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# Extra-Financial Risk Factors and the Cost of Debt

Florian Berg

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# THÈSE DE DOCTORAT

de l'Université de recherche Paris Sciences et Lettres  
PSL Research University

Préparée à l'Université Paris-Dauphine

## Extra-Financial Risk Factors and the Cost of Debt

École Doctorale de Dauphine — ED 543

Spécialité **Sciences économiques**

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## Résumé

Cette thèse a pour ambition d'analyser si la performance environnementale, social et de gouvernance (ESG) est intégrée par les marchés de la dette d'entreprise et souveraine. Le premier chapitre se concentre sur les informations ESG publiés à contenu négatif et leur impact négatif sur le coût de la dette. Plus exactement, dans les secteurs industriels et utilitaires les événements négatifs sociaux et de gouvernance font augmenter le coût de la dette. Egalement, un bon niveau général de performance ESG agit comme un mécanisme d'assurance contre ces événements négatifs. Dans un deuxième chapitre seront présentés les résultats d'une simulation de portefeuille intégrant la performance ESG d'entreprise. Un gérant de portefeuille peut améliorer le niveau agrégé de la performance ESG du portefeuille de 1,5 écart-type sans faire baisser la performance financière. Ainsi, le gérant peut combiner cette intégration avec des stratégies d'allocation d'actif financiers ou des stratégies de rendement absolu. Dans un troisième chapitre les résultats sur la réduction du coût de la dette dû à une bonne performance environnementale et sociale de souverains émergents seront analysés. Enfin dans le quatrième chapitre je décris comment la performance de gouvernance des souverains influence la différence entre le yield émis en devise étrangère et celui émis en devise locale. Dans les pays développés cette différence augmente avec le risque politique, i.e. le yield étranger augmente plus rapidement que le yield domestique. Dans les pays émergents, c'est l'effet inverse qui est observé. Cette différence entre les deux yields varie plus fortement avec un taux croissant de la dette domestique détenue par des investisseurs étrangers.

## Mots Clés

Responsabilité Sociale de l'Entreprise, Irresponsabilité d'Entreprise, Marché de Dette, Obligations Souveraines, Obligations d'Entreprise, Obligations Internationales, Risque de Défaut, Défaut Souverains, Dette en Devise Locale, Dette en Devise Etrangère

## Abstract

This thesis analyzes if and to what extent debt markets value the environmental, social and governance (ESG) performance of firms and sovereigns. The first chapter shows that negative ESG news has a negative impact on the cost of debt of firms. The news relates to environmental and social events within the industrial/utilities sector. In this sector, a sound corporate social performance acts as an insurance against the adverse impact of negative environmental events on bond prices. The second chapter reveals that ESG scores integrated into portfolios do not change the financial performance ex post. A portfolio manager can increase the average ESG rating of her portfolio by 1.5 standard deviations without incurring cost. This leaves substantial room and opportunity for ESG ratings to be combined with asset allocation or absolute return strategies. The third chapter shows how ESG performance is linked to a lower cost of debt of emerging sovereigns. Research indicates that an emerging country's average cost of capital decreases with its positive environmental and social performance. The fourth chapter discusses how governance performance may influence the spread of debt denominated in local and foreign currency. In developed countries, the spread between a foreign currency yield and a hedged local currency yield increases with our political risk indicator, i.e. the foreign yield increases faster than the domestic one. For emerging countries, the reverse trend is true. Interestingly, the foreign currency and local currency yield spreads move significantly stronger in absolute terms with increasing foreign investment participation in both emerging countries and developed countries' debt markets.

## Keywords

Corporate Social Responsibility, Corporate Social Irresponsibility, Bond Market, Sovereign Bonds, Corporate Bonds, International Bonds, Default Risk, Sovereign Default, Local Currency Debt, Foreign Currency Debt,



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conduite dans le cadre d'une CIFRE avec Amundi Asset Management

Ecole doctorale de Paris-Dauphine

Présentée par Florian BERG

Pour obtenir le grade de Docteur de l'Université Paris-Dauphine en  
Sciences-Economiques

**Extra-Financial Risk Factors and the Cost of Debt**

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*L'université Paris-Dauphine n'entend donner aucune approbation ni improbation aux opinions émises dans les thèses ; ces opinions doivent être considérées comme propre à leurs auteurs.*

## **Abstract**

This thesis analyzes if and to what extent debt markets value the environmental, social and governance (ESG) performance of firms and sovereigns. The first chapter shows that negative ESG news has a negative impact on the cost of debt of firms. The news relates to environmental and social events within the industrial/utilities sector. In this sector, a sound corporate social performance acts as an insurance against the adverse impact of negative environmental events on bond prices. The second chapter reveals that ESG scores integrated into portfolios do not change the financial performance ex post. A portfolio manager can increase the average ESG rating of her portfolio by 1.5 standard deviations without incurring cost. This leaves substantial room and opportunity for ESG ratings to be combined with asset allocation or absolute return strategies. The third chapter shows how ESG performance is linked to a lower cost of debt of emerging sovereigns. Research indicates that an emerging country's average cost of capital decreases with its positive environmental and social performance. The fourth chapter discusses how governance performance may influence the spread of debt denominated in local and foreign currency. In developed countries, the spread between a foreign currency yield and a hedged local currency yield increases with our political risk indicator, i.e. the foreign yield increases faster than the domestic one. For emerging countries, the reverse trend is true. Interestingly, the foreign currency and local currency yield spreads move significantly stronger in absolute terms with increasing foreign investment participation in both emerging countries and developed countries' debt markets.

## Résumé

Cette thèse a pour ambition d'analyser si la performance environnementale, social et de gouvernance (ESG) est intégrée par les marchés de la dette d'entreprise et souveraine. Le premier chapitre se concentre sur les informations ESG publiés à contenu négatif et leur impact négatif sur le coût de la dette. Plus exactement, dans les secteurs industriels et utilitaires les événements négatifs sociaux et de gouvernance font augmenter le coût de la dette. Egalement, un bon niveau général de performance ESG agit comme un mécanisme d'assurance contre ces événements négatifs. Dans un deuxième chapitre seront présentés les résultats d'une simulation de portefeuille intégrant la performance ESG d'entreprise. Un gérant de portefeuille peut améliorer le niveau agrégé de la performance ESG du portefeuille de 1,5 écart-type sans faire baisser la performance financière. Ainsi, le gérant peut combiner cette intégration avec des stratégies d'allocation d'actif financiers ou des stratégies de rendement absolu. Dans un troisième chapitre les résultats sur la réduction du coût de la dette dû à une bonne performance environnementale et sociale de souverains émergents seront analysés. Enfin dans le quatrième chapitre je décris comment la performance de gouvernance des souverains influence la différence entre le yield émis en devise étrangère et celui émis en devise locale. Dans les pays développés cette différence augmente avec le risque politique, i.e. le yield étranger augmente plus rapidement que le yield domestique. Dans les pays émergents, c'est l'effet inverse qui est observé. Cette différence entre les deux yields varie plus fortement avec un taux croissant de la dette domestique détenue par des investisseurs étrangers.

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## **2 Introduction**

### **2.1 Motivation**

In this dissertation I study how extra financial risk factors drive corporate and sovereign debt. The reason I started this research is rather idealistic. What if sustainable behavior of firms or sovereigns has direct financial consequences? And even positive ones? Then social responsibility becomes rational profit maximizing on the firm level and without doubt welfare maximizing on a sovereign level. The goal of this dissertation is to shed light on the impact of the environmental, social and governance performance of companies and countries on the cost of debt. In other words it studies to what extent fund managers value environmental, social and governance performance (henceforth ESG) of debt issued by firms and countries.

Historically, countries were responsible for regulating environmental, social and governance factors, whereas companies weren't seen as having a broader social responsibility. In the ideal world, profit maximization and competition from a micro economic point of view minimize dead weight loss and thus maximize social welfare on an aggregate level (Friedman, 1970). In the real world, societies become increasingly aware of governments' failures to address problems such as pollution, income inequalities, respect for communities and protection of employees, more and more citizens call for corporations to substitute elected governments (Tirole and Benabou, 2010).

Tirole and Benabou (2010) name three origins why governments fail. First, lobbies and interest groups may influence a government up to a point that its actions and

laws do not correspond to the best of society anymore. Second, if a corporation operates in different countries, a government cannot rule against behavior outside its territory that does not correspond to its moral standards. Third, if issues are local and too "small" for regulation, the government might not deal with it, i.e. a firm could pollute locally.

The resulting debate about how companies cope with environmental issues such as climate change or social issues such as income inequalities is increasingly present in the media as well as in the academic literature. Fund managers are of my particular interest. On an aggregate level, they are able to influence firms and even whole economies with their mass of investable funds. And, as any other firm, they face media pressure to be more and more socially responsible. Since they also see these issues as affecting their investment risk, it is a mix of investors appetite and firm/sovereign risk that explains the link between ESG performance and the cost of debt.

I look at the cost of debt for several reasons. The first one is of rather practical nature: governments and not listed firms do not issue stocks, i.e. debt is the only way to assess if financial markets value their ESG performance. Second, even though according to McKinsey's Mapping Capital Markets (2011) report, the bond market for firms is as important in terms of size as the stock market, i.e. issuance is worth 52 trillion and 54 trillion dollars in 2011 respectively, academic research is relatively scarce. This dissertation is an attempt to fill the gap and to further future research in this domain.



## **2.2 Dissertation Overview**

### **2.2.1 Positioning**

The general aim of this dissertation is to add to the financial economics literature a thorough exploration of the link between ESG issues and the cost of debt that firms and sovereigns face. More exactly, I focus on the scarcely covered topic how debt markets value changes in ESG performance. I rely heavily on research in management about stakeholders for my theoretical framework. I also draw from the financial econometrics literature for the technical aspect of my empirical research. In the following paragraphs, I give a brief introduction into these different streams of literatures and point out to what literature this dissertation contributes.

### **2.2.2 Research Framework**

The link between corporate social responsibility (CSR) and financial performance has given lieu for a vivid exchange between academics. On the firm level, this controversy can be schematically divided into two camps, the "shareholder theory" and the "stakeholder theory". Both theories defend different views on the role CSR should play in the definition of a firm's objectives.

According to the "shareholder theory", corporate managers should focus solely on increasing the wealth of shareholders. The responsibility towards shareholders should always be considered as more important than the responsibility towards non-shareholding stakeholders as long as laws are not transgressed. By doing so the benefit for society is maximized since, according to textbook microeconomics, the surplus goes to the consumer. This is particularly true if the government cor-

rects market failures when externalities and wealth distribution does not fit the society's moral standards. This thesis is notably upheld by Friedman (1970), Jensen and Meckling (1976) and Fama and Jensen (1983).

The "stakeholder theory" (Freeman, 1984, and Freeman et al. , 2007) states that corporations should consider the interests of each stakeholder in their decision making. A stakeholder is defined as "any group or individual who can affect or is affected by the achievement of an organization's purpose". According to Freeman (2004,) the stakeholder theory asks for the purpose of a firm and the shared values with all stakeholders. The "stakeholder theory" rejects the thesis that business and ethics can be separated.

Tirole and Benabou (2010) identify three ways of how the interaction with stakeholders works.

The first vision describes CSR as a "win-win" situation where good behavior makes a company more profitable. For instance, if managers increase their time horizons they might increase profits in the long run while acting more socially responsible. A firm may lay off its workers during economic turmoil in order to increase profits but might find it difficult afterwards to attract good employees.

According to the second vision, the "delegated philanthropy", the firm is willing to sacrifice money in order to attain social goals and to improve the relationship with its stakeholders. Those goals could be fair pay for workers in developing countries or less pollution. Stakeholders such as consumers would thus be more willing to interact with the firm. However, agency conflicts may lead to over-allocating resources to stakeholders which increases costs without fostering profits.

The third vision is called "insider-initiated corporate philanthropy". Here, the

board members engage in philanthropy in order to help their own cause without any relation to the business of the company. In this view CSR is seen as an agency cost that does not further profit. The last vision was one of the main reasons why Friedman (1970) wrote his famous critique on social responsibility and that the sole purpose of a company should be to increase its profits.

This is why in recent work of both camps, one can find a tendency of reconciliation. For example, Jensen (2002) calls for an "enlightened stakeholder theory" or an "enlightened shareholder theory" that still maximizes one objective function, but takes into account potential conflicts with stakeholders such as environmental issues or employees. He warns that if a company deviates from profit maximization, the welfare of the whole society is at stake. Freeman (2004) writes that "stakeholder theory is decidedly pro-shareholder". He adds that ultimately all of a firm's good relationships with its stakeholders, i.e. a good corporate social performance, increase value and thus create shareholder value.

To conclude, these different arguments plead in favor of a positive effect of CSR on firms' financial performance if it is not used as "insider-initiated corporate philanthropy". Thus fund managers should incorporate an ESG assessment of the firm in their investment decision.

On the sovereign level the link between economic performance and ESG performance seems more obvious. There seems to be a consensus why education, for instance, leads to a higher skilled work force and thus higher GDP growth (Krueger and Lindahl, 2000). Health also plays a positive role in GDP growth. Bloom *et al* (2004) find that good health has a positive, sizable, and statistically significant effect on GDP. Regarding pollution, Tahvonen and Kuuluvainen (1993) find that in their model higher-than-optimal pollution may decrease steady state consumption.

The governance dimension has also been in the focus of academic research. But unlike for the environmental and social dimension researchers have established a link between the cost of sovereign debt and governance performance (Cioccini *et al.*, 2003). Overall, these studies conclude that governance indicators matter to explain credit risk in emerging markets. We thus are among the first to establish a link between ESG factors and the cost of debt on the sovereign level.

### **2.2.3 Research Techniques**

I use econometric models, such as the event study methodology and panel regressions, to assess the magnitude of the impact of ESG performance on the price of bonds. The event study methodology is a common way of measuring the impact of events on financial return series. It has been widely used for stocks (Kothari and Warner, 2007). Its application on bonds is more complicated. Bonds, contrary to stocks, have a fixed maturity and their returns are thus, by definition, heteroscedastic, i.e. they have decreasing variance over time. This makes ordinary least squares estimation inconsistent. This is why my coauthor and I used matching portfolios to proxy the market return and calculate the unexpected return conditional on the event. This methodology has been thoroughly described in Bessembinder *et al.* (2008).

Regarding the panel regressions, I use the two way fixed effects estimator in an ordinary least squares framework and in a dynamic panel setting. Period fixed effects are important to capture shocks in time that are common to all firms or countries. Fixed effects on the firm/country level are important to capture omitted variables biases such as the abilities of the sitting political administration (Crifo *et al.*, 2014), i.e. politicians in some countries or managers of certain firms could

have a broader perception of important issues and might be more prone to take into account ESG issues. If the market valued these abilities, our model would capture a link between ESG indicators and the the cost of debt even though the causal link might be between the political administration's abilities and the cost of debt. When the dependent variable exhibits persistence, my coauthors and I use the dynamic panel data framework (Arellano-Bover ,1995, and Blundell-Bond (1998)) in one chapter to control for the dynamic panel bias since the number of countries is larger than the number of observations in time. It is very import to control for this bias as robustness checks show that it effects our coefficients quite strongly. Last but no least, I use a mean variance portfolio optimization framework to see if ESG integration impacts corporate bond portfolio construction. This is a standard procedure and is widely used in the financial industry. Drut (2010) applies it on sovereign bonds.

Regarding the input of these models, I use either ESG ratings or news published in the media for firms and publicly available ESG indicators for sovereigns.

On the firma level, ESG data is harder to asses than financial data. Financial reports are fairly standardized and openly available. Sustainable reports, although widely published nowadays, lack harmonization. Investors often, instead of conducting costly analysis in order to compare companies or countries to their peers buy ratings from agencies. These ratings are qualitative and quantitative assessments of environmental, social and governance factors. If these ratings are judged too expensive investors might refrain from buying them if they do not see that the expected profit exceeds the expected cost. This is why I also study the impact of ESG news for firms and publicly available ESG scores for sovereigns on the cost of debt since the media has the power of over-coming the rational ignorance para-

dox (Downs, 1957): agents do not access all the existing information if the cost of access exceeds the expected benefits. News that is published in the media can be accessed easily and cheaply by all investors and integrated immediately into portfolios, leading to buy and sell decisions of the corporate bonds.

On the sovereign level, both publicly available ESG indicators and ESG scores from rating providers exist. I use the former to overcome the rational ignorance paradox.

#### **2.2.4 Overview of Papers and Research Objectives**

The dissertation is separated in four chapters. Two examine the link between extra financial risk factors, or more exactly, environmental, social and governance performance and the corporate credit spread. The two remaining chapters focus on the link between ESG performance and sovereign debt. The first chapter sheds light on the impact of corporate social irresponsibility on credit spreads. The second chapter studies the link between ESG performance and the credit spread as well as its integration in socially responsible corporate bond portfolios. The third chapter studies the link between governance performance and the Dollar denominated bonds of emerging economies. The fourth chapter studies the link between one part of the governance performance, namely political risk, and the spread between sovereign bonds issued in foreign currency and local currency.

In the first chapter, my coauthor and I study if a disrespect of corporate actions that affect negatively a social stakeholder's legitimate claims or corporate social irresponsibility (CSIP) (Strike *et al.*, 2006), have an impact on corporate debt performance. More exactly, we evaluate the impact of published news related to the

environmental performance, social practices or governance of firms on corporate bond prices. We also examine if a good corporate social performance acts as an insurance against an increase of the cost of debt due to these adverse events.

We use a unique database of 1557 ESG events related to 219 firms that issues bonds in euro. The database is proprietary data of Amundi's Sustainable Investing department. We use daily data from 12/04/2003 to 31/07/2011 of all corporate bonds issued within the Euroaggregate Corporate universe. Furthermore, we use Amundi's ESG ratings to determine if CSP act as an insurance mechanism against adverse ESG events.

Powerful non-parametric tests show a significant impact of negative environmental and negative social events on corporate bond prices within the industrial/utilities sector. Furthermore, firms with a sound environmental, social and governance policy in the industrials/utilities macrosector have a smaller decrease of their bond price due to negative environmental and governance news. Put differently, we show that a sound corporate social performance acts as insurance against the impact of negative environmental and governance events on bond prices in the industrial/utilities sector.

The second chapter focuses on the integration of environmental, social and governance performance of firms in credit portfolios.

The environmental, social and governance performance is quantified by analysts that express their beliefs on a firm through ratings. In this process, the analysts rate a firm according to a predefined set of criteria that are then aggregated to obtain the ESG ratings. I collect these ratings from Amundi on the aggregate ESG level and on the criteria level. The cost of debt financing is measured by the credit

spread of a firm's outstanding bonds. Therefore, I collect monthly spread data of the Merrill Lynch Large Cap Corporate Bond index from Bloomberg in between the 31st of January 2010 and 31st of December of 2012. The chosen index only contains investment grade rated bonds and covers over 860 issuers from 57 countries.

The novelty of this chapter is threefold. First I compare Europe, Asia and North America in terms of materiality of the ESG criteria and aggregates from a fund's manager perspective. Second, I'm the first to use actual ratings from a major asset manager, other studies use KLD. Third, I run portfolio simulations to test if the ESG ratings can be a source of alpha.

Taking a fund manager's perspective, this study sheds light on the change of the spread and its translation into financial performance on the portfolio level. I show that the spread is more likely to change due to change in ESG performance rather than the level of ESG performance. Furthermore, I show that different ESG factors may have an opposing impact on bonds. They also have a different impact across regions.

Unlike existing literature I seek to test the link between ESG ratings and the the variation of the cost of debt, but I also run portfolio simulations to apprehend the cost of ESG integration in terms of financial performance. I create portfolios that have region, sector and investment style risk profiles similar to the benchmark's exposures. I show that using the level of ESG does not give any overperformance at least in the time horizon of a portfolio manager (1 month rebalancing basis). A portfolio manager can increase the average ESG rating of the portfolio by 1.5 standard deviations without incurring additional cost. This leaves substantial room for a combination with asset allocation or absolute return strategies.



On the sovereign side government bonds bear a risk of economic default, the ability-to-pay. Additionally to corporate bonds, they have a strategic default risk, also known as the willingness-to-pay, since governments can repudiate their debt due to their sovereignty privilege.

ESG factors can have an impact on both types of default risk. On the one hand, sound ESG policies might bring a strong and sustainable economic performance to a country, thereby reducing the risk of economic default. On the other hand, a clear engagement towards sustainable development might signal a country's willingness and ability to address long-term issues, and may thus act as a credible commitment to repay its debt in the future. This might reduce the risk of strategic default.

In the third chapter, we test whether the ESG performance of emerging countries indeed signal good commitment abilities and thus reduce their government bond spread.

We measure a country's extra-financial performance using three indices, on Environmental, Social and Governance issues based on data from Yale University (i.e., Environmental Performance Index) and the World Bank (e.g., World Governance Index). Overall, the results suggest that a good country's ESG performance is associated with a lower cost of debt.

Practical implications are twofold. First, these results indicate that ESG factors are priced by sovereign bond markets, good ESG being associated with less default risk and thus lower cost of debt. This is important to take into consideration when creating strategic asset allocations across countries. Second, these results suggest that tactical reallocations that aim at anticipating changes in countries ESG performance might improve sovereign bond portfolios Sharpe ratio.

The fourth chapter analyzes how the extra financial risk factor political risk determines the spread between the yield of bonds denominated in foreign and local currency. The rationale is that political risk reflects the coherence, stability and creditworthiness of the government and established institutions, i.e. it is a proxy for the willingness to repay the debt.

We find that the unhedged local currency (LC) yield is higher than the foreign currency (FC) yield for emerging economies. Moreover, the duration of FC bonds issued by emerging economies has almost doubled between 1998 and 2013 and remains considerably higher than duration of local currency bonds. These two effects explain why emerging economies continue to issue debt in foreign currencies despite the associated risks. For developed countries, the FC LC spread is actually positive.

In developed countries the spread between the FC and hedged LC yield increases with the political risk indicator, i.e. the foreign yield increases faster than the domestic one. For emerging countries the reverse is true due to a decrease of the hedged domestic yield. Interestingly, the FC LC spread varies stronger in absolute terms with increasing foreign participation in both, emerging countries and developed countries.

### **2.2.5 Scope of Analysis**

The bottom line of this dissertation is that financial markets value ESG performance on the firm and on the sovereign level. The first assumption would be that this is due to a change in the assessment of the riskiness of the firm or sovereign. But this is not necessarily true. The presence of more and more socially responsible

investors might influence valuations (Gollier and Pouget, 2014), i.e. even when the assessment of the riskiness of a firm or sovereign does not change the composition of those funds changes. I leave for further research the question if it is riskiness or investors' appetite that has an impact on the cost of debt.

It is important to keep in mind that, the fact that I rely heavily on ESG scores in my dissertation introduces a possible bias. Koelbel *et al.* (2015) show that ratings are subject to a cultural bias, i.e. issues perceived as important in one country might play a minor role in another country. As my data on the firm level comes from European providers, there might be a cultural bias in the results for non European issuers.

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## **3 Introduction française**

### **3.1 Motivation**

Dans cette thèse, j'examine comment les facteurs de risque extra-financiers impactent la dette souveraine. La raison pour laquelle je me suis penché sur ce sujet est de nature plutôt idéaliste. Que se passerait-il si le comportement socialement responsable d'une entreprise avait des conséquences financières ? Et peut-être même positifs ? Du coup, le comportement socialement responsable devient de la maximisation de profit rationel au niveau de la firme et maximiserait le bien-être au niveau souverain. Le but de cette thèse est d'analyser l'impact de la performance environnementale, sociale et de gouvernance (ESG) des entreprises et des états sur le coût de la dette. Autrement dit, j'étudie à quel point les gérants de fonds prennent en compte la performance ESG en investissant dans la dette émise par des entreprises ou des états.

Historiquement, les états étaient les seuls responsables de la réglementation des facteurs ESG. Les entreprises n'étaient pas considérées comme ayant une responsabilité socialement responsable. Dans le monde idéal, i.e. d'un point de vue macroéconomique, la maximisation du profit dans un environnement concurrentiel minimise la perte sèche. Il en résulte une maximisation du bien-être au niveau général (Friedman, 1970). Dans le monde réel, les sociétés se rendent de plus en plus compte des échecs de la part des gouvernements à régler les problèmes de pollution, d'inégalités de richesse, de respect des communautés minoritaires et de la protection des employés. De ce fait, de plus en plus de citoyens demandent aux entreprises de substituer les gouvernements élus (Tirole et Benabou, 2010).

Tirole et Benabou (2010) nomment trois origines d'échecs gouvernementaux. Des lobbies et groupement d'intérêts peuvent influencer un gouvernement à tel point que ses actions et lois ne correspondent plus au meilleur intérêt de la société. Si une entreprise opère dans des pays différents et ses actions vont à l'encontre des standards moraux d'un gouvernement, celui-ci ne peut pas réglementer les actions de l'entreprise à l'extérieur de ses frontières juridiques. Une autre origine d'échecs est en rapport avec la taille de l'entreprise. Si les problèmes causés par une entreprise sont trop petits, un gouvernement peut décider de ne pas légiférer, c'est-à-dire laisser l'entreprise polluer localement.

Le débat sur comment les entreprises gèrent les problèmes de pollution existe dans la littérature académique et dans les medias. Dans mes travaux, j'adopte le point de vue des gérants de fonds. Au niveau agrégé, ils sont capables d'influencer les entreprises et même des économies entières avec leur masse de fonds investis. Comme toute autre entreprise, elles font face à la pression médiatique de devenir plus en plus socialement responsable. Etant donné que la problématique ESG affecte aussi leur risque d'investissement, il s'agit d'un mélange entre l'appétit des investisseurs et le risque au niveau des entreprises qui explique le lien entre la performance ESG et le coût de la dette.

J'examine le coût de la dette pour plusieurs raisons. La première est de nature pratique: les gouvernements et les entreprises non listées n'émettent pas d'actions, i.e la dette est le seul moyen de savoir si les marchés financiers prennent en compte la performance ESG. Deuxièmement, même si selon la rapport Mapping Capital Market de McKinsey (2011) le marché obligataire est aussi important que le marché d'actions en termes de capitalisation, i.e. les émissions d'actions et d'obligations valent 52 milles milliards et 54 milles milliards de dollars en 2011, respective-



ment, la recherche académique sur ce sujet reste relativement rare. Cette thèse est une tentative de remplir cette lacune et de faire avancer la recherche dans ce domaine.

## **3.2 Aperçu général**

### **3.2.1 Positionnement**

Le but de cette thèse est de rajouter une analyse profonde du lien entre la performance ESG et le coût de la dette des entreprises et des souverains à la littérature académique. Plus exactement, je mets l'accent sur la prise en compte de la performance ESG par les marchés financiers. Je repose mon analyse sur la recherche existante sur les parties prenants dans le domaine du management afin de tracer le cadre théorique. Je me repose aussi sur la littérature d'économétrie financière pour les aspects techniques de ma recherche empirique. Dans les paragraphes suivants, je présente brièvement ces courants de littérature en mettant en avant les contributions de cette thèse.

### **3.2.2 Cadre de recherche**

Le lien entre la performance ESG et la performance financière a donné lieu à un débat vif entre académiciens. Au niveau de l'entreprise cette controverse peut-être divisée en deux camps, la théorie shareholder et la théorie partie prenante. Les deux théories défendent des vues différentes du rôle que les facteurs ESG devraient jouer dans la définition des objectifs d'une entreprise.

Selon la théorie shareholder, les gérants d'entreprise devraient seulement avoir

comme objectif d'accroître la capitalisation de l'entreprise. Tant que les lois sont respectées, la responsabilité des gérants devraient se focaliser sur les investisseurs. Ainsi, les bénéfices pour la société sont maximales car le surplus du consommateur est maximisé. Ceci est particulièrement vrai, si les gouvernements essaient de corriger les défauts des marchés quand les externalités ne correspondent pas aux standards moraux du pays. Cette hypothèse est notamment mise en avant par Friedman (1970), Jensen et Meckling (1976) et Fama et Jensen (1983).

La théorie des parties prenantes (Freeman (1984) et Freeman *et al.* (2007)) postule que les entreprises devraient prendre en compte les intérêts de chaque partie prenante dans leur prise de décision. Ici, une partie prenante est définie comme un groupe ou un individu qui pourrait affecter ou est affecté par les activités de l'entreprise. Selon Freeman (2004), la théorie des parties prenantes met en avant l'objectif de l'entreprise dans son rapport à la société et les valeurs partagées avec celle-ci. Cette théorie rejette la notion que les affaires peuvent être dénuées d'une certaine éthique.

Tirole et Benabou (2010) identifient trois façons pour définir comment les interactions fonctionnent entre parties prenantes.

La première façon décrit la performance sociale de l'entreprise (CSR) comme une situation gagnant-gagnant ou le comportement social rend l'entreprise plus profitable. Par exemple, si les gérants d'entreprise augmentent l'horizon de temps dans leur prise de décision, ils pourraient augmenter leurs profits à long terme en agissant de manière plus socialement responsable. Une entreprise pourrait faire face à des problèmes de recrutement si ses pratiques de licenciement étaient perçues comme problématiques.

Le deuxième type d'interactions entre les parties prenantes est la philanthropie déléguée. Dans ce cas là l'entreprise est prête à sacrifier de l'argent afin d'améliorer ses relations avec ses parties prenantes. Par exemple, l'entreprise pourrait payer un salaire équitable dans des pays en voie de développement. Ainsi, la réputation auprès des consommateurs pourrait s'améliorer. En revanche, une sur allocation des ressources pourrait augmenter les coûts sans améliorer les profits.

Le troisième type d'interaction entre les parties prenantes se nomme la philanthropie d'entreprise d'initiés. Ici, les directeurs utilisent la philanthropie afin de soutenir leurs propres causes n'ayant pas de lien avec l'activité de l'entreprise. Ainsi, la performance sociale devient un coût d'agence qui n'améliore pas le profit. Cette vue est la raison principale expliquant pourquoi Friedman (1970) a formulé sa critique bien connue sur la responsabilité sociale établissant que le seul objectif d'une entreprise devrait être l'amélioration du profit.

Des travaux dans les deux camps tentent de réconcilier cette problématique. Par exemple, Jensen (2002) parle d'une théorie des parties prenantes éveillée ou une théorie shareholder éveillée qui maximisent une seule fonction d'objectif mais pourtant prennent en compte le conflit potentiel de l'entreprise avec les parties prenantes. Il signale que si une entreprise devie de la maximisation de profit, le bien-être de toute la société est en danger. Freeman (2004) écrit que la théorie des parties prenantes prend en compte les détenteurs de capital de l'entreprise. Il rajoute que, à la fin, toutes les relations avec toutes les parties prenantes, i.e. y compris les investisseurs, augmentent la capitalisation de l'entreprise et donc crée de la valeur pour les investisseurs.

