP. Thus, it seems that sovereign risk analysts indeed respond to higher levels of debt in advanced economies which underlines the fact that some countries have reached a limit of debt sustainability. There are two large outliers, namely Japan and Greece. Excluding these two countries from the analysis does not change the results. Japan leads to a downward biased coefficient (high tolerance of debt dynamics) whereas Greece has a positive impact on the debt coefficient (high intolerance towards public debt possibly due to the recent partial default on government debt).

Third, we studied whether the euro area is treated differently by institutional investors relative to sovereigns outside the euro area. We find that this is not the case for the core members of the euro area. Hence, these countries do not seem to be held responsible for the bail-out of other members. However, we find that the GIIPS economies have received a large but insignificant debt privilege before the onset of the crisis and a large and significant debt penalty after 2008. Thus, one may conclude that analysts have overrated creditworthiness during the initial years of EMU (at least in some of the countries) and that they corrected this view during the crisis.

The major focus of this chapter was to explain how institutional investors respond to the dynamics of public debt across country groups. The aforementioned results point to-

wards two policy implications for the industrialized world:

First, the observed volatility in euro area CCRs points to a considerable degree of uncertainty among institutional investors regarding the future of the euro area. Therefore, it is advisable that the treaties are revised to put them on more solid and reliable ground especially with respect to the bail-out clause. Besides, the proposal of a sovereign debt restructuring mechanism seems to be an appropriate instrument to deal with investor uncertainty towards sovereign risk (also beyond the euro area).

Second, the response of ratings to a combination of high debt and its positive momentum should be taken as a warning signal for highly-indebted industrialized countries and lead them to more consolidation efforts before financial markets may suddenly lose their faith in the future creditworthiness of the reigning governments.

## 4.5 Appendix to Chapter 4

Table 10: Country Sample

| | (1) First obs. | (2) Last obs. | (3) No. of obs. |
|---|---|---|---|
| **Advanced Countries (18 countries)** | | | |
| *Australia* | 1993 | 2012 | 20 |
| *Austria* | 1993 | 2012 | 20 |
| *Belgium* | 1993 | 2012 | 20 |
| *Canada* | 1993 | 2012 | 20 |
| *Denmark* | 1993 | 2012 | 18 |
| *Finland* | 1993 | 2012 | 20 |
| *France* | 1993 | 2012 | 20 |
| *Germany* | 1995 | 2012 | 19 |
| *Greece* | 1993 | 2012 | 20 |
| *Ireland* | 1999 | 2012 | 14 |
| *Italy* | 1993 | 2012 | 20 |
| *Japan* | 1993 | 2012 | 20 |
| *Netherlands* | 1997 | 2012 | 16 |
| *Portugal* | 1993 | 2012 | 20 |
| *Spain* | 1993 | 2012 | 20 |
| *Sweden* | 1993 | 2012 | 20 |
| *United Kingdom* | 1993 | 2012 | 20 |
| *United States* | 1993 | 2012 | 20 |
| **Emerging Markets (17 countries)** | | | |
| *Argentina* | 1997 | 2012 | 16 |
| *Brazil* | 2000 | 2012 | 13 |
| *Chile* | 1993 | 2012 | 20 |
| *China* | 1993 | 2012 | 20 |
| *Colombia* | 1996 | 2012 | 17 |
| *Hungary* | 1997 | 2012 | 16 |
| *Indonesia* | 2000 | 2012 | 13 |
| *Malaysia* | 1993 | 2012 | 20 |
| *Mexico* | 1996 | 2012 | 17 |
| *Peru* | 2003 | 2012 | 11 |
| *Philippines* | 1996 | 2012 | 17 |
| *Poland* | 1997 | 2012 | 16 |
| *Russia* | 2000 | 2012 | 11 |
| *South Africa* | 2008 | 2012 | 5 |
| *Turkey* | 2004 | 2012 | 9 |
| *Uruguay* | 2001 | 2012 | 12 |
| *Venezuela* | 1998 | 2012 | 15 |

Table 11: Country Sample EMU

| | (1) First obs. | (2) Last obs. | (3) No. of obs. |
|---|---|---|---|
| **EMU "core" (6 countries)** | | | |
| *Austria* | 1999 | 2012 | 14 |
| *Belgium* | 1999 | 2012 | 14 |
| *Finland* | 1999 | 2012 | 14 |
| *France* | 1999 | 2012 | 14 |
| *Germany* | 1999 | 2012 | 14 |
| *Netherlands* | 1999 | 2012 | 14 |
| **EMU "GIIPS" (5 countries)** | | | |
| *Greece* | 2001 | 2012 | 12 |
| *Ireland* | 1999 | 2012 | 14 |
| *Italy* | 1999 | 2012 | 14 |
| *Portugal* | 1999 | 2012 | 14 |
| *Spain* | 1999 | 2012 | 14 |

Table 12: Variance Decomposition

| | (1) Between | (2) Within | (3) Total |
|---|---|---|---|
| **All countries** | 309.094 | 64.574 | 373.668 |
| | (7.581) | (8.036) | (19.330) |
| **Industrialized countries** | 59.432 | 57.751 | 117.183 |
| | (7.709) | (7.599) | (10.825) |
| **Emerging markets** | 114.227 | 73.68 | 187.907 |
| | (10.688) | (8.584) | (13.708) |

Standard errors in parentheses

Table 13: Contingency Tables

| $\Delta CCR$ | *Government Debt Level* $Debt < p(50)$ | $Debt > p(50)$ | *Total* |
|---|---|---|---|
| $\Delta CCR > p(75)$ | 51 (14.7%) | 41 (11.8%) | 92 (26.5%) |
| $p(25) < \Delta CCR < p(75)$ | 94 (27.1%) | 80 (23%) | 174 (50.1%) |
| $\Delta CCR < p(25)$ | 30 (8.6%) | 51 (14.7%) | 81 (23.3%) |
| *Total* | 175 (50.4%) | 172 (49.6%) | 347 (100%) |

| $\Delta CCR$ | $\Delta$*Government Debt* $\Delta < p(25)$ | $p(25) < \Delta < p(75)$ | $\Delta > p(75)$ | *Total* |
|---|---|---|---|---|
| $\Delta CCR > p(75)$ | 30 (8.7%) | 36 (10.4%) | 26 (7.5%) | 92 (26.5%) |
| $p(25) < \Delta CCR < p(75)$ | 43 (12.4%) | 99 (28.5%) | 32 (9.2%) | 174 (50.1%) |
| $\Delta CCR < p(25)$ | 9 (2.6%) | 29 (8.4%) | 43 (12.4%) | 81 (23.3%) |
| *Total* | 82 (23.6%) | 164 (47.3%) | 101 (29.1%) | 347 (100%) |

| $\Delta CCR$ - only level debt p>50 | $\Delta$*Government Debt* $\Delta < p(25)$ | $p(25) < \Delta < p(75)$ | $\Delta > p(75)$ | *Total* |
|---|---|---|---|---|
| $\Delta CCR > p(75)$ | 11 (6.4%) | 14 (8.1%) | 16 (9.3%) | 41 (23.8%) |
| $p(25) < \Delta CCR < p(75)$ | 19 (11.1%) | 40 (23.3%) | 21 (12.2%) | 80 (46.5%) |
| $\Delta CCR < p(25)$ | 4 (2.3%) | 16 (9.3%) | 31 (18.0%) | 51 (29.7%) |
| *Total* | 34 (19.8%) | 70 (40.7%) | 68 (39.5%) | 172 (100%) |

| $\Delta CCR$ - only debt level p<50 | $\Delta$*Government Debt* $\Delta < p(25)$ | $p(25) < \Delta < p(75)$ | $\Delta > p(75)$ | *Total* |
|---|---|---|---|---|
| $\Delta CCR > p(75)$ | 19 (10.9%) | 22 (12.6%) | 10 (5.7%) | 51 (29.1%) |
| $p(25) < \Delta CCR < p(75)$ | 24 (13.7%) | 59 (33.7%) | 11 (6.3%) | 94 (53.7%) |
| $\Delta CCR < p(25)$ | 5 (2.9%) | 13 (7.4%) | 12 (6.9%) | 30 (17.1%) |
| *Total* | 48 (27.4%) | 94 (53.7%) | 33 (18.9%) | 175 (100%) |

Table 14: Industrialized vs. Emerging (OLS lagged 1 year)

| | (1) Baseline | (2) incl. crises | (3) incl. debt burden |
|---|---|---|---|
| L.GDP per capita | 0.224*** | 0.240*** | 0.213*** |
| | (0.0462) | (0.0441) | (0.0425) |
| Inflation, 4y avg. | -0.286*** | -0.282*** | -0.224*** |
| | (0.0395) | (0.0545) | (0.0584) |
| L.Unemployment | -0.181*** | -0.182*** | -0.188*** |
| | (0.0488) | (0.0480) | (0.0472) |
| External Balance, 4y avg. | -0.0102 | -0.0143 | -0.0138 |
| | (0.0545) | (0.0532) | (0.0531) |
| Growth, 4y avg. | 0.157** | 0.152** | 0.151** |
| | (0.0590) | (0.0603) | (0.0617) |
| Fiscal Balance, 4y avg. | 0.0899*** | 0.0719** | 0.0830** |
| | (0.0327) | (0.0342) | (0.0334) |
| L.Gen. Gov. Debt | -0.304* | -0.326** | -0.305** |
| | (0.154) | (0.144) | (0.119) |
| L.Gen. Gov. Debt * Ind | 0.0438 | 0.0425 | 0.0546 |
| | (0.268) | (0.245) | (0.216) |
| Stockmarket Crash | | 0.0347 | 0.0309 |
| | | (0.0314) | (0.0319) |
| Currency Crisis | | 0.0423 | 0.0433 |
| | | (0.0396) | (0.0408) |
| Inflation Crisis | | 0.0308 | -0.0151 |
| | | (0.125) | (0.111) |
| Domestic Debt Crisis | | -0.00842 | -0.0482 |
| | | (0.177) | (0.158) |
| External Debt Crisis | | 0.159 | 0.197 |
| | | (0.138) | (0.120) |
| Banking Crisis | | -0.119* | -0.0699 |
| | | (0.0676) | (0.0564) |
| L.Original Sin | | | -0.473*** |
| | | | (0.117) |
| L.Curr. Mismatch | | | 0.0285 |
| | | | (0.0659) |
| Constant | 0.299 | 0.291 | -0.115 |
| | (0.316) | (0.288) | (0.298) |
| Observations | 559 | 559 | 559 |
| Adjusted $R^2$ | 0.917 | 0.918 | 0.927 |
| Country FE | Yes | Yes | Yes |

Clustered Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15: Debt and Ratings in EMU (OLS Diff)

This Table displays the coefficients for the OLS Diff regressions with the interaction terms for the two euro area groups (EMU core and GIIPS). A correct interpretation of the coefficients is only possible by calculation of the linear combinations between the interaction terms. The resulting marginal effects are displayed in Table 9.

| | (1) |
|---|---|
| | D.Rating |
| D.Gov. Debt | -0.0476 |
| | (0.0724) |
| D.Gov. Debt cris. | 0.0289 |
| | (0.0804) |
| EMU core | -0.0904 |
| | (0.182) |
| EMU core*D.Gov. Debt | 0.0933 |
| | (0.112) |
| EMU core*D.Gov. Debt*cris | -0.121 |
| | (0.175) |
| GIIPS | -0.257 |
| | (0.513) |
| GIIPS*D.Gov. Debt | 0.342 |
| | (0.205) |
| GIIPS*D.Gov. Debt*cris | -0.632** |
| | (0.299) |
| Constant | -1.011*** |
| | (0.334) |
| Observations | 231 |
| Adjusted $R^2$ | 0.464 |

Clustered Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
EMU core: Austria, Belgium, Finland, France, Germany, Netherlands
GIIPS: Greece, Ireland, Italy, Portugal, Spain

Figure 10: Monte Carlo experiment using Fixed effects vs. Difference GMM estimator

This Figure illustrates a simulation of our data generating process with the lagged exogenous variable ($\delta$) and the coefficient for government debt ($\beta$) in a sample with $N = 35$ and $T = 4 - 20$. Based on the moments in our sample, we set $\delta = 0.8$ and $\beta = 0.5$. The results of the simulation are based on 500 iterations of the dynamic panel model ($y_{i,t} = \delta y_{i,t-1} + \beta X_{i,t} + u_i + \varepsilon_{i,t}$) for each the fixed effects and the Difference GMM estimation (Arellano-Bond). We find that the FE estimator for $\delta$ is downward biased but becomes more precise with increasing T as expected. For the estimation of $\beta$, we find that the FE estimator provides unbiased results for T>6. The difference GMM estimator leads to unbiased results for both coefficients but it is less efficient than the fixed effects estimator (large variance) and not suited for large T. This result is in line with the findings by Judson and Owen (1999) and Kiviet (1995).