Pour conclure, ces différents arguments plaident pour un effet positif de la performance ESG sur la performance financière si la première n'est pas détournée

comme la philanthropie d'entreprise d'initiés. Ainsi, les gérants de fonds devraient incorporer une analyse ESG dans leurs décisions d'investissement.

Au niveau souverain, le lien entre la performance économique et la performance ESG est plus évidente. Il semble y avoir un consensus sur le fait que l'éducation, par exemple, mène à un PIB plus élevé via une main-d'oeuvre mieux formée (Krueger et Lindahl, 2000). La santé joue également un rôle positif dans la croissance du PIB. Bloom *et al.* (2004) constate qu'un bon système de santé a un impact positif, chiffrable et statistiquement significatif sur le PIB. Concernant la pollution, Tahvonen et Kuuluvainen (1993) concluent que dans leur modèle un niveau de pollution supérieur à un certain niveau pourrait décroître la consommation à l'état stationnaire et ainsi la croissance du PIB. La dimension de la gouvernance a également été dans le focus de la recherche académique. Mais contrairement aux dimensions sociales et environnementales, les chercheurs ont établi un lien entre le coût de la dette souveraine et la performance de gouvernance (Ciocchini *et al.*, 2003). Pour conclure, ces études montrent que les indicateurs de gouvernance expliquent en partie le risque de crédit.

### **3.2.3 Techniques de Recherche**

J'emploie des modèles économétriques, comme la méthode event-study et des régressions panel, afin d'analyser l'impact de la performance ESG sur les prix des obligations. La méthode event-study est un moyen fréquemment utilisé afin d'analyser l'impact de plusieurs événements sur des séries de rendements financiers. Elle a été le plus souvent appliquée sur les prix d'actions (Kothari et Warner, 2007) car son application sur les obligations s'avère plus compliquée. Les obligations, contrairement aux actions, ont une maturité finie. Ceci rend leurs rendements financiers

hétéroscédastiques car la variance décroît avec le temps. L'estimation via les moindres carrés ordinaires devient inconsistente. C'est la raison pour laquelle mon coauteur et moi avons utilisé la méthode des portefeuilles répliquants afin de créer un proxy du marché. Cette méthode a été bien décrite dans Bessembinder *et al.* (2008).

Concernant la régression panel, j'emploie l'estimateur effets fixes dans le cadre d'une estimation moindres carrés ordinaires et panel dynamique. Les effets fixes dans le temps sont censés capturer les chocs dans le temps qui sont communs à toutes les entreprises ou pays. Les effets fixes au niveau de l'entreprise ou du pays sont importants afin de capturer les variables omises telles que les capacités de l'administration politique (Crifo *et al.* 2014) ou du management d'entreprise, i.e. les hommes politiques ou gérants de quelques entreprises pourraient avoir une meilleure perception des risques et seraient plus aptes à intégrer les problématiques ESG dans leur gestion. Si le marché prend en compte ces capacités, notre modèle capturerait le lien entre les indicateurs ESG et le coût de la dette même si la causalité serait entre la capacité des hommes politiques/gérants et le coût de la dette. Quand les variables dépendantes sont autocorrélées, mes coauteurs et moi utilisons l'estimateur panel dynamique (Arellano-Bover (1995)/ Blundell-Bond (1998)) dans un chapitre afin de contrôler pour le biais de panel dynamique. Ceci est dû au fait que le nombre de pays est largement supérieur aux observations dans le temps. Il nous semble important de contrôler ce biais car des tests de robustesse montraient que les coefficients sont fortement biaisés. Finalement, j'emploie le modèle de moyenne variance afin d'analyser l'impact de l'intégration des notes ESG sur la construction de portefeuille. Ceci est une procédure fréquemment utilisée par l'industrie financière. Drut (2010) l'applique à des obligations souveraines.

Concernant l'input dans ces modèles, j'utilise soit des notes ESG soit des articles de presse pour les entreprises et des indicateurs librement téléchargeables sur internet pour les souverains.

Au niveau de l'entreprise, les données ESG sont plus difficiles à analyser que les données financières. Les rapports financiers sont assez harmonisés et publiquement disponibles. Les rapports de développement durable, même si facilement accessibles aujourd'hui, manquent d'harmonisation. Les investisseurs achètent souvent des analyses de développement durable en forme de note ESG afin de comparer les entreprises/pays à leurs pairs. Car ceci revient moins cher qu'une analyse faite par eux-même. Les notes constituent une analyse de données qualitatives et quantitatives englobant les dimensions environnementales, sociales et de gouvernance. Si ces notes sont jugées trop chères par les investisseurs et les coûts ne dépassent pas les profits espérés, les investisseurs devraient décider de ne pas les acheter. C'est la raison pour laquelle j'examine aussi l'impacte des articles de presse concernant la performance ESG des entreprises sur le coût de la dette car les médias peuvent surmonter le paradoxe de l'ignorance rationnelle (Downs, 1957): les agents qui ne possèdent pas toutes les informations existantes peuvent décider de les ignorer si les coûts dépassent le profit espéré. Les articles de presse publiés peuvent être facilement accessibles pour les investisseurs afin d'intégrer les nouvelles informations dans leurs choix d'investissement.

Au niveau souverain, il y a les indicateurs ESG publiquement disponibles et en provenance des agences de notation. J'emploie les premiers afin de surmonter le paradoxe d'ignorance rationnelle.

### **3.2.4 Résumé des articles et objectifs de recherche**

La thèse est séparée en quatre chapitres. Dans les deux premiers chapitres, j'examine le lien entre les facteurs de risque extra-financiers, ou plus exactement, la performance environnementale, sociale et de gouvernance avec le spread de crédit d'entreprise. Les deux chapitres suivants se concentrent sur le lien entre performance ESG et la dette souveraine. Le premier chapitre examine l'impact de l'irresponsabilité ESG des entreprises sur le spread de crédit d'entreprise. Le deuxième chapitre analyse le lien entre la performance ESG et le spread de crédit ainsi l'intégration dans les portefeuilles obligataires. Le troisième chapitre étudie le lien entre la performance ESG et le prix des obligations des pays émergents émises en dollars. Le quatrième chapitre étudie le lien entre une dimension de la performance de gouvernance, le risque politique, avec le spread entre obligations souveraines émises en devise étrangère et devise locale.

Dans le premier chapitre, mon coauteur et moi nous demandons si l'irresponsabilité ESG (Strike *et al.*, 2006) a un impact sur la performance obligataire. Plus exactement, nous évaluons l'effet des articles de presse publiés sur les pratiques environnementales, sociales et de gouvernance des entreprises avec les prix obligataires. Nous examinons également si une bonne performance ESG agit comme une assurance contre une augmentation du coût de la dette dû à ces événements négatifs.

Nous utilisons une base de données unique de 1557 événements ESG concernant 219 entreprises qui émettent des obligations en euro. La base de données appartient à Amundi Asset Management. Nous utilisons des données allant de 12/04/2003 à 31/07/2011 de toutes les obligations d'entreprise émises dans l'indice Euroaggregate Corporate de Barclay's. De plus, nous utilisons les notes ESG d'Amundi

Asset Management afin de déterminer si l'irresponsabilité ESG a une fonction d'assurance contre des évènements négatifs.

Des tests non paramétriques montrent un impact significatif et négatif des évènements environnementaux et sociaux sur les prix obligataires des entreprises dans le secteur industriel/ utilitaire. De plus, les entreprises ayant une bonne performance ESG dans le secteur industriel/ utilitaire font face à une plus petite diminution de leurs prix obligataires en cas de publication d'articles de presse environnementaux ou de gouvernance.

Le deuxième chapitre se focalise sur l'intégration de la performance environnementale, sociale et de gouvernance des entreprises dans des portefeuilles obligataires.

La performance ESG est quantifiée par des analystes qui expriment leur avis via des notes. Lors de ce processus, les analystes notent une entreprise selon quelques critères prédéfinis. Ces critères sont ensuite agrégés afin d'obtenir une note résumant toutes les dimensions ESG. Ces notes appartiennent à Amundi Asset Management. Le coût de la dette est mesuré par le spread de crédit des obligations émises par des entreprises. J'utilise des données mensuelles de l'indice Merrill Lynch Cap Corporate Bond index de Bloomberg allant du 31 janvier 2010 jusqu'au 31 décembre 2012. L'indice ne contient que des obligations notées investment grade et couvre 860 démetteurs de 57 pays différents.

Il y a trois nouveautés dans ce chapitre. Premièrement, je compare l'Europe, l'Asie et l'Amérique du Nord en termes de materialité des critères ESG du point de vue d'un gérant d'actifs. Deuxièmement, je suis le premier à utiliser des notes de l'un des plus grands gestionnaires de fonds, car la plupart des autres études emploient les notes de KLD. Troisièmement, je simule des portefeuilles obligataires afin de



savoir si les notes ESG peuvent être source d'alpha.

En prenant le point de vue d'un gérant d'actifs, cette étude fait la lumière sur la performance financière dans les portefeuilles ESG. Je montre que le spread est plus apte à changer dû à un changement de la performance ESG que le niveau de la performance ESG. Je montre également que les différents facteurs ESG peuvent avoir un impact opposés sur les obligations.

Contrairement à la littérature existante, j'analyse non seulement le lien entre les notes ESG et les variations du coût de la dette, mais aussi l'impact de l'intégration des ces notes dans des portefeuilles obligataires. Je simule des portefeuilles ayant les mêmes profils de risque en termes de secteurs, catégorie d'investissement et région que le benchmark. Je montre que le niveau de la performance ESG n'est pas source d'alpha à un horizon de rebalancement d'un mois. Selon ces résultats, un gérant peut facilement augmenter la note moyenne du portefeuille de 1,5 écart-type sans diminuer pour autant la performance financière. Ceci laisse de la place à une allocation d'actifs additionnelle.

Sur le coté souverain, les obligations d'états ont un risque de défaut économique en cas de problèmes macroéconomiques. De plus, ces obligations ont un risque de défaut stratégique car les états peuvent décider de ne pas payer leur dette suite à leur privilège de souveraineté.

Les facteurs ESG peuvent avoir un impact sur les deux types de risque de défaut. D'une part, une bonne performance ESG peut améliorer la performance économique sur le long terme et ainsi réduire le risque de défaut. De l'autre coté, un engagement clair par rapport au développement durable pourrait signaler une volonté d'honorer la dette. Ceci pourrait être perçu comme une promesse crédible de rem-

bourser la dette et donc réduire le risque de défaut stratégique.

Dans le troisième chapitre, j'analyse si la performance ESG des pays émergents pourrait signaler un engagement à rembourser la dette. Nous nous concentrons sur les pays émergents pour deux raisons. Premièrement le risque de défaut est assez prévalent. Les nombreux défauts du Venezuela, de la Russie, de l'Ukraine, du Pérou, de l'Écador, de l'Argentine, de l'Uruguay et de la République Dominicaine depuis 1998 en témoignent. Deuxièmement, les enjeux ESG sont bien plus problématiques dans les pays émergents. Par exemple, l'Environmental Performance Index de Yale paraît très bas en 2012 pour les pays inclus dans l'Emerging Market Index Plus, allant de 35 pour l'Afrique du Sud à 62 pour la Croatie. Ceci doit être comparé à une moyenne de 62 pour les pays de l'OCDE.

Nous avons choisi trois indices ESG afin de mesurer la performance extra-financière. La performance environnementale est mesurée par l'Environmental Performance Index de Yale, la performance sociale par le Human Development Index des Nations Unis et le World Governance Index de la Banque Mondiale. D'un point de vue général, les résultats suggèrent qu'une bonne performance ESG d'un pays est associée à un coût de dette moindre.

Il y a plusieurs implications pratiques. Premièrement, ces résultats indiquent que les facteurs ESG sont pris en compte dans l'évaluation des prix par les marchés obligataires, la bonne performance ESG étant associée à un risque de défaut moindre et donc à un coût de dette moindre.

Il est important de considérer ces facteurs de risque dans l'allocation d'actifs à travers les pays. Deuxièmement, ces résultats suggèrent que les allocations tactiques qui prennent en compte le changement de la performance ESG pourraient

être source d'alpha.

Le quatrième chapitre est une analyse de l'impact du facteur de risque de gouvernance, notamment le risque politique, sur le spread entre les obligations émises en devise étrangère et locale. Le risque politique est ici un proxy pour la cohérence et la stabilité du gouvernement, i.e. un proxy du défaut stratégique.

Nous montrons que le yield en devise locale est plus élevé que le yield en devise étrangère. De plus, la duration des obligations émises en devises étrangères et par des pays émergents a presque doublé entre 1998 et 2013. Elle reste considérablement plus élevée que celle des obligations émises en devise locale. Ces deux effets expliquent pourquoi les pays émergents continuent à émettre en devise étrangère malgré les risques associés. Pour les pays en voie de développement, le spread entre devise étrangère et locale reste positif. Dans les pays émergents, le contraire se produit, i.e. le yield en devise étrangère augmente plus rapidement que celui en devise domestique. Le spread entre le yield en devise étrangère et devise locale varie plus fortement avec la participation étrangère dans l'investissement pour les pays émergents et développés.

### **3.2.5 Portée de l'analyse**

Le message clé de cette thèse montre que les marchés financiers prennent en compte la performance ESG au niveau de l'entreprise et au niveau souverain. D'abord on pourrait penser que ceci est dû à un changement du risque financier de l'entreprise ou du souverain. Ceci n'est pas nécessairement vrai. La présence de plus en plus d'investisseurs responsable peut influencer les prix obligataires (Gollier et Pouget, 2014), i.e. même si l'évaluation du risque financier des entreprises

ne change pas la demande pour ces actifs augmente. Je laisse la recherche future d'analyser la différence entre le risque financier et l'appétit des investisseurs.

Il est important de se rappeler que, le fait d'étayer une partie de mon analyse sur des données en forme de notes ESG introduit un biais potentiel. Koelbel *et al.* (2015) montrent que les notes ESG sont assujetti à un biais culturel, i.e. les problématiques perçus comme important dans un pays peuvent jouer un rôle moindre dans un autre. Etant donné que mes notes ESG proviennent de fournisseurs européens, il y peut y avoir un biais culturel dans les résultats pour les émetteurs obligataires non européens.

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## 4 Chapter 1: Corporate Social Irresponsibility on the Corporate Bond Market

### Abstract

We measure the impact of negative environmental, social and governance news on corporate bond prices, using a unique data set. In doing so, we address the issue of reverse causality between corporate social performance and corporate financial performance. We find that negative events have a statistically significant impact on bond prices if we take into account the five days succeeding the event. The significance stems from the environmental and social events within the industrial/utilities sector. We then show that a sound corporate social performance acts as an insurance against the adverse impact of negative environmental events on bond prices in the industrial/utilities sector.<sup>1</sup>

*JEL Classification:* G12, G14, G30.

*Keywords:* Corporate Social Irresponsibility, Bond market, Event study.

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## 4.1 Introduction and Previous Literature

Societies have become increasingly aware of governments' failures to address problems such as pollution, income inequalities, lack of respect of communities and protection of employees. Citizens thus call for corporations to fulfill the role of elected governments (Benabou and Tirole, 2010). Corporate actions that negatively affect a social stakeholder's legitimate claims (also known as corporate social irresponsibility (CSIP) (Strike *et al.*, 2006)) disrespect these new societal values and we study whether this has an impact on corporate debt performance. More exactly, we evaluate the impact of published news related to a firm's environmental performance, social practices or governance (henceforth ESG) on corporate bond prices. Furthermore, we examine if a good corporate social performance acts as an insurance against an increase of the cost of debt due to CSIP. We address the issue of reverse causality between corporate social performance and corporate financial performance. This is of particular importance to firms, as bonds are an important source of financing, as well as to portfolio managers interested in factors affecting bond returns.

The link between corporate social performance (henceforth CSP) and a firm's financial performance, as measured by stock market capitalization or accounting measures, has been extensively covered. Literature surveys by Orlitzky *et al.* (2003) and Margolis *et al.* (2007) report evidence of a positive correlation between the two. Although, the general picture seems to show a positive link between corporate social performance and corporate financial performance, some individual studies at the portfolio level, for instance, conducted by Renneboog *et al.* (2008) and Amenc *et al.* (2008) report negative but mostly statistically insignificant results. Most studies on the link between CSP and financial securities focus on the stock market

performance. For instance, in two recent paper similar to ours, Krueger (2014) and Cappelle-Blancard and Petit (2014) assess the impact of ESG news on stock returns. They both show that a significant negative abnormal return is observed after the release of a negative event. In Krueger's paper, a positive event has a weak negative significant effect due to agency conflicts counteracting the positive impact. Cappelle-Blancard and Petit's do not find any impact of positive events.

However, empirical results from the stock market cannot be applied directly to corporate bond returns; stocks and bonds are not affected by news through the same channels. Bad news adversely impacts stock returns as it is expected to reduce a firm's profit, whereas it interacts with bond markets through its expected impact on the firm's default risk.

Some papers study the relationship between CSP and the cost of debt. Sharfman and Fernando (2008) evaluate the impact of environmental performance on the cost of capital for US firms listed in the S&P 500. Debt financing is one component of the cost of capital. The authors assume that a better environmental performance should reduce the cost of capital. One argument is that a better environmental performance reduces the expectation of financial distress, caused by an unexpected extreme environmental event. However, their empirical results do not confirm this conclusion, as they find a positive relationship between the cost of debt and their indicator of environmental performance. Finally, they find that environmental performance reduces the overall cost of capital, that is the cost of both equity financing and debt financing, due to increased tax subsidies.

Menz (2010) studies the relationship between the Euro corporate bond credit spread and an index including environmental, social and corporate governance practices. His estimates show weak evidence of a positive effect of CSP on bond credit spreads.

Goss and Roberts (2011) study the relationship between corporate social responsibility and the cost of bank loans for US firms. They find that firms with weak CSP tend to pay higher interest rates. Bauer and Hann (2010) look at the relationship between the environmental profile of 582 public US firms and their credit spread from 1995 to 2006. They find that environmental concerns are linked to a higher cost of debt financing and lower credit ratings, whereas a sound environmental profile is correlated to a lower cost of debt. Oikonomou (2014) extends their work to social and governance dimensions. He confirms their findings and shows that high levels of CSP are correlated with lower spreads.

Our approach is different to the aforementioned studies on corporate debt: we chose the event study methodology to establish a causal link between CSP and the cost of debt. This methodology has been described for stocks in numerous surveys, the most recent being Kothary and Warner (2007) and Corrado (2011). Bessembinder *et al.* (2008) expose the characteristics of event studies applied to the corporate bond market. The main difference with stocks is that abnormal bond returns are computed from comparison with a matching portfolio that proxies the market return.

Moreover, this paper contributes to the very little research that has been done on CSP as an insurance mechanism. Fombrun and Shanley (1990), Lange and Washburn, (2012A) and Godfrey *et al.* (2008) argue that a good CSP may act as an insurance against the adverse effects of negative ESG events by improving a firm's reputation.

We use a unique database of 1557 ESG events related to 219 firms that issue bonds in Euros. The database is proprietary data of Amundi's Sustainable Investing department. We use daily data from 12/04/2003 to 31/07/2011 of all corpo-

rate bonds issued within the Euroaggregate Corporate universe. Furthermore, we use Amundi's ESG ratings to determine if CSP acts as an insurance mechanism against adverse ESG events.

Powerful non-parametric tests show a significant impact of both negative environmental and social events on corporate bond prices within the industrial/utilities sector. We then show that a sound CSP acts as insurance against the impact of negative environmental events on bond prices in the industrial/utilities sector.

## **4.2 Theoretical Framework, Transmission Channels and Hypothesis Development**

### **4.2.1 Theoretical Framework**

Friedman (1970), Jensen and Meckling (1976) and Fama and Jensen (1983) posit that maximizing shareholders' wealth benefits society the most, provided that the company does not transgress the legal framework. In this sense, ethics is considered more as a constraint rather than a part of the objective function. Agency conflicts lead to over-allocating resources to stakeholders which increases costs without fostering profits (Benabou and Tirole, 2010). A manager that increases the salary of his employees may do so in order to improve his personal reputation to the detriment of the firm.

Freeman (1984), on the other hand, posits the stakeholder theory. Here the firm is at the center of a complex network of stakeholders which affect or are affected by the strategic outcomes of a firm. A stakeholder can refer to an individual (e.g. an employee or client), a group of individuals (e.g. labor unions or NGOs) or other

firms (e.g. a customer or supply chain) (Harrison, Bosse and Phillips, 2010). Managing for stakeholders implies finding synergies between the purpose of the firm and the values shared with all the other legitimate stakeholders (Freeman, 2004). This creates trust-based relationships that will eventually lead to a better understanding of the stakeholders' utility function since stakeholders are more willing to disclose their preferences. Hence, if firms allocate more resources than the minimum required to their stakeholders, they are able to use this knowledge about the stakeholders' utility function to seize opportunities which (i) increase demand, (ii) increase efficiency, (iii) increase the ability to innovate and (iv) improve the ability to deal with unexpected changes. This could increase corporate profits, at least in the long-run. It also reduces potential conflicts that arise due to a loss of the stakeholders' support. The increase of potential conflicts could arguably destroy value.

#### **4.2.2 The Media as Transmission Channel**

By focusing on published CSIP, we introduce several biases. We do not observe CSIP that has been successfully omitted. Unfortunately, these firms are potentially amongst the least transparent and worst in terms of CSIP. Thus, the media itself is also potentially biased. By collecting, selecting and interpreting the environmental, social and governance news, the media performs an agenda-setting that is itself driven by the expectation of the news' impact. Journalists are incentivized by their reputation to maximize the impact of their news. We expect the size of the scoop not only to be related directly to the magnitude of the CSIP but also to the size of the company involved. Furthermore, Deephouse and Heugens (2008) point out that the perception of an issue does not necessarily reflect the

seriousness of the issue. The issue becomes serious if individuals perceive it as serious. Lange and Washburn (2012) give an example. In 1970, Ford was under fire for its compact car Pinto. It became known as a deathtrap even though other compact cars statistically had as many accidents. The difference was that the Ford managers were perceived as having made a choice between number of deaths and the cost to improve the car.

We focus on CSIP reported in the media since the media has the power of overcoming the rational ignorance paradox (Downs, 1957): agents do not access all the existing information if the cost of access exceeds the expected benefits. For example, CSP ratings are costly and the process of integrating new information can take up to several months between the analyst receiving the new information and the integration of these ratings into portfolios by investors. News that is published in the media can be accessed easily and cheaply by all investors and integrated immediately into portfolios, leading to buy and sell decisions of the corporate bonds. We thus expect the media to be a transmission channel with a great impact on bond prices.

### **4.2.3 Hypothesis Development**

A negative ESG event should increase a firm's credit risk. For instance, on 3 April 2008, Reuters News revealed major safety issues in ArcelorMittal's facility in Kazakhstan. Such an incident can cause the loss of support of stakeholders including the regulator or government (there could be a temporary shutdown, fine or regulatory change), labor unions (labor strikes) or employees (leaving the firm). In any case, this event is likely to cause unexpected expenses that increase the riskiness of the firm. We expect that risk-averse bondholders will reduce their exposure

to riskier firms and that the market price of their bond will drop. Put differently, these expected expenses might be financed by issuing debt or reducing capital. The following deterioration of the firm's balance sheet should increase the cost of debt. As Merton (1973) writes, a corporate bond has the same pay-off structure as holding a risk-free asset and selling a put on the firm's assets. Thus the price of the corporate bond should drop.

*Hypothesis 1. A negative ESG event increases a firm's credit risk*

A good CSP may act as an insurance by improving a firm's reputation (Fombrun and Shanley, 1990, Lange and Washburn, 2012). This improved reputation will create moral capital or goodwill that acts as an insurance mechanism (Godfrey *et al.*, 2008). A firm may engage its CSP practices to signal that is trustworthy so that it is less likely to lose the stakeholders' support in bad times (Elfenbein *et al.*, 2011). For example, a sincere relationship with a customer might mean he will keep up good relations with the firm in the aftermath of an adverse event. Proactive CSP strategies may also convince non-governmental organizations to be less severe with firms after an adverse event (Baron and Diermeier - 2007). Thus it preserves corporate financial performance. Firms with bad CSP lack this moral capital or goodwill and are therefore more exposed to negative events. Lange and Washburn (2012) note that individuals are suspicious that firms prioritize corporate profits over social interests. Thus a bad CSP may even increase the impact of an event.

Moreover, a good level of CSP can be a signal for investors that an adverse event is bad luck rather than an avoidable accident. This should convince investors to stay invested in the firm. We hypothesize that a negative event might be less severe or has less impact on a bond of a firm with a good CSP.

Hypothesis 2. *Negative events have less impact on firms with a good CSP*

Some papers discard the financial sector for their analysis (Bauer and Hann, 2010, Oikonomou *et al.*, 2014). Indeed, debt in the financial sector and the industrial/utilities sector is not the same. The former uses it for financial intermediation, i.e. to connect surplus and deficit agents with different time horizons as well as different risk profiles. Its remuneration is the return differential. The latter uses debt as a finance mechanism to accumulate capital for further production. We therefore separate the industrial/utilities and the financial macro-sectors.

## **4.3 Data**

### **4.3.1 Bond Data**

We use the Barclays Euroaggregate Corporate index as our universe. We have daily data from 04/12/2003 to 07/31/2011. Bonds with no reported events are excluded. We thus analyse 219 firms' bond prices. We consider the dirty price, that is the clean price plus accrued interest. All characteristics, such as yield to maturity, maturity and duration, are given by Barclay's and computed with discrete compounded interest rates. We drop the highest and lowest rating of Moody's, S&P and Fitch and use the middle rating. If only two ratings are available we use the lower one. Callable, puttable, convertible and floating bonds are excluded. It would be too cumbersome to control for volatility stemming from embedded options. Subordinated debt is also excluded, as it does not behave like plain vanilla debt. When a company issues more than one bond, we take the bond with the duration closest to 3.5, which is the median duration of our universe. To date, Barclay's has no indicator of trade size or number of trades in a given period. We check for illiquidity by



looking at the movement of prices. Bonds with a zero return at least twice during the ten days preceding the event are excluded from our sample.

### **4.3.2 Events**

We store 1,557 events linked to 219 companies from Amundi's database. Amundi's extra-financial analysts collect the events and classify them in one of the following three categories: environmental, social and corporate governance. This classification with its sub-categories is displayed in Table 7. The first category covers environmental issues such as pollution, climate change and green investing. The second covers everything related to community relations, diversity, employee relations, human rights and product safety. The third refers to corporate governance issues such as transparency, ethics, accounting, corruption and more generally everything related to ownership. For each event, we also provide the source as well as a short description. Table 2 gives examples of these events. There is strong evidence that the events included in the database are independent and that there is no event day clustering.

### **4.3.3 Environmental, Social and Governance Ratings**

Firstly, Amundi's extra-financial analysts identify the ESG criteria that play an important role in terms of reputational, operational and regulatory risks in each sector. Amundi buys quantitative ratings for each criteria from its suppliers, such as Vigeo, GMI, MSCI, Sustainalitics and Oekom.

Secondly, these criteria are aggregated to one of the three ESG dimensions. The sector-specific characteristics are taken into account via a weighting scheme that

differs from sector to sector. Since the criteria from different providers are on different scales, the analysts use z-scores to aggregate them.

Finally, the analyst aggregates the three environment, social and governance dimensions according to another sector-specific weighting scheme to obtain a single rating for each firm.

At each step, the analysts apply a best-in-class transformation so that firms are only compared to their peers. Technically speaking, the standard deviation is conditional to the universe but the average rating of each sector is set to zero. Thus they keep the distance of the ratings within a sector but set the average equal among all sectors.

$$Rating_i = \frac{RawRating_i - \mu_{sector}}{\sigma_{universe}}$$

Where  $Rating_i$  is the final rating of firm  $i$ ,  $RawRating_i$  the raw rating,  $\mu_{sector}$  the mean of the sector of firm  $i$  and  $\sigma_{universe}$  the standard deviation of the universe consisting of all rated firms.

Furthermore, all ratings on both the criteria and the aggregate level are then orthogonalized to the market capitalization. This means that the debiased rating is the residual of a regression of the criteria on the natural logarithm of the underlying entity's market capitalization.

In addition to the automatic rating calculation, the extra-financial analysts conduct an active in-depth analysis on more than 250 issuers through meetings with the respective firms, NGOs, scientific reports and brokers. If needed, they intervene to change the rating "manually".

## 4.4 Methodology

### 4.4.1 Corporate Bond Returns and Abnormal Returns

As suggested by Bessembinder *et al.* (2008), we compute the corporate bond holding period return as:

$$R_t = \frac{P_t - P_{t-1} + AI_t}{P_{t-1}}$$

where  $P_t$  and  $P_{t-1}$  are respectively the bond transaction price at time  $t$  and  $t-1$ .  $AI_t$  is the accrued interest<sup>2</sup> over day  $t$ .

Abnormal bond return is the difference between the bond returns conditional and unconditional on the event. In an equity universe, the abnormal performance is usually estimated by means of the Capital Asset Pricing Model. As proposed in Fama and French (1993), this framework can be extended to include other risk factors such as value/growth or size. This is known as arbitrage pricing theory and is seldom applied to bond data, because the absolute value of bond returns gets smaller with decreasing maturity. By definition, the difference between the market return and the bond return has changing variance over time. Matching portfolios give more precise abnormal returns as shown by Barber and Lyon (1997) and Bessembinder *et al.* (2008). We apply the matching portfolio approach and compute the abnormal return  $AR_t$  as follows:

$$AR_t = R_t - EBR_t$$

where  $EBR_t$  represents the return of the matching portfolio.

The matching portfolio is constructed in a way that its duration matches exactly

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<sup>2</sup> $AI_t$  is defined as the coupon payment multiplied by the ratio of days passed since  $t-1$

the duration of the reference bond on the event date. To do this, we create an equally weighted portfolio with the 20 closest bonds in terms of duration to the reference bond that are above the duration of the reference bond. We only choose bonds that are part of the same macro-sector and that are close to the reference bond in terms of rating. A bond that is part of the matching portfolio does not exceed the reference bond by more than five rating steps. We do the same for the 20 closest bonds whose duration is below the reference bond. A linear combination is used to match the duration of these two portfolios to the duration of the reference bond. We then calculate the returns for the matching portfolio over an estimation window of 150 returns. The formula above describes how we calculate abnormal returns.

If the exact event date is unknown or we expect a lasting impact of the event, the cumulative abnormal return around the event date has to be analyzed. This cumulative abnormal return is defined as follows:

$$CAR_t = \sum_{l=t-h}^{t+j} AR_l, j \geq 0, h \geq 0$$

where  $t$  is the event date and  $j + h + 1$  is the number of included returns.

#### 4.4.2 Tests for Abnormal Returns

We apply the non-parametric tests such as the Corrado (1989) and the Grank test (Kolari and Pynnönen, 2010). Parametric tests are widely used, but their properties crucially depend on the assumption of the returns distribution. Bessembinder *et al.* (2008) show that the rank test outperforms the standard  $t$ -test for single day abnormal returns.

Cowan (1992) and Kolari and Pynnönen (2010) show, however, that the efficacy of non-parametric tests is seriously reduced when extended to cumulative abnormal returns. Kolari and Pynnönen (2011) proposed a rank test to cumulative returns. We briefly present this test and refer the reader to the aforementioned surveys on event studies for a presentation of the usual tests.

We use the same notations as Campbell *et al.* (1997). Day  $t = 0$  indicates the event day. The estimation period relative to the event day is  $t = T_0 + 1, \dots, T_1$  and  $t = T_1 + 1, T_1 + 2, \dots, T_2$  is the event window.  $L_1 = T_1 - T_0$  is the estimation period length,  $L_2 = T_2 - T_1$  the event period length.  $L = L_1 + L_2$  is the length of the combined estimation and event periods. We define the bond's  $i$  standardized abnormal returns as:

$$SAR_{it} = \frac{AR_{it}}{S_i}$$

where  $S_i$  is the standard deviation of the abnormal returns of bond  $i$ . The bond's  $i$  cumulative abnormal return over  $l$  event days (the CAR period) is then defined as:

$$CAR_{i,l} = \sum_{t=t_1+1}^{t_1+l} AR_{it}$$

with  $T_1 \leq t_1 \leq T_2 - l$  and  $1 \leq l \leq L_2$ . We then standardize  $CAR_{i,l}$  with its standard deviation to obtain:

$$SCAR_i = \frac{CAR_{i,l}}{S_{CAR_i}}$$

where

$$S_{SCAR_i}$$

is the the standard deviation of the cumulative abnormal returns of bond  $i$ . The authors follow Boehmer, Mucumeci and Poulsen (1981) by standardizing the cross-

sectional standard deviation to cope with potential event-induced volatility.

$$SCAR_i^* = \frac{SCAR_{i,t}}{S_{CAR_t}}$$

where

$$S_{SCAR_t} = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (SCAR_{it} - \overline{SCAR}_t)^2}$$

is the cross-sectional deviation of cumulated abnormal returns and  $\overline{SCAR}_t = \frac{1}{n} \sum_{i=1}^n SCAR_{it}$ .  $n$  is the number of abnormal returns. The generalized standardized abnormal return (GSAR) is defined as:

$$GSAR_{it} = \begin{cases} SCAR_i^*, & \text{for } T_1 + 1 \leq t \leq T_1 + l \\ SAR_{it}, & \text{for } t = T_0 + 1, \dots, T_1, T_1 + l + 1, \dots, T_2 \end{cases}$$

Thus the cumulated event period is counted as one observation. Kolari's and Pynnönen's (2011) test is a rank test applied to  $GSAR_{it}$ . The demeaned standardized abnormal rank is defined as:

$$U_{it} = \frac{Rank(GSAR_{it})}{T+1} - 1/2$$

for  $i = 1, \dots, n$ , where  $t \in \Gamma = \{T_0 + 1, \dots, T_1\}$  is the set of time indices including the estimation period and the cumulative abnormal return at  $t = 0$ .  $T_0 + 1$  and  $T_1$  correspond to the first and last observations in the estimation period and  $T = T_1 - T_0 + 1$  is the total number of observations.  $Rank(GSAR_{it})$  replaces  $GSAR_{it}$  by its rank number  $1, \dots, T$ .  $U_{i0}$  denotes the rank of the cumulative abnormal return. Under the null hypothesis of no event effect, the expected value of  $U_{i0}$  should be equal to zero for all  $i = 1, \dots, n$ . Kolary and Pynnönen define the generalized rank

t-statistics (GRANK-T) as follows:

$$t_{grank} = \frac{\bar{U}_0}{S_{\bar{U}}}$$

where  $S_{\bar{U}} = \sqrt{\frac{1}{T} \sum_{t \in \Gamma} \bar{U}_t^2}$  and  $\bar{U}_t = \frac{1}{n_t} \sum_{i=1}^{n_t} U_{it}$  and  $T$  the number of the adjusted observations.

Under the null hypothesis of no event,  $t_{grank}$  approaches the standard normal distribution as  $T \rightarrow \infty$ .

## 4.5 Empirical Results

### 4.5.1 Impact on Bond Returns

Table 3 reports several descriptive statistics as well as the results of tests for abnormal returns for all environmental, social and governance events. We observe that the average single day abnormal return is equal to zero, its minimum value is negative and its maximum value is slightly positive. By looking at the Corrado test we conclude that our events do not have an impact on bond prices on the same day of publication. When we extend the event period to five days, the grank test shows that all events put together have a negative impact at the five per cent confidence level. It seems therefore that enlarging the event window increases the significance of abnormal returns.

For each of the three categories E, S and G, the average and median abnormal return is almost equal to zero. Environmental events do not seem to have any visible impact on bond returns in the very short term. The grank test shows some

minor significance at the 10 % level of environmental events. In terms of the social events, the Corrado test does not show us any significance. By looking at the cumulative five day event window, the grank test confirms a negative impact. The social events are significant at the five % level according to the grank test. Events related to corporate governance have no significant effect on bond prices.

By taking a look at the financial sector in table 4, we notice that no test statistic is significant. The story is different in the industrial/utilities sector. The single event day tests tells us that the abnormal return is close to zero. But when we look at the cumulative five event day period, the tgrank test detects a significant impact at the one % level of all the events put together. The split into the environmental, social and governance category shows us that the impact of the environmental and social events is significant at the five and one % levels respectively.

The global picture that can be drawn from these results is that ESG news has a limited impact on corporate bond prices of issuers from the financial sector. In the industrial/utilities sector negative environmental and social news decreases bond prices and thus the firms face a higher cost of debt. Therefore, we accept the first hypothesis that negative events will increase the firm's credit risk in the industrial/utilities sector

#### **4.5.2 Negative News and the Environmental, Social and Governance Reputation of a Firm**

The impact of negative news might be different according to the ESG rating of a firm. We perform regressions of the cross sectional cumulated abnormal return on the ESG ratings and the size of a firm as measured by total assets as well as total



debt to total assets as a proxy for leverage. The ESG ratings have a significant impact at the five per cent level on all news pooled together. In the industrial/utilities sector we see that only the abnormal return of the environmental news depends significantly on the ESG rating at the one per cent. We accept hypothesis 2 that a sound environmental, social and governance policy might protect against the impact of negative environmental news on bond prices in the industrial/utilities sector.

## 4.6 Discussion

We conducted several robustness checks. First, we used market value weighted matching portfolios. We also changed the characteristics of the matching portfolios in order to see if there is a difference in the results. It seems that our matching portfolio captures the market risk quite well. We do not have any data about the liquidity of the bonds. We expect some bonds to be quite illiquid, even though we checked for stale prices. Thus it does not come to our surprise that only the five day estimation window detects an abnormal return different from zero.

This paper contributes to two relatively new strands of research. First, we look at the link between CSP and corporate financial performance through the channel of the cost of debt. Most of these studies perform a panel regression on CSP ratings (Oikonomou *et al.*, 2014, Bauer and Hann, 2010). This does not address the issue of reverse causality. We use an event study to tackle this issue.

Even though Chava (2010) demonstrates that environmental risks play a role for lenders, ESG events do not have an impact on debt issued by the financial macro-sector. According to our database, banks are sometimes quite heavily criticized

for not taking into account enough ESG issues. But since debt issued by financial firms differs in its nature to debt issued by the industrial/utilities sector, and even though these funds are eventually used to finance risky firms or projects, the event study results show that it does not play any role in the pricing of bonds. In the industrial/utilities macro-sector, our study establishes a causal link for the previously found correlations between environmental and social risks and the bond price (Oikonomou *et al.*, 2014, Bauer and Hann, 2010). We cannot confirm the link between governance events and the cost of debt.

Secondly, we investigate if CSP may potentially act as an insurance mechanism, i.e. if a sound CSP might reduce the adverse effects of negative ESG events. We find that this mechanism only works for environmental events. Further research should investigate why a good CSP does not protect from adverse social events.

The results of this research are not only of particular importance to firms, as bonds are an important source of financing, but also to investors that are interested in factors driving bond returns.

## **4.7 Conclusion**

In this paper, we evaluated the effect of published negative news about environmental, social or corporate governance events of firms on bonds. We find that these events have a statistically significant impact on bond prices if we take into account the five days succeeding the event. By splitting up the environmental, social and governance categories, we find that the significance stems mostly from the environmental and social events. After splitting up the industrial/utilities and financial sectors, we find that the events only have an impact on firms within the industrial/utilities sector. In fact, it is the environmental and social events within that sector that are significant.

Furthermore, we find that a sound environmental, social and governance policy might protect against the impact of negative environmental news on bond prices in the industrial/utilities sector.

**Table 1**  
Categories of Events

Categories	Criteria
Environment	Development of Renewable Energy
Environment	Environmental Performance
Environment	Green Investing
Environment	Environmental Strategy
Environment	Pollution
Environment	Biodiversity
Environment	Water
Social	Human Rights
Social	Health & Safety
Social	Employment Conditions
Social	Labour Relations
Social	Supply Chain & Customers
Social	Product Responsibility
Social	Responsible Marketing
Social	Community Involvement
Governance	Board Independence
Governance	Audit & Control
Governance	Remuneration
Governance	Shareholders' Rights
Governance	Takeover Defense Measures
Governance	Ethics
Governance	Transparency And Integration Of ESG Risks

**Table 2**  
Example of Events

<i>Category</i>	<i>Date</i>	<i>Company</i>	<i>Short Description</i>	<i>Source</i>
Environmental	1/27/2011	Lufthansa	biokerosene containing palm oil	Greenpeace
Environmental	8/20/2009	Coca Cola	On pollution watchlist by Chinese authorities	Forbes online
Social	3/4/2008	ArcelorMittal	Major safety issues in a Kazakh facility	Reuters News
Social	6/16/2011	Carrefour SA	Fine for not preventing sexual harassment	China Times online
Governance	8/22/2008	Alstom	Corruption and Money Laundering	Bloomberg
Governance	5/2/2011	Barclays	Investigation for collusion on CDS prices	Wall Street Journal

*Note:* We only report short descriptions here as the database is the property of Amundi. A longer description of the social news about ArcelorMittal is the following: Authorities in Kazakhstan issued a warning to close down ArcelorMittal's facilities unless they take care of safety issues that led to more than 100 deaths of employees. six out of eight mines do not meet the required minimum safety standards to run such a facility in Kazakhstan.

**Table 3**

Tests by Categories of Negative ESG News on Bond Returns

	<i>Number</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>Median</i>	<i>Corrado</i>	<i>t<sub>grank</sub></i>
All	1557	-0.09	0.02	0.0	0.0	0.24	-2.17**
E	586	-0.06	0.01	0.0	0.0	0.76	-1.71*
S	602	-0.08	0.02	0.0	0.0	-0.41	-2.41**
G	369	-0.09	0.01	0.0	0.0	0.03	-0.92

**Table 4**

Tests for an Aggregate Effect of Negative ESG News on Bond Returns from the Financial and Industrial/Utilities Sector

<i>Financials</i>							
	<i>Number</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>Median</i>	<i>Corrado</i>	<i>t<sub>grank</sub></i>
All	589	-0.09	0.01	0.0	0.0	0.71	0.35
E	296	-0.02	0.01	0.0	0.0	1.56	-0.07
S	115	-0.08	0.01	0.0	0.0	-1.57	-0.82
G	178	-0.09	0.01	0.0	0.0	0.35	0.29

<i>Industrial/Utilities</i>							
	<i>Number</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>Median</i>	<i>Corrado</i>	<i>t<sub>grank</sub></i>
All	968	-0.06	0.02	0.0	0.0	-0.16	-3.49***
E	290	-0.06	0.01	0.0	0.0	-0.35	-2.22**
S	487	-0.01	0.02	0.0	0.0	0.21	-2.9***
G	191	-0.01	0.01	0.0	0.0	-0.34	-1.43

*Note:* A negative statistic indicates that we have a significant proportion of negative abnormal returns in our sample. For the  $t_{grank}$  the abnormal returns are cumulated over an event day period of five business days (five daily returns) starting at the date that is stored in our database. \*, \*\* and \*\*\* signify that the abnormal return is significant at the 10 %, 5 % and 1 % levels respectively.

**Table 5**  
 Regression of Abnormal Returns Conditional on all Events on the ESG Ratings  
 in the Industrial/Utilities Sector

<i>All Events</i>			
<i>Variables</i>	<i>All</i>	<i>E</i>	<i>S</i>
Constant	0.022 (1.04)	0.12 (1.81)	0.015 (0.66)
ESG Rating	0.025*** (2.83)	0.06** (2.00)	0.001 (0.17)
Total Assets	0.00 (0.55)	0.00 (1.33)	0.00 (0.80)
Total Debt / Total Assets	-0.001** (2.35)	-0.005*** (2.70)	-0.001 (1.16)
Financial Rating	0.00 (0.04)	0.00 (0.04)	0.00 (0.36)

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## **5 Chapter 2: A Critique on the Integration of Environmental, Social and Governance Risk Factors in Bond Portfolio Construction**

### **Abstract**

I analyze, from a fund manager's perspective, the integration of environmental, social and governance (henceforth ESG) performance of firms in credit portfolios. The ESG performance is measured by analysts that quantify their beliefs through ratings. This study shows that the spread is more likely to change due to change in ESG performance rather than the level of ESG performance. Furthermore, I show that different ESG factors may have an opposing impact on bonds. They also have a different impact across different geographic regions. I create portfolios that have region, sector and investment style risk profiles similar to the benchmark's exposures. I show that using the level of ESG ratings as expected return does not give any over-performance at least in the time horizon of a portfolio manager (on a one month rebalancing basis). A portfolio manager can increase the average ESG rating of the portfolio by 1.5 standard deviations without cost. This leaves substantial room for ESG ratings to be combined with asset allocation or absolute return strategies.<sup>3</sup>

*JEL Classification:* G12, G30.

*Keywords:* Corporate Social Responsibility, Bond market.

<sup>3</sup>I thank Yannick Le Pen (Université Paris-Dauphine) and Patricia Crifo (Polytechnique) for their valuable comments.

## 5.1 Introduction and Previous Literature

Socially responsible investors constitute an important part of today's financial markets. According to Eurosif's Socially Responsible Study (2015), sustainability-themed investments grew in Europe by a staggering 30.7% per annum since 2005. Bonds represented about 40% of the assets selected by socially responsible criteria.

I analyze, from a fund manager's perspective, the integration of environmental, social and governance (henceforth ESG) performance of firms in credit portfolios. The ESG performance is quantified by analysts that express their beliefs on a firm through ratings. In this process, the analysts rate a firm according to a predefined set of criteria. These criteria are then aggregated to obtain the ESG ratings. I collect these ratings from Amundi on the aggregate ESG level and on the criteria level. The cost of debt financing is measured by the credit spread of a firm's outstanding bonds. Therefore, I collect monthly spread data of the Merrill Lynch Large Cap Corporate Bond index from Bloomberg in between the 31st of January 2010 and 31st of December of 2012. This index contains only investment grade rated bonds and covers over 860 issuers from 57 countries.

Taking a fund manager's perspective, this study examines the change of the spread and its translation into financial performance of bond portfolios. I show that the spread is more likely to change due to change in ESG performance rather than the level of ESG performance. Furthermore, I show that different ESG factors may have an opposing impact on bonds. They also have a different impact across regions.

Literature surveys by Orlitzky *et al.* (2003) and Margolis *et al.* (2007) report evidence of a positive correlation between corporate social performance (henceforth

CSP) and the firms' financial performance measured by stock market capitalization or accounting measures. The question remains if that link has any repercussions on the cost of debt.

There is only a handful of papers that study the relationship between CSR and the cost of debt. Most of them find that CSR does not reduce interest rates. Sharfman and Fernando (2008) evaluate the impact of environmental performance on the cost of capital for US firms listed in the SP 500. Debt financing is one component of the cost of capital. The authors assume that a better environmental performance should reduce the cost of capital. One argument is that a better environmental performance reduces the expectation of financial distress caused by unexpected extreme environmental events. However, their empirical results do not confirm this as they find a positive relationship between the cost of debt and their indicator of environmental performance. They conclude that environmental performance reduces the overall cost of capital, that is the cost of equity financing and the cost of debt financing.

Menz (2010) studies the relationship between Euro corporate bond credit spreads and an index including environmental, social and corporate governance practices. He uses monthly data from July 2004 to August 2007. His estimates show weak evidence of a positive effect of CSR on bond credit spreads.

Goss and Roberts (2011) study the relationship between corporate social responsibility and the cost of bank loans for US firms. They find that firms with weak CSR tend to pay higher interest rates. Bauer and Hann (2010) look at the relationship between the environmental profile of 582 public US firms and their credit spread from 1995 to 2006. They find that environmental concerns are linked to a higher cost of debt financing and lower credit ratings, whereas a sound environmental

profile is correlated with a lower cost of debt.

Koelbel *et al.*(2013) study the link between media attention as measured by an indicator developed by Reprisk and credit default swap spreads in the years between 2007 and 2012. They find that media attention towards corporate social performance increases the cost of debt in the US but not significantly in Europe.

Oikonomou *et al.*(2011) extend Bauer and Hann's (2010) study to different dimensions of corporate social responsibility in the US. They use KLD data from 1994 to 2008 to build aggregate variables that indicate a firm's strength and concerns. The bottom line is that firms face a lower spread for sound corporate social behavior and a higher spread for bad social behavior. They come to similar conclusions regarding bond ratings.

Kölbel and Busch (2013) are the first to compare the US and Europe regarding the impact of ESG issues on the corporate debt market. To do so, they investigate the impact of the number of negative environmental, social and governance news on CDS spreads in between 2007 and 2012. They find that negative media attention of ESG related issues increases the spread of CDS in the US and in Europe.

Crifo *et al.* (2014) show that the cost of debt of 23 OECD countries is lower due to a sound ESG performance of the issuer. The impact is higher with shorter maturities.

Drut (2010) investigates how the mean efficient frontier changes of portfolios containing sovereign bonds from 20 different issuers due to an integration of ESG ratings. According to his findings, no harm is done to the risk/return relationship.

Derwall and Koedijk (2009) measure the performance of socially responsible bond and balanced funds relative to matched samples of conventional funds, over the



period of 1987-2003. They find that the average SRI bond fund performed similar to conventional funds, while the average SRI balanced fund outperformed its conventional peers by more than 1.3% per year.

Unlike existing studies I seek to test the link between ESG ratings and the variation of the cost of debt, but I also run portfolio simulations to apprehend the cost of ESG integration in terms of financial performance. I create portfolios that have region, sector and investment style risk profiles similar to the benchmark's exposures. I show that using the level of ESG does not give rise to any overperformance at least in the time horizon of a portfolio manager (1 month rebalancing basis). A portfolio manager can increase the average ESG rating of the portfolio by 1.5 standard deviations without incurring additional cost. This leaves substantial room for a combination with asset allocation or absolute return strategies.

The novelty of this study is threefold. First I compare Europe, Asia and North America in terms of materiality of the ESG criteria and aggregates from a fund's manager perspective. Second, I'm the first to use actual ratings from a major asset manager, other studies use KLD. Third, I run portfolio simulations to test if the ESG ratings can be a source of alpha.

The rest of the paper is organized as follows. Section 2 presents the theoretical framework and the hypothesis development. Section 3 introduces the data. Section 4 shows the empirical results. Finally, section 6 concludes.

## **5.2 Hypothesis Development**

The relationship between environmental, governance and social practice and financial performance has attracted much debate in recent years. This controversy

is fed by arguments from disciplines such as economics, management and finance. As reminded by Kacperczyk (2009), the two main theses in play could be described as the "shareholder theory" and the "stakeholder theory". A stakeholder as defined by Freeman (1984) is "any group or individual who can affect or is affected by the achievement of an organization's purpose". Both theories defend different views on the role CSR should play in the definition of a firm's objectives.

According to the "shareholder theory", corporate managers should focus solely on increasing the wealth of shareholders. The responsibility towards shareholders should always be considered as more important than the responsibility towards non-shareholding stakeholders such as employees, customers, natural environment or local communities. This thesis is notably upheld by Friedman (1970), Jensen and Meckling (1976) and Fama and Jensen (1983).

Friedman (1970) posits that maximizing shareholders' wealth benefits society the most provided that the company does not transgress the legal framework. In this sense, ethics is considered more as a constraint than as a part of the objective function. Put differently, these authors consider maximizing more than one objective as an impossible task. Thus CSR potentially increases costs without fostering profits. Second, the shareholder theory supposes all contracts between the firm and the non shareholding stakeholders as complete. This means that all possible future events are specified in the contract. The welfare of the non- shareholding stakeholders is thus protected whereas shareholders have no protection against a breach of contract (Kacperczyk 2008), i.e. there is no reason to attribute additional resources, in terms of relationship management for instance, to any stakeholder than the strict minimum. A third argument is shown by Barnea and Rubin (2005). CSR investment is not always motivated by the maximization of profit, but

could result from agency conflicts between shareholders and managers. Investment managers or CEOs may have an incentive to favor CSR investments for their personal reputation, for instance, at the expense of a firm's financial profits.

The "stakeholder theory" (Freeman (1984) and Freeman *et al.* (2007)) states that corporations should consider the interests of each stakeholder in their decision making. In a modern pluralistic society, a firm cannot simply maximize one objective function in order to deal with all potential contingencies. Furthermore, no stakeholder should have a *prima facie* obligation over another (Kacperczyk 2008). According to Freeman (2004,) the stakeholder theory asks for the purpose of a firm and the shared values with all stakeholders.

Contracts between firms and stakeholders are considered incomplete (Freeman, 2004). Thus firms could commit to socially responsible behavior to avoid the loss of the stakeholders' support. The reduction of potential conflicts could arguably increase corporate profits or financial performance, at least in the long-run. Heal (2005) finds proof of the incomplete contracts in neo-classical microeconomics. As governments cannot resolve all problems resulting from negative externalities, he defends that corporate social or environmental activities should substitute to missing markets and regulation if external costs arise from them. This will reduce conflicts between firms and stakeholders such as non-governmental organizations. In that case, CSR can be considered as a risk mitigating policy.

In the resource-based view of the firm, economic performance depends on internal resources and capabilities that are valuable, rare and difficult to imitate or substitute. Stakeholder management can be considered as an important organizational capability and a good reputation can be a valuable asset making access to financing easier.

According to Freeman (2004) the "stakeholder theory" rejects the thesis that business and ethics can be separated. In recent work of both camps, one can find a tendency of reconciliation. For example, Jensen (2002) calls for an "enlightened stakeholder theory" or an "enlightened shareholder theory" that still maximizes one objective function, but takes into account potential conflicts with stakeholders such as environmental issues or employees. He warns that if a company deviates from profit maximization, the welfare of the whole society is at stake. Freeman (2004) writes that "stakeholder theory is decidedly pro-shareholder". He adds that ultimately all of a firm's good relationships with its stakeholders increase value and thus create shareholder value. To conclude, these different arguments plead in favor of a positive effect of CSR on firms' financial performance. The following improvement of the firm's balance sheet may induce a lower cost of debt. This makes me therefore infer that a better corporate social performance reduces a firm's credit risk.

A second reason, why the spread might decrease, is the increasing presence of socially responsible investors, i.e. investors that value the externalities imposed by firms on society. Socially responsible investors constitute an important part of today's financial markets. According to the Social Investment Forum, about 11% of assets under management in the US is managed following this investment style. In Europe, this percentage has been growing at a fast pace to reach 17% of assets under management according to Eurosif.

**Hypothesis 1:** *Firms that have a sound environmental, social and governance performance will benefit from decreasing credit spreads.*

A rapid change in ESG performance may induce a change of the spread since investors change profit and risk expectations of the firm. Gollier and Pouget (2014)

write that in the presence of socially responsible investors, a firm that improves its ESG performance rapidly should be subject to increased demand for its stocks. I assume, that this should also have an effect on bond prices in the same direction.

**Hypothesis 2:** *Firms experiencing a rapid increase in their environmental, social and governance performance have decreasing credit spreads.*

The usual framework of a best-in-class fund within the fixed income universe is a bond picking process. A bond picking process consists of choosing bonds for their intrinsic value and not for any bet on style, region or any other systematic asset allocation. Thus such a process supposes a minimization of the portfolio's active systemic risk compared to its market proxied by a benchmark. Put another way, the main active risk source is the bond's specific part of the risk. By keeping the sector and regional weights neutral, such a process is in line with the best-in-class idea of comparing each company to its direct competitors.

An investor who does not hold the bonds until maturity, is interested in identifying bonds whose yields are going down, i.e. whose prices are going up. If hypothesis 1 is true, then this should translate as a source of alpha for bond portfolios integrating ESG data.

However, since the ESG selection process restricts the investable universe dramatically, the portfolio construction has an additional constraint. A constraint should reduce the potential performance of the portfolio and make it hard to track or outperform the benchmark according to modern portfolio theory.

I posit thus two alternative hypothesis:

**Hypothesis 3.a:** *Portfolios integrating ESG ratings outperform their benchmark due to a intrinsic value of the ratings.*

**Hypothesis 3.b:** *Portfolios integrating ESG ratings underperform their benchmark due to an additional constraint.*

## **5.3 Data**

### **5.3.1 Bonds**

I collect monthly spreads of the constituents of the Merrill Lynch Large Cap Corporate Bond index from Bloomberg in between the 31st of January 2010 and 31st of December of 2012. This index contains only investment grade bonds and covers over 860 issuers from 57 countries. I only take one representative bond for each issuer in my sample. If the issuer has several bonds outstanding, I create a synthetic bond with all senior bonds in the index. Table 6 shows that the sample contains 88 issuers from Asia/Pacific, 348 from Europe and 396 from North America. The average spread is 1.82% for the whole index, 1.59% for Asia/Pacific, 1.95% for Europe, 1.71% for North America and 2.83% for the remaining issues. 216 issuers are financials with an average spread of 2.16%, 562 are industrials with 1.66% and 82 are utilities with 1.64%.

### **5.3.2 Environment, Social and Governance Ratings**

The purpose of the extra-financial analysis is to assign an ESG rating based on a set of criteria to each firm. These criteria belong to the following three dimensions:

- Environmental Dimension.
- Social Dimension.

- Governance Dimension.

In the following paragraph I describe the criteria of these three dimensions in order to expose the methodology used by Amundi to aggregate them to a single ESG rating. Amundi only discloses criteria that are not sector specific<sup>4</sup>. For instance, green investing, is a criteria that only concerns financials and is thus not part of the study. Table 7 shows all criteria that belong to each dimension.

### **Environmental criteria**

The criteria *Emissions and Energy* measures the energy consumption and the output of gases related to climate change. It is an assessment of how much a firm optimizes its energy using processes.

### **Social criteria**

The *Human Rights* criteria measures to what extent a firm respects fundamental rights. Firms that establish internal control mechanisms in order to respect international conventions on child labor and arms trade, for instance, have a better rating than their peers without those control mechanisms. *Health and Safety* is a proxy for the health and safety policy to prevent occupational accidents and diseases. It takes into account if firms have established monitoring committees with real influence composed by labor representatives. The variable *Employment Conditions* quantifies the development of the firm's human capital through training and career management. *Labor Relations* assesses if the right of freedom of

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<sup>4</sup>Amundis' ratings are non public proprietary data.

association and labor union is guaranteed without discrimination. *Supply Chain and Customer Relation* quantifies the supply chain and customer relation management.

### **Governance criteria**

*Board Independence* gauges the separation of the decision-making and supervisory functions (chairman/CEO) as well as the existence of independent oversight bodies such as the board of directors or remuneration and appointment committees. *Audit & Control* evaluates the existence of a competent and independent audit committee that supervises the control of accounts. It also measures the presence of quality and risk control mechanisms. *Remuneration* rates the firm's compensation policy in terms of transparency and formalization especially in respect to the conditions of performance attached to the variable part of the salary. *Shareholders' Rights* measures to what extent different shareholders are treated equally and can freely exercise their voting rights. *Takeover Defense Measures* gauges to what degree anti take-over measures restrict shareholders' rights. *Ethics* values to what amount the firm prevents corruption, fraud and money laundering as well as if the firm's output is sold in accordance with ethical values.

### **ESG ratings methodology**

First, Amundi's extra-financial analysts identify the ESG criteria that play an important role in terms of reputational, operational and regulatory risk in each sector. Amundi buys quantitative ratings for each criteria from its suppliers such as Vigeo, GMI, MSCI, Sustainalitics and Oekom.



In a second step, these criteria are aggregated to one of the three ESG dimensions. The sector specific characteristics are taken into account via a weighting scheme that differs from sector to sector. Since these criteria from different providers are on different scales, the analysts use z-scores to aggregate them.

Finally in a third and last step, the analysts aggregate the three dimensions environment, social and governance according to another sector specific weighting scheme to obtain a single rating for each firm.

At each step, the analysts apply a best-in-class transformation so that companies are only compared to their peers. Technically speaking, the standard deviation is conditional to the universe but the average rating of each sector is set to 0. Thus they keep the distance of the ratings within a sector but set the average of all sectors equal.

$$Rating_i = \frac{RawRating_i - \mu_{sector}}{\sigma_{universe}}$$

Where  $Rating_i$  is the final rating of firm i,  $RawRating_i$  the raw rating,  $\mu_{sector}$  the mean of the sector of firm i and  $\sigma_{universe}$  the standard deviation of the universe including all rated firms.

All ratings on both the criteria and the aggregate level are then orthogonalized to the market capitalization, i.e. the unbiased rating is the residual of a regression of the criteria on the natural logarithm of the market capitalization of the underlying entity.

In addition to the automatic rating calculation, the extra-financial analysts conduct an active in depth analysis on more than 250 issuers through meetings with

the respective firms, NGOs, scientific reports and brokers. If needed, they intervene to change the rating "manually".

Table 8 shows the minimum, maximum and the average of ratings uses in this sample. Since the sample used in this study is a subsample of Amundi's total investment universe, average and standard deviation differ from 0 and 1, respectively.

### **Correlation Between Amundis' and MSCI's Ratings**

I check if Amundi's ratings are correlated with ratings from MSCI, one of the most widely used providers in the asset management industry. The correlation for the ESG ratings is 53 percent. The correlation for the E, S and G ratings are 40, 32 and 27 percent, respectively. All correlations are significant at the one per cent level. It is interesting to see that the three criteria E, S and G have lower correlations with Amundi's counterparts as the aggregate ESG score. An explanation might be the fact that both methodologies adjust for sector differences, MSCI on the ESG level and Amundi on all levels. This might create a bias that drives correlations up. I infer that it is very likely that if Amundi's ratings go up, MSCI's ratings go up as well. Thus, Amundi and other market participants will receive the same signal at the same time.

### **5.3.3 Control Variables**

To test the link between the change of bond spreads and ESG ratings, I introduce control variables specific to the issue and to the issuer. All issuer specific data stem from Factset. The control variables specific to the issuer are detailed in the

following paragraph.