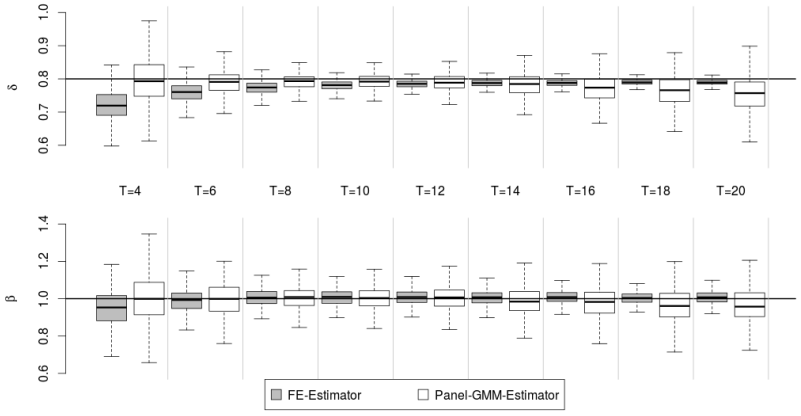
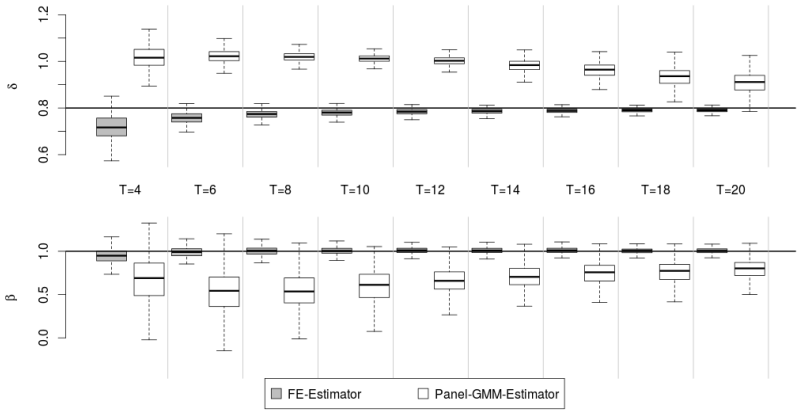



Figure 11: Monte Carlo experiment using Fixed effects vs. System GMM estimator

This Figure illustrates a simulation of our data generating process with the lagged exogenous variable ($\delta$) and the coefficient for government debt ($\beta$) in a sample with $N = 35$ and $T = 4 - 20$. Based on the moments in our sample, we set $\delta = 0.8$ and $\beta = 0.5$. The results of the simulation are based on 500 iterations of the dynamic panel model ($y_{i,t} = \delta y_{i,t-1} + \beta X_{i,t} + u_i + \varepsilon_{i,t}$) for each the fixed effects and the System GMM estimation (Arellano-Bover/Blundell-Bond). We find that the FE estimator for $\delta$ is downward biased but becomes more precise with increasing T as expected. For the estimation of $\beta$, we find that the FE estimator provides unbiased results for T>6. The System GMM estimator leads to strongly biased results for both coefficients. The bias seems to be driven by the inclusion of additional moment conditions.



# 5 Why Rating Agencies Disagree on Sovereign Ratings[22]

## 5.1 Introduction

The recent financial crisis has evoked a revival of the discussion about the role of Credit Rating Agencies (CRAs). During the sovereign debt crisis in Europe, the so called Big Three rating agencies Standard & Poor's, Moody's and Fitch Ratings started to downgrade several euro area economies and even assigned junk status to Ireland, Portugal and Greece. The sudden decline of trust in the solvency of European economies led many politicians to claim that the Big Three did either not realize the true credit risk or that their decisions were biased by political influence.[23]

Also, the academic literature has contributed to this debate: For instance, Gaertner *et al.* (2011) find that ratings in selected euro area economies between 2009 and 2010 ranked 2.3 notches below a hypothetical rating for a country outside the monetary union with the same economic fundamentals. Ferri *et al.* (1999) show that ratings have been pro-cyclical during the Asian crisis, thereby amplifying the recessions in affected countries. Add to this, Fuchs and Gehring (2013) find that sovereign ratings are subject to a home bias (the resident agency assigns a rating which is on average one notch higher than that of competitors). Also, the most influential agencies, namely the Big Three are shown to exhibit only a weak home bias.[24] Further, by comparing the behavior of nine agencies, the authors find that cultural distance (for instance language) and economic ties (bank exposure, export interests) with the home country affect the respective country's rating. However, the channels through which the ratings are biased vary substantially across the individual agencies. Finally, the authors admit that most of the variation in ratings is explained by macroeconomic and political fundamentals.

At the same time, the literature on determinants of sovereign credit ratings also shows that large parts of the variation can be explained with few macroeconomic variables (see for instance Cantor and Packer (1996)). In a related panel analysis for sovereign ratings

[22] This chapter has been published as a Working Paper in the IPP Discussion Paper Series of the Gutenberg School of Management and Economics (GSME).

[23] see Handelsblatt (January 17, 2012): "The myth of the U.S. conspiracy"

[24] Only S&P is shown to rate the United States better than other countries and Fitch exhibits a home bias for both France and the United States (based on ownership and headquarter).

between 1995 and 2005, Afonso *et al.* (2011) find that their model (including a set of macroeconomic, political and regional variables) correctly predicts 75 percent of the ratings (within one notch variation) despite the fact that expectations for future economic development or other qualitative assessments are not taken into account by the respective agency.

Thus, empirical evidence towards the adequacy of sovereign ratings appears to be mixed: In general, ratings seem to quite well reflect the credit risk of a country, however, during times of crisis, the Big Three have often been accused of reacting too late and to be overly bearish towards a country's creditworthiness. However, compared to the corporate sector it remains difficult to assess the adequacy of ratings since at least the advanced countries have not defaulted for many years. Therefore, I have to rely on indirect measures of performance such as the relative activity of rating agencies by studying follower-leader behavior (Hill and Faff (2010)) or by comparing whether some regions systematically receive better ratings than others (Fuchs and Gehring (2013)).

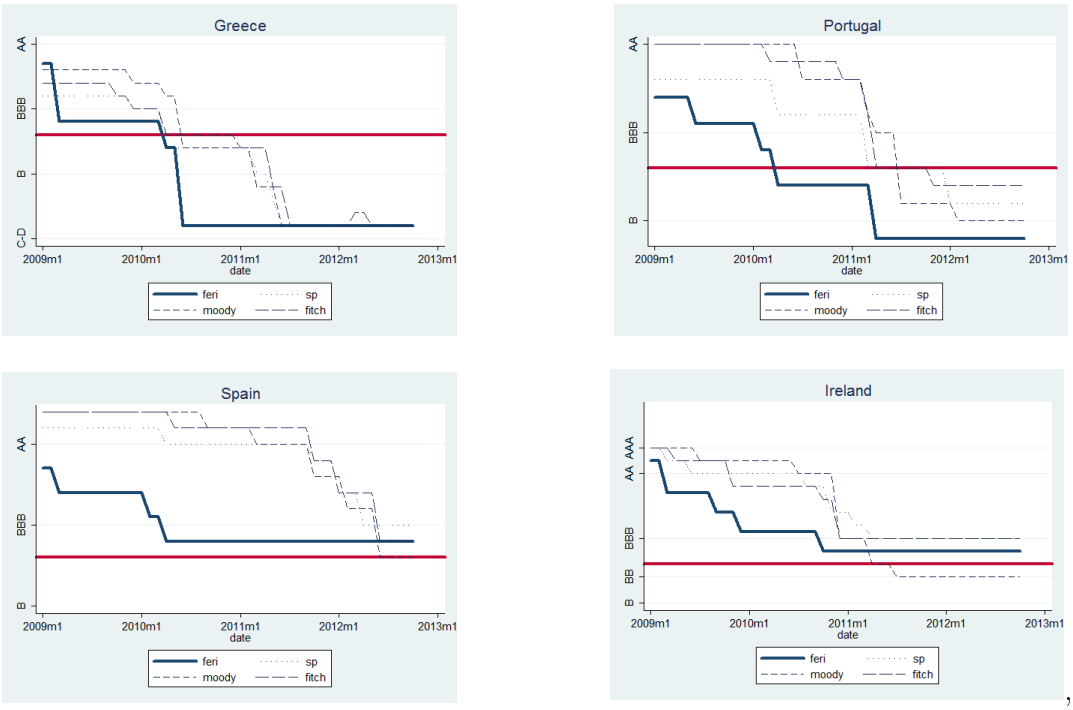
Figure 12 illustrates the recent downgrades of euro area countries. Here, I observe that the Big Three decided almost unanimously on euro area ratings (besides Moody's downgrade for Ireland to speculative grade status). However, when adding the ratings from the smaller European rating agency, I observe that Feri has started to downgrade the same countries earlier and it assigned junk status to Portugal even one year before the Big Three took action. This observation raises the question how often rating agencies disagree on sovereign ratings and, even more important, what the reason for this disagreement might be.

The purpose of this chapter is to shed more light on the issue of disagreement among CRAs. I study the determinants of sovereign split ratings across agencies and their propensity to be optimistic/pessimistic towards a country's credit risk (lopsided or symmetric ratings). Further, I evaluate whether the individual propensity to up- or downgrade a country's credit rating increases, following a previous rating change of a competitive agency in the same direction.

My results indicate that split probabilities are not driven by a rating agency's home

Figure 12: Sovereign Credit Ratings during the Euro Crisis

The rating data have been retrieved from the four rating agencies whereby Feri uses a different rating scale but offers a translation table of their 9-notch-scale to the 21-notch-scales of the Big Three. The red line illustrates the threshold between investment and speculative grade status.



region but rather seem to be a consequence of the use of different rating models and uncertainty in the presence of adverse shocks. I also observe a different rating behavior between the subscriber funded European agency and the Big Three which can be explained by the varying frequency of rating actions.

The chapter is organized as follows: In section 5.2, I briefly review the related literature. Section 5.3 presents my data sample. In section 5.4, I show the results for political, macroeconomic and regional determinants of split ratings between the four agencies. In Section 5.5, I explore whether ratings are lopsided across agencies and analyze potential determinants of optimism and pessimism. Section 5.6 presents the results of up- and downgrade interaction between rating agencies before I conclude in section 5.7.

## 5.2 Literature Review

In principle, one can distinguish between three types of explanations for split ratings:

First, splits are the consequence of uncertainty towards the true credit risk. Until now, the literature has only focused on banks (Morgan (2002)) and non-financial firms (Livingston *et al.* (2007)). They find that disagreement is not randomly distributed but that those companies with higher asset opaqueness are more likely to receive split ratings. To my knowledge, determinants of rating splits in the case of sovereigns have not been studied so far. However, looking at the frequency of rating splits (see section 5.2), it seems that rating agencies have different views on a country's default risk. These may be attributed to the use of different rating models or uncertainty in times of adverse shocks. For instance, one agency may put more weight on the default history and public debt ratio of a country whereas another primarily considers the economic well-being and political stability. Taking into account the empirical findings during times of crisis, one may also contemplate whether the frequency of split ratings increases when a country is subject to adverse shocks.

Second, prior studies have discussed whether different business models among rating agencies can be a reason for split ratings. Using corporate bond ratings from 1999 to 2013 Bruno *et al.* (2013) find that a subscriber funded rating agency (Egan-Jones Rating Company) provides more rating updates than a rating agency that uses the issuer-pays

model (Big Three agencies). This observation is robust to the registration of Egan-Jones as a National Recognized Statistical Rating Organization (NRSRO) in 2007. The authors conclude that the rating behavior is thus driven by different business models (issuer-pays vs. subscriber funded). Bhattacharya *et al.* (2014) find that Egan-Jones provides not only more rating updates but also a higher rating quality suggesting that subscriber-funded agencies are even better suited to act in the best interest of investors. In case of sovereign ratings it is more difficult to measure the rating performance due to a lack of defaults. However, issuer-paid agencies may be acting in the home country's interest in order to keep their mandate whereas subscriber funded companies should be primarily interested in satisfying their customers.[25]

Third, split ratings can be the consequence of a rating agency's inclusion in regulatory frameworks. Many studies find that decisions by the Big Three have an impact on bond rates (Gaertner *et al.* (2011), Afonso *et al.* (2012), Alsakka and ap Gwilym (2010), Arezki *et al.* (2011)) and stock prices. That is to say, interest rates often follow rating decisions.[26] One may suggest that a part of the causal relationship is driven by the quasi-automatic impact on bond rates and stock prices via the inclusion of external ratings in regulatory frameworks: According to the Basel rules, institutional investors (pension funds, insurance companies etc.) are required to hold a fixed share of investment grade rated bonds in their portfolio. The decision of a rating agency to downgrade a country close to (or even to) junk status, might prompt investors to sell the respective bonds just to comply with the established rules.[27] Consequently, if ratings are included in regulation, a respective CRA may have incentives to follow the decisions of other regulated competitors due to the expected effect of a rating change on interest rates.

Moreover, CRAs whose ratings are used by regulators may have incentives to be reluctant towards sovereign downgrades when they use sovereign ceiling policies which compel rating agencies not to assign a better rating to a firm than to the sovereign (Borensztein

[25]Only a limited number of the Big Three ratings are unsolicited (26.6%). In my sample, I find no significant difference across rating agencies between unsolicited and solicited ratings for one particular country.

[26]Some of those studies find that the relationship is bi-directional.

[27]Investors do not necessarily rely on the rules of this standardized approach if they use the internal risk based approach (IRB).

*et al.* (2013)). Adelino and Ferreira (2014) find that the downgrades of banks due to sovereign ceiling policies have significant negative effects on bank lending. This may lead rating agencies to be reluctant towards changes in sovereign credit risk. However, if one of the Big Three agencies takes the first step, competitors are incentivized to follow this decision due to expected repercussions on the country's credit risk. On the contrary, a smaller CRA has a higher degree of flexibility (it rates fewer big issuers like large banks and corporate firms (Bhattacharya *et al.* (2014))) and may thus have less concern to change a country's rating.

I contribute to the literature by exploring major determinants of split ratings for sovereigns across the four agencies. In particular, I investigate three hypotheses why split ratings for countries may exist:

(1) Split ratings for sovereigns can be explained by model uncertainty when rating agencies measure default risk differently, especially in the presence of large adverse shocks to credit risk.

(2) Conditional on the place of residence and the ownership, rating agencies assign better ratings to their home region (given the economic and political environment of countries).

(3) The inclusion of ratings into regulatory frameworks leads to a more reluctant stance of the respective agency towards downgrades because it fears more far-reaching consequences than intended such as accompanying downgrades of bank ratings and rising interest rates. This in turn increases the tendency of agencies to follow competitors if these assign a downgrade previously.

## 5.3 Data and Stylized Facts

In this chapter, I use monthly sovereign ratings from the Big Three rating agencies and from Feri AG, Germany's largest non-bank adviser/asset manager for private and institutional assets.[28]

Exploring these data, I obtain a sample of 54 countries with monthly rating actions

[28] see homepage of Feri AG at `http://www.feri.de/en/company/portrait/`

ranging from June 1999 to October 2012. The sample comprises 23 industrial countries and 31 emerging market economies and the total number of monthly observations for each rating agency is 9,016 (except for Fitch with 8,929 country-month observations).[29] During my sample period of 13 years, I observe between 169 (Moody's) and 393 (Feri) rating changes. For robustness checks, I also consider watch and outlook decisions by the Big Three.