The *Size* is measured by the natural logarithm of the total assets of the firm. Large firms are widely perceived as less risky and thus benefit from a lower cost of debt. The *Leverage* is defined as total liabilities over total assets. It indicates how much debt a firm has. The higher the leverage ratio, the riskier the firm. A high leverage ratio should increase the cost of debt. The *ROA* is the accounting return on assets. It represents the profitability of the firm and thus the ability to pay back its debt. The *Capital Intensity* is the ratio of fixed assets to total assets. Since the fixed assets could be claimed by a creditor in case of a default, a high capital intensity should decrease the level of the spread. *Loss* is a dummy variable that equals 1 if the firm's net income before extraordinary items is negative in the current and prior fiscal year. The control variable specific to the bond issue are the *Modified Duration* and the *Nominal*. The *Modified Duration* is positively linked to the spread since a bond with a higher maturity is perceived as riskier.

## **5.4 The Link Between the Spread and the CSP**

This sections studies the link between change of spreads on the level and the change of ESG performance. Hereby showing how current practices of aggregating ESG criteria by asset managers could be potentially improved.

### **5.4.1 Methodology**

The panel is built according to the following general form.

(1)

$$\begin{aligned}\Delta Spread_{i,t} = & \alpha + \beta \Delta Spread_{i,t-1} + \gamma ESG_{i,t-1} + \kappa CapitalIntensity_{i,t-1} \\ & + \zeta ROA_{i,t-1} + \eta Leverage_{i,t-1} + \theta Size_{i,t-1} + u_{i,t}\end{aligned}$$

(2)

$$\begin{aligned}\Delta Spread_{i,t} = & \alpha + \beta \Delta Spread_{i,t-1} + \gamma \Delta ESG_{i,t-1} + \kappa \Delta CapitalIntensity_{i,t-1} \\ & + \zeta \Delta ROA_{i,t-1} + \eta \Delta Leverage_{i,t-1} + \theta \Delta Size_{i,t-1} + u_{i,t}\end{aligned}$$

where  $\Delta Spread_{i,t}$  is the first difference of the spread at t,  $\alpha$  a constant common to all observations in the panel,  $ESG_{i,t-1}$  the ESG variable or criteria variable of the issuer  $i$  at  $t - 1$ ,  $CapitalIntensity_{i,t-1}$  the capital intensity of the issuer  $i$  at  $t - 1$ ,  $ROA_{i,t-1}$  the return on assets of issuer  $i$  at  $t - 1$ ,  $Leverage_{i,t-1}$  the leverage of issuer  $i$  at  $t - 1$ ,  $Size_{i,t-1}$  of the issuer  $i$  at  $t - 1$  and  $u_{i,t} = \phi_t + \epsilon_{i,t}$  with  $\phi_t$  the time fixed effect and  $\epsilon_{i,t}$  the random error.

I perform ordinary least squares linear panel regressions that calculate cluster robust standard errors on the industry level (Petersen, 2009). I also control for auto-correlation at the first order and heteroskedasticity in between panels. I also include an auto-regressive term since the differences of the spread are heavily auto-correlated. The resulting dynamic panel bias is probably very low due to the 36 different observation in time. The panel is unbalanced because of some bonds entering the index and others maturing. Since the main interest of this study is

the change of the spread due to a change in the corporate social performance from an asset manager's perspective, I use ESG ratings as well as firm specific control variables one month delayed.

(1) is a regression of the spread change on the firm specific control variables and the ESG ratings. I do not include issuer specific fixed effects for rating, currency and country etc. since the first differences remove unobserved unit-level effects. Since the market moves according to macroeconomic news, I opt for fixed time effects on the monthly level. I do not include issue specific control variables such as duration because this would only make sense if I used the level of the spread as the dependent variable.

The only thing that changes in (2) is that I regress the change of the ESG performance on the spread change. I thus take the first differences of the control variables, too.

## **5.4.2 Empirical Results**

### **Change of Spreads on Level of CSR**

First, I regress the first differences of the spread on the ESG factors and a set of control variables. Control variables are generally insignificant. Furthermore, table 9 shows that the level of CSP does not have an impact on the first differences of the spread. Table 10 does not indicate a correlation between the environmental, social and governance factor in Europe, North America and Asia. The social rating has a small positive impact that is significant at the 10% level in the World sample. Table 11 exhibits the absence of a link between the criteria *Emissions and Energy*

and the spread across all regions.

The picture is different for the social criteria. Table 12 reveals that the *Human Rights* criteria has a negative impact on the change of the spread at the one per cent level, but only in Europe. *Health and Safety* has a positive impact on the change of the spread in North America and Asia at the ten and one per cent level, respectively. It seems that a good performance of this criteria is seen as an additional cost. *Employment Conditions* is linked to a spread increase in Europe with a significance of ten per cent. A sound performance of the *Labor Relations* and the *Supply Chain and Customer Relation* criteria is correlated with a decrease of the spread in Asia at the five per cent level.

Table 13 shows the governance criteria. The criteria *Audit & Control* is positively linked to an increase of the spread in the world sample at the five per cent level, whereas *Remuneration* is negatively linked in the same sample at the ten per cent level. *Shareholders' Rights* is positively correlated with a spread change in Asia at the ten per cent level.

I thus dismiss hypothesis one for the ESG aggregate and the environmental and governance ratings. The picture is different for the environmental, social and governance criteria. I detect some weakly negative and some weakly positive correlations generally differing between regions.

### **Change of Spreads on Change of CSR**

I also regress the changes of the spread on the changes of ESG performance. Table 14 shows that a positive change of the aggregate ESG performance is positively related to an increase of the spread in North America at the five per cent level.

Table 15 shows the change of environmental, social and governance performance. Across all regions a positive change in the environmental performance is followed by a decrease in the spread at the one per cent level. In North America and Asia an increase in the social performance induces a higher cost of debt at the one per cent level. The governance performance is only significant in Asia. An increase is followed by a decrease of the spread at the one per cent level.

Table 16 shows that an increase of the performance of the *Emissions and Energy* criteria induces a decrease of the spread in North America.

Table 17 shows the performance of the social criteria. The impact of the *Human Rights* criteria differs across regions. A good performance induces a spread decrease in Europe and Asia at the one and five per cent significance level, respectively. In contrast, a good performance is followed by a spread increase in North America at the one per cent level. *Health and Safety* only induces a negative change in spread in Asia at the five per cent level. The performance of the criteria *Employment Conditions* has a very heterogeneous impact on spreads across regions. It is followed by a spread increase in Europe and Asia at the five per cent level, whereas it triggers a spread decrease in North America significant at the ten per cent level. A positive change in the criteria *Labor Relations* is clearly followed by a decrease of the spread across all regions significant at the one per cent level. A better performance of *Supply Chain and Customer Relation* gives rise to a decrease in the spread in Asia at the one per cent level.

Table 18 shows the results for the governance criteria. A decrease of the the criteria *Board Independence* is followed by a decrease in the spread in Europe and Asia at the one per cent level. A change in the criteria *Audit & Control* is positively linked with a change in the spread across all regions at the one per cent level in

Europe, the five per cent level in North America and Asia. A change in the performance of the criteria *Remuneration* is only linked to change in the spread in North America, where it induces a decrease of the spread, significant at the ten per cent level. A variation of the *Shareholders' Rights* criteria performance is followed by a variation of the opposite sign in Europe and North America at the ten and five per cent level, respectively. The criteria *Takeover Defense Measures* solely has a positive coefficient at the one per cent level in Asia. The criteria *Ethics* seems to play only a role in Europe and Asia. In both regions an increase in its performance results in a smaller spread.

I can only accept hypothesis two for the environmental dimension. Even though, there seems a general impact of ESG criteria and ESG aggregate performance on the spread, the direction is not clear. A better ESG performance sometimes seems to lower and sometimes to increase the cost of debt.

## **Discussion**

Most of the criteria do not have any impact on the corporate spreads. One explanation could be that ESG criteria strengths shouldn't be added up to ESG criteria concerns. Corporate social irresponsibility is conceptually different from corporate social responsibility for two reasons. First, the absence of socially irresponsible behavior does not mean that the firm acts in a socially responsible way. Strike, Gao and Bansal (2006) write that violence against employees is irresponsible whereas no violence against employees is not necessarily socially responsible. Second, Lange and Washburn (2012) note that these two concepts are processed differently by individuals because their perception is selective, skewed and gap filled. This leads to the fact that on average, individuals spend more time think-



ing about negative events than positive ones and negative events are judged more severely. Kruger (2014) points out that certain positive events may have a negative impact on stock prices due to agency conflicts.

Furthermore, I show that different ESG factors may have an opposing impact on bonds. This calls for more research on the materiality of these criteria. They also have a different impact across regions. The materiality may differ across regions due to different conceptions of sustainability in different cultures Kölbl *et al.* (2013). It also shows that those indicators shouldn't be blindly aggregated if the portfolio manager is seeking performance.

This study shows that the spread is more likely to change due to change in ESG performance rather than the level of ESG performance. In the presence of socially responsible investors, a firm that improves its ESG performance rapidly should be subject to increased demand for its stocks. I assume, that this should also have an effect on bond prices in the same direction

### **5.4.3 Robustness Checks**

The results are robust to a change of the frequency to yearly data. The data is also robust to taking the arithmetic average of three monthly observations.

McWilliams and Siegel (2000) argue that research and development might be a variable that is correlated with CSP. I address the risk of an omitted variable bias by integrating research and development. It does not change results at all. I thus do not use it in the main regressions since the size of the sample would be reduced.

The autoregressive term in the regression might introduce a dynamic panel bias. I use Arellano and Bond's (1991) dynamic linear panel methodology for robustness

checks. The results are stable.

Some paper discard the financial sector for their analysis (Bauer and Hann, 2010, Oikonomou *et al.*, 2014). Indeed, debt in the financial sector and the industrial/utilities sector is not the same. The former uses it for financial intermediation, i.e. to connect surplus and deficit agents with different time horizons as well as a different risk profiles. Its remuneration is the return differential. The latter uses debt as a finance mechanism to accumulate capital for further production. I therefore perform the same regressions without the financial sector. The results are stable.

## 5.5 Portfolio Simulations

This study replicates current best in class practices of integrating ESG performance in bond picking credit processes and gives advice on how to potentially improve these practices.

### 5.5.1 Methodology

The bond picking process is a maximization of the forecast of the intrinsic value of each company while respecting a given risk constraint. In a socially responsible fund it comes down to integrating ESG ratings as expected returns. This supposes that these criteria have an intrinsic value, i.e. source of alpha.

I use the following utility function for this bond picking process:

$$Utility = x'r - \lambda(expo'VCVexpo + \phi x'\Omega x)$$

Where  $x$  is a vector containing the weights of the bonds,  $exp$  is a vector containing the expositions of all bonds to the risk factors,  $r$  is the vector of expected returns (i.e. the ESG ratings),  $V$  is the covariance matrix of the systematic risk,  $\Omega$  is a matrix containing the specific variances on the diagonal,  $\lambda$  is the risk aversion and  $\phi$  the specific risk multiplier.

The covariance matrix contains as risk factors the sovereign yield, the swap spread, the different credit spreads for each macrosector and the foreign exchange rate to the dollar for each currency in the sample. The exposure of a bond to these risk factors is simply the weight of the bond in the portfolio times its duration. The specific variances are simply the risk of a bond being downgraded.

The specific risk multiplier is set to a very small value so that the portfolios have an almost free floating active specific risk. Indeed, at any given point in time in these portfolio simulations, more than 90 per cent of the active risk is idiosyncratic.

I use a relatively high risk aversion that assures a very low active systematic risk while keeping a high level of the portfolio ESG ratings. I optimize each portfolio on a monthly basis between January 2010 and July 2013. The benchmark is the Merrill Lynch Large Cap Corporate Bond index. This index only contains investment grade bonds. Furthermore, I use the Merrill Lynch industry level 3 that classifies all issues according to 16 different sectors. The modified duration and the option adjusted spread of each sector of the optimized portfolio must be within  $\pm 5$  basis points of their benchmark counterparts. I set the same constraint on the entire portfolio. Furthermore, I set a constraint of the weight of each currency of  $\pm 5$  basis points. I track currency risk closely and notice that it is negligible at all times (less than 5 per cent of the very low active systematic risk). No issue and no issuer may exceed one and two per cent in terms of weight of the portfolio, respectively.

Furthermore, I restrict the portfolio to 300 assets.

### **5.5.2 Results**

By looking at Figure 1 we see that the portfolio containing European bonds outperforms its counterparts by an annualized 0.4 per cent, albeit this overperformance is not significant. The active performance of the North America and Asia/Pacific portfolios is almost zero. On a global scale, the World portfolio exhibits a statistically non-significant outperformance of 0.3 per cent annualized.

Figure 2 depicts the return of the portfolio simulations only using the E rating. Again, Europe outperforms its benchmark by a non-significant 0.40 per cent. The North America, Asia/ Pacific and World portfolios are both close to their respective benchmark.

Figure 3 shows the return of the portfolio simulations using the S rating as the expected return. All regions and the World portfolio are very close to their respective benchmark.

In Figure 4, the portfolio Europe optimized according to the rating G outperforms its benchmark with 0.60 per cent being significant at the 10 per cent level. Table 19 shows the t-statistics and information ratios of all portfolios. The Portfolio Europe optimized using the G rating has an information ratio of 0.88. The other three portfolios using the rating G as the expected return are close to their respective benchmarks.

These portfolio simulations show the current practice of socially responsible best-in-class investment process in the corporate bond universe. The portfolio simulations confirm that the level of ESG performance does not induce a decrease of

the spread. Thus integration in bond picking does not result in overperformance. Although, it is very important to note that a portfolio manager can increase the average ESG rating of the firms in the portfolio by 1.5 standard deviations without cost in terms of financial performance. This leaves substantial room for a combination with asset allocation or absolute return strategies.

## **5.6 Conclusion**

This study shows that the spread is more likely to change due to change in ESG performance rather than the level of ESG performance. Furthermore, I show that different ESG factors may have an opposing impact on bonds. This calls for more research on the materiality of these criteria. They also have a different impact across regions. It also shows that those indicators shouldn't be blindly aggregated if the portfolio manager is seeking performance.

The portfolio simulations confirm that the level of ESG performance does not induce a decrease of the spread. Thus integration in bond picking does not result in overperformance. Although, it is very important to note that a portfolio manager can increase the average ESG rating of the firms in the portfolio by 1.5 standard deviations without cost in terms of financial performance. This leaves substantial room for a combination with asset allocation or absolute return strategies.

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**Table 6**

Issuers by Region and Industry

Region/Industry	Nb of Issuers	Average Spread
Europe	348	1.95%
North America	396	1.71%
Asia/Pacific	88	1.59%
Financials	216	2.16%
Industrials	562	1.66%
Utilities	82	1.66%
Total	860	1.64%

**Table 7**  
Environmental, Social and Governance criteria

Categories	Criteria
Environment	Emissions and Energy
Social	Human Rights
Social	Health & Safety
Social	Employment Conditions
Social	Labor Relations
Governance	Board Independence
Governance	Audit & Control
Governance	Remuneration
Governance	Shareholders' Rights
Governance	Takeover Defense Measures
Governance	Ethics

**Table 8**  
Descriptive Statistics

Variable	Min	Max	Mean	Median	StDev
ESG	-3.436	3.726	0.344	0.344	0.970
E	-3.786	4.382	0.278	0.272	0.993
S	-3.363	4.455	0.229	0.204	1.017
G	-4.698	2.538	0.306	0.394	0.837
Emissions and Energy	-2.557	4.093	0.277	0.243	0.989
Human Rights	-3.037	4.077	0.321	0.296	0.967
Health & Safety	-3.717	3.448	0.188	0.190	0.927
Employment Conditions	-3.187	4.648	0.240	0.150	0.991
Labor Relations	-3.864	3.983	0.153	0.011	0.992
Board Independence	-4.098	2.377	0.241	0.312	0.802
Audit & Control	-4.568	2.892	0.236	0.304	0.804
Remuneration	-3.771	3.451	0.266	0.324	0.858
Shareholders' Rights	-3.973	2.765	0.242	0.350	0.847
Takeover Defense Measures	-3.181	2.722	0.135	0.162	1.022
Ethics	-4.021	2.682	0.224	0.277	0.840

**Table 9**

Results of Regression of Changes in the Spread on the Level of ESG Performance

Observations included	11489	3637	6756	985
Firms included	392	128	225	37
Dependent Variable	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$
Independent Variable	World	Europe	North America	Asia Pacific
$\Delta Spread_{t-1}$	-0.43*** (-24.44)	-0.43*** (-19.22)	-0.44*** (-21.22)	-0.54*** (-7.90)
$ESG_{t-1}$	0.00 (0.62)	-0.00 (-0.68)	0.00 (0.47)	-0.00 (-0.65)
$CapitalIntensity_{t-1}$	0.25 (1.53)	0.25 (0.77)	0.13 (0.76)	-0.25 (-0.31)
$ROA_{t-1}$	0.00 (0.55)	-0.00 (-1.52)	0.00* (1.90)	-0.00 (-0.47)
$Leverage_{t-1}$	-0.00 (-0.79)	0.00 (0.47)	-0.00 (-1.60)	0.00 (0.70)
$Size_{t-1}$	0.02 (1.38)	0.05** (2.02)	-0.01 (-0.38)	-0.37*** (-5.29)
Period Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.45	0.57	0.45	0.33

\*(p≤0.1), \*\*(p≤0.05), \*\*\*(p≤0.01)

**Table 10**

Results of Regression of Changes in the Spread on the Level of E, S, and G Performance

Observations included	11489	3637	6756	985
Firms included	392	128	225	37
Dependent Variable	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$
Independent Variable	World	Europe	North America	Asia Pacific
$\Delta Spread_{t-1}$	-0.43*** (-24.49)	-0.43*** (-19.25)	-0.44*** (-21.25)	-0.54*** (-7.96)
$E_{t-1}$	-0.00 (-1.44)	-0.00 (-0.92)	-0.00 (-1.31)	-0.02 (-1.11)
$S_{t-1}$	0.00* (1.69)	-0.00 (-0.13)	0.00 (1.21)	0.02 (1.34)
$G_{t-1}$	-0.00 (-0.80)	-0.00 (-1.09)	-0.00 (-0.23)	-0.01 (-0.93)
$Capital Intensity_{t-1}$	0.25 (1.51)	0.25 (0.76)	0.12 (0.72)	-0.21 (-0.26)
$ROA_{t-1}$	0.00 (0.55)	-0.00 (-1.53)	0.00* (1.89)	-0.00 (-0.45)
$Leverage_{t-1}$	-0.00 (-0.75)	0.00 (0.48)	-0.00 (-1.56)	0.00 (0.68)
$Size_{t-1}$	0.02	0.05**	-0.01	-0.37***
Period Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.45	0.57	0.45	0.34

\*( $p \leq 0.1$ ), \*\*( $p \leq 0.05$ ), \*\*\*( $p \leq 0.01$ )

**Table 11**  
Results of Regression of Changes in the Spread on the Level of Environmental  
Criteria Performance

Observations included	11439	3613	6756	983
Firms included	392	128	225	37
Dependent Variable	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$
Independent Variable	World	Europe	North America	Asia Pacific
$\Delta Spread_{t-1}$	-0.43*** (-24.35)	-0.43*** (-18.60)	-0.44*** (-21.22)	-0.54*** (-7.89)
$EmissionsandEnergy_{t-1}$	-0.00 (-0.31)	-0.00 (-0.65)	-0.00 (-0.50)	-0.00 (-0.14)
$CapitalIntensity_{t-1}$	0.23 (1.37)	0.23 (0.72)	0.13 (0.76)	-0.20 (-0.25)
$ROA_{t-1}$	0.00 (0.47)	-0.00* (-1.65)	0.00* (1.91)	-0.00 (-0.52)
$Leverage_{t-1}$	-0.00 (-0.75)	0.00 (0.38)	-0.00 (-1.60)	0.00 (0.75)
$Size_{t-1}$	0.01 (0.89)	0.05 (1.55)	0.01 (-0.38)	-0.37*** (-5.21)
Period Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.45	0.57	0.45	0.33

\*( $p \leq 0.1$ ), \*\*( $p \leq 0.05$ ), \*\*\*( $p \leq 0.01$ )

**Table 12**

Results of Regression of Changes in the Spread on the Level of Social Criteria Performance

Observations included	8201	2426	5018	691
Firms included	285	86	171	28
Dependent Variable	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$
Independent Variable	World	Europe	North America	Asia Pacific
$\Delta Spread_{t-1}$	-0.43*** (-19.70)	-0.45*** (-16.35)	-0.42*** (-23.25)	-0.58*** (-6.85)
$HumanRights_{t-1}$	-0.01** (-2.09)	-0.02*** (-3.76)	0.00 (0.32)	0.01 (0.49)
$Health\&Safety_{t-1}$	0.00 (1.13)	-0.01 (-0.80)	0.01* (1.68)	0.04*** (2.64)
$EmploymentConditions_{t-1}$	0.01* (1.94)	0.01* (1.80)	0.00 (0.38)	-0.01 (-0.28)
$LaborRelations_{t-1}$	-0.01* (-1.73)	-0.01 (-1.47)	-0.00 (-1.06)	-0.04** (-1.96)
$SupplyCustomer_{t-1}$	-0.00 (-0.15)	0.01 (1.64)	-0.00 (-0.85)	-0.05** (-2.53)
$CapitalIntensity_{t-1}$	-0.05 (-0.28)	-0.59* (-1.69)	0.08 (0.49)	-1.57* (-1.80)
$ROA_{t-1}$	0.00** (1.98)	-0.00 (-0.51)	0.00*** (3.20)	-0.01 (-0.86)
$Leverage_{t-1}$	-0.00 (-0.64)	-0.00* (-1.94)	-0.00 (-0.56)	0.01* (1.75)
$Size_{t-1}$	-0.00 (-0.09)	0.04 (1.04)	-0.00 (-0.21)	-0.33*** (-3.97)
Period Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.42	0.53	0.44	0.33

\*( $p \leq 0.1$ ), \*\*( $p \leq 0.05$ ), \*\*\*( $p \leq 0.01$ )

**Table 13**

Results of Regression of Changes in the Spread on the Level of Governance  
Criteria Performance

Observations included	11104	3391	6677	983
Firms included	386	123	224	37
Dependent Variable	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$
Independent Variable	World	Europe	North America	Asia Pacific
$\Delta Spread_{t-1}$	-0.43*** (-23.81)	-0.41*** (-19.05)	-0.44*** (-21.06)	-0.55*** (-8.00)
$BoardIndependence_{t-1}$	-0.00 (-1.03)	-0.01 (-1.16)	0.00 (0.34)	-0.03 (-1.55)
$Audit\&Control_{t-1}$	0.01** (2.09)	0.01 (0.77)	0.00 (0.64)	0.02 (0.81)
$Remuneration_{t-1}$	-0.01* (-1.66)	-0.00 (-0.63)	-0.01 (-1.18)	-0.01 (-0.53)
$Shareholders'Rights_{t-1}$	-0.00 (-0.31)	-0.00 (-0.76)	-0.00 (-0.66)	0.03* (1.74)
$TakeoverDefenseMeasures_{t-1}$	-0.00 (-0.24)	0.00 (1.06)	-0.00 (-0.43)	0.01 (0.49)
$Ethics_{t-1}$	0.00 (0.46)	-0.00 (-0.59)	0.00 (0.24)	0.00 (0.04)
$CapitalIntensity_{t-1}$	0.29* (1.75)	0.58* (1.71)	0.16 (0.90)	-0.25 (-0.31)
$ROA_{t-1}$	-0.00 (-0.93)	-0.01*** (-4.56)	0.00* (1.90)	-0.00 (-0.67)
$Leverage_{t-1}$	-0.00 (-1.31)	-0.00 (-0.33)	-0.00* (-1.67)	0.00 (0.65)
$Size_{t-1}$	0.02 (1.62)	0.10*** (4.43)	-0.01 (-0.35)	-0.38*** (-5.29)
Period Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.45	0.56	0.45	0.34

\*( $p \leq 0.1$ ), \*\*( $p \leq 0.05$ ), \*\*\*( $p \leq 0.01$ )



**Table 14**

Results of Regression of Changes in the Spread on Changes of ESG Performance

Observations included	11489	3637	6756	985
Firms included	392	128	225	37
Dependent Variable	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$
Independent Variable	World	Europe	North America	Asia Pacific
$\Delta Spread_{t-1}$	-0.43*** (-24.50)	-0.43*** (-19.21)	-0.44*** (-21.41)	-0.54*** (-7.90)
$\Delta ESG_{t-1}$	0.01** (2.08)	-0.01 (-1.46)	0.02*** (3.49)	-0.03 (-1.22)
$\Delta CapitalIntensity_{t-1}$	0.24 (1.48)	0.24 (0.74)	0.10 (0.61)	-0.24 (-0.30)
$\Delta ROA_{t-1}$	0.00 (0.51)	-0.00 (-1.57)	0.00* (1.78)	-0.00 (-0.44)
$\Delta Leverage_{t-1}$	-0.00 (-0.72)	0.00 (0.42)	-0.00 (-1.50)	0.00 (0.73)
$\Delta Size_{t-1}$	0.02 (1.43)	0.05* (1.94)	-0.01 (-0.43)	-0.38*** (-5.32)
Period Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.45	0.57	0.45	0.33

\*( $p \leq 0.1$ ), \*\*( $p \leq 0.05$ ), \*\*\*( $p \leq 0.01$ )

**Table 15**

Results of Regression of Changes in the Spread on Changes of E, S, and G Performance

Observations included	11489	3637	6756	985
Firms included	392	128	225	37
Dependent Variable	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$
Independent Variable	World	Europe	North America	Asia Pacific
$\Delta Spread_{t-1}$	-0.43*** (-24.66)	-0.43*** (-19.16)	-0.45*** (-21.68)	-0.52*** (-7.76)
$\Delta E_{t-1}$	-0.04*** (-7.23)	-0.04*** (-4.13)	-0.02*** (-3.81)	-0.10*** (-4.07)
$\Delta S_{t-1}$	0.02*** (4.75)	-0.00 (-0.44)	0.04*** (6.60)	0.07*** (3.81)
$\Delta G_{t-1}$	-0.00 (-0.01)	-0.02 (-1.59)	-0.00 (-0.56)	-0.08*** (-3.15)
$\Delta CapitalIntensity_{t-1}$	0.24 (1.46)	0.24 (0.75)	0.02 (0.12)	0.35 (0.43)
$\Delta ROA_{t-1}$	0.00 (0.44)	-0.00* (-1.77)	0.00 (1.49)	-0.00 (-0.19)
$\Delta Leverage_{t-1}$	-0.00 (-0.31)	0.00 (0.47)	-0.00 (-1.25)	0.00 (0.35)
$\Delta Size_{t-1}$	0.03* (0.31)	0.05* (0.47)	-0.00 (-1.25)	-0.30*** (-3.15)
Period Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.45	0.57	0.45	0.36

\*( $p \leq 0.1$ ), \*\*( $p \leq 0.05$ ), \*\*\*( $p \leq 0.01$ )

**Table 16**

Results of Regression of Changes in the Spread on Changes of Environmental Criteria Performance

Observations included	11378	3594	6740	982
Firms included	392	128	225	37
Dependent Variable	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$
Independent Variable	World	Europe	North America	Asia Pacific
$\Delta Spread_{t-1}$	-0.43*** (-24.20)	-0.41*** (-19.74)	-0.44*** (-21.23)	-0.54*** (-7.86)
$\Delta Emissions_{t-1}$	-0.00 (-0.62)	0.00 (0.33)	-0.01* (-1.89)	0.00 (0.30)
$\Delta CapitalIntensity_{t-1}$	0.20 (1.23)	0.32 (0.98)	0.14 (0.80)	-0.19 (-0.24)
$\Delta ROA_{t-1}$	0.00 (0.04)	-0.00*** (-2.62)	0.00* (1.90)	-0.00 (-0.56)
$\Delta Leverage_{t-1}$	-0.00 (-0.83)	0.00 (0.23)	-0.00 (-1.52)	0.00 (0.76)
$\Delta Size_{t-1}$	0.02* (1.75)	0.09*** (4.28)	-0.01 (-0.35)	-0.37*** (-5.01)
Period Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.45	0.57	0.45	0.33

\*( $p \leq 0.1$ ), \*\*( $p \leq 0.05$ ), \*\*\*( $p \leq 0.01$ )

**Table 17**  
Results of Regression of Changes in the Spread on Changes of Social Criteria Performance

Observations included	8154	2413	4985	690
Firms included	281	86	168	27
Dependent Variable	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$
Independent Variable	World	Europe	North America	Asia Pacific
$\Delta Spread_{t-1}$	-0.43*** (-19.68)	-0.44*** (-16.86)	-0.43*** (-23.31)	-0.55*** (-6.36)
$\Delta HumanRights_{t-1}$	0.00 (0.21)	-0.02*** (-2.86)	0.02*** (3.16)	-0.05** (-2.16)
$\Delta Health\&Safety_{t-1}$	0.00 (0.52)	-0.01 (-0.95)	0.00 (0.70)	0.05** (2.52)
$\Delta EmploymentConditions_{t-1}$	0.00 (0.74)	0.02** (2.12)	-0.01* (-1.70)	0.07** (2.49)
$\Delta LaborRelations_{t-1}$	-0.02*** (-5.15)	-0.02*** (-2.67)	-0.02*** (-3.57)	-0.08*** (-2.62)
$\Delta SupplyCustomer_{t-1}$	-0.01*** (-3.35)	-0.01 (-1.09)	-0.00 (-0.32)	-0.06*** (-2.89)
$\Delta CapitalIntensity_{t-1}$	-0.03 (-0.19)	-0.64* (-1.78)	0.07 (0.42)	-1.11 (-1.05)
$\Delta ROA_{t-1}$	0.00** (2.14)	-0.00 (-1.43)	0.00*** (3.75)	-0.01 (-1.35)
$\Delta Leverage_{t-1}$	-0.00 (-0.76)	-0.00*** (-2.67)	-0.00 (-0.27)	0.01 (1.01)
$\Delta Size_{t-1}$	-0.00 (-0.07)	0.04 (1.16)	-0.00 (-0.20)	-0.28*** (-3.33)
Period Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.42	0.53	0.45	0.33

\*( $p \leq 0.1$ ), \*\*( $p \leq 0.05$ ), \*\*\*( $p \leq 0.01$ )

**Table 18**

Results of Regression of Changes in the Spread on Changes of Governance  
Criteria Performance