One part of the analysis will use annual data due to the fact that political and economic variables are only available on a yearly basis. The sample entails 702 (except for Fitch with 695) rating observations by using end-of-year ratings in the analyses. As robustness checks, I also computed the results by using yearly rating averages.

I start by mapping the alphabetical notches into numerical values in order to perform statistical analyses.[30] A 17 maps the best rating (AAA or AAa) and a 1 the worst (D/D/C). Therefore, lower values indicate a higher default probability. The Big Three ratings have 22 notches when using a linear scale.[31] Feri uses 11 notches and provides a translation table for comparison with the Big Three. I apply this transformation.[32] The dividing line between investment grade and speculative grade on Feri's scale is between C and D, for S&P and Fitch the dividing line is between BBB- and BB+ and for Moody's it runs between the Baa3 and Ba1.

In order to compare rating differences across CRAs, the most convenient approach would be to use the transformation in Table 31. However, I cannot ensure that the values in the provided diagram by Feri are perfectly comparable. For instance, I am not able to verify that a letter B+ on the Feri scale is comparable to the letter A on the Big Three scale. For that reason, I decided to classify the rating scales into broader categories as to ensure a better comparability. In the roughest classification I distinguish between three classes (see Table 16): First, I separate the best possible rating category (AAA) from those ratings considered as investment grade (while lower than AAA). The third category

[29] see list of countries in Table 30 of this chapter's Appendix

[30] see Table 31 in the Appendix of this chapter

[31] I follow Güttler and Wahrenburg (2007) and Afonso *et al.* (2011) in restricting the scale to 17 values since there are few observations in the lowest range

[32] see Feri press release on country ratings: `http://frr.feri.de/files/documents/fer/press/2010-06-07_FER_PM_0.pdf`

entails country-year observations with speculative grade ratings. In the authors' opinion, this approach has two advantages: First, I ensure that ratings are better comparable across agencies and second, the balanced number of ratings in each category enables us to exploit differences in the rating behavior among industrialized countries (AAA/ investment grade) and emerging markets (investment grade/ speculative grade). A more segmented classification is provided in Table 32 of the Appendix and has been used for the mean-comparison tests in section 5.5.

Table 16: Classification of Ratings

This Table summarizes annual observations of ratings across CRAs according to the three rating categories AAA/investment grade/speculative grade.

| | (1) S&P | (2) Moody's | (3) Fitch | (4) Feri |
|---|---|---|---|---|
| *AAA/Aaa/AAA* | 179 | 191 | 169 | 142 |
| *Investment Grade* | 351 | 340 | 362 | 435 |
| *Speculative Grade* | 172 | 191 | 164 | 125 |
| *Observations* | **702** | **702** | **695** | **702** |

Table 17 shows the absolute numbers of split ratings across the agencies. Here, all four agencies agreed in more than 50 percent of the sample (396/702). Feri has relatively often disagreed with the ratings of the Big Three (200-300/702) whereas I observe a split across the Big Three only in every fifth case (105/702). The numbers remain broadly the same if I use yearly averages instead of year-end values and they indicate that Feri has more often deviated from the assessments of the Big Three than the latter to each other. Consequently, one might suggest that Feri's ratings are more independent compared to those by the Big Three. However, the results give no indication of whether the observed differences are region-specific or randomly distributed. I will shed more light on this issue

Table 17: Split Ratings across Rating Agencies

The numbers are based on the individual rating agencies' definitions. I only consider split ratings between AAA - investment grade and speculative grade status and use end-of-year ratings.

| | (1) No-Split | (2) Split Feri | (3) Split Big3 |
|---|---|---|---|
| *Standard & Poor's* | 396 | 236 | 105 |
| *Moody's* | 396 | 275 | 105 |
| *Fitch Ratings* | 396 | 239 | 105 |
| *Feri* | 396 | - | 306 |

in the next section.

## 5.4 Determinants of Split Ratings

I now turn to show how often rating agencies disagree on a region's rating in order to find out whether some regions receive more splits than others. Table 18 provides an overview of the absolute number of rating splits across the three categories AAA/investment grade/speculative grade status. Two facts are worth mentioning:

First, Feri disagrees more often on a rating across every region except the developed Asian & Pacific countries. Thus, different opinions on credit risk are not restricted to specific areas. Also, disagreement does not seem to depend on a region's level of economic development.

Second, I observe a higher frequency of split ratings across the Big Three in developed Asian & Pacific countries (50% of the observations). One explanation for this result might be the distance between a rating agency's home region and the rated country. Still, the descriptive results may also be the consequence of country-specific characteristics. In the following, I will test whether the macroeconomic stance on the country level and the

Table 18: Split Ratings across Regions

This Table displays split ratings across selected regions. I differ between the three different rating classes according to Table 16. The industrialized Asian & Pacific countries include Australia, New Zealand, Japan, Singapore and South Korea.

| | (1) Feri S&P | (2) Feri Moody | (3) Feri Fitch | (4) Split Big3 | (5) Observations |
|---|---|---|---|---|---|
| EMU | 35 | 40 | 38 | 12 | 137 |
| US/Canada | 7 | 8 | 6 | 3 | 39 |
| Asia & Pacific (ind.) | 17 | 28 | 18 | 33 | 65 |
| Asia (emerg.) | 34 | 32 | 36 | 9 | 91 |
| South America | 38 | 40 | 39 | 3 | 78 |
| Eastern Europe | 67 | 72 | 66 | 20 | 169 |

political environment have an influence on the disagreement across CRAs.

It is a generally accepted view that political risk determines the willingness to repay debt obligations whereas economic risk mirrors the country's ability to repay. Both variables are considered in the rating agencies' methodologies. By contrast, a country's business climate (protection of property rights, predictability of tax and legal regimes) is not necessarily related to the probability of sovereign debt repayment.[33]

The authors include the following two determinants of political uncertainty: (1) *Political stability* measures the probability of a government to be destabilized by unconstitutional or violent means. If political stability is endangered rating agencies may have different views on political developments within the country or on future governments. (2) *Government effectiveness* captures the ability of a government to provide public services, the degree of independence from political pressures and government credibility (Kaufmann *et al.* (2010)). If government effectiveness is low, rating agencies may face uncertainty with respect to the formal capacity of the government to service its debt.

I also use determinants for economic uncertainty: First, a higher (1) *GDP per capita* reduces the uncertainty towards a country's ability to repay its debt due to a large tax base. Second, a low ratio of (2) *government debt to GDP* reduces uncertainty as well as a low ratio of (3) *external debt to imports*. I also control for the (4) *default history* where a past default (after 1945) potentially increases uncertainty.

Finally, I include a measure for large adverse shocks to a country's default risk within a given year. If a country is subject to such a shock, I assume that rating agencies face a greater uncertainty towards future country risk. In the model, I use the Institutional Investor's country credit risk index which is based on a semi-annual survey among institutional investors and weighted by their exposure to sovereign risk. The variable is computed as the squared one-year-change in credit risk whereby we only consider negative changes in credit risk.[34] Thus, positive coefficients indicate that large adverse shocks to credit risk lead to higher uncertainty among rating agencies.

In the following, I carry out two separate regressions and present the results. First, I

[33] For details, I refer to the published methodologies of the CRAs

[34] Positive values are set equal to zero.

restrict the sample to advanced economies and measure the probability to observe a split rating between AAA and below. In the second probit model, I measure the probability of split ratings in emerging economies at the threshold between investment and speculative grade status.

$$Pr(Split\ AAA_{ij,t}) = F(macro_{k,t}, region, \Delta CCR_{k,t}) + e_{ij,t} \tag{4}$$

and

$$Pr(Split\ InvJunk_{ij,t}) = F(macro_{k,t}, region, default_k, \Delta CCR_{k,t}) + e_{ij,t}. \tag{5}$$

Table 19 provides the results obtained from the probit regression on AAA-level splits. Columns (1) and (2) present split results for Feri against the Big Three. Most importantly, I find no systematic increase in the split probability across regions. Higher government debt and a negative external balance increase the split probability whereby a lower value of government effectiveness leads to a decline. The latter result looks surprising, however, one may think of countries having a low probability to receive AAA-status by any agency if the index has not reached a certain upper threshold. The split probability increases significantly with a large decline in the Country Credit Rating. Indeed, this result confirms earlier findings in the literature stating that ratings are less reliable during times of crisis (Ferri *et al.* (1999), Gaertner *et al.* (2011)).

The split results for the Big Three in columns (3) and (4) are similar, however, I observe that the agencies disagree more often on ratings for Asian & Pacific countries.[35] In contrast to S&P's and Moody's, Fitch has never assigned AAA-status to these countries. Also, the Big Three are often discordant on Japan's credit risk with S&P's being the most pessimistic agency.

Taken together, the findings for splits on AAA-status do not suggest that countries in the euro area are particularly affected by split ratings whereas other regions are not. It seems that the frequency of disagreement increases only between the Big Three in the case of Asian & Pacific countries, confirming my descriptive result in Table 18.

[35]The Asian & Pacific region includes Australia, New Zealand, Japan, Singapore and South Korea.

Table 19: Split Ratings AAA vs. Non-AAA

This Table displays split probabilities for advanced economies at the threshold between AAA and below. I use a probit model with a dummy variable equal to one if two agencies disagree on the rating category (AAA/Non-AAA). Positive coefficients reflect an increase in the split probability, negative coefficients indicate a decrease. Standard errors are clustered on the country level.

| | (1) Split Feri-Big3 | (2) Split Feri-Big3 | (3) Split Big3 | (4) Split Big3 |
|---|---|---|---|---|
| Δ CCR sq. | 0.000533* | 0.000847*** | 0.00105*** | 0.00134*** |
| | (1.92) | (2.83) | (3.94) | (4.10) |
| EMU | -0.110 | -0.0204 | -0.171 | -0.167 |
| | (-0.58) | (-0.14) | (-1.15) | (-1.23) |
| Asia & Pacific | 0.0975 | 0.206 | 0.176 | 0.179* |
| | (0.46) | (1.59) | (1.27) | (1.73) |
| USA & Canada | -0.142 | -0.232 | -0.123 | -0.152 |
| | (-0.60) | (-1.27) | (-0.89) | (-1.16) |
| GDP per Capita | | 0.00167 | | -0.00385 |
| | | (0.57) | | (-1.15) |
| Government Debt | | 0.00176* | | 0.000578 |
| | | (1.81) | | (1.14) |
| Fiscal Balance | | -0.00213 | | -0.00565 |
| | | (-0.22) | | (-0.83) |
| External Balance | | -0.0302*** | | -0.0175*** |
| | | (-4.47) | | (-3.73) |
| GDP Growth | | 0.00259 | | 0.00889 |
| | | (0.21) | | (0.80) |
| Government Effectiveness | | 0.651*** | | 0.358*** |
| | | (4.70) | | (3.79) |
| Political Stability | | 0.0322 | | 0.0934 |
| | | (0.20) | | (0.78) |
| Observations | 299 | 297 | 299 | 297 |
| Pseudo $R^2$ | 0.025 | 0.189 | 0.138 | 0.283 |

$t$ statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 20: Split Ratings Speculative vs. Investment Grade

This Table displays split probabilities for countries at the threshold between investment grade and junk status. I use a probit model with a dummy variable equal to one if two agencies disagree on the rating category (Investment Grade/Junk status). Positive coefficients reflect an increase in the split probability, negative coefficients indicate a decrease. Standard errors are clustered on the country level.

| | (1) Split Feri-Big3 | (2) Split Feri-Big3 | (3) Split Big3 | (4) Split Big3 |
|---|---|---|---|---|
| Δ CCR sq. | -0.0000553 | -0.000897*** | 0.0000973 | -0.000226 |
| | (-0.14) | (-2.63) | (0.55) | (-0.76) |
| Default History | 0.137 | -0.0360 | 0.0252 | -0.102** |
| | (1.22) | (-0.32) | (0.66) | (-2.28) |
| Eastern Europe | 0.0796 | 0.0225 | 0.0179 | 0.0570 |
| | (0.44) | (0.15) | (0.32) | (0.77) |
| Asia | 0.127 | -0.110 | 0.00731 | -0.0226 |
| | (0.60) | (-0.71) | (0.11) | (-0.33) |
| South America | 0.185 | -0.107 | -0.0611 | -0.0927 |
| | (0.93) | (-0.65) | (-0.94) | (-1.09) |
| GDP per Capita | | -0.0181 | | 0.00307 |
| | | (-1.48) | | (0.35) |
| Government Debt | | -0.000706 | | 0.000970 |
| | | (-0.29) | | (0.69) |
| External Debt | | 0.00166** | | 0.000206 |
| | | (2.28) | | (0.55) |
| Fiscal Balance | | -0.0101 | | -0.00283 |
| | | (-0.74) | | (-0.48) |
| External Balance | | -0.00153 | | -0.000868 |
| | | (-0.19) | | (-0.26) |
| GDP Growth | | -0.00611 | | -0.00583 |
| | | (-0.69) | | (-1.27) |
| Government Effectiveness | | -0.299** | | -0.142* |
| | | (-2.44) | | (-1.85) |
| Political Stability | | -0.0650 | | 0.0426 |
| | | (-0.90) | | (1.47) |
| Observations | 403 | 284 | 403 | 284 |
| Pseudo $R^2$ | 0.021 | 0.217 | 0.015 | 0.117 |

$t$ statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 20 presents the results for splits between investment and speculative grade ratings. I find more split ratings between Feri and the Big Three in countries with high external debt and low levels of government effectiveness given. Again, I find no significant increase in the split probability across regions. In contrast to the results in Table 19, I find no positive effect of adverse shocks on the split probability. The coefficient is even negative and significant in column (2) suggesting that in the case of emerging markets, the agreement (to downgrade countries) among CRAs even increases. The Big Three disagree more often if countries have no default history and if the index of government effectiveness is low. I do not find an indication for the Big Three to disagree more often on country risk in one region than in another.