Observations included	10999	3344	6630	982
Firms included	377	118	223	37
Dependent Variable	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$	$\Delta Spread_t$
Independent Variable	World	Europe	North America	Asia Pacific
$\Delta Spread_{t-1}$	-0.43*** (-23.58)	-0.41*** (-19.05)	-0.44*** (-21.03)	-0.55*** (-7.90)
$\Delta BoardIndependence_{t-1}$	-0.01* (-1.66)	-0.05*** (-3.61)	0.00 (0.50)	-0.15*** (-5.16)
$\Delta Audit\&Control_{t-1}$	0.02*** (3.31)	0.05*** (4.71)	0.02** (2.29)	0.08** (2.39)
$\Delta Remuneration_{t-1}$	-0.01 (-0.69)	-0.01 (-0.67)	-0.02* (-1.88)	0.01 (0.28)
$\Delta Shareholders' Rights_{t-1}$	-0.01 (-0.89)	-0.03*** (-2.67)	-0.02** (-1.99)	0.03 (0.82)
$\Delta Takeover Defense Measures_{t-1}$	-0.01 (-1.59)	-0.01 (-0.63)	-0.00 (-0.60)	0.17*** (4.23)
$\Delta Ethics_{t-1}$	-0.00 (-0.76)	-0.03*** (-3.48)	0.00 (0.09)	-0.05** (-2.26)
$\Delta Capital Intensity_{t-1}$	0.35** (2.11)	0.71** (2.11)	0.26 (1.51)	-0.01 (-0.01)
$\Delta ROA_{t-1}$	-0.00 (-1.00)	-0.01*** (-4.40)	0.00* (1.88)	-0.01 (-1.38)
$\Delta Leverage_{t-1}$	-0.00* (-1.91)	-0.00 (-0.93)	-0.00* (-1.71)	-0.01 (-1.41)
$\Delta Size_{t-1}$	0.02 (1.46)	0.10*** (4.33)	-0.00 (-0.30)	-0.41*** (-5.75)
Period Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-Squared	0.44	0.57	0.45	0.35

\*( $p \leq 0.1$ ), \*\*( $p \leq 0.05$ ), \*\*\*( $p \leq 0.01$ )

**Table 19**  
Portfolio Simulations

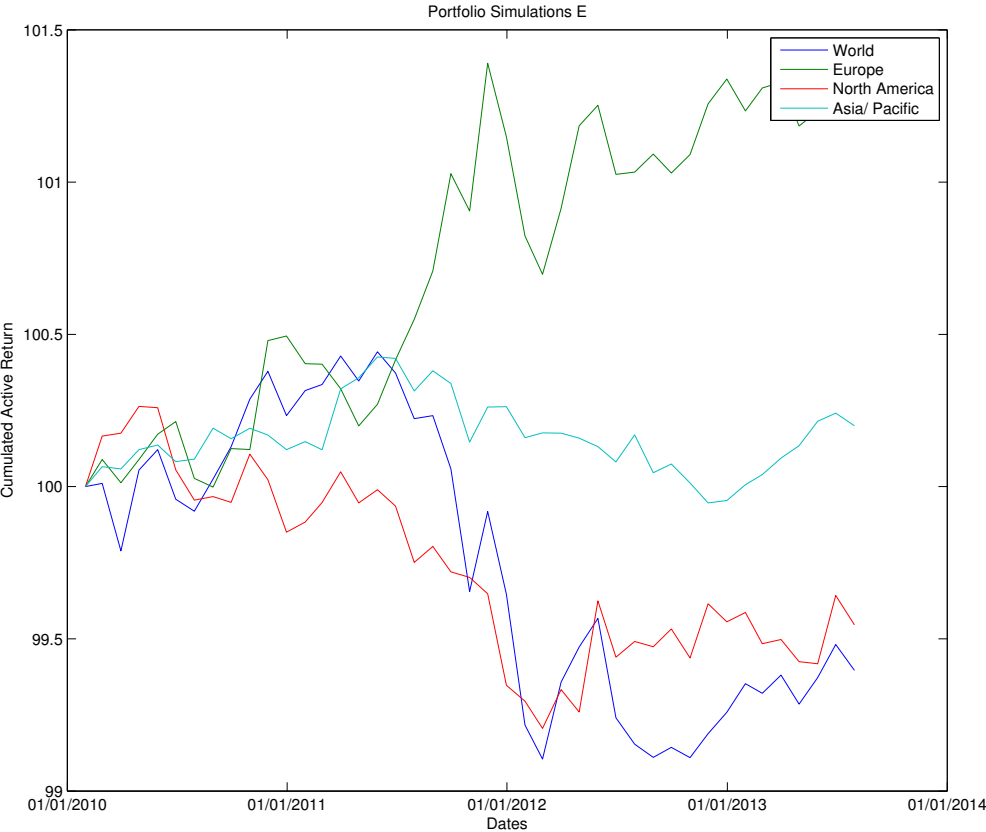
		ESG	E	S	G
World	Av Act Rating	1.55	1.58	1.76	1.26
	Ann Act Return	0.30%	-0.20%	-0.30%	0.20%
	IR	0.47	-0.31	-0.41	0.29
	T-stat	0.9	-0.58	-0.77	0.55
Europe	Av Act Rating	0.97	1.10	1.02	0.97
	Ann Act Return	0.40%	0.40%	-0.20%	0.60%
	IR	0.6	0.65	-0.31	0.88
	T-stat	1.13	1.23	-0.59	1.67*
North America	Av Act Rating	1.16	1.07	1.42	0.82
	Ann Act Return	-0.05%	-0.10%	-0.30%	-0.10%
	IR	-0.05	-0.3	-0.36	-0.07
	T-stat	-0.10	-0.57	-0.68	-0.13
Asia/ Pacific	Av Act Rating	0.41	0.39	0.44	0.42
	Ann Act Return	0.00%	0.10%	0.10%	0.00%
	IR	0.13	0.23	0.3	0.06
	T-stat	0.25	0.44	0.56	0.11

\*( $p \leq 0.1$ ), \*\*( $p \leq 0.05$ ), \*\*\*( $p \leq 0.01$ )

**Figure 1**  
Cumulated Active Return of Portfolio Simulations of the ESG Rating

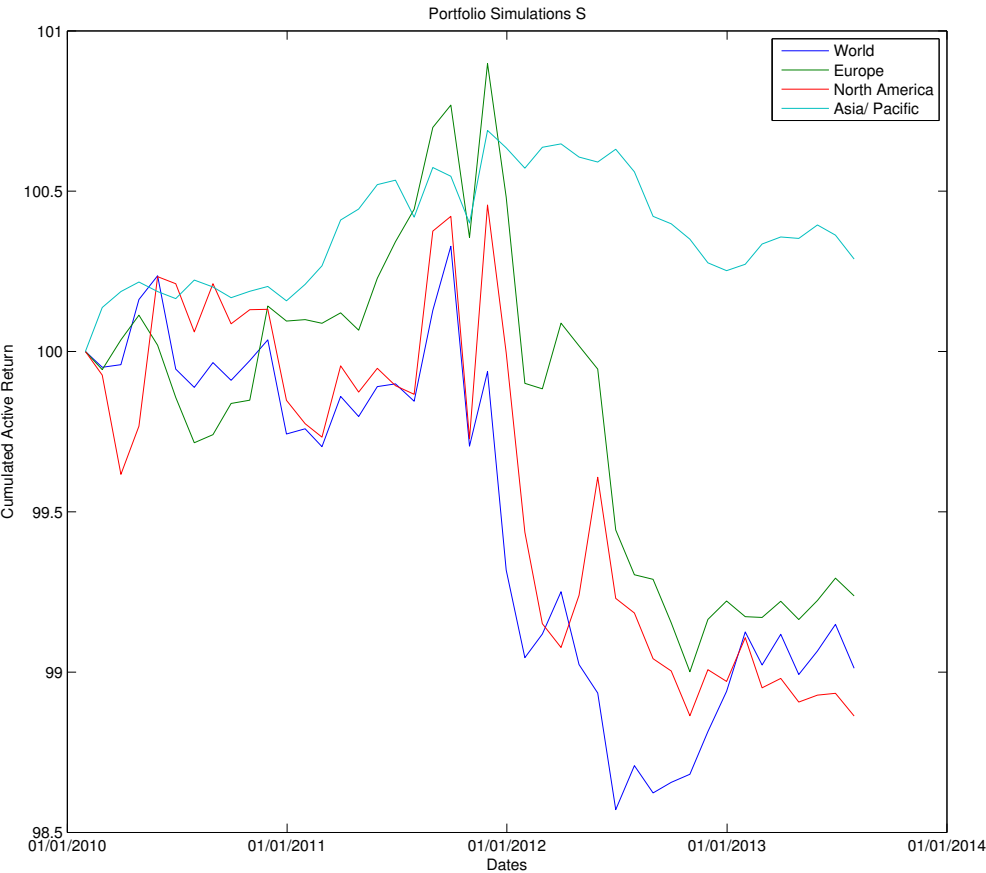


**Figure 2**  
Cumulated Active Return of Portfolio Simulations of the E Rating

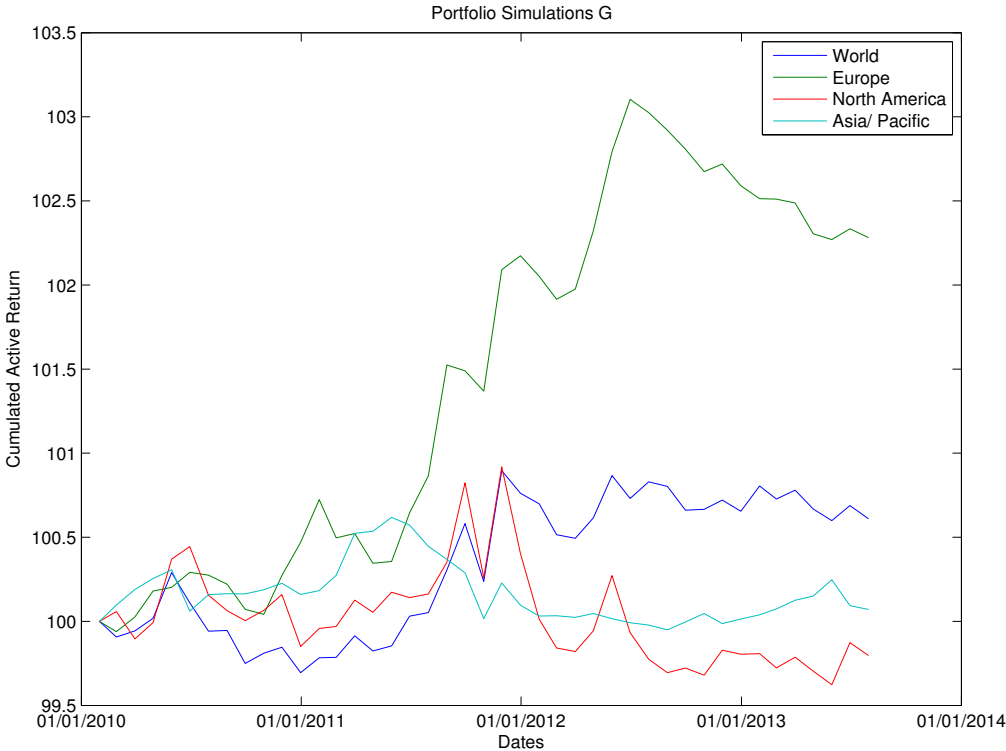




**Figure 3**  
Cumulated Active Return of Portfolio Simulations of the S Rating



**Figure 4**  
Cumulated Active Return of Portfolio Simulations of the G Rating



## 6 Chapter 3: Sovereign Bond Spreads and Extra-Financial Performance: An Empirical Analysis of Emerging Markets

### Abstract

This paper studies the impact of a country's extra-financial performance on their sovereign bond spreads. Sovereign bond spreads reflect both an economic default risk and a strategic default risk. We hypothesize that a country's extra-financial performance reduces economic and/or strategic default risk by signaling good commitment ability. We test this hypothesis for the countries which bonds are included in the JP Morgan Emerging Markets Bond Index Global. Over the period from 2001 to 2010, we find that an emerging country's average cost of capital decreases with its environmental and social performance. <sup>5</sup>

**Keywords:** Sovereign bonds, Spreads, Default risk, Environmental performance, Social performance, State governance

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<sup>5</sup>We thank Marie Brière, Patricia Crifo, and Rim Oueghlissi for helpful comments. We gratefully acknowledge support from the Center on Sustainable Finance and Responsible Investment (“Chaire Finance Durable et Investissement Responsable”) at IDEI-R. Remaining errors are naturally ours.

## 6.1 Introduction

This paper studies the link between a country's sovereign bond returns and its extra-financial performance, as measured by Environmental, Social and Governance (ESG) variables. Similar to corporate bonds, government bonds bear a risk of economic default in case of major macroeconomic downturns. But government bonds also bear a strategic default risk to the extent that governments can repudiate their debt due to their sovereignty privilege.

A good extra-financial performance at the country level might serve three distinct economic roles. First, a good performance might signal a country's long-term orientation and may thus act as a credible commitment to repay its debt in the future. Second, to the extent that exploiting natural resources and social development requires the collaboration of outside parties (like foreign countries or large foreign private organizations), countries with sound extra-financial performance might have more to lose in case of default: They would not only lose some future opportunities to borrow, but also lose part of the future benefits from its natural and social resources. Third, a country's natural and social resources might have a direct long term economic impact, acting as a buffer against negative economic shocks or having a positive impact on future growth.

In this paper, we test whether emerging countries with good ESG performance, have a lower (economic and/or strategic) risk of default and therefore, a lower cost of debt. We focus on emerging countries for two reasons. First, the risk of default is pretty prevalent. This can be seen in the significant number of emerging countries which have experienced default episodes since 2000 (*e.g.*, Argentina, Ecuador, Dominican Republic, Gabon, Nigeria, Venezuela and Ukraine).

Second, ESG issues are particularly acute for emerging countries. For example, the Environmental Performance Index (EPI), published annually by Yale University, appears pretty low in 2010 for the countries included in the Emerging Market Bond Index Global, ranging from 25 (for Iraq) to 64 (for Croatia). This has to be compared to the average EPI score for OECD countries which equals 72 for the same year.

To measure the cost of debt, we focus on government bond spreads as provided by the JP Morgan's EMBI Global database.<sup>6</sup> The data sample is 2001 – 2010. To proxy a country's extra-financial performance, we use three indices on Environmental, Social and Governance issues: the Environmental Performance Index (constructed by Yale University), the Human Development Index and the World Governance Index (both from the World Bank), respectively.

The environmental performance reflects how well countries manage their natural resources (access to water, biodiversity,...), while the social performance measures the countries' human development (literacy rate, education enrollment ratios, life expectancy...). The governance indicator, in turn, covers issues such as government effectiveness, regulatory quality, rule of law, control of corruption, voice and accountability, political stability and no violence. Finally, we also use additional data to build control variables related to technical bond issues, macroeconomic conditions and sovereign credit ratings.

We use an estimation based on the generalized method of moments which enables to regress the government bond spreads, as a function of the ESG indicators and the various control variables. Because of the long-run features of the macroeconomic control variables and the ESG factor correlation, we introduce various au-

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<sup>6</sup>The spread is the government bond interest rate minus the US government bond rate.

toregressive variables in the estimation.

Overall, our results show that a good country's ESG performance is associated with a lower cost of debt. Furthermore, the evidence presented below suggests a dual effect of the ESG factors. On the one hand, the governance indicator is negatively associated with contemporaneous government bond spreads. On the other hand, the environmental and social factors are positively associated with contemporaneous government bond spreads and negatively associated with future spreads. These results are robust to alternative specifications of the variables used to proxy the country-specific macroeconomic conditions.

This last result indicates that changes in a country's environmental and social performance take some time to be incorporated by financial markets. This seems intuitive since the impact of environmental and social performance is likely to have a long-term impact that is difficult to evaluate. Interestingly, our results are in line with Crifo *et al.* (2014)'s conclusion that the cost of debt of 23 OECD countries is lower due to a sound ESG performance of the issuer.

Practical implications of our results are twofold. First, these results indicate that environmental, social and governance factors are priced by sovereign bond markets, good ESG performance being associated with less default risk and thus lower cost of debt. Such a conclusion is interesting for governments and policy makers, concerned about the determinants of the cost of sovereign debt. It is also relevant for responsible asset managers and investors who screen investment opportunities based on ESG criteria to avoid investing in countries that are not acting in accordance with international norms.<sup>7</sup> These institutions rely on the same type

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<sup>7</sup>An example of asset management firm who uses ESG factors to design its investment policy is Global Evolution, as indicated in its sovereign screening process at [globalevolution.com](http://globalevolution.com). The Norway sovereign fund is another example of a responsible investor who uses ethical principles to

of information as we do, given the non-availability of high frequency data. Second, these results suggest that tactical portfolio reallocations, based on observed changes in countries ESG performance, might improve sovereign bond portfolios risk-adjusted returns.

The remainder of the paper is organized as follows. Section 2 reviews the related literature, whereas section 3 describes the Hypothesis we test in this paper. Section 4 presents the data and the methodology. Section 5 displays the empirical results and discusses the main findings of the paper. Finally, section 6 concludes. The appendix contains additional details and descriptive statistics, absent in the main text.

## **6.2 Literature Review**

Our paper is related to two strands of literature.

First, there is the abundant literature on the empirical determinants of EM sovereign bond spreads. Although the list of drivers this strand identifies is long, it is possible to classify them into two groups. On one hand, global factors, also known as "push" factors, such as, capital flows, international interest rates and risk appetite, international terms of trades and external shocks. On the other hand, country-specific macroeconomic variables or "pull" factors, like GDP growth, international reserves, export growth, fiscal and current account balance, public investment, inflation and sovereign credit ratings. Among the most recent contributions, it is possible to cite Gonzalez-Rosada and Levy-Yeyati (2008), Hilscher and Nobusch (2010) and Kennedy and Palerm (2014).

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screen potential investments in foreign countries.

One focus of this literature has been to determine whether the pull or push factors dominate. As some illustrations, Gonzalez-Rosada and Levy-Yeyati (2008) find that over 1993 – 2005, a large fraction of the time variability of EMBI spreads has been explained by the evolution of global factors, such as risk appetite, global liquidity and contagion from systemic events. Kennedy and Palerm (2014), in turn, find that much of the decline in the EMBI spreads from 2002 to 2007 reflects improved country-specific fundamentals, but their sharp increase in the 2008 crisis has been due to risk aversion.<sup>8</sup>

Second, there is the strand examining the impact of environmental, social and governance factors on sovereign bond spreads or sovereign credit ratings. The majority of articles consider the governance indicators as a way to proxy these soft factors.<sup>9</sup> Among them, Ciocchini *et al.* (2003) and Depken *et al.* (2011) focus on corruption; Moser (2007), Baldacci *et al.* (2011) and Bekaert *et al.* (2014) concentrate on political risk and finally, Cosset and Jeanneret (2014) and Benzoni *et al.* (2015) examine the impact of government effectiveness and political stability, respectively.<sup>10</sup>

Overall, these studies conclude that governance indicators matter to explain credit risk in emerging markets. For instance, Ciocchini *et al.* (2003) show that emerging countries that are perceived as more corrupt must pay a higher risk premium when issuing bonds, while Baldacci *et al.* (2011) find that lower levels of political risk are associated with tighter sovereign bond spreads, particularly during financial

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<sup>8</sup>Instead of EMBI spreads, several authors have looked at sovereign Credit Default Swap data. Some examples are Remolona *et al.* (2008), Longstaff *et al.* (2010) and Amstad *et al.* (2016).

<sup>9</sup>Most of them also include global and macro-economic country-specific variables, as additional covariates.

<sup>10</sup>Ciocchini *et al.* (2003) and Depken *et al.* (2011) rely on the Transparency International Corruption Perception Index; Baldacci *et al.* (2011) use the International Country Risk Guide Political Risk Indicator and Bekaert *et al.* (2014) elaborate their own index, based on the World Bank Governance Indicators. Finally, Cosset and Jeanneret (2014) rely on the World Bank Governance Indicators.



turmoil.

Only two studies investigate how a broad measure of environmental, social and governance factors affect sovereign bond markets. First, Drut (2010) investigates how the mean efficient frontier of portfolios containing sovereign bonds from 20 developed countries changes, due to an integration of ESG factors. He concludes that an integration of ESG factors in sovereign bond portfolios does not affect the efficient frontier and thus the financial performance.

Second, Crifo *et al.* (2014) show that the cost of debt of 23 OECD countries, as measured by sovereign bond yield spreads, is lower due to a sound ESG performance of the issuer. The ESG performance is measured by *Vigeo* ratings. In addition, they show that the positive effect of ESG ratings on the cost of debt decreases with bond maturities.

We contribute to the aforementioned strands of literature, since in addition to global and country-specific macroeconomic variables, we examine whether ESG factors are significant non-economic, long-run determinants of EM sovereign bond spreads. To our best knowledge, we are first to examine these factors for emerging markets.

### **6.3 Hypothesis**

The reasons why countries ever pay back their debt have been the object of a long standing debate in economics. Their sovereignty indeed does not put them under external authority to impose repayment. One reason for repayment as highlighted for example by Eaton and Gersovitz (1981) is that sovereign entities want to maintain a good reputation to ensure future access to borrowing. In this case, the more

long-term oriented a country is, the more important its reputation is, and the less likely its default.

This logic has been questioned by Bulow and Rogoff (1989) on the ground that credibility for repayment is very hard to establish: After a country has borrowed, it has an incentive to use any money obtained or generated by positive fiscal shocks to invest and smooth future negative shocks with these savings, thus not depending on future borrowing capacities. Bulow and Rogoff (1989) then show that additional sanctions, above the fact of not lending, should be exercised in order for sovereign entities to be able to borrow.

Cole and Kehoe (1994) elaborate on this idea by indicating that the threat of terminating non-lending relationships such as collaborations to exploit common resources, as suggested by Conklin (1998), might induce countries to repay in order to preserve these agreements. Dhillon *et al.* (2013) further show that borrowing countries and their lenders might be involved in long-term relationships, aside from the lending ones, that may also enable lenders to impose penalties on borrowers in case of default. This reduces the risk of default on the sovereign borrower. Overall, in these models, sovereign countries repay their debt because they are concerned about their long-term reputation. Finally, following the insight of Grossman and Van Huyk (1988), sovereign (partial) default might be viewed as an efficient way of smoothing shocks over time (countries pay back when they are rich but pay back less when they are poor).

Given these conceptual considerations, a good extra-financial performance at the country level might serve three distinct economic roles. First, to the extent that extra-financial performance mostly materializes in economic benefits in the long term, a good performance might act as a signal of a country's long-term orienta-

tion. Second, to the extent that exploiting natural resources and social development requires the collaboration of outside parties (like foreign countries or large foreign private organizations), countries with a high level of extra-financial performance might have more to lose in case of default, because they would not only lose future opportunities to borrow but also lose part of the future benefits from its natural and social resources. Third, a country's natural and social resources might act as a buffer against negative shocks. Finally, another reason why a good extra-financial performance might be associated with a lower cost of debt is that ESG factors might have a positive impact on future growth and thus on the future ability to repay. These considerations indicate that countries with a good extra-financial performance should have a lower (economic and/or strategic) risk of default and thus a lower cost of debt. This leads to the following Hypothesis.

**Hypothesis 1:** *There is a negative link between a good environmental, social and governance performance and the cost of debt, as measured by sovereign spreads.*

We focus here on the cost of debt, as measured by the spread over the US interest rate, because it is more easily observable than actual defaults which occur pretty infrequently. Moreover, it is obviously likely that other factors than the extra-financial performance of a country affect its spread. We thus include a number of control variables in our analysis, including sovereign credit ratings and macroeconomic variables.

## 6.4 Data and Methodology

### 6.4.1 Data

#### Bond Data

We use bond data on the JP Morgan's EMBI Global, from 2001 to 2010. The EMBI Global tracks total returns of dollar-denominated sovereign bonds, issued by emerging market countries. We consider the country-specific subindexes of 33 emerging economies. Debt instruments in (each country-specific subindex of) the EMBI Global must have a minimum face value outstanding of 500 million dollars. We choose the stripped mid-point spread, as our measure for the cost of debt. It corresponds to the zero-volatility spread over the US zero-coupon yield curve.

Furthermore, JP Morgans strips away those cash flows that are guaranteed by the US government, *e.g.* Brady bonds. We then take the arithmetic average of the monthly spreads for each year (which we name hereafter as *Spread*). In addition, we use the Bid Ask spread (hereafter, *Bid Ask*), to measure liquidity; the average life (*Average Life*) of the country-specific subindex and the squared average life (*Average Life Squared*), to measure duration and convexity, respectively. Finally, we rely on Fitch's long term credit rating (hereafter, *Rating*) to measure credit worthiness.<sup>11</sup>

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<sup>11</sup>Fitch makes both a qualitative and quantitative assessment of the sovereign creditworthiness to construct their sovereign ratings. The quantitative evaluation is mainly based on economic and financial variables, corresponding to structural features (such as GDP per capita and aggregate money supply), macroeconomic performance (like GDP growth), public finances (*e.g.* the stock of debt and fiscal balance) and external balance (as the current account). To complement the quantitative assessment, Fitch adds an evaluation of each sovereign's country risk. The latter includes a variety of dimensions, ranging from the level of corruption, the functionality of the administration to the perception of potential social unrest.

## **Macroeconomic Control Variables**

GDP Growth (*GDP Growth*) is a risk score from 0 to 10 that includes current and expected growth. It is part of the International Country Risk Guide (ICRG) from the Political Risk Services (PRS) group. We use the general government gross debt (which we denote hereafter as *Gov Debt*), to measure the government's performance in managing its public finances.

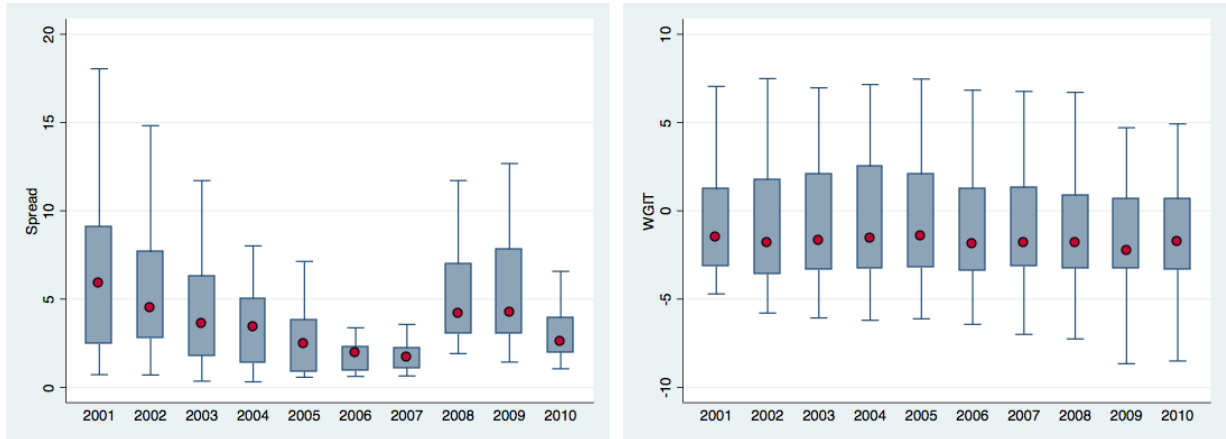
## **Environmental, Social and Governance Data**

The **environmental indicator** is based on the Environmental Performance Index (*EPI*) constructed by Yale University. *EPI* covers environmental health, corresponding to the protection of human health (for instance, access to water and sanitation) and ecosystem vitality, corresponding to the impact of human activities on the natural environment (*e.g.*, biodiversity). *EPI* scores range from 0 (worst) to 100 (best).

The **human development index** (hereafter *HDI*) combines three measures that proxy for human development. First, it contains knowledge and education, as measured by the adult literacy rate and the combined primary, secondary, and tertiary gross enrollment ratio. Second, it includes the standard of living, as indicated by the natural logarithm of GDP per capita at purchasing power parity. Third, it integrates life expectancy at birth. The data source is World Bank.

The **governance indicator** is based on the World Governance Indicators constructed by the World Bank. These indicators cover issues such as government effectiveness, regulatory quality, rule of law, control of corruption, voice and accountability, political stability and non violence. Each indicator is normally dis-

**Figure 5**  
Box plot of *Spread* (left) and *WGIT* (right), by year



Notes: Red points depict annual median values. *Spread*: Stripped Spread Mid-Point. *WGIT*: World Governance Indicator Index Total.

tributed, with mean 0, standard deviation of 1 and ranges from approximately  $-5$  to  $5$ , with higher values corresponding to better governance.

Following common practice, we add them up, to create the variable *WGIT*.<sup>12</sup> Appendix A contains a detailed description of each indicator, together with the correlation matrix between them. Table 20 shows the descriptive statistics, while figures 5 and 6 depict the box plot of *Spread* and the ESG factors, namely, *EPI*, *HDI* and *WGIT*, at each point in time.

Two comments are at place. First, tables 20 and figures 5 and 6 outline the evolution of *Spread*, as well as the heterogeneity between countries, in terms of their environmental, social and governance performance. For instance, if we consider the environmental dimension, not all the considered economies take care of their natural resources in the same way. Indeed, in 2010, the *EPI* score ranges from 25

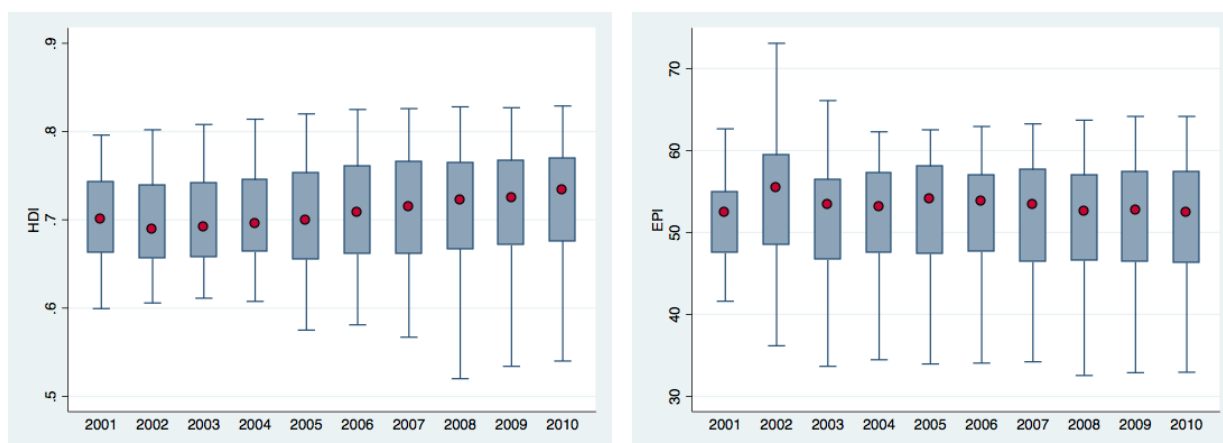
<sup>12</sup>See for example, Butler and Fauver (2006).