To sum up, my results suggest that disagreement among rating agencies stems either from the use of different rating models (external balance and debt ratios seem to have different weights) or from uncertainty during times of adverse shocks (only in advanced economies). I find that regional splits occur more frequently among the Big Three in Asian & Pacific countries. In the following, I study in which cases a CRA is more likely to be optimistic or pessimistic than its competitors.

## 5.5 Are Sovereign Ratings Lopsided?

During the euro crisis, policy makers have expressed the expectation that a European based rating agency would publish a more unbiased view about European countries than rating agencies with headquarters in the U.S. Accordingly, one should expect that the U.S. based agencies assign better ratings to their immediate neighbors. Given the recent criticism by European politicians, I first examine rating differences in the euro area.

To begin, I investigate the rating differences in industrialized and emerging markets and on the euro area in particular. In Tables 21 and 22, I show the mean comparisons of rating differences between Feri and the Big Three. The coefficients indicate that Feri has assigned more positive ratings to emerging markets (between 1999 to 2007) and has had a more pessimistic view on industrialized countries (only during the crisis). Within the euro area (Table 22), I observe no significant difference across the agencies during the Great Moderation, but a strong decline in both euro area groups (GIIPS and non-GIIPS

Table 21: Mean Comparison of Ratings to the World

Differences of the ratings are based on the transformation in Table 16; Positive coefficients indicate a better rating average compared to Feri; Significance levels of T-test are given as ***, **, and * representing 1%, 5%, and 10% respectively

| *Country Group* | (1) Feri - S&P | (2) Feri - Moody's | (3) Feri - Fitch | Observations |
|---|---|---|---|---|
| **1999-2012** | | | | |
| *All Countries* | 0.18*** | 0.12*** | 0.19*** | 702 |
| *industrialized Countries* | -0.1*** | -0.16*** | -0.09*** | 299 |
| *Emerging Economies* | 0.12*** | 0.11*** | 0.11*** | 403 |
| **Great Moderation (1999-2007)** | | | | |
| *All Countries* | 0.36*** | 0.33*** | 0.35*** | 486 |
| *industrialized Countries* | 0.02 | -0.03 | -0.02 | 207 |
| *Emerging Economies* | 0.62*** | 0.60*** | 0.58*** | 279 |
| **Crisis Period (2008-2012)** | | | | |
| *All Countries* | -0.22*** | -0.32*** | -0.16*** | 216 |
| *Advanced Countries* | -0.37*** | -0.46*** | -0.34*** | 92 |
| *Emerging Economies* | -0.11*** | -0.22*** | -0.02 | 124 |

Table 22: Mean Comparison of Ratings within the Euro Area

Differences of the ratings are based on the transformation in Table 16; Positive coefficients indicate a better rating average compared to Feri; Significance levels of T-test are given as ***, **, and * representing 1%, 5%, and 10% respectively

| *Rating Agencies* | (1) Feri - S&P | (2) Feri - Moody's | (3) Feri - Fitch | Observations |
|---|---|---|---|---|
| **1999-2012** | | | | |
| *euro area* | -0.18*** | -0.31*** | -0.25*** | 137 |
| *GIIPS* | -0.17** | -0.38*** | -0.25*** | 63 |
| $Non-GIIPS$ | -0.22*** | -0.11* | -0.26*** | 87 |
| **Great Moderation (1999-2007)** | | | | |
| *euro area* | 0.03 | -0.09 | -0.08 | 89 |
| *GIIPS* | 0.05 | -0.12 | -0.09 | 43 |
| $Non-GIIPS$ | 0.02 | -0.07 | -0.07 | 46 |
| **Crisis Period (2008-2012)** | | | | |
| *euro area* | -0.58*** | -0.71*** | -0.56*** | 48 |
| *GIIPS* | -0.65*** | -0.95*** | -0.6*** | 20 |
| $Non-GIIPS$ | -0.54*** | -0.54*** | -0.54*** | 28 |

countries) between 2008-2012.

These preliminary findings indicate that Feri tends to be more pro-cyclical in its rating behavior than the Big Three and that compared to what could be expected it surprisingly perceives the entire euro area as a more risky asset. This result has not been described previously. On the contrary, Fuchs and Gehring (2013) find that in general rating agencies give preferential treatment to their home country and to countries with close cultural and economic ties to the home country.[36]

I also differ from Fuchs and Gehring (2013) by using a different definition of the home bias: They reproduce the rating models used by each agency and compare their results with the actual ratings. If the predicted rating is lower than the actual rating, the authors define this as a home bias. In this paper, I focus instead on the determinants of disagreement across agencies. Specifically, I ask whether the observed optimistic/pessimistic stance of a rating agency relative to competitors can be explained by the use of different rating models (for instance by assigning different weights to economic or political factors) or the belonging to the home region. I am not able to identify a home bias on the country level due to the limited variation across the four rating agencies with respect to the ratings of the United States, Germany and France.

In Table 23, I summarize the number of months in which a CRA had a more pessimistic stance compared to all competitors across regions. In the case of Feri, I use the classification in Table 16 due to the different rating scales. The comparison among the Big Three is based on the scale of alphabetical notches.[37] For instance, I consider a more pessimistic stance for Feri if the agency assigns investment grade whereas all Big Three agencies assign AAA-status. In case of the Big Three, I attribute a negative stance if one agency assign B+ whereas another one assigns a B.

The descriptive findings indicate that Feri is more often pessimistic towards credit risk in North America and Eastern Europe than its competitors. Standard & Poor's takes the lead by having most often a pessimistic stance towards the euro area and emerging Asia

[36] The home bias has not been identified for Feri and Moody's and it is shown to hold for Fitch in France and the U.S. at the same time (ownership and headquarter).

[37] This explains why disagreement with Feri is less frequent although the agency assigns more rating changes overall.

whereas Moody's exhibits a negative bias towards South America. Fitch Ratings has most often assigned lower ratings to the Asian & Pacific region (industrialized).

Table 23: No. of Negative Deviations towards other CRAs

This Table displays country-month observations in which a rating agency has assigned lower ratings to specific regions than its competitors. Due to the different scales, I compare Feri's ratings with those of the Big Three along the pre-defined three rating categories whereas I use the full rating scale for the Big Three.

| | (1) Feri Pes. | (2) S&P Pes. | (3) Moody Pes. | (4) Fitch Pes. | (5) Observations |
|---|---|---|---|---|---|
| EMU | 235 | 296 | 92 | 111 | 1,738 |
| North America | 101 | 17 | 0 | 52 | 486 |
| Asia & Pacific (industr.) | 12 | 99 | 74 | 136 | 810 |
| South America | 19 | 9 | 413 | 98 | 972 |
| Eastern Europe | 526 | 249 | 259 | 156 | 2,106 |
| Asia (em. markets) | 0 | 202 | 157 | 84 | 1,134 |
| Observations | 893 | 872 | 995 | 637 | 7,246 |

The findings for optimism in Table 24 show that Feri assigns more often better ratings to emerging Asia and South America than the Big Three. Moody's has most often assigned better ratings to the EMU, North America, Asian & Pacific economies and Eastern Europe.

Taking the two Tables together, three observations are worth mentioning: First, I find more volatility in ratings towards emerging markets than towards advanced economies (this confirms earlier findings). Second, the Big Three are more often optimistic towards advanced countries whereas Feri has more frequently assigned better ratings to the emerging world (except for Eastern Europe). Third, I observe that Moody's is the most often optimistic agency among the Big Three. The agency assigns more often better ratings in four of the six regions. It turns out that pessimism is more dispersed across agencies and regions.

Next, I include a set of macroeconomic variables following Cantor and Packer (1996) and use a probit model to explain in which cases a rating agency shows a lower/higher

Table 24: No. of Positive Deviations towards other CRAs

This Table displays country-month observations in which a rating agency has assigned higher ratings to specific regions than its competitors. Due to the different scales, I compare Feri's ratings with those of the Big Three along the pre-defined three rating categories whereas I use the full rating scale for the Big Three.

| | (1) Feri Opt. | (2) S&P Opt. | (3) Moody Opt. | (4) Fitch Opt. | (5) Observations |
|---|---|---|---|---|---|
| EMU | 123 | 74 | 193 | 53 | 1,738 |
| North America | 0 | 12 | 98 | 0 | 486 |
| Asia & Pacific (industr.) | 45 | 51 | 221 | 158 | 810 |
| South America | 418 | 159 | 29 | 118 | 972 |
| Eastern Europe | 181 | 302 | 733 | 133 | 2,106 |
| Asia (em. markets) | 364 | 88 | 87 | 228 | 1,134 |
| Observations | 1131 | 686 | 1361 | 657 | 7,246 |

probability to deviate from its competitors:

$$Pr(pessimism_{ij,t}) = F(macro_{k,t}, region, default_k) + e_{ij,t}. \quad (6)$$

and

$$Pr(optimism_{ij,t}) = F(macro_{k,t}, region, default_k) + e_{ij,t} \quad (7)$$

Thereby, I can examine whether the descriptive findings hold when I control for country-specific variation in the macroeconomic stance. North American countries are not taken into account due to the low overall disagreement across agencies. Table 25 presents the probit results for a negative rating bias. I find that Feri shows a higher probability to downgrade Eastern European countries and to assign lower ratings to countries with higher per capita income. S&P's is more pessimistic on Eastern Europe and on EMU economies than the other Big Three. Moody's assigns more often negative ratings to South America, emerging Asia, countries with a default history and those with higher growth rates. The results for Fitch mirror the descriptive findings: I find no significant relation between the region and a higher frequency of stand-alone negative ratings. Here, I do not include the

Table 25: Probit Results for a Negative Bias

This Table displays the probit results for the probability to have a more pessimistic stance on a country's rating. The binary variable takes the value one in all years when the respective CRA assigns a lower rating (class) than competitors. Standard errors are clustered on the country level.

| | (1) Feri Neg. | (2) S&P Neg. | (3) Moody Neg. | (4) Fitch Neg. |
|---|---|---|---|---|
| GDP per Capita | 0.00358** | -0.00350** | -0.00501*** | -0.00127 |
| | (2.39) | (-2.08) | (-2.73) | (-0.62) |
| Government Debt | -0.00212** | 0.000729 | -0.00114 | -0.000175 |
| | (-2.10) | (1.26) | (-1.33) | (-0.24) |
| Fiscal Balance | 0.000112 | -0.00156 | -0.00315 | 0.000132 |
| | (0.02) | (-0.35) | (-0.49) | (0.03) |
| Inflation | -0.00439 | 0.00364 | 0.00134 | -0.00178 |
| | (-0.97) | (1.37) | (0.60) | (-0.70) |
| External Balance | -0.00569* | 0.00263 | -0.000562 | 0.000313 |
| | (-1.88) | (1.03) | (-0.22) | (0.13) |
| GDP Growth | -0.0132*** | -0.00250 | 0.00499* | -0.00189 |
| | (-3.34) | (-0.64) | (1.75) | (-0.43) |
| Industrialized | 0.0498 | 0.136* | 0.488** | 0.0219 |
| | (0.64) | (1.67) | (2.57) | (0.28) |
| Default History | -0.0632 | -0.0173 | 0.131*** | -0.0574 |
| | (-1.05) | (-0.39) | (3.05) | (-1.38) |
| EMU | 0.0359 | 0.107** | -0.119 | -0.0387 |
| | (0.71) | (2.23) | (-0.96) | (-0.59) |
| South America | 0.00188 | -0.0452 | 0.359*** | 0.0308 |
| | (0.02) | (-0.58) | (4.13) | (0.40) |
| Eastern Europe | 0.175** | 0.169*** | 0.190** | -0.00802 |
| | (2.41) | (2.72) | (2.21) | (-0.17) |
| Asia (em. markets) | | 0.159** | 0.234*** | -0.0274 |
| | | (2.03) | (2.63) | (-0.41) |
| Asia & Pacific (industr.) | | 0.0597 | -0.118 | 0.0356 |
| | | (1.11) | (-0.97) | (0.42) |
| Observations | 681 | 681 | 681 | 681 |
| Pseudo $R^2$ | 0.236 | 0.118 | 0.175 | 0.033 |

$t$ statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 26: Probit Results for a Positive Bias

This Table displays the probit results for the probability to have a more optimistic stance on a country's rating. The binary variable takes the value one in all years when the respective CRA assigns a higher rating (class) than competitors. Standard errors are clustered on the country level.

| | (1) Feri Pos. | (2) S&P Pos. | (3) Moody Pos. | (4) Fitch Pos. |
|---|---|---|---|---|
| GDP per Capita | -0.00992*** | -0.00216 | -0.00219 | -0.00545** |
| | (-3.00) | (-1.22) | (-0.90) | (-2.19) |
| Government Debt | 0.00292*** | 0.000302 | 0.00128* | 0.000351 |
| | (3.24) | (0.67) | (1.89) | (0.86) |
| Fiscal Balance | 0.00728 | -0.00143 | -0.00553 | 0.00502 |
| | (0.95) | (-0.28) | (-0.87) | (1.13) |
| Inflation | 0.00576* | -0.00110 | -0.00370 | 0.00513*** |
| | (1.79) | (-0.43) | (-0.71) | (2.82) |
| External Balance | 0.00199 | -0.00255 | -0.00864* | -0.00257 |
| | (0.54) | (-0.97) | (-1.75) | (-1.20) |
| GDP Growth | 0.00736* | 0.000687 | -0.00494 | -0.00445 |
| | (1.65) | (0.27) | (-1.04) | (-1.60) |
| Industrialized | -0.0833 | 0.148 | -0.300*** | -0.00600 |
| | (-0.71) | (1.63) | (-2.59) | (-0.08) |
| Default History | 0.0784 | 0.111** | -0.149** | 0.0244 |
| | (1.48) | (2.31) | (-2.17) | (0.70) |
| EMU | 0.174*** | 0.0343 | -0.0674 | 0.0776** |
| | (2.91) | (0.65) | (-1.00) | (2.34) |
| South America | 0.0931 | 0.172*** | -0.359*** | 0.0404 |
| | (1.14) | (2.64) | (-2.78) | (0.79) |
| Eastern Europe | -0.0818 | 0.165** | -0.0394 | -0.0310 |
| | (-0.93) | (2.50) | (-0.43) | (-0.52) |
| Asia (em. markets) | 0.0237 | 0.142* | -0.316*** | 0.0742 |
| | (0.27) | (1.70) | (-3.42) | (1.27) |
| Asia & Pacific (industr.) | 0.0674 | 0.0933 | 0.160 | 0.215*** |
| | (0.56) | (1.48) | (1.51) | (3.72) |
| Observations | 681 | 681 | 681 | 681 |
| Pseudo $R^2$ | 0.357 | 0.144 | 0.239 | 0.219 |

$t$ statistics in parentheses
* p<0.10, ** p<0.05, *** p<0.01

United States and Canada due to the lack of variation across agencies.