**Table 20**  
Summary Statistics

<b>Variable</b>	<b>Mean</b>	<b>Min</b>	<b>Max</b>	<b>N</b>
<i>Spread</i>	4.66 (5.95)	0.31	60.67	353
<i>Average Life</i>	10.14 (4.92)	1.46	25.58	366
<i>Average Life Squared</i>	126.94 (117.52)	2.12	654.47	366
<i>Bid Ask</i>	0.01 (0.01)	0.00	0.05	353
<i>GDP Growth</i>	8.32 (1.72)	1.00	10.00	366
<i>Gov Debt</i>	47.78 (30.56)	3.89	181.91	359
<i>Rating</i>	12.35 (3.46)	1	19	309
<i>WGIT</i>	-1.28 (3.55)	-10.44	7.49	366
<i>HDI</i>	0.70 (0.08)	0.43	0.83	358
<i>EPI</i>	51.63 (9.20)	13.14	88.91	296

Notes: Standard deviation, in parentheses. *Spread*: Stripped Spread MidPoint. *Average Life*: Average Life. *Average Life Squared*: Average Life Squared. *Bid Ask*: Bid Ask Spread. *GDP Growth*: GDP Growth. *Gov Debt*: General Government Gross Debt. *Rating*: Fitch's Long Term Credit Rating. *WGIT*: World Governance Indicator Index Total. *HDI*: Human Development Index. *EPI*: Environmental Performance Index.

**Figure 6**  
Box plot of *HDI* (left) and *EPI* (right), by year



Notes: Red points depict annual median values. *HDI*: Human Development Index. *EPI*: Environmental Performance Index.

(for Iraq) to 64 (for Croatia). To put the latter figures into perspective, the average *EPI* score for OECD countries equals 72 for the same year.

Second, over the period, some emerging economies have experienced significant disruptive episodes. For example, Argentina, Venezuela, Dominican Republic, Ecuador, Nigeria and Gabon have suffered sovereign debt crisis,<sup>13</sup> whereas Lebanon entered in war in 2006.<sup>14</sup> Critical events like the aforementioned ones may not be well captured by the commonly used empirical determinants of *Spread* (see section 2). The inclusion of the ESG factors aims at capturing the impact of extra-financial performance information on emerging markets' cost of debt.

In order to assess the informational content of the ESG factors relative to the

<sup>13</sup>We define sovereign debt crisis as episodes at which the sovereign was unable to meet its obligations, as they became due. The latter definition thus includes sovereign defaults and/or sovereign debt restructuring plans.

<sup>14</sup>As an illustration, the *WGIT* score of Lebanon in 2006 is  $-4.34$ , below the  $-2.93$  average *WGIT* score of the countries in our dataset belonging to the same region.



country-specific macroeconomic variables, we conduct the following exercise. We first construct quartiles, based on the empirical distribution of each ESG factor and *Rating*, the latter summarizing the country-specific macroeconomic determinants. We then look at whether countries with good (bad) ESG performance tend to coincide with those with high (low) credit scores.

Tables 21, 22 and 23 present bivariate contingency tables between the quartiles of each ESG factor and *Rating*, as well as the mean and standard deviation of *Rating*, for each quartile of the ESG factors. Recall that higher values of the four variables correspond to better performance.

Interestingly, tables 21, 22 and 23 suggest a distinct pattern between the environmental and social factors, on one hand, and the governance indicator, on the other: While countries with good environmental and social indicators may not necessarily be those with sound macroeconomic performance, as measured by credit scores, the evidence on *WGIT* depicts a positive relationship with *Rating*.

As an illustration, if we look at the diagonal elements of the bivariate contingency tables (left blocks of tables 21, 22 and 23), the number of matches between *WGIT* and *Rating*, by quartile, is much higher than in the other two bivariate comparisons. The latter is reflecting that Fitch Credit Rating Agency takes this information into account when evaluating the financial health of a country, as described in its credit rating model documentation.

Notes: Standard deviation, in parentheses. Rating: Fitch's Long Term Credit Rating. EPI: Environmental Performance Index.

Notes: Standard deviation, in parentheses. Rating: Fitch's Long Term Credit Rating. HDI: Human Development Index

**Table 21**

Bivariate contingency table between the quartiles of *EPI* and *Rating* (left block) and mean and standard deviation of *Rating*, for each quartile of *EPI* (last column)

Quartiles of	<i>Rating</i>				<i>Rating</i>
	1	2	3	4	
1	7.14	24.64	17.65	31.88	13.71 (0.39)
2	41.43	34.78	23.53	7.25	10.97 (0.30)
3	32.86	20.29	22.06	30.43	11.91 (0.53)
4	18.57	20.29	36.76	30.43	12.92 (0.38)
Total	100.00	100.00	100.00	100.00	

**Table 22**

Bivariate contingency table between the quartiles of *HDI* and *Rating* (left block) and mean and standard deviation of *Rating*, for each quartile of *HDI* (last column)

Quartiles of	<i>Rating</i>				<i>Rating</i>
	1	2	3	4	
1	7.46	27.27	28.57	18.42	13.21 (0.30)
2	44.78	42.42	17.46	6.58	10.94 (0.35)
3	32.84	18.18	41.27	21.05	12.23 (0.36)
4	14.93	12.12	12.7	53.95	13.65 (0.59)
Total	100.00	100.00	100.00	100.00	

**Table 23**

Bivariate contingency table between the quartiles of *WGIT* and *Rating* (left block) and mean and standard deviation of *Rating*, for each quartile of *WGIT* (last column)

Quartiles of	<i>Rating</i>				<i>Rating</i>
	1	2	3	4	
1	37.97	26.32	5.19	10.39	10.47 (0.36)
2	29.11	40.79	24.68	12.99	11.63 (0.40)
3	26.58	23.68	45.45	7.79	11.68 (0.34)
4	6.33	9.21	24.68	68.83	15.09 (0.26)
Total	100.00	100.00	100.00	100.00	

Notes: Standard deviation, in parentheses. Rating: Fitch's Long Term Credit Rating. WGIT: World Governance Indicator Index Total.

In the next section, we present the methodology we use to test the Hypothesis 1.

### 6.4.2 Methodology

The estimation technique is a dynamic panel data regression. This is because the data show that *Spread* are persistent. More specifically, we follow a general method of moment (GMM) estimation, through which we regress the difference of *Spread*, as a function of the first lagged difference of *Spread*, the previously defined subindex-specific and macroeconomic control variables and the ESG factors, all in first differences.<sup>15</sup> For the estimation, we use the Arellano-Bover (1995)/Blundell-

<sup>15</sup>Using dummy variables to estimate individual (country-specific) fixed-effects in a model which also includes a lagged value of the dependent variable results in biased estimates, when the time dimension  $T$  of the panel is small (in our case,  $T = 10$ ). This problem is widely known in the literature

Bond (1998) estimator, also known as system GMM;<sup>16</sup> in particular, we consider the one-step System GMM. Finally, the to-be reported standard errors are robust to the presence of both arbitrary heteroskedasticity and serial correlation.

Because the long-run features of any macroeconomic variable and ESG factor correlation are relevant, we allow for various autoregressive equations in the estimation. The model specification for the *Spread* equation, in levels, follows:

$$\begin{aligned}
 \text{Spread}_{t,k} = & \alpha + \phi_1 \times \text{Spread}_{t-1,k} + \beta_1 \times \text{Average Life}_{t,k} + \beta_2 \times \text{Average Life Squared}_{t,k} + \\
 & \beta_3 \times \text{Bid Ask}_{t,k} + \sum_{l=0}^{L_1} \rho_{1l} \times \text{GDP Growth}_{t-l,k} + \sum_{l=0}^{L_2} \rho_{2l} \times \text{Gov Debt}_{t-l,k} + \\
 & \sum_{l=0}^{L_3} \tau_l \times \text{EPI}_{t-l,k} + \sum_{l=0}^{L_4} \delta_l \times \text{HDI}_{t-l,k} + \sum_{l=0}^{L_5} \mu_l \times \text{WGIT}_{t-l,k} + \epsilon_{t,k}, \text{ with} \\
 & \epsilon_{t,k} = \mu_k + \lambda_t + e_{t,k}
 \end{aligned} \tag{1}$$

where  $k$  and  $t$  denote country  $k$  and year  $t$ , respectively;  $\mu_k$ ,  $\lambda_t$  and  $e_{t,k}$  are unobserved country effects, year effects and observation-specific errors, respectively; while  $l$ ,  $L_1$ ,  $L_2$ ,  $L_3$ ,  $L_4$ ,  $L_5$  refer to lag  $l$  and potentially various maximum lags for the macroeconomic control variables and the ESG factors, respectively (to-be discussed).

We introduce lags in this manner for several reasons. First, macroeconomic control variables and ESG factors may be autoregressive. In particular, sluggish adjust-

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as the Dynamic Panel Bias or Nickel Bias. That is why we first need to difference the equation to estimate and then instrument the first lagged difference of *Spread*.

<sup>16</sup>As Blundell and Bond (1998) and Blundell *et al.* (2000) point out, system GMM is particularly adequate (over Difference GMM) for applications with persistent series. To implement it, we use the *xtabond2* command, available in Stata 14.1.

ment of ESG factors may occur across countries and the specification needs to allow for that. Second, the timing of economic, environmental, social and governance reforms/changes is likely to vary across countries, thereby creating lags and possible dynamics. Third, using lagged ESG factors may help mitigate possible spurious positive correlation between those factors and *Spread*. Finally, lags of the independent variables may reduce the possibility of simultaneity bias from ESG factors to macroeconomic variables. Our distributed lag model provides the flexibility to account for these aspects.

If instead of using macroeconomic control variables, we rely on *Rating*, the model specification for the *Spread* equation, in levels, becomes,

$$\begin{aligned}
\text{Spread}_{t,k} = & \alpha + \phi_1 \times \text{Spread}_{t-1,k} + \beta_1 \times \text{Average Life}_{t,k} + \beta_2 \times \text{Average Life Squared}_{t,k} + \\
& \beta_3 \times \text{Bid Ask}_{t,k} + \sum_{l=0}^{L_1} \rho_{1l} \times \text{Rating}_{t-l,k} + \\
& \sum_{l=0}^{L_2} \tau_l \times \text{EPI}_{t-l,k} + \sum_{l=0}^{L_3} \delta_l \times \text{HDI}_{t-l,k} + \sum_{l=0}^{L_4} \mu_l \times \text{WGIT}_{t-l,k} + \epsilon_{t,k}, \text{ with} \\
& \epsilon_{t,k} = \mu_k + \lambda_t + e_{t,k}
\end{aligned} \tag{2}$$

In the next section, we present the lag structure used in each of the previous equations to estimate.

## 6.5 Empirical Results

Tables 24 and 25 report the estimation of equations (1) and (2), respectively; the first one uses macroeconomic variables as control, the second one uses *Rating*. In each table, there are several columns of results, due to alternative lag structures for the macroeconomic control variables (or the variable *Rating*) and the ESG factors and due to different combinations of control variables.

Starting with table 24, in its first column of results, we include as covariates the first differenced subindex-specific regressors, which are standardized, as well as the macroeconomic control variables. The second column adds to the first one the differenced ESG factors, also standardized, which enter contemporaneously in the equation to estimate. The third column of results, in turn, allows for distinct lag structures for the macroeconomic control variables, on one hand, and the ESG factors, on the other hand.

More specifically, while the differenced macroeconomic control variables enter contemporaneously and with their first lag, in the case of the ESG factors, we include their first as well as their second lag. Finally, in the fourth column of results, we augment the third model specification with a dummy variable that takes the value of 1 if the country has experienced a sovereign debt crisis over the sample period.

The motivation behind the distinct lag structure for the macroeconomic control variables, on one hand, and the ESG factors, on the other hand, is as follows. Regarding the first group, the inclusion of their first lag (in the third and fourth column of results of table 24) is for robustness. Concerning the ESG factors, they seem to be autoregressive, in particular, the environmental and social factors. The correlation matrix of the differenced ESG factors and their lags in Appendix A

provides evidence in favor of the environmental and social factors being moving slowly.

Table 25, in turn, reports the model estimates of equation (2), this time with *Rating* summarizing the macroeconomic control variables. As before, there are several columns of results, due to alternative lag structures and different combinations of covariates. The only difference with table 24 is that table 25 no longer reports the model estimates without the ESG factors.

From table 24, several comments are at place.

First, the GMM estimator we propose here aims at providing consistent estimates of the model parameters, while addressing at the same time the Dynamic Panel Bias. Indeed, one way to evaluate the performance of our estimator is to compare the coefficient estimate of the first lagged difference of *Spread*, as reported in table 24, with the one that would be obtained if estimating our model with a simple linear regression (OLS) or the within panel transformation. If consistent, the coefficient estimate of the first lagged difference of *Spread* presented here should lie between the coefficient estimates of the alternative two estimators.

More specifically, if we were to ignore the dynamic panel nature and estimate a linear regression of the model specification in equation (1) without lagged control variables, for instance, the coefficient estimate for the first lag of *Spread* would be 0.63. If instead, we were to account for the unobserved country-specific heterogeneity and apply the within transformation, the same coefficient estimate would be 0.30. Since we know that the fixed-effect (FE) estimate suffer from the Nickel Bias -downward-biased- and importantly, because the 0.57 reported here lie between the bounds of its OLS and FE counterparts, the latter provides evidence in favor of our GMM estimator.

A complementary way to assess the performance of our estimator is to consider the model diagnostics reported in the last lines of table 24. On one hand, the results of the Arellano-Bond test for AR(2) autocorrelation confirm the absence of second-order autocorrelation in the residuals (as it should be, since system GMM assumes that the twice-lagged residuals are not correlated).<sup>17</sup> On the other hand,

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<sup>17</sup>The Arellano-Bond test is applied to the residuals in differences. Thus, to check for first-order serial correlation in levels, we look for second-order correlation in differences.



**Table 24**GMM Regressions of  $D(\text{Spread})$  on the differenced ESG Indicators.

Variable	Spread <sub>t,k</sub>	Spread <sub>t,k</sub>	Spread <sub>t,k</sub>	Spread <sub>t,k</sub>
<i>Spread</i> <sub>t-1,k</sub>	0.61*** (0.02)	0.57*** (0.03)	0.63*** (0.03)	0.60*** (0.02)
<i>Average Life</i> <sub>t,k</sub>	3.82*** (1.36)	3.93*** (1.53)	3.21*** (0.98)	3.91*** (1.38)
<i>Average Life Squared</i> <sub>t,k</sub>	-3.60*** (1.28)	-3.81*** (1.51)	-3.24*** (1.02)	-4.07*** (1.50)
<i>Bid Ask</i> <sub>t,k</sub>	2.14*** (0.79)	2.28** (0.87)	1.50*** (0.39)	1.41*** (0.35)
<i>GDP Growth</i> <sub>t,k</sub>	-0.72*** (0.28)	-0.63*** (0.21)	-0.37** (0.17)	-0.33* (0.18)
<i>GDP Growth</i> <sub>t-1,k</sub>			0.02 (0.25)	0.07 (0.23)
<i>Gov Debt</i> <sub>t,k</sub>	0.02 (0.02)	0.02 (0.02)	0.02 (0.03)	0.03 (0.03)
<i>Gov Debt</i> <sub>t-1,k</sub>			-0.01 (0.03)	-0.01 (0.03)
<i>WGIT</i> <sub>t,k</sub>		-0.74** (0.36)	-2.44* (1.46)	-1.81* (1.13)
<i>WGIT</i> <sub>t-1,k</sub>			0.85 (1.82)	0.91 (1.66)
<i>WGIT</i> <sub>t-2,k</sub>			1.26* (0.87)	0.89 (0.96)
<i>EPI</i> <sub>t,k</sub>		-0.06 (0.30)	1.09* (0.60)	0.91* (0.53)
<i>EPI</i> <sub>t-1,k</sub>			-0.63* (0.36)	-0.66* (0.36)
<i>EPI</i> <sub>t-2,k</sub>			-0.44* (0.24)	-0.45** (0.24)
<i>HDI</i> <sub>t,k</sub>		0.97* (0.69)	6.81* (4.11)	6.63* (4.04)
<i>HDI</i> <sub>t-1,k</sub>			2.03 (3.59)	2.06 (3.51)
<i>HDI</i> <sub>t-2,k</sub>			-8.34** (3.76)	-8.27** (3.44)
Observations (Number of instruments)	240 (39)	237 (42)	204 (38)	204 (45)
Sovereign debt crisis dummy	No	No	No	Yes
Arellano-Bond test for AR(2) p-value	0.85	0.95	0.18	0.15
Hansen test of overid. restrictions p-value	0.54	0.61	0.39	0.97
Hansen test of $\zeta_{\frac{1}{2}}$ exog of GMM-type $\zeta_{\frac{1}{2}}$ instr p-value	0.76	0.72	0.76	0.93
Hansen test of $\zeta_{\frac{1}{2}}$ exog of IV-type $\zeta_{\frac{1}{2}}$ instr p-value	0.81	0.72	0.76	0.99

Notes: Standard deviation, in parentheses. Level of significance : . 15% ,\* 10% , \*\* 5 % , \*\*\* 1%. *Spread*: Stripped Spread MidPoint. *Average Life*: Average Life. *Average Life Squared*: Average Life Squared. *Bid Ask*: Bid Ask Spread. *GDP Growth*: GDP Growth. *Gov Debt*: General Government Gross Debt. *WGIT*: World Governance Indicator Index Total. *HDI*: Human Development Index. *EPI*: Environmental Performance Index. Arellano-Bond test for AR(2) p-value: Arellano-Bond test for second order serial correlation in first differences,  $Pr > z$ . Hansen test of overid. restrictions p-value: Hansen test of over-identifying restrictions,  $Prob > chi2$ . Hansen test of exog of GMM-type instr p- value: Difference-in-Hansen test of exogeneity of GMM type instruments for levels (null  $H = \text{exogenous}$ ),  $Prob > chi2$ . Hansen test of exog, IV-type instr p-value: Difference-in-Hansen tests of exogeneity of IV type instruments for levels (null  $H = \text{exogenous}$ ),  $Prob > chi2$ .

the Hansen test of over-identifying restrictions and of instrument exogeneity confirm that the GMM and the IV instruments we use here are valid exogenous instruments.<sup>18</sup>

Third, concerning the index-specific variables, table 24 shows that *Average Life*, *Average Life Squared* and *Bid Ask* are significant, at usual confidence levels, and with the expected signs: While *Average Life* (controlling for duration) shows a positive sign, namely, the longer the duration, the higher the spread; *Average Life Squared* (which controls for non linear duration effects, that is, convexity) has a negative sign. In turn, the significant and positive coefficient for *Bid Ask* (proxying for liquidity) implies, as expected, the higher the bid ask spread, the lower the liquidity and the higher the liquidity premium.

Fourth, in relation to the macroeconomic control variables, table 24 shows that *GDP Growth*, as expected, has a negative and contemporaneous significant impact on *Spread*, whereas government debt appears non-significant, regardless of the lag structure considered. As a robustness check, instead of the stock of gross government debt, we have also used the government debt service (not reported), but still,

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<sup>18</sup>In addition, the results of Hausman tests (not reported) always confirm that the preferred model is the fixed effect model.

it was non-significant.

Fifth, the estimation results allow us to extract two conclusions about the environmental, social and governance factors. On the one hand, the governance indicator always exerts a contemporaneous negative influence on *Spread*. On the other hand, the environmental and social dimensions, captured through the *EPI* and the *HDI*, respectively, exhibit strong long-term negative links with *Spread*. Indeed, the estimated coefficients for the first and second lagged *EPI* and for the second lagged *HDI* are significantly negative in the third and fourth columns of results.

The evidence on the positive contemporaneous impact for the differenced environmental and social factors is more difficult to interpret. It suggests that increases in environmental and social performance of a country are associated with higher contemporaneous spreads. This might reflect the fact that such good extra-financial performances are initially interpreted by financial markets as signs of excessive governmental spending and are thus penalizing the cost of borrowing for the country. In the case of the *EPI*, the coefficient significance is not stable and might thus be related to a statistical artefact: It might be reflecting spurious positive correlation between those factors and *Spread*.

Overall, the results on the link between environmental and social performance and the cost of debt of a country suggests that financial markets are slow to reflect the effects of these policies on the solvency of a country. This is in line with the fact that such effects mostly occur in the long term and are difficult to evaluate.

Finally, the inclusion of the sovereign debt crisis dummy variable, while being significant at 10% confidence level, does not alter the previous results. As a robustness check, we have also included regional indicator variables (not reported) and

results were unaffected. In addition, we could not reject the null that the regional dummies were significantly different from zero.

Summing up, the previous results allow us to conclude that we do accept Hypothesis 1. We view the environmental, social and governance factors as non-economic determinants of the long run evolution of *Spread*. Interestingly, our results are in line with Crifo *et al.* (2014), who, using a sample of 23 OECD countries, find that the cost of debt is lower due to a sound ESG performance of the issuer. Furthermore, they are indicative of a dual effect of the ESG factors: While the governance indicator seems to have a contemporaneous impact on *Spread*, the environmental and social factors exhibit a long-term negative influence on *Spread*.<sup>19</sup>

Table 25 reports the model estimates of equations (2), this time with *Rating* summarizing the macroeconomic control variables.

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<sup>19</sup>As a robustness check, we have extracted the Hodrick-Prescott (HP) trend of *Spread*. Using the latter as the dependent variable, we have run a fixed effect estimator of the HP trend of *Spread*, as a function of the same macroeconomic control variables, as well as the ESG factors. Interestingly, we find that the environmental and social indicators continue to be significant and with the expected signs. Thus, it reinforces the conclusion that they are significant non-economic long-term determinants of the long run *Spread* evolution.

**Table 25**  
GMM Regressions of  $D(\text{Spread})$  on the differenced ESG factors, with *Rating*.

Variable	Spread <sub>t,k</sub>	Spread <sub>t,k</sub>	Spread <sub>t,k</sub>
<i>Spread</i> <sub>t-1,k</sub>	0.50*** (0.05)	0.60*** (0.03)	0.60*** (0.03)
<i>Average Life</i> <sub>t,k</sub>	5.29** (2.34)	3.76** (1.54)	3.97** (1.61)
<i>Average Life Squared</i> <sub>t,k</sub>	-5.27** (2.41)	-3.91** (1.72)	-4.14** (1.81)
<i>Bid Ask</i> <sub>t,k</sub>	2.98** (1.27)	1.47** (0.62)	1.42** (0.60)
<i>Rating</i> <sub>t,k</sub>	-0.31* (0.19)	-0.97*** (0.26)	-0.93*** (0.24)
<i>Rating</i> <sub>t-1,k</sub>		0.75*** (0.26)	0.76*** (0.25)
<i>WGIT</i> <sub>t,k</sub>	-0.48* (0.29)	-2.60** (1.34)	-2.23* (1.25)
<i>WGIT</i> <sub>t-1,k</sub>		0.38 (1.28)	0.34 (1.25)
<i>WGIT</i> <sub>t-2,k</sub>		2.24** (0.99)	2.03** (0.98)
<i>EPI</i> <sub>t,k</sub>	-0.26 (0.33)	1.08 (0.74)	1.11* (0.71)
<i>EPI</i> <sub>t-1,k</sub>		-0.61 (0.43)	-0.67* (0.43)
<i>EPI</i> <sub>t-2,k</sub>		-0.59** (0.29)	-0.63** (0.29)
<i>HDI</i> <sub>t,k</sub>	1.16* (0.69)	5.96 (4.35)	5.85 (4.31)
<i>HDI</i> <sub>t-1,k</sub>		2.58 (4.08)	2.54 (4.02)
<i>HDI</i> <sub>t-2,k</sub>		-7.96*** (2.73)	-7.86*** (2.60)
Observations (Number of instruments)	229 (48)	197 (47)	197 (48)
Year effects	Yes	Yes	Yes
Sovereign debt crisis dummy	No	No	Yes
Arellano-Bond test for AR(2) p-value	0.99	0.15	0.14
Hansen test of overid. restrictions p-value	0.98	0.99	0.99
Hansen test of $i_{\frac{1}{2}}$ exog of GMM-type $i_{\frac{1}{2}}$ instr, p-value	0.99	0.78	0.85
Hansen test of $i_{\frac{1}{2}}$ exog of IV-type $i_{\frac{1}{2}}$ instr p-value	0.99	0.99	0.99

Notes: Standard deviation, in parentheses. Level of significance : . 15%, \* 10% , \*\* 5 % , \*\*\* 1%. *Spread*: Stripped Spread MidPoint. *Average Life*: Average Life. *Average Life Squared*: Average Life Squared. *Bid Ask*: Bid Ask Spread. *Rating*: Fitch's Long Term Credit Rating. *WGIT*: World Governance Indicator Index Total. *HDI*: Human Development Index. *EPI*: Environmental Performance Index. Arellano-Bond test for AR(2) p-value: Arellano-Bond test for second order serial correlation in first differences,  $Pr > z$ . Hansen test of overid. restrictions p-value: Hansen test of over-identifying restrictions,  $Prob > \chi^2$ . Hansen test of exog of GMM-type instr p-value: Difference-in-Hansen test of exogeneity of GMM type instruments for levels (null  $H = \text{exogenous}$ ),  $Prob > \chi^2$ . Hansen test of exog of IV-type instr p-value: Difference-in-Hansen tests of exogeneity of IV type instruments for levels (null  $H = \text{exogenous}$ ),  $Prob > \chi^2$ .

From table 25, several changes are worth to highlight, relative to table 24. First, interestingly, *Rating* exhibits a significant negative contemporaneous impact on *Spread*, that is, the better the country's *Rating*, the lower the sovereign bond *Spread*. Moreover, this effect seems to persist, since the first lag of the differenced *Rating* is also significant.

Second, in relation to the control variables, table 25 shows that overall, their coefficient estimates only change in a minimal way, relative to table 24. Third, concerning the ESG factors, the similarity of their estimated coefficients, relative to the previous table of results, seems encouraging: The governance indicator continues to exert a contemporaneous negative influence on *Spread*, whereas the environmental and social factors exhibit a strong negative long-term link with *Spread*.

However, in contrast to table 24, the second lagged coefficient estimates for the differenced governance indicator (second and third column of results) are now positive and statistically significant, regardless of whether we include the sovereign debt crisis dummy or not. We believe that the latter may be due to a positive correlation between *WGIT* and *Rating*. Fitch's credit rating model documentation, together with the evidence presented in section 4 that countries with good governance indicators tend to coincide with those with sound macroeconomic per-

formance, as measured by *Rating*, reinforce this idea.

Summing up, thanks to the results reported in table 25, we continue to accept the Hypothesis 1, for the environmental, social and governance dimensions.

## 6.6 Conclusion

This paper studies the link between environmental, social, and governance (ESG) performance of a country and its cost of debt. The idea is that such extra-financial performance can decrease default risk either through a positive impact on future growth or through a positive signal regarding the long term orientation of a country. We focus on emerging markets because the risk of default is more prevalent and the ESG issues are more acute than in more developed countries.

We measure a country's ESG performance by using well-established indicators: the Environmental Performance Index constructed by Yale for the environmental performance, the Human Development Index constructed by the World Bank for the social performance, and the World Governance Index constructed again by the World Bank for the governance performance of a country. The cost of debt is measure by the spread between the rate of return offered by a country's sovereign bond minus the one offered by the U.S. We include the bonds that are part of the EMBI Global Index. We perform our regression analyses by using the Generalized Method of Moments. We include various control variables to account for macroeconomic conditions and technical issues related to fixed-income instruments.

The first result from this study is that the environmental, social and governance performance impacts the *Spread*. We view these factors as non-economic determinants of the long run evolution of the *Spread* variable. Importantly, they can have

an impact on both types of default risk. On the one hand, sound ESG policies might bring a strong and sustainable economic performance to a country, thereby reducing the risk of economic default. On the other hand, a clear engagement towards sustainable development might signal a country's willingness to address long-term issues, and may thus act as a credible commitment to repay its debt in the future. This might reduce the risk of strategic default.

Second, the environmental, social and governance factors exhibit a strong negative link with *Spread*. Interestingly, our results are indicative of a dual effect of the ESG factors: While the governance indicator seems to have a more contemporaneous impact on *Spread*, the environmental and social factors exhibit a long-term negative influence on *Spread*. The environmental and social performance also has a positive link with the contemporaneous spreads, which suggests that financial markets initially overemphasize the cost of the underlying public policies.

One possible explanation of the distinct behavior of the environmental and social factors, on one hand, and the governance indicator, on the other hand, could be that the *WGIT*, as a measure of country risk, has become a widely used piece of information. Furthermore, several studies have shown their impact on *Spread* (Cioccini *et al.* (2003), Depken *et al.* (2011), Moser (2007), Baldacci *et al.* (2011), Bekaert *et al.* (2014), Cosset and Jeanneret (2014), Benzoni *et al.* (2015)).

The impact of environmental and social indicators on *Spread* was less straightforward: An increase in health expenditure or stricter air pollution legislation, for instance, may be evaluated as a cost in the short run by financial markets. It may thus take financial markets a certain time before they fully assess the benefits of these policies on the country's future capacity to pay back its sovereign debt. This is what we find in our analysis.



Regarding endogeneity concerns, we do not expect that a country would engage in better environmental or social policies, when benefiting from a lower *Spread*. Since the indicators include a wide variety of criteria, we can assume that we capture a stance towards ESG policies rather than the ability to finance certain individual projects. We thus rule out reverse causality. This is particularly relevant in the face of the lagged influence that the environmental and social performance have on the cost of debt. It seems very unlikely that a country starts developing policies to improve its environmental and social performance because it expects spreads to decrease two years down the road. As a result, we believe that it is the environmental and social performance that is affecting the cost of debt and not the reverse.

We are also confident that we do not have an omitted variables bias, such as the abilities of the sitting political administration (Crifo *et al.*, 2014), *i.e.* politicians in some countries could have a broader perception of important issues and might be more prone to take into account ESG issues. If the market valued these abilities, our model would capture a link between ESG indicators and the *Spread* even though the causal link might be between the political administration's abilities and the *Spread*. We believe that these effects are constant over time and fully captured by the fixed effects.

Unfortunately, the coverage of emerging countries is not broad enough to build yield curves. Thus, we cannot test our hypothesis for different maturities. Moreover, one could argue that a sound ESG performance would stabilize *Spreads* during periods of turmoil for the same reason it decreases *Spreads*, namely, a higher commitment to repay the debt. In regressions using *Spread* volatility instead of changes in *Spread*, we find that ESG factors do not have any explanatory power.

In future research, it could be interesting to study further these issues.

Another venue of future research could be to further exploit the heterogeneities that exist between countries in our database (for instance, geographical and cultural) and apply spatial data panel estimation. This estimation technique is commonly used in the regional science and the spatial econometrics literature and it could be applied in our context to further explore the role of the ESG factors on the cost of sovereign debt in emerging economies.