In Table 26, I show the probit results for a positive rating bias. Here, Feri is more generous to countries with large ratios of public debt and inflation. I do not find that a rating agency is characterized by marked optimism towards a specific region. This result stands in contrast to the descriptive findings when Feri often assigned more positive ratings to emerging markets than the Big Three. S&P's has more often an optimistic view on South America, Eastern Europe and Asia. They also frequently assign better ratings to previous defaulters than the other Big Three agencies. Moody's is only more optimistic towards countries with higher public debt ratios whereas Fitch assigns better ratings to the industrialized Asian & Pacific region and the euro area.

Taken together, in contrast to widespread political presumptions my results do not point to the existence of a home bias across the four rating agencies. If anything, Eastern European countries receive more often lower ratings by Feri than by the Big Three and S&P's assigns relatively low ratings to the euro area. South American countries are favored by S&P's and disadvantaged by Moody's. Overall, it seems that Feri assigns more often positive ratings to emerging markets (and less often negative ratings) whereas the Big Three are more often generous towards the advanced economies. Fitch seems to have a more neutral stance towards all regions except for the industrialized Asian & Pacific countries.
With respect to the economic determinants of disagreement, Feri seems to assign a lower weight on general government debt and pays more attention to short-term fluctuations of economic growth than the Big Three.

## 5.6 Rating Agency Interaction

Previously, I have explained the behavior of rating agencies by using economic, political or regional determinants. In this section, I take a closer look at the interaction between rating agencies. Like I have shown before, Feri disagrees with the Big Three in almost every second case whereas the Big Three disagree with each other only in every fifth case (see Table 17).

Table 27: Number of Up- and Downgrades

This Table illustrates the total number of up- and downgrades across a sample of biannual rating observations across the four rating agencies. "Followers" indicate the share of observations when at least one of the competitors (excluding Feri) has changed its rating in the same direction during the previous six months.

| | (1) Feri | (2) S&P | (3) Moody's | (4) Fitch |
|---|---|---|---|---|
| *Upgrades* | 185 | 136 | 104 | 126 |
| *% of "Followers"* | 10% | 23% | 42% | 28% |
| *Downgrades* | 175 | 78 | 48 | 73 |
| *% of "Followers"* | 17% | 35% | 33% | 38% |

Bartels and Weder di Mauro (2013) and Hill and Faff (2010) have shown how often rating agencies take a lead in times of crisis and how often they followed another agency.[38] In this chapter, I study whether it is possible to predict a rating agency's downgrade probability with an empirical model. I deliberately control for times of crisis and focus on the rating behavior in normal times. During times of crisis CRAs have changed their ratings frequently which makes it hard to differentiate between pure interaction behavior and common responses to crisis events such as a declaration of default.

My reasoning during normal times is as follows: If one of the Big Three agencies decides to downgrade a country's rating by at least one notch, sovereign issuers face higher refinancing costs when investors begin to sell their positions or when they issue new bonds. Accordingly, competitors follow with subsequent downgrades as a lower rating increases sovereign risk by itself due to regulatory provisions such as the Basel capital regulation. The following behavior is more pronounced for regulated agencies because they face higher

[38] This part significantly extends an earlier study by Bartels and Weder di Mauro (2013) in which I provide a first descriptive analysis of leader/follower behavior during selected crises in emerging markets and the euro area. Here, I extend the previous research by setting up a probit model which also includes potential interaction in normal times.

Table 28: Downgrade Interaction

This Table presents the probit results for downgrade interaction between rating agencies. The binary variable takes the value in all periods (bi-annual) if a rating agency assigns a downgrade to a country. The observations are restricted to those years in which at least one downgrade by at least one agency occurred. The lagged downgrade coefficients take the value one if a competitor has previously assigned a downgrade in the six months before and the agency under consideration has not.

| | (1) DG Feri | (2) DG S&P | (3) DG Moody | (4) DG Fitch |
|---|---|---|---|---|
| S&P follower | -0.272*** | | 0.0262 | 0.0587 |
| | (-3.33) | | (0.77) | (1.30) |
| Moody follower | -0.0490 | 0.0563 | | 0.0308 |
| | (-0.50) | (0.84) | | (0.49) |
| Fitch follower | -0.308*** | 0.109** | 0.0300 | |
| | (-3.81) | (2.07) | (0.79) | |
| CCR Change | -0.0117** | -0.0183*** | -0.00585** | -0.0142*** |
| | (-2.12) | (-5.00) | (-2.06) | (-3.97) |
| Emerging Market Crises | 0.111 | 0.283** | 0.167** | 0.263** |
| | (0.65) | (2.55) | (2.33) | (2.42) |
| GIIPS Crises | 0.117 | 0.201*** | 0.207*** | 0.155*** |
| | (1.23) | (3.98) | (5.73) | (2.97) |
| Observations | 428 | 428 | 428 | 428 |
| Pseudo $R^2$ | 0.078 | 0.185 | 0.196 | 0.135 |
| Share of pred. DG ($p > 0.5$) | 0.23 | 0.4 | 0.25 | 0.18 |

$t$ statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

costs of downgrades in the form of subsequent changes in bank ratings or rising interest rates in the economy. On the contrary, a smaller, less influential agency is not impeded by sovereign ceilings policy or other forms of unintended feedback.

In the following probit model I compute the probability of a negative/positive change in the rating within six months following the assignment of a lower rating by at least one other agency (*lagged DG/ lagged UG*). When considering downgrades, I control for the recent sovereign debt crises in emerging markets as well as the crises in the GIIPS economies. I also control for external credit risk shocks of common knowledge reflected by the semi-annual change in the Institutional Investor's Country Credit Rating (CCR). The inclusion of this variable helps to account for situations when rating agencies respond together to previously observable external shocks. Table 27 illustrates the number of up- and downgrades for each rating agency and shows the share of rating changes when a competitor has assigned a change in the same direction during the six previous months. These preliminary results show that the Big Three respond to each other in 23 to 42 percent of the change observations. Feri follows the Big Three less often which is probably due to its higher volatility. In the following, I test in three specifications for each agency whether the Big Three have a statistically significant propensity to follow each other. I also test in a fourth specification whether Feri responds to the Big Three.

$$Pr(up-/downgrade_{i,t}) = F(up-/downgrade_{j,t-1}, crisis_{k,t}, ccr_{k,t}) + e_{i,t} \tag{8}$$

Table 28 presents the probit results for downgrade interaction across agencies. In the case of Feri (column (1)), i observe that Feri's downgrades are not related to the rating actions of the Big Three. On the contrary, the coefficients suggest that a downgrade by Feri is even less likely when the Big Three assigned a downgrade in the previous six months. Overall, the model is not able to predict Feri's downgrade probability. Even in times of crisis in the GIIPS and in emerging markets, Feri does not assign more downgrades than usual.

In case of the Big Three, I observe that all interaction coefficients are positive. However, only the coefficient for S&P following Fitch is significant. Besides, the Big Three show a

Table 29: Upgrade Interaction

This Table presents the probit results for upgrade interaction between rating agencies. The binary variable takes the value in all periods (bi-annual) if a rating agency assigns an upgrade to a country. The observations are restricted to those years in which at least one upgrade by at least one agency occurred. The lagged upgrade coefficients take the value one if a competitor has previously assigned an upgrade to the same country in the six months before and the agency under consideration has not.

| | (1) UG Feri | (2) UG S&P | (3) UG Moody | (4) UG Fitch |
|---|---|---|---|---|
| Feri follows S&P | -0.203*** | | | |
| | (-3.93) | | | |
| Feri follows Moody | -0.167*** | | | |
| | (-3.01) | | | |
| Feri follows Fitch | -0.178*** | | | |
| | (-3.28) | | | |
| S&P follows Moody | | 0.0320 | | |
| | | (0.71) | | |
| S&P follows Fitch | | 0.139*** | | |
| | | (3.42) | | |
| Moody follows S&P | | | -0.00677 | |
| | | | (-0.18) | |
| Moody follows Fitch | | | -0.00721 | |
| | | | (-0.19) | |
| Fitch follows S&P | | | | 0.131*** |
| | | | | (3.52) |
| Fitch follows Moody | | | | 0.00292 |
| | | | | (0.06) |
| CCR Change | -0.00287 | 0.00880** | 0.000473 | 0.0134*** |
| | (-0.63) | (2.02) | (0.12) | (3.03) |
| Observations | 628 | 628 | 628 | 628 |
| Pseudo $R^2$ | 0.073 | 0.025 | 0.000 | 0.036 |
| Share of pred. UG (p>0.5) | 0 | 0 | 0 | 0 |

$t$ statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

higher probability to assign a downgrade in times of crisis and after negative shocks to the Country Credit Rating. Yet, due to the small number of rating change observations in the overall sample, the model can only predict between 18 and 40 percent of the downgrades.

In Table 29, I present the results for upgrade interaction. I find that Feri assigns upgrades in a rather anti-cyclical fashion whereas S&P and Fitch have a higher degree of interaction. I also observe that positive shocks to the CCR increase the upgrade probability among two of the Big Three, however the coefficients are much smaller relative to those in the probit model for downgrade interaction. Add to this, the model does not predict the upgrade propensity of agencies at all which is in line with former theoretical and empirical studies which find that upgrades usually do not come as a surprise to market participants because they are based on public information (Hand *et al.* (1992), Boot *et al.* (2006)). Also, rating agencies should be less reluctant to assign upgrades since they are not constrained by sovereign ceiling policies.

To sum up, I conclude that Feri seems to be more independent in its decisions to downgrade a country. The coefficients for Feri are even negative whereas I find positive and significant results for the Big Three. One explanation is that the smaller European agency uses a different rating model and that it is more independent than the Big Three. Second, it seems that following behavior is more likely to occur during times of recessions rather than in times of economic booms.

## 5.7 Concluding Remarks

The purpose of this chapter is to investigate the question why rating agencies have different perceptions of country credit risk. After exploring the rating behavior of four agencies I find that belonging to a particular world region or the membership in the European Monetary Union neither leads to a higher split probability nor does it explain a rating if I control for other macroeconomic and political determinants.

Besides, the subscriber funded European agency Feri seems to have a stronger short-term focus (economic growth, fiscal balance, external balance) whereas the Big Three put more weight on long-term macroeconomic developments (GDP per capita, Government

Debt). This can serve as an explanation why Feri tends to change its ratings more often than the Big Three.

My findings further suggest that sovereign ratings are not shaped by the origin or the language of the rating agency. Thus, the issuer-pays model does not constitute a conflict of interest for sovereign ratings. I argue that this is due to the fact that fees for sovereign ratings are relatively low compared to for instance structured finance products. Also, the agencies produce unsolicited ratings [39]. However, I find that CRAs use different rating models to assess a country's default risk. As I have stated above, the results suggest that Feri puts more weight on short-term variables.

Finally, I have explored whether rating agencies respond to the actions of their competitors. The probit results indicate that the Big Three have a higher propensity to follow each other than Feri. The descriptive results show that the Big Three follow each other in every third case on average while Feri tends to be more independent (10-17% follower decisions). Also, the probit results support this finding with the follower coefficients even being negative and significant. The probit results for downgrades largely support the empirical findings whereas the upgrade results cannot be explained by following behavior. This result is related to earlier findings by Hand *et al.* (1992) who show that the impact of downgrades on markets is much stronger than the response of interest rates on upgrades. The authors conclude that downgrade decisions include more new information than upgrades.

One may conclude from this that the inclusion of sovereign ratings in regulatory frameworks puts large and influential agencies under pressure to be reluctant towards rating changes until one of the competitors starts to take action. I have shown that this behavior is especially pronounced in times of crisis (in the euro area and in emerging markets) which might contribute to explain the pro-cyclical downgrades that I have seen in the past.

To conclude, my analysis does not support the notion that rating agencies have deliberately caused or at least aggravated the sovereign debt crisis in the euro area and might thus contribute to soothe concerns of European politicians. However, the inclusion in regulatory frameworks and the sheer size of agencies may have led to some unintended pro-cyclicality.

[39] Feri produces only unsolicited ratings and the Big Three also have a share of 10-20% unsolicited ratings across all country groups and regions.

Of course, I do not claim that the same applies to asset classes such as structured finance products or corporate bonds where the issuer-pays model is of much more importance.

## 5.8 Appendix to Chapter 5

Table 30: Country Table 1999-2012

| *Country Group* | (1) *Advanced Countries* | (2) *Emerging Countries* |
|---|---|---|
| | Australia | Argentina |
| | Austria | Brazil |
| | Belgium | Bulgaria |
| | Canada | Chile |
| | Denmark | China |
| | Finland | Colombia |
| | France | Croatia |
| | Germany | Czech Republic |
| | Greece | Egypt |
| | Ireland | Estonia |
| | Italy | Hungary |
| | Japan | India |
| | Netherlands | Indonesia |
| | New Zealand | Israel |
| | Norway | Latvia |
| | Portugal | Lithuania |
| | Singapore | Malaysia |
| | South Korea | Mexico |
| | Spain | Peru |
| | Sweden | Philippines |
| | Switzerland | Poland |
| | U.K. | Romania |
| | U.S. | Russia |
| | | Slovakia |
| | | Slovenia |
| | | South Africa |
| | | Thailand |
| | | Turkey |
| | | Ukraine |
| | | Venezuela |
| | | Vietnam |

classification according to the IMF definition

Table 31: Rating Transformation

| (1) *Rating Notation* | (2) *Feri* | (3) *S&P/Fitch* | (4) *Moody's* |
|---|---|---|---|
| AAA/AAA/AAa | 9 | 17 | 17 |
| AA/AA+/Aa1 | 8 | 16 | 16 |
| AA/AA/Aa2 | 8 | 15 | 15 |
| A/AA-/Aa3 | 7 | 14 | 14 |
| B+/A+/A1 | 6 | 13 | 13 |
| B+/A/A2 | 6 | 12 | 12 |
| B/A-/A3 | 5 | 11 | 11 |
| C/BBB+/Baa1 | 4 | 10 | 10 |
| C/BBB/Baa2 | 4 | 9 | 9 |
| C/BBB-/Baa3 | 4 | 8 | 8 |
| D/BB+/Ba1 | 3 | 7 | 7 |
| D/BB/Ba2 | 3 | 6 | 6 |
| D/BB-/Ba3 | 3 | 5 | 5 |
| D-/B+/B1 | 2 | 4 | 4 |
| D-/B/B2 | 2 | 3 | 3 |
| D-/B-/B3 | 2 | 2 | 2 |
| E/CCC+/Caa1 | 1 | 1 | 1 |
| E/CCC/Caa2 | 1 | 1 | 1 |
| E/CCC-/Caa3 | 1 | 1 | 1 |
| E-/CC/Ca | 1 | 1 | 1 |
| E-/C/Ca | 1 | 1 | 1 |
| Default/Default/C | 1 | 1 | 1 |

Rating transformation based on the Feri translation Table

Sources: Feri Rating GmbH, Standard & Poor's, Moody's, Fitch

Table 32: Classification of Ratings

| | (1) S&P | (2) Mooody's | (3) Fitch | (4) Feri |
|---|---|---|---|---|
| $AAA/Aaa/AAA$ | 179 | 191 | 169 | 142 |
| $AA/Aa/AA$ | 95 | 89 | 104 | 118 |
| $A/A/A-B$ | 122 | 129 | 117 | 145 |
| $BBB/Baa/C$ | 134 | 122 | 141 | 172 |
| $BB/Ba/D$ | 113 | 112 | 110 | 52 |
| $B/B/D-$ | 43 | 50 | 43 | 34 |
| $CCC-D/Caa-D/E-E-$ | 16 | 8 | 11 | 39 |

Table 33: Descriptive Statistics

| | (1) Overall Sample | (2) Non-Split | (3) Split Feri-Big3 | (4) Split Big3 |
|---|---|---|---|---|
| *GDP per Capita* | 19.000 | 27.205 | 14.265 | 15.848 |
| *Government Debt* | 52.6 | 58.8 | 48.3 | 50.8 |
| *External Debt* | 64.2 | 36.1 | 84.7 | 73.2 |
| *Political Stability* | 0.92 | 1.04 | 0.98 | 0.69 |
| *Government Effectiveness* | 0.82 | 1.18 | 0.6 | 0.72 |
| $\Delta$ *Country Credit Rating* (*CCR*) | 4.58 | 4.17 | 5.12 | 5.02 |
| *Default History* | 221 | 47 | 100 | 74 |
| *European Monetary Union* | 137 | 63 | 51 | 23 |

# 6 Does the Rating Industry Need Further Reforms?

## 6.1 Introduction

In the previous chapter, I found no indication that CRAs systematically rate particular sovereigns (for instance the home region) better than others. However, the result indicate that the Big Three seem to follow each other relatively often in the case of downgrades. In contrast to Feri, the ratings of the Big Three are included in many regulatory frameworks and thus, the agencies may often feel pressed to follow competitors. In this chapter, I discuss potential regulatory reforms to mitigate pro-cyclical rating decisions.

Apart from the behavior of sovereign ratings, I have pointed to potentially misleading incentives in the second chapter of this thesis. The issuer-pays structure and related problems such as revolving doors appeared specifically on the market for structured finance products. With the outbreak of the financial crisis in 2007, these problems became visible when investors recognized that underlying loans of structured products (mostly in the form of subprime mortgages) were not worth a AAA rating.
In their response to the recent crises, the U.S. Government and the EU Commission have initiated major regulatory reforms for the rating industry in order to enhance competition and transparency. In 2006, the U.S. Congress passed the Credit Rating Agency Reform Act. Following the financial crisis, these new rules have been further extended by the Dodd-Frank Act signed in July 2010. The EU introduced a regulatory framework for rating agencies in 2009 (Regulation No 1060/2009) which was also followed by an amendment passed in June 2010.

Still, critics claim that the new framework is not sufficient to eliminate the incentive problems, in particular conflicts of interest (de Haan and Amtenbrink (2011), White (2010), Opp *et al.* (2013)).

The idea of this chapter is to provide a review of the regulatory reforms in light of the previously discussed problems such as the issuer pays structure or revolving doors. Thereafter, I will present and discuss potential amendments to the current institutional framework. Here, the major focus is on the establishment of an auctioneer between CRAs and issuers to eliminate conflicts of interest and to enhance competition (on the market for

structured finance products). This idea is complemented by a proposal for a more decentralized supply side. Further, I discuss whether the centralization of rating publication may help to mitigate pro-cyclical announcements (for sovereign ratings). Finally, this chapter examines whether the proposed amendments may contribute to an increased utilization of user-paid rating services.

I start with an overview of the recently passed reforms for the rating industry in the United States and Europe. In this context, I will also review the alternative compensation models for the rating agencies which have been proposed by the U.S. Government Accountability Office (GAO). In the main part, I will focus on the potential supplements to the existing regulation before I conclude.

## 6.2 Regulatory Initiatives

### 6.2.1 Rating Agency Regulation in the EU

In September 2009, a new regulatory framework for credit rating agencies has been adopted by the European Parliament and the Council (Regulation No. 1060/2009). In June 2010, the rules have been supplemented by an amendment. Taken together, the legislation is centered around the registration procedure, rules of conduct and the supervision of registered CRAs (de Haan and Amtenbrink (2011)).

The rules of conduct under Regulation No. 1060/2009 are mostly self-regulating provisions, adopted from the rules of conduct of the International Organization of Securities Commissions (IOSCO-code). They are based on voluntary compliance and do not include any enforcement mechanisms (de Haan and Amtenbrink (2011)). Regulation 1060/2009 has transferred some of the voluntary provisions into public law, such as the publication of changes in methodologies and rating models or the disclosure of business activities related to the rating process. In addition, the regulation comprises provisions for the relationship among the supervisory authorities (Member States and the European Securities and Markets Authority (ESMA)). Finally, it includes detailed requirements for the registration process of CRAs, in particular the provision for foreign rating companies to establish a subsidiary on European territory (Commission (2010)).

In the Regulation Amendment to No. 1060/2009, the focus was primarily on more transparency to enhance competition among CRAs. The administrator (ESMA) was advised to facilitate the establishment of newly registered agencies by providing private firm information for unsolicited ratings. In addition, national entrants shall be supported by the member states to stimulate competition: Market entry for small and medium-sized agencies shall be enhanced by encouraging firms to collaborate on a common rating forum. Also, the EU Commission considers the creation of a European Independent Rating Agency with a public/private structure. The rating foundation shall provide more independent and reliable ratings for Europe since the market is currently dominated by the Big Three which have their headquarters in the U.S. All those measures have indeed facilitated the entrance of new firms on the rating market, however, until today their market share remains small compared to that of the Big Three (de Haan and Amtenbrink (2011)).

Furthermore, the EU has decided to deal with the phenomenon of rating inflation by authorizing ESMA to monitor and assess rating agencies' performance. However, this ex-post assessment does not prevent a CRA from inflating their ratings initially (Mathis *et al.* (2009)). Even if the supervisor penalizes misbehavior, the horse has already left the barn. This was shown by Mathis *et al.* (2009) and Bar-Isaac and Shapiro (2013) who claim that reputation concerns are dominated by short-term profit-oriented behavior. Add to this, it is difficult to measure performance in advance of maturity as risks have not yet materialized.

The regulation also entails detailed prescriptions to prevent conflicts of interest as for instance the implementation of a rotation system between analysts and rating committees. In addition, at least one third of the agency's administrative and supervisory body is not allowed to participate in rating activities. Still, these extensive and detailed provisions cannot yet fully prevent the emergence of strong relationships between issuer and rating agency as the latter is still being paid by the former. What is more, the new regulation lacks precision, enabling firms to avoid those rules (Amtenbrink and De Haan (2009)).

Another proposal by the EU claims the wider use unsolicited ratings. The regulators argue that the mandatory disclosure of firm information shall lead to more ratings per rated product. Thereby, competition will be enhanced and the agencies shall be prevented

from inflating their ratings. However, Becker and Milbourn (2011) show that a rising number of market participants in the rating industry will not necessarily lead to better results when firms are still able to shop for ratings. In addition, it seems difficult to decide which information the firm has to reveal to the public. Firms may also argue that the mandatory disclosure of private information leads to an uncontrolled circulation of intellectual property (White (2010)).

Amtenbrink and De Haan (2009) bring up a more general critique on the reforms: They claim that the current regulatory framework even worsens the situation compared to the unregulated past. In their view, the EU tries to re-establish trust in the rating industry by pointing out its achievements in terms of supervision and transparency. However, since the major problems (i.e. conflict of interest, use of ratings in regulation) have not been eliminated, investors are endangered to walk right into the same trap as before simply because they trust in the seemingly disciplining effect of the new framework.

### 6.2.2 Rating Agency Regulation in the U.S.

In 2006, the U.S. Congress enacted a reform for the rating industry to "improve ratings quality for the protection of investors and in the public interest by fostering (...) competition in the credit rating agency industry" (U.S. Government (2006)). Further steps were laid down in the Dodd-Frank Act passed in 2010 (U.S. Government (2010)). Following the Rating Agency Act in 2006, the U.S. Government Accountability Office (GAO) was put in charge to prepare a study on the impact of the Act concerning independence, competition, transparency, feasibility, market acceptance and choice, and oversight (GAO (2012)). In its report to congressional committees, the GAO came up with a number of alternative compensation models which will be discussed later in this chapter.

The Rating Agency Act of 2006 revised the conditions for the registration of NRSROs and provided more detailed requirements concerning transparency issues. Most importantly, the SEC was advised to set up rules to facilitate the registration process for new NRSROs. In addition, it was mandated to formulate provisions in order to deal with conflicts of interest and to foster transparency. Thus, the SEC formulated a new law for NRSROs by not allowing them to issue ratings for products they had helped to design.

Further, rating analysts are prohibited to be involved in pricing decisions. Finally, registered CRAs are obliged to provide details of their methodologies, assumptions and track records to the SEC (White (2010)).

Additional binding requirements have been set out in the Dodd-Frank Act: The first objective is to prevent employees from inflating ratings in their own interest. Compliance shall be ensured by the managing board ("look-back review"). Job rotation between issuers and credit rating agencies has to be monitored closely and reported to the SEC. With the Dodd-Frank Act, the Congress has also imposed additional requirements to the issuers of structured finance products. For instance, they have to publish standardized information about the underlying loans of the rated product. This measure intends to reduce the reliance of investors on credit ratings (U.S. Government (2010)).

Another provision of the Dodd-Frank Act advises the SEC to hire smaller agencies for the creation of secondary ratings. The newly registered agencies shall get access to firm information in order to provide unsolicited ratings. However, it remains unclear who will be obliged to pay for these ratings and in which way smaller rating agencies should be enabled to acquire the necessary resources to provide a credible and qualitative alternative to the established agencies (SEC (2012)).

In fact, what has been done is similar to the reforms in the EU. Regulators try to deal with conflicts of interest by facilitating the registration procedure for new entrants and by setting stricter rules to the NRSROs regarding their incentives to inflate ratings. However, White (2010) claims that the new rules in the U.S. are subject to the same problems as the provisions in the EU: Entry barriers continue to exist, conflicts of interest have not been credibly removed, and the mandatory disclosure of firm information may lead to an erosion of firms' intellectual property.

It is also remarkable that as part of the new bill the Congress has instructed the GAO to set up alternative proposals in order to prevent future conflicts of interest in the rating industry. This mandate leads observers to believe that the regulators were not convinced by their own reform. Following, I shortly discuss the GAO ideas which have been summarized in a report to Congress in January 2012 (GAO (2012)).

### 6.2.3 Alternative Compensation Models (GAO Report)

The GAO has published seven alternative compensation models. They either follow the issuer-pays or investor-pays approach or they present a mixture of both. The proposals also differ in the design of third-party institutions, the allocation of rating mandates, fee determination, and performance monitoring. In the following, I compare the presented models along those criteria and summarize major comments from market participants which have been published by the SEC (SEC (2012)). A summary of the proposals is presented in Table 34 of the Appendix. I exclude an analysis of performance monitoring, since the proposals are similar to recent regulatory innovations.

**Third-party institutions** All GAO proposals (except the Investor-Owned CRA approach) introduce a third-party in the form of a governmental agency or an independent body. Their main tasks are the allocation of rating mandates, fee determination and performance monitoring.

The third-party institution has a central role in the credit rating process: First, it decides about the number of NRSROs (registration process) and the allocation of mandates. Second, it has to monitor the rating agencies' performance and is responsible for sanctions. Finally, a third-party institution may even be advised to set rating fees.

The formation of an independent body has a major advantage, namely to break the relationship between CRAs, issuers and investors. But it is also subject to criticism (SEC (2012)): As an independent institution, the administrator cannot be held accountable by the public and might be perceived as non-democratic. If the administrator is designed as a dependent body of the government, one may argue that decisions will be biased in the direction of the government's interests, i.e. to protect nationally important companies.

One solution of this problem could be the assignation of an explicitly defined mandate to the SEC or ESMA as independent boards. For instance, they are advised to guarantee a transparent and credible rating process. The administrator's management should then be held accountable for obvious violations by the Congress/Parliament. The foundation of competition authorities or antitrust divisions have turned out successful in the past and may serve as a role model.