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## 6.8 Appendix: World Governance Indicators

**Government effectiveness** captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

**Regulatory quality** captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

**Rule of law** captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

**Control of corruption** captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

**Voice and accountability** captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.

**Political Stability and Absence of Violence/Terrorism** measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.

**Table A1**

Correlation matrix of the differenced ESG factors and their lags.

Variables	$EPI_t$	$EPI_{t-1}$	$EPI_{t-2}$	$HDI_t$	$HDI_{t-1}$	$HDI_{t-2}$	$WGIT_t$	$WGIT_{t-1}$	$WGIT_{t-2}$
$EPI_t$	1.00								
$EPI_{t-1}$	-0.66*	1.00							
$EPI_{t-2}$	-0.14	-0.66*	1.00						
$HDI_t$	0.04	0.04	0.01	1.00					
$HDI_{t-1}$	0.03	0.04	0.04	0.24*	1.00				
$HDI_{t-2}$	-0.12	0.03	0.04	0.19*	0.20*	1.00			
$WGIT_t$	0.10	-0.05	-0.02	0.06	-0.02	0.05	1.00		
$WGIT_{t-1}$	-0.08	0.10	-0.05	0.01	0.05	-0.03	0.01	1.00	
$WGIT_{t-2}$	0.00	-0.07	0.10	-0.07	0.01	0.05	0.03	0.02	1.00

## 6.9 Appendix: Descriptive Statistics, by Country



**Table B1**  
Summary Statistics, by Country.

<b>Country</b>	<b>Spread</b>	<b>Avg Life</b>	<b>Avg Life Sq.</b>	<b>Bid Ask</b>	<b>GDP Growth</b>	<b>Debt Serv</b>	<b>Gov Debt</b>	<b>WGIT</b>	<b>HDI</b>	<b>EPI</b>
<b>Africa</b>										
Egypt	2.38 (1.46)	6.54 (3.39)	53.29 (50.50)	0.01 (0.00)	8.59 (1.13)	9.33 (0.24)	85.60 (12.54)	-3.32 (0.66)	0.64 (0.02)	55.16 (2.66)
Gabon	4.76 (2.24)	7.39 (1.58)	56.71 (23.47)	0.02 (0.01)	8.38 (1.00)	9.28 (0.26)	19.79 (2.76)	-3.33 (0.39)	0.68 (0.01)	57.03 (1.39)
Ghana	5.87 (1.96)	7.21 (1.58)	53.95 (22.87)	0.02 (0.01)	9.73 (0.37)	9.8 (0.21)	42.00 (6.93)	0.49 (0.19)	0.54 (0.02)	47.29 (0.23)
South Africa	2.06 (0.87)	7.92 (1.25)	64.11 (20.01)	0.01 (0.00)	8.02 (1.11)	9.17 (0.35)	35.48 (4.93)	1.97 (0.45)	0.61 (0.01)	34.62 (0.87)
<b>Europe</b>										
Bulgaria	2.64 (1.69)	7.36 (2.97)	62.32 (43.66)	0.01 (0.00)	8.09 (1.79)	7.98 (0.89)	33.75 (9.83)	1.21 (0.17)	0.76 (0.02)	54.50 (1.94)
Croatia	2.77 (1.39)	4.83 (2.37)	28.43 (29.01)	0.01 (0.00)	7.31 (2.26)	7.84 (1.58)	38.45 (6.94)	2.09 (0.35)	0.79 (0.02)	61.97 (1.54)
Hungary	1.85 (1.65)	6.19 (3.10)	47.18 (37.34)	0.01 (0.01)	7.01 (2.36)	8.30 (0.49)	68.00 (10.68)	5.10 (0.76)	0.82 (0.01)	55.63 (1.63)
Poland	1.50 (0.71)	8.30 (2.63)	75.27 (45.99)	0.01 (0.00)	8.22 (1.24)	8.16 (0.80)	48.08 (5.56)	3.87 (0.76)	0.80 (0.01)	65.88 (8.16)
Serbia	4.38 (1.63)	8.65 (1.45)	76.55 (26.30)	0.02 (0.01)	7.40 (2.70)	8.92 (1.58)	43.72 (9.93)	-1.27 (0.46)	0.76 (0.01)	46.31 (0.22)
Turkey	4.11 (2.29)	11.84 (1.15)	141.34 (26.11)	0.01 (0.00)	8.15 (1.78)	6.54 (0.56)	51.84 (14.54)	-0.59 (0.58)	0.69 (0.02)	43.45 (1.10)

**Table B1**  
Summary Statistics, by Country (cont.).

<b>Country</b>	<b>Spread</b>	<b>Avg Life</b>	<b>Avg Life Sq.</b>	<b>Bid Ask</b>	<b>GDP Growth</b>	<b>Debt Serv</b>	<b>Gov Debt</b>	<b>WGIT</b>	<b>HDI</b>	<b>EPI</b>
<b>Asia Pacific</b>										
China	1.20 (0.60)	6.18 (0.92)	38.98 (11.23)	0.01 (0.01)	9.97 (0.10)	9.78 (0.31)	20.90 (5.48)	-3.25 (0.17)	0.65 (0.03)	42.21 (0.31)
Indonesia	2.95 (1.19)	13.62 (2.39)	190.58 (65.47)	0.01 (0.00)	9.34 (0.59)	7.81 (0.76)	32.25 (7.71)	-3.11 (0.63)	0.60 (0.02)	51.30 (1.07)
Iraq	5.84 (1.34)	14.24 (1.87)	205.64 (53.34)	0.02 (0.01)	9.28 (0.75)	10 (0)	66.54 (30.80)	-8.87 (0.93)	0.58 (0.01)	25.36 (0.19)
Kazakhstan	5.07 (2.30)	6.79 (0.89)	210.43 (14.23)	0.01 (0.01)	8.81 (1.34)	5.95 (1.91)	10.06 (2.16)	-3.18 (0.58)	0.74 (0.01)	32.79 (0.22)
Lebanon	4.73 (1.79)	5.16 (0.89)	27.40 (9.03)	0.01 (0.00)	8.61 (1.06)	9.26 (0.34)	159.39 (14.99)	-3.44 (0.98)	0.73 (0.01)	50.63 (9.99)
Malaysia	1.57 (0.57)	7.84 (1.08)	62.61 (17.28)	0.01 (0.00)	8.77 (1.13)	9.75 (0.27)	46.50 (5.77)	2.14 (0.50)	0.75 (0.02)	63.04 (3.76)
Pakistan	7.24 (4.05)	4.98 (2.10)	28.80 (21.23)	0.03 (0.01)	8.98 (0.92)	8.40 (0.92)	61.00 (5.93)	-6.21 (0.62)	0.49 (0.02)	37.73 (4.91)
Philippines	3.39 (1.37)	12.86 (1.34)	166.95 (37.61)	0.01 (0.00)	8.72 (0.98)	8.78 (0.41)	52.27 (10.09)	-2.75 (0.53)	0.63 (0.01)	54.44 (2.91)
Russia	3.33 (1.79)	10.54 (2.09)	115.04 (44.37)	0.00 (0.00)	8.67 (2.09)	9.51 (0.44)	18.87 (13.46)	-4.27 (0.25)	0.76 (0.02)	46.31 (1.24)
Ukraine	6.92 (5.13)	4.65 (1.00)	22.51 (8.36)	0.01 (0.01)	8.48 (1.97)	8.61 (0.99)	28.31 (9.88)	-3.33 (0.61)	0.72 (0.02)	46.49 (0.75)
Vietnam	3.32 (1.33)	7.45 (1.25)	56.84 (19.17)	0.01 (0.01)	9.15 (1.19)	9.86 (0.23)	45.21 (5.59)	-3.19 (0.11)	0.60 (0.01)	50.38 (0.34)

**Table B1**  
Summary Statistics, by Country (cont.).

<b>Country</b>	<b>Spread</b>	<b>Avg Life</b>	<b>Avg Life Sq.</b>	<b>Bid Ask</b>	<b>GDP Growth</b>	<b>Debt Serv</b>	<b>Gov Debt</b>	<b>WGIT</b>	<b>HDI</b>
<b>Americas</b>									
Argentina	21.93 (21.48)	18.38 (5.48)	365.34 (194.75)	0.02 (0.01)	7.64 (2.87)	5.21 (2.91)	81.26 (40.46)	-1.88 (0.57)	0.78 (0.02)
Brazil	4.77 (3.90)	14.39 (0.88)	207.80 (25.58)	0.01 (0.00)	8.07 (0.86)	5.94 (2.11)	68.73 (4.62)	0.13 (0.53)	0.70 (0.03)
Chile	1.46 (0.54)	8.66 (1.54)	77.11 (26.54)	0.01 (0.00)	8.77 (1.04)	7.95 (0.80)	9.22 (3.89)	7.07 (0.25)	0.80 (0.02)
Colombia	3.41 (1.86)	11.08 (1.94)	126.27 (42.74)	0.01 (0.00)	8.36 (0.77)	6.97 (1.31)	37.74 (4.75)	-2.87 (0.81)	0.69 (0.02)
Dominican Republic	5.79 (3.05)	6.91 (1.40)	49.48 (19.24)	0.01 (0.01)	7.98 (1.52)	9.30 (0.44)	26.56 (5.92)	-2.18 (0.34)	0.68 (0.02)
Ecuador	10.84 (4.42)	15.29 (7.31)	282.82 (192.17)	0.01 (0.00)	7.85 (1.67)	7.76 (1.22)	32.47 (14.58)	-4.61 (0.38)	0.69 (0.02)
El Salvador	3.34 (1.12)	17.37 (0.93)	302.39 (32.15)	0.01 (0.00)	7.60 (0.91)	8.67 (0.72)	43.68 (6.43)	-0.88 (0.28)	0.67 (0.01)
Mexico	2.27 (0.75)	13.71 (1.72)	190.63 (49.56)	0.01 (0.00)	7.49 (1.87)	8.43 (1.36)	41.58 (2.41)	-0.54 (0.56)	0.75 (0.02)
Panama	2.80 (1.06)	15.52 (1.90)	244.23 (60.49)	0.01 (0.00)	8.45 (1.33)	7.95 (0.91)	54.80 (9.97)	0.54 (0.27)	0.75 (0.02)
Peru	3.16 (1.78)	13.84 (4.12)	207.00 (116.63)	0.01 (0.00)	8.91 (0.95)	7.69 (1.03)	33.20 (9.30)	-1.95 (0.40)	0.71 (0.02)
Uruguay	4.38 (2.93)	17.47 (5.19)	329.56 (148.90)	0.01 (0.01)	7.64 (2.48)	6.49 (1.33)	75.40 (17.29)	4.29 (0.48)	0.77 (0.02)
Venezuela	8.41 (3.57)	14.12 (1.49)	201.46 (39.74)	0.01 (0.00)	6.73 (3.50)	9.00 (0.82)	40.17 (11.31)	-6.65 (0.91)	0.71 (0.03)

Notes. *Spread*: Stripped Spread MidPoint. *Average Life*: Average Life. *Average Life Squared*: Average Life Squared. *Bid Ask*: Bid Ask Spread. *VIX*: Implied Volatility of S&P500 Index Options. 10y US Treasury: 10 year US Treasury Zero Coupon Yield. *GDP Growth*: GDP Growth. *Gov Debt*: General Government Gross Debt. *Debt Serv*: Debt Service. *WGIT*: World Governance Indicator Index Total. *HDI*: Human Development Index. *EPI*: Environmental Performance Index.

## 7 Chapter 4: Do Local and Foreign Currency Bonds React Differently to Shocks to Local Risk Factors?

### Abstract

Using a new unique dataset composed of individual bonds for 30 developed and emerging countries, this article investigates the determinants of foreign and local currency yields and the spread between them. We find that the unhedged local currency (LC) yield is higher than the foreign currency (FC) yield for emerging economies. Moreover, the duration of FC bonds issued by emerging economies has almost doubled between 1998 and 2013 and remains considerably higher than the duration of local currency bonds. These two effects explain why emerging economies continue to issue debt in foreign currencies despite the associated risks. For developed countries, the FCLC spread is actually positive. In developed countries the spread between the FC and hedged LC yield increases with the political risk indicator, i.e. the foreign yield increases faster than the domestic one. For emerging countries the reverse is true. Interestingly, the FCLC spread varies stronger in absolute terms with increasing foreign participation in both, emerging countries and developed countries.<sup>20</sup>

*JEL Classification:* F31, F33, F34, F41, H63

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*Keywords:* Sovereign Default, Local Currency Debt, Foreign Currency Debt, International Bonds

## 7.1 Introduction

Currency and sovereign crisis that wreaked havoc in emerging economies throughout the 1970s to 1990s stigmatized these countries as unreliable borrowers. Underlying economic uncertainty, low credibility of monetary institutions and high inflation resulted in limited confidence in local currency (LC) securities. Many sovereign borrowers were constrained to borrow in foreign currencies (FC), mainly dollar, sterling or mark.

However, over the last two decades many developing economies switched to the path of stable growth, reduced external vulnerability, implemented financial liberalization and improved statistical coverage. As a result, their exchange rates stabilized and their local equity and bond markets expanded. The world market for government debt, once dominated by bonds of advanced countries, began to embrace emerging market bonds denominated in local currencies. Emerging economies reduced their dependence on foreign funding from over 50 per cent in 1993 to less than 20 per cent in 2003 and have maintained this level since. As of 2013 total outstanding foreign currency emerging government debt equalled USD 1700bn, or 5 per cent of globally outstanding sovereign debt. It is noteworthy that governments of advanced countries have been issuing more foreign-currency debt than emerging economies. Although, the share of foreign debt issued by developed economies historically oscillated around 5 per cent.

Holding LC bonds, as compared to FC bonds, exposes the investor to four serious risks. First, in case of default, the creditor is likely to face losses not only on bond prices due to the haircut, but also on currency depreciation that usually comes along. Should the country experience an inflationary shock or capital outflows,

then the local currency is likely to depreciate, lowering the return on the initial investment.

Second, in most developing countries holding local currency instruments implies serious liquidity risk not only for currency hedging instruments, i.e. sovereign CDS, but also on LC bonds themselves.

Third, due to a lack of enforcement in international law, holding LC debt may be risky in case of default, as the issuing government may easily amend the local law and discriminate between local and foreign bondholders.

Fourth, the borrowing government's willingness to pay may fall if the majority of the debt is held by foreign investors and the government prefers to shift the burden on foreign investors to protect the wealth of domestic agents. Although FC bonds do not expose the investor to these risks, they might eventually be riskier since they are by definition held predominately by foreign investors and a government could decide to default on them in the first place.

The bulk of the existing literature is dedicated to the valuation and the drivers of foreign currency bonds, exchange rates or deviations from covered and uncovered interest rate parity. However, a gap persists with regard to the valuation of bond yields and credit risk of the same issuer in different currencies. The objective of this study is to determine the drivers of local and foreign currency bonds through the prism of political risk and the investor base.

The rationale is that political risk reflects the coherence, stability and creditworthiness of the government and established institutions. It is also a proxy for the willingness to repay the debt. We also include the investor base in our study because it reflects the cost and stability of government financing. If the provision of

funds by investors match the supply of assets, long-term refinancing risk for the government should be limited. Hence in countries where bonds are held mainly by domestic agents their yields should react less to domestic political shocks.

FC bond yields are traditionally benchmarked against risk-free government paper in corresponding currency, i.e. US Treasuries for USD-denominated bonds, German Bunds for Euro, Gilts for GBP and JGB for JPY. The resulting sovereign spread for foreign currency bonds remains the uncontested measure of sovereign credit risk. However, the lack of equivalent benchmark for local currency sovereign bonds renders the comparison between countries and maturities a more challenging task. In order to make the FC and LC yield comparable, we build a hedge by using the currency future curves.

This article combines these different viewpoints by analyzing how fundamental and political indicators related to sovereign risk determine the LC and FC yields and the FX-hedged difference between them. The novelty of our approach consists in comparing LC bonds with FC bonds using a broad data set of individual bonds covering both developed and emerging countries. On top of that, we use data for the currency structure of government debt and foreign participation to analyze how the reactivity of LC yields evolves under different structures.

We find that the unhedged LC yield is higher than the FC yield for emerging economies. Moreover, the duration of FC bonds issued by emerging economies has almost doubled between 1998 and 2013 and remains considerably higher than duration of local currency bonds. These two effects explain why emerging economies continue to issue debt in foreign currencies despite the associated risks. For developed countries, the FCLC spread is actually positive.



In developed countries the spread between the FC and hedged LC yield increases with the political risk indicator, i.e. the foreign yield increases faster than the domestic one. For emerging countries the reverse is true. Interestingly, the FCLC spread varies stronger in absolute terms with increasing foreign participation in both, emerging countries and developed countries.

The article begins with the hypothesis development and literature overview in section 2, then it moves to the data and the estimation methodology in section 3, section 4 presents the descriptive statistics and econometric results, and the 5th and final section concludes.

## **7.2 Hypothesis Development and Literature Overview**

In this section we aim to pin down potential channels through which macroeconomic, political and demand-related factors could affect local and foreign currency bond yields.

### **7.2.1 Currency Hedging and the Covered Interest Rate Parity**

According to the literature, the covered interest parity does not hold. Popper (1993), for instance, analyses the covered interest rate parity for long-maturity bonds of major risk-free developed economies as compared to shorter maturities. Her findings for the 1985 to 1988 period indicate that the deviation for longer maturities does occur, but the extent of deviations in the long part of the yield curve is only slightly larger, ca. 10 bps, than in the short part.

McBrady and Schill (2007) focus on the currency choice of sovereign and sub-

sovereign issuers from developed and emerging economies in terms of market timing. They prove that borrowers tend to exploit cross-currency differences in covered and uncovered interest yields. Their results indicate also that the average new bond offering precedes a large and beneficial depreciation of the issue currency of around 150 bps over the course of the following year.

Lustig and Verdelhan (2007) find that investors on average earn large excess returns simply by taking long positions in baskets of currencies with high interest rates while shorting baskets of currencies with low interest rates, regardless of the history of interest rate differences for individual currency pairs.

Munro and Wooldridge (2011) analyze the borrowing behavior of governments issuing in both local and currency markets. They find that numerous borrowers prefer to issue interest rate swap covered foreign currency bonds instead of tapping directly the local currency market.

Du and Schreger (2013) show that the LC spread over US treasuries can be decomposed into currency and credit-specific spreads, with currency spread accounting for ca. two thirds of the entire LC spread. Interestingly, this decomposition indicates that LC credit spreads are generally lower and less correlated with global risk factors than FC credit spreads.

We thus hypothesize that the covered interest parity does not hold, i.e. there is a spread between the foreign currency and the hedged local currency yield.

*Hypothesis 1: The covered interest parity does not hold. Hence there is a spread between the foreign currency and the hedged local currency yield.*

### **7.2.2 Domestic and Foreign Debt Default**

Investors, credit rating analysts and academics tend to disagree on the formal boundaries of sovereign default. Debt in domestic currency can be repudiated in several ways. If the government can influence the central bank, it may steer the economy into the territory of higher inflation rates, or report inflation rates that are lower than actual figures. This would reduce the country's debt liability in real terms. To maximize this effect the troubled government could freeze bank deposits, force conversion of deposits in foreign currencies into domestic currency, cap rates on deposits and increase required reserves ratio which would shift the loss to the private sector.

In case of a default in foreign currency debt, the situation is more clearcut as the failure to meet a principal or interest payments on the originally fixed date would automatically trigger the default mechanism specified in the bond legal documentation.

Empirical research on the number and severity of government defaults remains relatively scarce. In their seminal article on the history of sovereign defaults, Reinhart and Rogoff (2011) identified 250 cases of external defaults and only 68 documented cases of outright domestic default between 1900 and 2010. However, these authors underline that the actual number of domestic defaults related to financial repression and high inflation, i.e. cases of debt being inflated away, appears to be significantly higher. In fact, even though domestic bankruptcies were less frequent, these episodes were marked by a greater fall in output and significantly higher inflation rates that persisted for several years after the occurrence.

In their seminal work on the governments' default choices, Eaton and Gersovitz

(1981) demonstrate that in absence of an international enforcement mechanism, the debtor government is more likely to repay its external debt if it is facing the threat of being permanently excluded from the debt market. Moreover, Gersovitz (1983) postulates that the government would not default on external debt if domestic financial institutions are dependent on foreign financing, since reduced refinancing capacity would translate into a welfare loss to the domestic private sector. Bulow and Rogoff (1989) further extend this theory showing that legal rights and institutions in the creditor's country, i.e. rule of law and law enforcement in the jurisdiction where debt is issued, determine the willingness to repay its debt.

Empirical research confirms discrimination between local and foreign bondholders. Diaz-Cassou and Erce (2010) report that episodes of discrimination between domestic and foreign creditors indeed occurred in the past. Out of ten recent default episodes, four discriminated against foreign creditors, three adopted equal treatment and particularly dramatic default episodes, specifically in Argentina, Russia and Ukraine, afforded preferential treatment to foreign creditors.

Interestingly, rating agencies perceive local currency debt as less risky than foreign currency debt. Packer (2003) reports that in 2003 S&P and Fitch were assigning a higher local currency rating to over 50% of sovereigns under coverage. The LC to FC gap was in range 1 to 3 notches and occurred most frequently around BBB rating. The key rationale behind the superiority of LC debt goes back to sovereign's capacity to increase taxation of residents to repay LC debt.

Recent empirical evidence on debt servicing in developing countries by Kohlscheen (2010) also demonstrates that between 1980 and 2006 sovereign default rates for domestic debt were lower than those for external debt.

As a bottomline, these empirical findings give ground to believe that default in domestic debt is less likely, i.e. foreign currency yields increase more strongly with political risk than hedged local currency yields.

*Hypothesis 2: Foreign currency yields increase more strongly with rising political risk than hedged local currency yields. Hence the FCLC spread increases.*

### **7.2.3 Foreign Participation in Local Currency Bonds**

While advanced economies have been able to borrow in local currency bond markets for over half a century, until late 1990s most emerging economies were constrained to borrow either short-term, with floating rates or in foreign currencies. This phenomenon has been outlined by Eichengreen and Hausmann (1999) as the 'original sin'. Low credibility of local authorities, high inflation rates and economic instability discouraged investors from embracing local currency debt. As a result, emerging economies were raising funds in foreign currency, while local currency debt was either non-existent, or short-duration or inflation-indexed.

Mehl and Reynaud (2010) show in a sample of 33 emerging economies over 1994-2006 that the share of foreign currency denominated debt is related to fiscal soundness, size of the economy, the investor base, and most importantly, the rate of inflation.

In a review of existing works on sovereign debt and default, Tomz and Wright (2013) find that there is limited empirical literature on why governments honor domestic debt depending on the currency of borrowing. They also find that the rise in foreign participation in domestic debt creates incentives for default on domestic debt.

Moreover, greater foreign participation does not necessarily result in increased volatility in bond yields in emerging markets and could even dampen volatility in certain situations. Gadanecz, Miyajima, and Shu (2014) analyze the determinants of LC bond yields at 5 year maturity between 2012 and 2014 in 12 EM countries and find that foreign participation in LC bond markets tends to lower bond yields. For each additional percentage point increase in foreign nonbank holdings, local currency bond yields fall by 8 to 9 basis points.

Peiris (2010) also analyzes the relationship between local currency yields and foreign participation in 10 emerging markets between 2000 and 2009. His results show that greater foreign participation in the domestic government bond market tends to significantly reduce long-term government yields.

In turn, Ebeke and Yinqiu (2014) analyze at the period Q2 2009 to Q1 2013 in a similar panel of countries and find that foreign holdings have reduced bond yields but increased yield volatility in the post-Lehman period.

Reinhart and Rogoff (2011) points out that the incentives of domestic and external default should converge at high participation of foreign investors in domestic debt, as high inflation would scare foreign investors off.

Since the foreign denominated debt is by definition almost solely hold by foreign investors, we assume that at higher foreign participation, the domestic yield moves closer to and behaves more like the foreign yield.

*Hypothesis 3: At high levels of foreign participation in local currency bonds, political risk should have a similar impact on hedged local currency yields as on foreign currency yields. Hence the impact of political risk on the FCLC spread should be less strong with increasing foreign participation in domestic debt.*

## 7.3 Data and Methodology

### 7.3.1 Data

The novelty of our approach consists in merging local currency bonds with foreign currency bonds into one dataset. We chose Bloomberg as our data provider due to its wide complete coverage. Bloomberg provides data on yields, bid-ask spreads, currency of issuance, maturity and outstanding amount. At the outset of the project we identified 20 emerging economies and 10 advanced countries that issued 1350 foreign currency bonds with sufficient historical data to conduct the analysis, as indicated in Table B2. In the first step of the data identification process, we excluded bonds that require non conventional pricing methods and are labelled by Bloomberg as restructured, exchanged, funged or based on a step-up coupon.

However, the availability of foreign currency bonds is not the only factor limiting the scope of our analysis. The historical series of yield curves provided by Datastream for maturities between 1 year and 30 years lack coverage. Although, on average the breadth and historical availability of local currency yields exceeded the availability of foreign currency yields.

On top of that we have not been able to identify zero coupon curves for Argentina and Venezuela. In the case of South Africa the local currency yield turned out to be, to a great extent, incomplete and inconsistent. To overcome these issues we have analyzed historical series for individual local currency bonds, but the curves constructed in this way generated less data points than the curves provided directly by Bloomberg<sup>21</sup>.

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<sup>21</sup>The remaining countries in the sample can be found in Table B4.

The political risk indicator stems from the Economist Intelligence Unit. It combines measures of rule of law and political stability. The analysts assess on a qualitative basis the countries riskiness and express their opinion on a scale between 0 and 1 where 1 designates a highly risky country.

We use the following macro-economic variables to control for fundamentals: GovDebt is the government debt gross domestic ratio which reflects the relative amount of past debt accumulated. FXResExtDebt is the foreign exchange rate reserves over external debt ratio. IntTotDebt represents the interest over debt ratio. It indicates the sum of current coupon payments. ExtDebtGDP is the external debt over gross domestic product ratio. It indicates how much external debt was accumulated by a country relative to its economic size. The CPI or consumer price index is the rate of inflation. CAGDP is the ratio of the current account over the gross domestic product. GDP is the gross domestic product.

We use the dataset compiled by Arslanalp and Tsuda (2014) for holdings of government bonds denominated in local currencies.

Last but not least, Table B2 provides an overview of the control variables and their respective sources.

### **7.3.2 Data Distribution by Country, Currency and Maturity**

Statistics in Table B3 indicate that the USD remains the preferred currency of issuance for foreign currency bonds. Interestingly, while emerging countries tend to issue foreign currency bonds denominated mainly in EUR, JPY and USD, developed countries issue also in CHF and GBP.

Table B3 also shows that the majority of observations is available for USD bonds



with over 6546, followed by Euro with 1814, whereas JPY and GBP bonds have around 1459 observations, respectively. Relatively few observations are available for the CHF, and the Euro predecessors.

Figure 7 and 8 present the historical number of observations over time of foreign bond yields by issuance currency. While for developed countries most data points are equally spread over time between 1998 and 2006, data for emerging economies begins in 2003 with most observations between 2009 and 2013. Thus one has to be cautious about analyzing FC yields during sub-periods.

Following the same approach, we also studied the number of observations by maturity segments for three time periods. Figure 9 and 10 indicate that the short, medium and long-term maturities are evenly distributed for developed, but not for emerging economies. We find that the majority of FC yields for developed economies are located in the 1Y to 5Y segments, while observations for emerging markets are concentrated on long-term maturities between 7-10Y and above 10Y.

Finally, Table B4 shows that data availability of the FCLC spread differs strongly from country to country. For instance Sweden has 92 foreign currency denominated bonds in our sample whereas South Africa has only 2. Note that Brazil, Ireland and South Africa do not have any observations in the final sample due to missing observations of the hedge.

### **7.3.3 Methodology**

In this section we outline our approach to calculate the yields in local and foreign currencies as well as the local currency hedge. Finally, we present the econometric

approach.

## **Yields**

We calculate the z-spread of the foreign currency bonds over the US zero coupon yield curve. The final yield is the addition between the two. This way, we can insure comparability between the FC and LC zero coupon yield.

If we took the conventional yield for the foreign exchange bonds, we would implicitly assume a flat US yield curve. In our study we take into account the fact that the US yield curve might have a positive or negative slope. For instance, if the US yield curve has a positive slope, the yield of the foreign exchange bond is higher than the conventional yield and vice versa.

## **Foreign Exchange Hedging**

For each local currency bond yield in our sample we calculate future curves against the dollar by supposing a piecewise linear relationship between each maturity. For each local currency bond we match its maturity with a synthetic currency future in order to calculate the hedge:

$$hedge_{LC,mt} = \frac{future_{FCtoLC,mt}}{spot_{FCtoLC,mt}} - 1$$

Where FC stands for foreign currency, LC for local currency, m for maturity and t for time.

We match exactly the maturity of the local and foreign currency bonds, whereas a real portfolio manager would most likely use a 3 months rolling hedge to protect his

investment as 3 months currency futures are the most liquid. From an academic standpoint, matching the maturity is the accurate way to do it. We thus take the exact match and use the 3 months hedge as a robustness check.

The hedged FCLC spread is calculated as follows:

$$FCLC_{mnt} = yield_{FC,mnt} - (yield_{LC,mt} - hedge_{LC,mt})$$

Where  $n$  is the bond issue,  $yield_{FC,mnt}$  is the observed foreign currency yield,  $yield_{LC,mt}$  is the local currency yield derived from the local currency yield curve and FCLC the resulting spread between the foreign currency yield and the hedged local currency yield.

In a second step, we calculate in the same fashion future curves against the dollar for all foreign currencies in our sample. We are thus able to perform a robustness check when we compare bonds in Yen, Euro, Pounds and Dollar.

### **Econometric Approach**

We perform ordinary least square panel regressions by using time, country, and currency fixed effects. Macroeconomic variables such as the abilities of the sitting political administration (Crifo *et al.*, 2014) are very likely to be correlated with macro-economic fundamentals. Thus we assume that control variables are correlated with the country specific fixed effects, i.e. we rule out the random effects model. Our results are robust to using fixed effects on the bond level instead of fixed effects on the country level. The panel autocorrelation test by (Jeffrey M. Wooldridge 2001) detects a weak first order autocorrelation. A likelihood ratio test detects heteroscedasticity. We thus control for both at the residual level. Adding

an autoregressive term in the regressions as robustness check does not change the results.