Irrespective of the degree of independence, the complexity of tasks calls for highly qualified staff: First, employees must be able to assess the adequacy of rating methods and their applicability during the rating process. Second, they have to assess the agencies' performance on a regular basis. And third, they might be responsible for the determination of rating fees (as has been argued by some of the GAO proposals) so that agencies earn an appropriate return for their activities. Still, important questions remain unanswered: How many additional resources are needed in the rating process? Which consequences for prices and supplied quantities of structured finance products can be expected? How to recruit qualified personnel with sufficient qualification (SEC (2012))?

**Allocation of rating mandates** The selection of NRSROs is another crucial feature in the credit rating process: Only the ratings of registered and certified CRAs are regarded as eligible for regulatory purposes. Thus, it is almost impossible for a non-registered rating agency to gain market shares. But even if a CRA obtains the NRSRO certificate, it will remain difficult to acquire rating mandates in the current setting due to a lack of reputation for any newcomer. The alternative compensation models make several proposals to facilitate market entry for newcomers: Random assignment by the administrator, designation by investors, implementation of a bidding process or allocation of periodic mandates.

If mandates are assigned by random, it will be assured that no long-term relationship between issuer and rating agency can be built up (reduces the revolving door problem described in 2.4). At the same time, rating quality may erode because agencies know for sure that they will receive a mandate, irrespective of their expertise (SEC (2012)). Add to this, they have no possibility to use experience from the past.

In the designation model, CRAs are directly recruited by investors. On the one hand, this procedure will strengthen the position of investors in the rating process. On the other hand, rating agencies are then supposed to provide ratings with no guarantee that these will later be acquired by an investor. Hence, rating agencies have incentives to invest only little research effort because of the ex-ante uncertainty to receive compensation afterwards (SEC (2012)).

In the Alternative User-Pays Model, creditors have to contribute upfront fees to a

central fund before a product is issued. NRSROs are then allowed to bid for a rating mandate which is assigned conditional on the price, extent of diligence by the agency and the quantity of firm information that has to be provided. By implementing a bidding process, competition between agencies is enhanced and at the same time the regulator ensures rating quality. Still, a central role is assigned to the latter who has to trade-off the lowest bid against the extent of diligence offered by the bidder.

Finally, the allocation of periodic mandates ensures that a rating agency has no guarantee to receive a mandate until maturity of the product. Instead, the periodic reallocation of mandates will incentivize agencies to provide accurate ratings. A major problem here is that the initial mandate is allocated by random and is therefore subject to the same drawbacks as in the random assignment model.

**Fee determination** The alternative compensation models offer two types of fee determination: administrative price setting or market-based determination. The latter is only applied in the investor-pays proposal. However, as I have shown in section 6.1, this model is subject to problems of asymmetric information, namely free-riding incentives and adverse selection (Kashyap and Kovrijnykh (2013), Leland and Pyle (1977)). Then again, administrative price-setting as an alternative requires a lot of information about the supply and demand side of the market. Still, the GAO proposals provide little clarification concerning the determination of those fees. Some authors state that fees shall either rely on the respective type of bond/security or on the complexity of products. Others claim that fees shall be determined by historic and projected volumes of primary issuance and secondary market trading.

After all, the process of fee determination is complex and resource-intensive. This may again lead to higher prices for issued products and possibly to a lack of transparency. Finally, the administrator will always be subject to criticism and pressure by both market sides due to the rather vague suggestions concerning determinants of the fee-setting (SEC (2012)).

## 6.3 Potential Supplements to the Current Regulation

Although regulators have taken several initiatives in order to re-establish investors' confidence in the quality of ratings, the reforms are not yet completed. In particular, the regulatory inclusion of ratings and the issuer-pays structure have largely been left untouched. In the following, I combine several existing proposals for the rating industry to address the ratings for structured finance products where the issuer-pays structure is of particular importance. Specifically, I discuss a combination of three pillars: First, the introduction of auctions for rating mandates. Second, a registration process to allow for the emergence of a more decentralized supply side and third, a revised publication process to reduce pro-cyclical volatility on financial markets. Whereas the first two pillars refer to the ratings for structured finance products, the revised publication process applies especially to sovereign ratings.

### 6.3.1 The Introduction of Rating Auctions

Bolton *et al.* (2012) claimed that the issuer-pays problem can be solved when issuers have to expend upfront payments before CRAs do their initial analysis. The idea is based on the so called "Cuomo plan" which is a voluntary agreement between the New York State Attorney Andrew Cuomo and the Big Three that the latter receive rating fees from the issuers before their initial analysis. The authors claim that upfront payments will eliminate incentives to inflate ratings.
However, the Cuomo agreement does not exclude rating shopping by issuers who are still allowed to choose freely among a list of registered CRAs. Another problem emerges when the relationship between firms and rating agencies goes beyond rating activities. In this case, both parties may use other channels in order to reward inflated ratings.

As shown in section 6.2.3, the GAO proposals have set out another way of eliminating conflicts of interest: In the alternative compensation models, they introduce an independent third-party administrator to serve as a buffer between issuer and rating agency. For instance, the Random Selection Model suggests the creation of a clearinghouse which assigns rating mandates by applying a random procedure. First, issuers have to pay a rating fee depending on the type of security issued to the clearinghouse. Subsequently, the latter

allocates these contributions to mandated rating agencies. Similar proposals are mentioned in the Stand-Alone Model, the Designation Model and the Issuer-and-Investor-pays Model (see Table 34 in the Appendix to this chapter).
The main advantage of a third-party administrator is the elimination of incentives to inflate ratings or to shop for ratings. Further, rating agencies do not have to worry about their business model since the fees are still contributed by the issuer and not by the user of a rating. However, it remains to be explained how a third-party institution will determine the rating fee. In general, market pricing should be favored in order to ensure market clearing. This is not the case when a the third-party administrator has to set rating fees.

An alternative solution is the introduction of a market mechanism such as the third-party administrator organizing auctions. Based on auction platforms, initial rating mandates for every new product (or group of products) to be issued are traded. Registered CRAs (for this product category) will then offer their bids to the administrator. The three (or more) lowest bids will be forwarded to the issuer who has either to pay the initial fee according to the bids or may withdraw his offer. A second upfront contribution has to be paid into a fund similar to the "Cuomo plan" to finance the creation of subsequent ratings until maturity of the product. The size of those upfront payments will be subject to the size of the initial fee and they are conditional on maturity. The variable part will be paid out on an annual basis until maturity.

The set-up ensures that rating agencies are indirectly held responsible in the case of defaults by keeping the variable part of their rating fees. This framework is analogous to the current compensation schemes for supervisory board members and the management of listed companies: Incumbents receive a fixed salary and a variable part whereby the latter is conditional on the long-term stock performance of the company. Thereby, managers and board members shall have less incentives to reap short-term profits at the expense of the company's future value. Likewise, the payout of rating fees may also be divided into two parts: A fixed component will be disbursed with the initial rating creation whereas a smaller second component will be paid out annually for subsequent rating updates. For the case that the issuer becomes insolvent, the variable part is kept in the Fund be it that the rating agency did not predict the default. Equivalently, the rating agency does not

receive the annual component in those years when it predicted a default which did not occur. Thereby, the regulator prevents agencies to assign low ratings as to insure against the risk of default. This incentive structure may contribute to a stronger commitment of the CRA to its mandate.

The auction-based framework has a number of implications: First, it mitigates the misallocation of mandates due to an imperfect price-setting. Especially for complex securities, it seems to be difficult for a regulatory authority to set market-clearing fees for the rating production. In my view, the determination of rating fees is of crucial importance since it determines the final price and supply of structured finance products. Otherwise, if the rating fee is set by the regulator, one may further expect issuers and CRAs to exert more pressure on the administrator than in the case of a market-based determination. Here, increasing rating fees and rising prices for structured securities simply reflect the research effort in order to provide independent and sophisticated information about the default risk of complex products.

Second, the auction-based framework ensures competition between the rating agencies. A bidding process will take place on an auction platform giving access to every registered agency. New issues are displayed together with information about maturity, underlying bonds and other concomitant product characteristics. One may criticize that the auction will be won by those agencies that put the least effort in rating activities because the lowest bids win. However, the CRAs have strong incentives to keep their initial mandate, since they have already undertaken research effort to rate this security in the first place (sunk costs). Also, in contrast to the random-selection of agencies, a bidding process ensures that registered CRAs continue to innovate and improve their rating methodologies. By random appointment, the agencies know for sure that they will receive a mandate. Hence, they have fewer incentives to invest in individual research effort than in the case of a bidding process. Finally, the annual payout of a performance-related part of the fee should contribute to self-discipline.

However, the auction process has also disadvantages: First, the proposal to split the rating fee in a fixed and a variable component is not always performance-related. In cases of issuers not having defaulted, the rating fees are paid out in full despite possible differences

in the relative performance of mandated agencies. However, who should then be in charge to assess the probability of default before maturity? A truly objective performance measure seems to be difficult to obtain as the true default probability is not predictable. Therefore, the proposed idea uses the only objective criterion for rating performance, namely default or non-default. In order to improve performance, one may discuss the introduction of a sanction for high rating volatility (for instance frequent changes of more than one notch). This would ensure the long-term orientation of credit rating agencies regardless of business cycles. Gaillard (2014) points out that one important merit for regulators is the stability of ratings relative to the more volatile market indices. A major drawback of this proposal is that CRAs become too reluctant to change their rating although they may consider a rating action to be necessary.

Second and even more important, issuers may fear that the mandated agencies do not have the desired reputation or expertise to rate them. For this reason, the regulator has to ensure that only those CRAs have access to the auction process which provide the necessary resources in terms of staff size and expertise. Accordingly, I will proceed with a discussion of the registration process in the following section.

### 6.3.2 Towards a Decentralized Supply Side

One idea to increase the quality of ratings is presented by Goodhart (2009) and Eijffinger (2012) who claim that the rating industry needs a more decentralized structure. The authors suggest that more competition on the supply side would lead to a better use of comparative advantages by enabling small agencies to establish reputation in specific niches. This reform would entail consequences for the industry and the issuers alike: First, with a higher percentage of small specialized agencies in the market, the industry will be more dispersed across product categories and regions. This may lead to negative scale effects and therefore higher rating fees, especially when complex products require a more intensive use of costly resources. Second, decentralization may facilitate market entry for small firms with a special focus on certain products when they provide better expertise on specific issuance than the agencies trying to supply credit ratings for the entire world across all asset classes.

In contrast to other proposals (Goodhart (2009) and the Dodd-Frank Act (15E(w) system)) I suggest that rating agencies with no past performance record should also be allowed to apply for registration. In order to control for a sufficient rating quality, more emphasis is then to be put on staff requirements (amount of resources used to rate a product with respect to staff quality). Hence, a rating agency may only apply for registration to rate a specified list of products (MBS issued in specific regions, etc.) and will be given a license conditional on the supplied resources and the provided methodology. The provision of sufficiently qualified staff will also contribute to reduce revolving-door effects. If a registered agency loses part of its staff, it has to reduce the number of rating mandates in order to remain eligible for the continued rating production. Moreover, if rating agencies are faced with wage pressure (for example due to higher remuneration in investment banks) they are able to adjust their fees in the auction process. Here, regulator has a central role in the process of rating creation: First, (s)he is required to ensure the sufficient endowment of agencies and second, (s)he has to monitor whether the CRAs keep their staff after receiving the mandate.

In order to deal with the varying complexity across products, Goodhart (2009) claims that the regulator should also come up with an uncertainty measure. The idea is that ESMA and SEC take advice to categorize different asset classes according to their opaqueness with respect to risk.[40] This measure shall incentivize investors to obtain more information about specific products and give them an impression about the true cost of rating production. Another advantage of the uncertainty measure is the increase in comparability across asset classes. To date, this comparability is facilitated by the Big Three rating agencies who offer rating services across all rating classes. By implementing an uncertainty measure they would still be allowed to take part in the rating process. Nevertheless, it is also possible that certain product categories will be rated exclusively by smaller newcomers. The current regulatory framework in Europe has already led to the emergence of new competitors: ESMA currently lists 24 registered Credit Rating Agencies (excluding the Big Three), with four newcomers each in 2013 and 2014.[41]

[40] One may take the results of the study by Morgan (2002) as a benchmark.

[41] See this link for a list of currently registered and certified credit rating agencies: `http://www.esma.europa.eu/page/List-registered-and-certified-CRAs`

Rating quality will thus be raised by several qualifications of the current regulation: First, newcomers will be given better access to registration as a certified CRA by setting incentives for applications to particular niches and by the elimination of preconditions such as past track records. Second, in accordance to Goodhart (2009) the administrator is supposed to publish an uncertainty measure for the different product categories. On the one hand, this will reduce the reliance of investors on single ratings and on the other hand increase their demand for a broader risk analysis of structured finance products. Third, the mandatory provision of qualified staff for rating purposes ensures that CRAs will only get access to the rating process if they can demonstrate a sufficient endowment of resources exclusively dedicated to rating purposes.

The central role of the administrator in the registration process has also an important drawback: It requires a transparent and comprehensible definition of the staff requirements in the registered agencies. This is especially important as it affects the rating fee and finally, the price of the rated product to a significant extent. In my view, the requirements have to be determined by policymakers because they ultimately depend on the degree of desired investor protection. Besides, the regulator is responsible for the registration already, however, this function becomes even more important when issuers have no longer a say in the selection of their raters.

### 6.3.3 Centralized Publication of Ratings

In times of financial distress, rating agencies have often contributed to an aggravation of crises by serial downgrades. During the recent euro turmoil, I have seen numerous announcements within a few months (see my empirical analysis for sovereign ratings in the previous chapter). This behavior is especially harmful to issuers when market volatility increases due to the continuous flow of rating news in an already troubled market environment.

One solution to this problem is that the three mandated CRAs send their ratings to the regulator who is then supposed to publish the median of submitted ratings. A median puts less weight on outliers than the average which ultimately puts less pressure on the mandated agencies. The idea is similar to that proposed by Goodhart (2009) suggesting

that larger banks should publish their ratings via an independent assessment body similar to the publication of LIBOR estimates. Publication dates are subject to the size and number of rating changes by the commissioned agencies. The third-party administrator should be enabled to publish early warnings (comparable to the watch announcements by the Big Three) well in advance of presumable rating changes to prevent excessive market volatility.

The advantages of this procedure compared to the current framework can be summarized as follows: First, the probability of a strong and unexpected market reaction is reduced if the auction-based rating will be published as a median at pre-defined dates (for instance at the end of every month). Second, the individual influence of a single rating agency on financial markets is mitigated. Consequently, issuers have less incentives to exert pressure on registered agencies and investors receive more reliable information by an independent body.

A major drawback of a centralized publication process may be seen in the protraction of the information flow between agencies and investors. For instance, the unexpected election of a new government may lead a rating agency to change its opinion on the sovereign's creditworthiness. If this rating change is only published with a delay, one may perceive the assessment as useless because markets have already priced in the new information. However, if the sovereign rating is perceived as a long-term assessment of country risk irrespective of short-term fluctuations in the political and/or macroeconomic development, one may ask whether it is necessary to have the information the same day. The Big Three agencies themselves often claim that they do not respond to short-term developments. My findings in the previous chapter largely confirm that the agencies indeed follow a long-term policy except for situations in which competitors have assigned a downgrade. Therefore, changes in the sovereign rating should be considered as a result of long-term oriented considerations. Whether this also holds for other asset classes (namely corporate or bank ratings) is less clear: Here, short-term developments of credit risk may be more important which is often reflected in the shorter maturities of bonds. Also, rating agencies may have better access to private firm information that should be quickly made available for investors, especially in the period between a watch decision and the rating assignment. By

contrast, sovereign risk is strongly related to a country's composition of institutions (i.e. private property rights, corruption, political stability) which are hardly changing within a couple of months.

### 6.3.4 The Use of Investor-paid Rating Services

One may ask whether the introduction of an auction process is really necessary when looking at the recent emergence of user-paid rating agencies (for instance the U.S. based Eagon-Jones Rating Company and the German based Feri Rating GmbH). Also the GAO proposals discuss a re-introduction of the investor-pays structure as one alternative to the issuer-pays model. However, this compensation scheme may lead to free-riding incentives and consequently to a break-down of the entire market. On the other hand, one may conceive the user-paid rating services as a complement to the auction-based issuer-pays model. Free-riding behavior will be less pronounced in this case because a median rating is already publicly available whereas detailed information about the products has to be paid for by investors. This kind of system is comparable to the market for media products: Online media provide basic news at no cost whereas further background information has to be paid for. For instance, the Financial Times and other newspapers allow free access to the news on their homepage but one has to subscribe to the newspaper in order to get access to longer reports, essays or commentaries. In addition, the emergence of companies with user-pays business models indicates that free-riding behavior might be less pronounced than previously assumed.

The additional information about credit risk will be sold on the market for rating reports. At present, CRAs publish rating reports which include various features such as a presentation of assumptions and methodologies, analyses of strengths and risks, credit structure, amount of defaults and recoveries or a detailed description of collateral. Most reports are available at no charge since the agencies are paid by the issuers. In order to re-establish confidence especially in the market for structured finance products, I propose to substitute issuers by investors to compensate the agencies for their work.

Hence, rating agencies may concentrate their business on two markets: They receive fees for rating mandates and they may sell detailed rating reports to investors. The user-paid

structure of this market will also have a disciplining effect: Rating agencies will be interested in increasing their revenues by serving their customers with unbiased and independent information about credit risk. In the current setting, investors are probably dubious about the reliability of information provided by those agencies who are paid by the issuers at the same time.

## 6.4 Concluding Remarks

In this chapter, I have complemented the current regulatory frameworks for the rating industry by additional features to prevent conflicts of interest and to reduce pro-cyclical rating assignments. The amendments consist of three pillars: An auction-based allocation mechanism to mitigate the issuer-pays problem, a revised registration process to allow for the emergence of a decentralized structure in the rating industry and a centralized publication process to reduce pro-cyclical rating decisions.

Most of the GAO proposals discussed above attribute a central role to the regulator. However, a regulator is often claimed to be subject to political pressure and only advisable if the market is not able to allocate resources efficiently. This proposal assigns a minor role to the regulator by limiting its scope to the registration process. The most important function is to monitor the rating agencies' accordance with pre-established rules. These mainly consist of qualified staff requirements. Against this, the auction process, the management of the "Cuomo Fund", and the publication process are administrative tasks which have neither an effect on the determination of ratings nor on the size of rating fees. In the end, the rating agencies may freely choose the fee for which they are willing to provide a rating and the issuer decides on whether to agree this offer or to reject it. Besides, it is the investor who decides whether to only use the auction-based rating or to take additional advice by acquiring rating reports of a preferred agency.

Observes may object that the issuers have the best information about their own solvency making them the best qualified party to monitor the rating agencies. However, the recent literature has shown that in some cases CRAs and issuers have incentives to collude against investors (see the discussion in chapter 2).

Still, criticism might emerge with respect to the size of rating fees. On the one hand,

more staff requirements increase the cost for production subject to the complexity and opacity of a product. But on the other hand, this will incentivize issuers to be more transparent on the underlying loan composition of structured products. Besides, the higher cost of creating a rating for a product should be reflected in its final price to serve as an additional signal for the investor.

## 6.5 Appendix to Chapter 6

Figure 13: The Rating Process

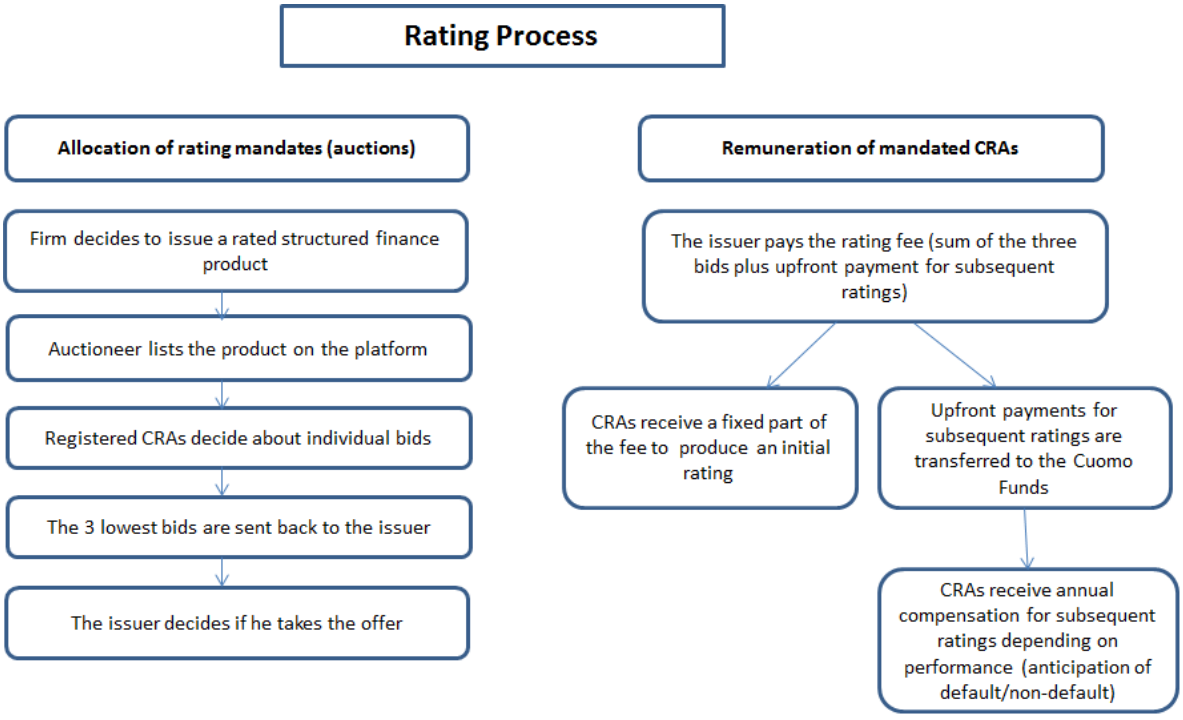


Table 34: GAO Proposals

| Rating Model | Compensation | Regulator | Fee determination | Certification | Monitoring |
|---|---|---|---|---|---|
| **Random Selection Model** | issuer pays | Clearinghouse | set by Clearinghouse, depending on product type | random assignment by Clearing-house | based on default rates and yield differentials |
| **Investor-Owned CRA** | issuer pays | - | market-based | qualification as highly sophisticated institutional investor | indirect monitoring by investor-owned agency |
| **Stand-Alone Model** | issuer and investor pays | Funding source | transaction fees set by Funding source | pre-condition of no charges to issuers | - |
| **Designation Model** | issuer pays | third-party administrator | market-based | designation by investors | indirect monitoring by investors via designation |
| **User-Pays Model** | investor pays | third-party auditors/public company auditing oversight board | market based | user selects NRSRO | indirect monitoring by users |
| **Alternative User-Pays Model** | investor pays | government agency/independent board | one-time fee at initial sale conditional on product complexity | bidding process by NRSROs | judging bids by the board in terms of extent of diligence |
| **Issuer and Investor-Pays Model** | issuer and investor pays | Ratings Fund | set by Ratings Fund and determined by historic and projected volumes of primary issuances and secondary market trading | assigned NRSROs receive periodic mandates by Ratings Fund to rate issuances (at least two agencies) | periodic reviews |

# 7 Summary of Findings

In the previous chapters, I studied the behavior of rating agencies with a special focus on the treatment of sovereign risk. The results can be summarized as follows:

The empirical findings in the second chapter, the literature on potential let me suggest that incentive problems such as the issuer-pays structure merely apply to the ratings of structured finance products. The higher complexity of these products and higher fee revenues than in the case of sovereign ratings explain why agencies often assigned high ratings to actually risky securities.

In the third chapter, I studied the existing literature on the importance of sovereign ratings. Here, most authors claim that sovereign ratings are long-term indicators of a country's default risk with a weak predictive power to forecast crises in the short-term. Other studies show that financial markets often respond to rating changes whereby it remains unclear to date if the reaction is due to the provision of new information or whether the inclusion of ratings in regulatory frameworks initiated the market reaction.

In the fourth chapter, we addressed the relationship between sovereign ratings and a country's public debt ratio. In the empirical analysis, we use a survey based measure (Country Credit Rating by the Institutional Investor) that enables as to exploit a more segmented scale (0-100) than the one used by the Big Three agencies. We find that investors give equal importance to general government debt in advanced and emerging economies. We also show that advanced countries with large ratios of debt to GDP seem to be especially vulnerable to a downgrade if they experience a negative fiscal shock. Also, peripheral members of the euro area are subject to larger downgrades with increasing public debt than core members and non-euro area countries. Finally, Japan seems to receive a rather large debt privilege compared to other advanced countries.

In the fifth chapter, I explored the sources of disagreement among CRAs towards sovereign credit ratings. The results suggest that a small European agency has a more pronounced short-term orientation than the Big Three and that none of the agencies is subject to a home bias. Besides, a downgrade decisions by one of the Big Three institutions increases the probability of a negative rating change by the other two, whereas the smaller agency has shown to be more independent in its rating assignments.

In the final chapter of this thesis, I reviewed the recently passed reforms for the rating industry in the U.S. and Europe. Building on these reforms, I discussed three amendments to the current framework in order to deal with the issuer-pays structure and with the pro-cyclicality of ratings. Based on the findings in chapter two and five, it seems appropriate that solutions for the issuer-pays problem should primarily refer to ratings in the area structured finance products whereas the revised publication process is more appropriate for sovereign ratings.

At the end of this thesis, I would like to conclude with two policy implications derived from the above results: First, it seems that sovereign ratings have been misinterpreted as a (short-term) predictor of sovereign default, especially during turbulent times. However, at least the Big Three put emphasis on their long-term orientation with regard to sovereign risk although the results in chapter five do not fully support their published statements. Besides, the observation that a less popular and influential rating agency provides us with higher rates of disagreement relative to the Big Three than the latter among themselves speaks in favor of more competition among sovereign raters which may eventually raise the plurality of opinions towards sovereign risk. More plurality of opinions may first reduce the investors' and regulators' dependency on few institutions and second, it may lead to more credibility in the public. This is especially relevant for sovereign ratings which are to a large degree build on qualitative assessments. In contrast to the allowance of more competition, a reform of the issuer-pays structure does not seem to be a pressing issue in the case of sovereign ratings as my results in chapter five do not indicate that particular regions receive better ratings than others. Thus, if regulators allow market entry one may simply let the issuers of sovereign bonds decide on whether they are willing to have more variety among their raters.
As discussed above, the situation is different for the ratings of structured finance products. Here, it seems advisable to take action in order to mitigate the problems resulting from the issuer-pays structure.

The second policy implication is derived from the fact that sovereign risk analysts seem to penalize public debt in advanced countries if a high debt ratio is accompanied with a growing one (see chapter four). Together with the sudden downgrade of the GIIPS

countries during the sovereign debt crisis, it seems that sovereign ratings may change rapidly in case of an adverse fiscal shock. For instance, Portugal had been assigned a AA (third-best rating) by Fitch Ratings for more than a decade (since 1998) before the agency suddenly downgraded the country to junk status within less than two years time (March 2010 - November 2011). Thus, a high rating does not necessarily imply that governments have guaranteed access to capital markets in the future. Policy-makers and regulators may take this finding as a warning signal for the currently highly indebted advanced economies such as Italy, Spain or France. Added to this, once one of the Big Three agencies initiates a downgrade, our results in chapter five suggest that such an event may quickly result in a downward spiral due to other agencies following their competitor.

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Bernhard Bartels, born in 1983, studied Political Sciences and Economics from 2003 to 2008 at the Johannes Gutenberg- University in Mainz and at the Nelson Mandela Metropolitan University in Port Elizabeth (South Africa). From 2008 to 2009, he completed successfully the Advanced Studies Program (ASP) in International Economic Policy Research at the Institute for the World Economy in Kiel. From July 2009 to December 2009, he worked as a personal assistant to the Chief Economist of Deutsche Bank Group in Frankfurt am Main. Bernhard Bartels is currently working as a research assistant at the Johannes Gutenberg University- Mainz.