The baseline model is as follows:

(1)

$$\begin{aligned}
FCLC_{t,i} = & \alpha + \beta PolRisk_{t-1,k} + \gamma PolRiskEM_{t-1,k} + \kappa Maturity_{t,i} + \zeta MaturitySquared_{t,i} \\
& + \eta AmountIssued_{t,i} + \theta GovDebt_{t-1,k} + \iota FXResExtDebt_{t-1,k} + \kappa IntTotDebt_{t-1,k} \\
& + \lambda ExtDebtGDP_{t-1,k} + \rho CPI_{t-1,k} + \tau CAGDP_{t-1,k} + \pi \log GDP_{t-1,k} + u_{t,i}
\end{aligned}$$

where  $FCLC_{t,i}$  is the spread between the foreign currency bond  $i$  and the corresponding local currency bond at  $t$ ,  $\alpha$  is a constant term common to all observations in the sample,  $PolRisk_{t-1,k}$  is the political risk indicator at time  $t$  of country  $k$ ,  $PolRiskEM_{t-1,k}$  is an interaction term between the political risk indicator and a dummy variable that equals one if the country  $k$  is an emerging economy,  $Maturity_{t,i}$  is the maturity of bond  $i$  at  $t$ ,  $MaturitySquared_{t,i}$  is the squared maturity,  $AmountIssued_{t,i}$  is the amount of the issue,  $GovDebt_{t-1,k}$  is the government debt of country  $k$  at  $t$ ,  $FXResExtDebt_{t-1,k}$  is the foreign exchange reserves to external debt ratio,  $IntTotDebt_{t-1,k}$  is the interest to total debt ratio,  $ExtDebtGDP_{t-1,k}$  is the external debt to GDP ratio,  $CPI_{t-1,k}$  is the consumer price index,  $CAGDP_{t-1,k}$

is the current account to GDP ratio,  $\log GDP_{t-1,k}$  is the natural logarithm of the GDP, and  $u_{t,i} = \phi_t + \psi_k + \epsilon_{t-1,i}$  with  $\epsilon_{t-1,i}$  the random error term,  $\phi_t$  the time fixed effects and  $\psi_k$  the country fixed effects.

The baseline model will be adapted by replacing  $FCLC_{t,i}$  with the foreign currency denominated yield and the hedged local currency denominated yield.

To reduce noise we smooth our dataset by creating one observation out of the average of three months of any given variable. We think this gives our results additional stability compared to Du and Schreger (2013) who use monthly observations for their regressions. Our results are robust to not smoothing at all or smoothing over 6 months.

We do not use financial ratings since they are correlated with the political risk indicator at 44% and we already control for the most important financial variables. We also used the 10 year US treasury yield and the VIX as proxies for world interest rates and worldwide financial risk. We drop both variables due to collinearity with the time fixed effects.

## **7.4 Empirical Results**

In this section we present the descriptive statistics and the econometric results.

### **7.4.1 Descriptive Statistics**

In this section we describe statistical findings on foreign and local currency bond yields. Data from JPM Indices reveals interesting patterns concerning the duration of local and foreign currency bonds in emerging economies represented on

figure 11<sup>22</sup> . First, it is remarkable that the duration of foreign currency bonds increased from 4 years in 1998 to over 7 years in 2013 indicating that investors' confidence towards emerging economies increased over time. Second, between 2004 and 2014 the duration of foreign currency bonds was over 2 years longer than the one of local currency bonds.

Figure 12 depicts the average spread between the foreign currency yield and the hedged local currency yield in advanced economies. For Canada, Denmark, Sweden and Core Eurozone, the foreign currency yield oscillates very closely around the hedged local yield within the 1% range. Conversely, in Greece and Spain, the FC yield is consistently higher than the hedged LC yield during the period of the Euro introduction and the Euro-crisis. It is remarkable that the strong spread deviations ranging between 5% and 14% appear mainly in long maturities above 5 years where the currency hedge is difficult to establish. The spreads between foreign and hedged local currency yields were historically in the range of -0.5% to 1.5% which is relatively low. It is however noteworthy that in Austria, Belgium and Finland the spread jumped to around 4% around 2000-2001 crisis.

In contrast, in emerging economies the spread between FC yields and FX-hedged LC yields is positive and we can observe strong differences between countries. Results in Figure 13 indicate that in Brazil, Chile, Israel, Malaysia, Poland and Philippines the 1 year to 5 year spreads ranges between low 1% to 4%, whereas in Hungary, Mexico, Russia and Turkey spreads broadly exceeded 8%. In a nutshell, this shows that foreign investors require higher yields on FC bonds than local investors on LC bonds hedged into USD. Hence, we can argue that the default risk on hedged local default risk is different from the FC default risk. We thus accept

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<sup>22</sup>The EMBI index represents the foreign currency bonds and the GBI index the local currency bonds.

hypothesis one, i.e. the covered interest rate parity is not maintained. Moreover, at longer maturities the spreads often exceed 15%. In Hungary, Turkey, Russia and Philippines spreads skyrocketed around the 2008 crisis breaking the 8% level. Finally, it is noteworthy that Israel and Thailand experienced short-lived jumps during the periods of political and military tensions.

To sum it up, the spread between LC and FC yields in advanced economies has been relatively low except for Greece and Spain, while in emerging economies the FC yield remains higher by 1% to 20% than the hedged LC yield. These results suggest that sovereign risk on FC debt might be perceived differently from LC debt causing the deviations from covered interest parity.

Interestingly, unlike the bulk of the literature for emerging economies, we find that the foreign currency debt has a higher yield than the local currency yield. If we do not hedge the local currency bonds the picture is different.

As for the spread between foreign currency yield and unhedged local currency yield in developed countries, Figure 14 shows that the unhedged spread was relatively high during the period 1996-2001, diminished over time to 1%-2% by 2007 and stabilized at this level everywhere except for Greece. It is however noteworthy that in Austria, Belgium and Finland the spread jumped to around 4% during the 2000-2001 crisis.

For emerging economies the investigation of the spread between the FC yield and the unhedged LC yield reveals a different picture with highly interesting results. Figure 15 shows that the spread between FC yields and unhedged LC yields in emerging economies moved from positive between the 2002-2007 period, when data coverage was relatively weak, to negative in 2007-2013. During the most recent

period in most emerging economies the LC local bond yields were higher than FC yields by 1% to 3%, while in Russia, Indonesia and Turkey LC yields were higher than FC yields by 4% to 8%.

These results join the bulk of the existing literature showing that the unhedged LC yield is higher than the FC yield for emerging economies. Moreover, the duration of FC bonds issued by emerging economies has almost doubled between 1998 and 2013 and remains considerably higher than the duration of local currency bonds. These two effects explain why emerging economies continue to issue debt in foreign currencies despite the associated risks.

#### **7.4.2 Panel Regressions and Discussion**

Table B5 shows the regression results for the baseline model. As expected, both the maturity and the squared maturity are positively correlated with the foreign yield and the hedged domestic yield. Interestingly, the foreign yield increases faster with the maturity, hence the FCLC spread widens. The amount issued is also positively correlated with the domestic yield. Even though the expected sign would be negative since the amount issued is a proxy for liquidity, we keep the variable in our regressions.

The increase of government debt has a stronger impact on the domestic yield than the foreign yield. Contrary to these findings, The FCLC spread increases. This might happen due to the use of the level effects induced by using fixed effects. The increase of the ratio of foreign exchange reserves to external debt, a measure of the availability of foreign funds of a country to pay back its foreign denominated debt, is followed by an unexpected increase of the domestic yield. The FCLC spread de-



creases when this ratio goes down. Interests to total debt is the only variable that has a higher impact on the FC yield than the LC yield. The impact on the FCLC spread is neutral. If the ratio external debt to GDP increases the domestic yield increases, whereas the foreign yield decreases. The foreign yield might increase because of increased liquidity as more issues attract more investors. Inflation as measured by the CPI has a positive impact on the domestic yield whereas it has no impact on the foreign yield. With rising inflation, the FCLC spread rises as well. The current account to GDP ratio has a negative impact on the yield, i.e. when exports increase compared to imports the domestic yield decreases and thus the FCLC as well. GDP only has an impact on domestic yields. Thus the FCLC spread tightens with growing GDP.

Thus hedged local currency yields respond generally more strongly to unfavorable changes in macroeconomic fundamentals than foreign currency yields. This confirms Jeanneret and Souissi (2014) findings that a government is more likely to default on its bonds when the country exhibits weaker long-term economic growth and higher inflation. As for the latter effect, inflation raises the probability of default on both types of debt but has a greater effect on local currency debt.

Table B5 shows that for developed countries the FCLC spread increases with the political risk indicator, i.e. the foreign yield increases faster than the domestic one. We thus accept hypothesis 2 for developed countries.

The picture is different for emerging countries where the FCLC spread decreases with higher risk. The foreign yield increases with risk whereas the domestic yield decreases with risk. The main difference between developed and emerging countries seems to be the impact of political risk on the domestic yield. The first thought would be that the decrease of the domestic yield is caused by a depreciation of the

currency. Thus the hedged yield would go down. Robustness checks without the hedge confirm that the domestic yield still decreases with increasing political risk. Another explanation would be that governments push central banks to buy local currency bonds in periods of turmoil. Table B8 <sup>23</sup> shows that central bank assets remain stable. A market based rationale would be a flight to safety from more risky assets such as stocks to safer bonds. Table B8 gives a hint that domestic banks actually increase their holdings. Table B8 also shows that that the relative share of domestic investors increases slowly with political risk. Table B9 shows that in emerging economies the share of foreign investors decreases slightly with political risk, due to a withdraw of holdings by non banks, i.e. asset managers. We thus reject hypothesis 2 for emerging countries due to a decreasing FCLC spread.

Table B6 shows the results of the impact of political risk on the FCLC spread when foreign participation changes. We use interaction terms between political risk and the percentage share of foreign investors in local currency bonds to shed light on the link between political risk and the FCLC spread. Table B7 gives an interpretation of the coefficients. In developed economies, the FCLC spread increases faster with growing political risk when the foreign participation is higher. The foreign yield increases faster with higher foreign participation whereas the domestic yield increases more slowly. One interpretation could be that like for emerging countries the higher the share of domestic investors the more money will flow from riskier markets to sovereign bond markets. Thus the domestic yield increases more slowly. We thus dismiss hypothesis 3 for developing countries, i.e. the FCLC spread increases faster with increasing foreign participation.

Regarding the FCLC spread the opposite is happening in emerging economies. The

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<sup>23</sup>The sample only contains 381 observations, because we only keep variables on the country level that correspond to our full sample.

FCLC decreases faster when foreign participation is high. The foreign yield is not much affected but the domestic yield decreases faster with higher foreign participation. We thus dismiss hypothesis 3 for emerging countries since the FCLC spread varies stronger in absolute terms with increasing foreign participation.

Table B8 shows that ownership structure is impacted by political risk. Hence, ownership structure and political risk are jointly endogenous. This calls for further research to clarify causal links between political risk, ownership structure and default risk.

## 7.5 Conclusion

Over the last two decades numerous countries successfully developed local currency bond markets, yet foreign currency issuance remains an important source of funding for many emerging economies. To date, empirical literature on currency denomination of government debt was divided into two flows, one on development of LC bond markets and the original sin, and the other on FC bond yields. This article combines these two schools by analyzing how political indicators related to sovereign risk determine the LC and FC yields and the FX-hedged difference between them. The novelty of our approach consists of comparing local currency bonds with foreign currency bonds using a broad data set of individual bonds covering both developed and emerging countries. On top of that, we use data for the currency structure of government debt and foreign participation.

We find that the unhedged LC yield is higher than the FC yield for emerging economies. Moreover, the duration of FC bonds issued by emerging economies has almost doubled between 1998 and 2013 and remains considerably higher than the duration of local currency bonds. These two effects explain why emerging economies continue to issue debt in foreign currencies despite the associated risks. For developed countries, the FCLC spread is actually positive.

In developed countries the spread between the FC and hedged LC yield increases with the political risk indicator, i.e. the foreign yield increases faster than the domestic one. For emerging countries the reverse is true due to a decrease of the hedged domestic yield. Interestingly, the FCLC spread varies stronger in absolute terms with increasing foreign participation in both, emerging countries and developed countries.

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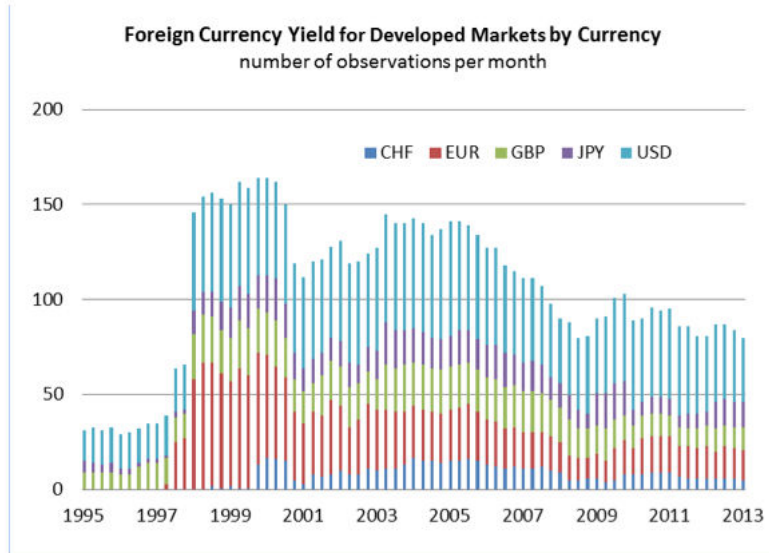
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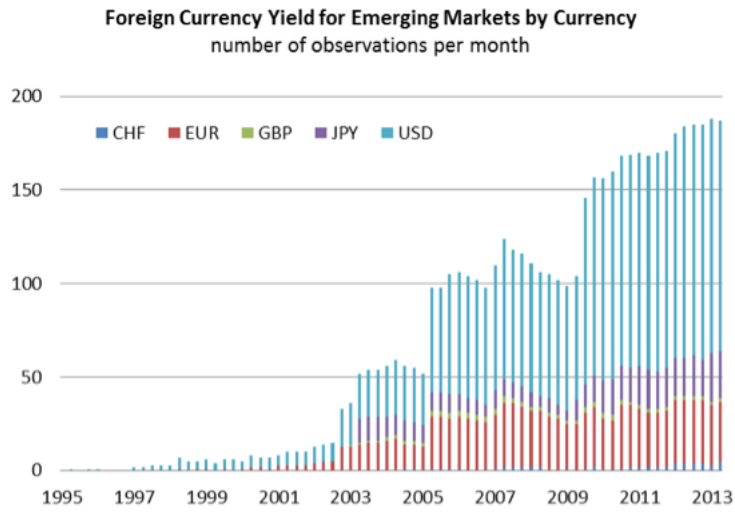
**Table B2**  
Data Sources

Indicator	Unit	Source
CB Policy Rate	%	National Sources, Bloomberg
CPI	% YoY Change	National Sources, Bloomberg
Current Account Balance	% of GDP	IMF IFS
Debt Servicing Cost	%	IMF IFS
Exchange Rate Stability	Score 0 to 1	Chinn-Ito (2007)
External Debt	% of GDP	IMF IFS
Fiscal Balance	% of GDP	IMF IFS
Fitch Rating FC	Score 0 to 1	Fitch
Fitch Rating LC	Score 0 to 1	Fitch
FX - LC Bond Yield	%	Bloomberg
FX Bond Yield	%	Bloomberg
FX Hedge	%	Bloomberg
FX Reserves to Ext Debt	%	IMF IFS
GDP Size	bn USD	IMF IFS
Government Debt	% of GDP	IMF IFS
Issue Size Log Local	Currency	Bloomberg
LC Bond Yield	%	Bloomberg
Maturity	Years	Bloomberg
Moody's Rating FC	%	Moody's
Moody's Rating LC	%	Moody's
Political Risk Score	0 to 1	Economist Intelligence Unit
S&P Rating FC	%	S&P
S&P Rating LC	%	S&P
Holdings of Gvt Debt	Share of LC Holdings	IMF Arsanalp and Tsuda (2013)

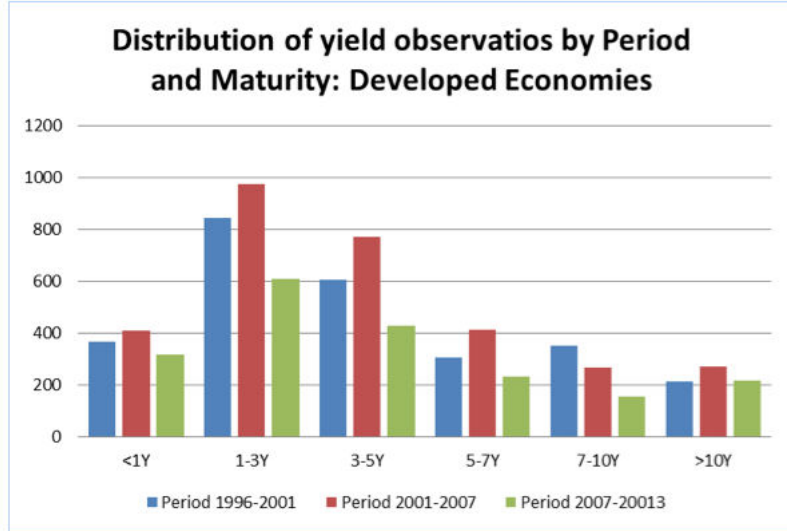




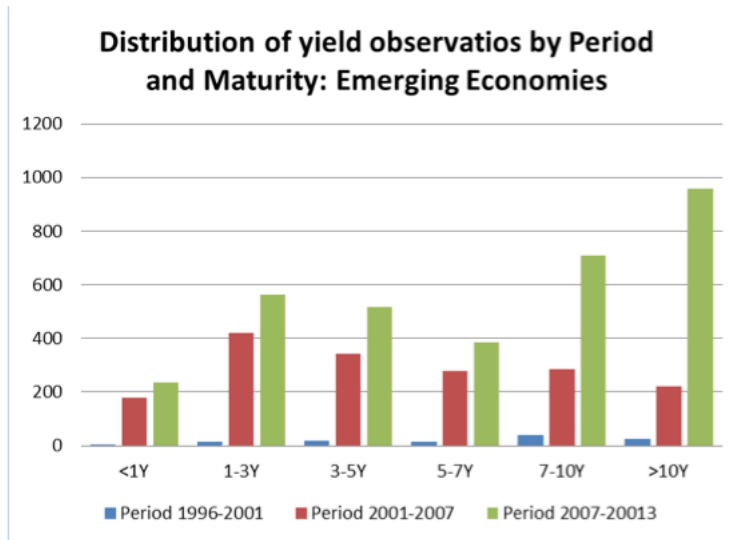
**Figure 7**  
FCDMobspermonth



**Figure 8**  
FCEMobspermonth



**Figure 9**  
DistObsDM



**Figure 10**  
DistObsEM

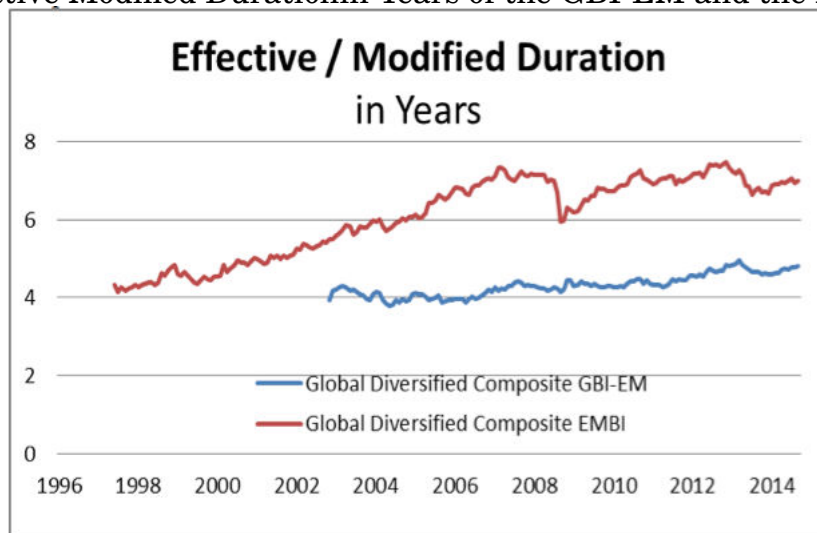
**Table B3**  
Foreign Currency Bond Data Availability

Issues per currency									
	CHF	DEM	EUR	FRF	GBP	ITL	JPY	USD	TOTAL
Developed Economies	39	45	41	19	47	6	62	192	451
Emerging Economies	9	4	67		5	3	50	187	325
Total	48	49	108	19	52	9	112	379	776

Observations per currency									
	CHF	DEM	EUR	FRF	GBP	ITL	JPY	USD	TOTAL
Developed Economies	534	665	741	317	1284	90	916	3191	7738
Emerging Economies	60	55	1073		97	36	543	3355	5219
Total	594	720	1814	317	1381	126	1459	6546	12957

Effective Modified Duration in Years of the GBI-EM and the EMBI



**Figure 11**  
effmodduration

Average of the hedged foreign currency and local currency yield spread of developed countries sorted by maturity and period

	Canada	Denmark	Sweden	Austria	Belgium	Finland	Greece	Ireland	Italy	Portugal	Spain
<b>Period 1: 1996-2001</b>											
<1Y	0.02	0.02	0.02	0.03	0.03	0.02					0.02
1-3Y	0.00	0.00	0.00	0.06	0.03	-0.01				-0.01	0.00
3-5Y	0.00	-0.01	0.01		0.02						0.03
5-7Y	-0.01	-0.04	0.00		0.01						0.16
7-10Y	0.06	-0.01	0.02		0.01				0.11		0.07
>10Y			-0.04		-0.02				-0.01		-0.08
<b>Period 2: 2002-2007</b>											
<1Y	0.01	0.01	0.01	0.02	0.02	0.02	0.06				
1-3Y	0.01	0.00	0.00				0.02				
3-5Y	0.02	0.00	-0.01				0.03				
5-7Y	0.07	0.01	-0.01								
7-10Y	0.11		-0.02								
>10Y			0.00								
<b>Period 3: 2007-2013</b>											
<1Y	0.02	0.01	0.01	0.00	0.00	0.00	0.08		0.01		0.01
1-3Y	0.01	0.00	0.01	0.00	0.01	-0.01	0.09		0.00	0.00	0.00
3-5Y	0.01	0.00	0.02	0.00	0.00	0.00	0.14		0.00		0.02
5-7Y	0.03		0.01	0.01	0.04	-0.01	0.10		0.03		0.09
7-10Y	0.02				0.00		0.10		0.03		0.10
>10Y			0.05	0.01	0.02				-0.01		-0.01

**Figure 12**  
averageFCLCbymaturityperiodDM

### Average of the hedged foreign currency and local currency yield spread of emerging countries sorted by maturity and period

	Brazil	Chile	Colombia	Croatia	Hungary	Indonesia	Israel	Malaysia	Mexico	Poland	Philippines	Russia	South Africa	Thailand	Turkey	
<b>Period 1: 1996-2001</b>																
<1Y									0.01						0.06	
1-3Y											0.12				0.08	
3-5Y											0.13				0.11	
5-7Y											0.41				0.12	
7-10Y											0.31				0.19	
>10Y											0.31					
<b>Period 2: 2002-2007</b>																
<1Y	0.02	0.02			0.02	0.02	0.08	0.01	0.02	0.00	0.04	0.02			0.02	0.01
1-3Y		0.01			0.06		0.01	-0.01	0.05	0.03	0.05	0.00			0.04	0.08
3-5Y					0.08		0.01	-0.02	0.08	0.04	0.09	0.02			0.04	0.15
5-7Y					0.18	0.12	0.02		0.20	0.08	0.26			0.08	0.36	
7-10Y					0.18	0.12	0.04		0.23	0.12	0.19				0.37	
>10Y						0.11	0.03		0.15		0.20	0.07			0.36	
<b>Period 3: 2007-2013</b>																
<1Y	0.00	0.00	0.01		0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.02			0.05	0.01
1-3Y	0.02	0.02	0.06		0.08	0.08	0.01	0.01	0.05	0.03	0.02	0.12			0.04	0.08
3-5Y	0.01				0.10	0.10	0.01	0.02	0.07	0.05	0.03	0.09			0.05	0.12
5-7Y					0.20	0.23	0.04		0.16	0.12	0.10	0.21				0.27
7-10Y	0.15				0.22	0.24	0.04	0.06	0.17	0.12	0.11	0.22				0.28
>10Y	0.17				0.18	0.21	0.04		0.16	0.17	0.07	0.22				0.29

**Figure 13**  
averageFCLCbymaturityperiodEM

Average of the unhedged foreign currency and local currency yield spread of developed countries sorted by maturity and period

	Canada	Denmark	Sweden	Austria	Finland	Belgium	Greece	Ireland	Italy	Portugal	Spain
<b>Period 1: 1996-2001</b>											
<1Y	0.02	0.03	0.03	0.03	0.03	0.03		0.03			0.03
1-3Y	0.00	0.01	0.02	0.03	0.04	0.04	0.01	0.03		0.05	0.04
3-5Y	0.01	0.02	0.03	0.04	0.04	0.04		0.04	0.02	0.02	0.06
5-7Y	0.00	0.02	0.02	0.08	0.06	0.02	0.03		0.14	0.01	0.18
7-10Y	0.07	0.05	0.05	0.10	0.02	0.01	0.01	0.03	0.15	0.28	0.09
>10Y	0.09		-0.02	0.09	0.00	0.00		-0.02	0.03	0.00	0.02
<b>Period 2: 2002-2007</b>											
<1Y	0.01	0.01	0.01	0.02	0.01	0.01	0.06	0.01	0.03	0.00	0.01
1-3Y	0.01	0.00	0.01	0.01	0.01	0.00	0.04	0.01	0.02	0.02	0.01
3-5Y	0.02	0.01	0.01	0.01	0.00	-0.01	0.03	0.00	0.02	0.05	0.01
5-7Y	0.03	0.01	-0.01	0.02	-0.04	-0.04	0.08	0.01	0.04		0.00
7-10Y	0.11		-0.04	0.01	-0.03				0.04	-0.01	0.00
>10Y			-0.03	0.05		-0.02			0.02	-0.03	-0.03
<b>Period 3: 2007-2013</b>											
<1Y	0.01	0.00	0.00	0.01	0.01	0.01	0.08	0.01	0.01		0.01
1-3Y	-0.01	0.00	-0.01	0.00	0.00	0.01	0.09	-0.01	0.00	0.01	0.00
3-5Y	-0.01	0.00	-0.01	0.00	0.00	0.00	0.15		0.00	-0.01	0.02
5-7Y	0.00		0.00	0.00	0.00	0.04	0.12		0.03	0.00	0.09
7-10Y	0.01			-0.02		-0.01	0.12		0.04	-0.03	0.12
>10Y			0.02	0.01		0.00			0.00		-0.01

**Figure 14**  
averageFCLCbymaturityperiodDMunhedged

### Average of the unhedged foreign currency and local currency yield spread of emerging countries sorted by maturity and period

	Brazil	Chile	Colombia	Croatia	Hungary	Indonesia	Israel	Malaysia	Mexico	Poland	Philippines	Russia	South Africa	Thailand	Turkey
<b>Period 1: 1996-2001</b>															
<1Y										-0.06					0.04
1-3Y					-0.04					-0.06	-0.05				0.03
3-5Y					-0.01			0.03		-0.05	-0.04				0.04
5-7Y					-0.02					-0.05	-0.07				0.01
7-10Y					0.04			0.03		-0.01	-0.07				0.04
>10Y											-0.09				
<b>Period 2: 2002-2007</b>															
<1Y	0.00	0.02	0.01	0.01	-0.01	-0.02	0.08	0.02	0.00	-0.02	0.03	0.02		0.01	-0.05
1-3Y	-0.06	-0.01	-0.02	0.02	-0.02	-0.05	0.02	0.00	-0.03	0.01	-0.03	0.00		0.03	-0.11
3-5Y	-0.06	-0.01	-0.03	0.01	0.01		0.00	0.01	-0.04	0.02	-0.03	-0.01		0.03	-0.09
5-7Y	-0.05	-0.01	-0.02	0.02	0.05	-0.03	0.00	0.01	-0.03	0.05	-0.03			0.11	-0.08
7-10Y		-0.01	-0.03	0.04	-0.01	-0.05	0.01	0.01	-0.03	0.00	-0.02			0.00	-0.08
>10Y			-0.03			-0.07	0.00		-0.06		-0.04	-0.01			-0.08
<b>Period 3: 2007-2013</b>															
<1Y	-0.05	-0.02	-0.02	0.00	0.00	-0.03	0.01	0.00	-0.01	0.00	0.00	0.00		0.04	-0.04
1-3Y	-0.09	-0.03	-0.04	-0.01	-0.02	-0.03	-0.01	-0.01	-0.04	-0.02	-0.02	-0.05		0.02	-0.09
3-5Y	-0.09	-0.02	-0.04	-0.01	-0.02	-0.04	-0.01	-0.01	-0.03	-0.01	-0.02	-0.04		0.03	-0.07
5-7Y	-0.08		-0.03	0.00	0.02	-0.03	0.00		-0.02	0.01	-0.01	-0.04		0.14	-0.06
7-10Y	-0.08	-0.03	-0.02	0.00	0.02	-0.01	0.00	0.00	-0.01	0.02	-0.01	-0.04	0.01		-0.05
>10Y	-0.07	-0.01	-0.02		0.00	-0.05	0.00		-0.03	0.05	-0.03	-0.03			-0.05

**Figure 15**  
averageFCLCbymaturityperiodEMunhedged



**Table B4**  
FCLC Spread Data Availability by Country

Country	Number of Issues	Number of observations
Austria	59	157
Belgium	31	197
Brazil	33	0
Canada	22	400
Chile	8	38
Colombia	24	60
Denmark	60	626
Finland	33	83
Greece	20	138
Croatia	13	13
Hungary	28	384
Indonesia	18	286
Ireland	20	0
Israel	13	170
Italy	49	288
Malaysia	6	56
Mexico	53	806
Poland	58	683
Philippines	30	721
Portugal	8	2
Russia	9	88
South Africa	2	0
Spain	29	145
Sweden	92	958
Thailand	14	83
Turkey	44	793
Total	776	7175

**Table B5**

Regression of FCLC spread, foreign currency yield and local currency yield on the political risk indicator

	(1)	(2)	(3)
	$FCLC_{t,i}$	$ForYield_{t,i}$	$DomYield_{t,i}$
$PolRisk_{t-1,k}$	0.236*** (5.79)	0.290*** (7.11)	0.186*** (6.55)
$PolRiskEM_{t-1,k}$	-0.340*** (-5.15)	-0.194*** (-4.21)	-0.349*** (-5.04)
$MaturitySquared_{t,i}$	-0.0000870*** (-14.80)	-0.0000232*** (-12.52)	-0.0000952*** (-14.39)
$Maturity_{t,i}$	0.00871*** (24.63)	0.00272*** (24.67)	0.0100*** (24.45)
$AmountIssued_{t,i}$	0.0128*** (7.15)	0.000322 (0.42)	0.0150*** (7.11)
$GovDebt_{t-1,k}$	0.0719* (1.97)	0.128*** (5.01)	0.245*** (7.71)
$FXResExtDebt_{t-1,k}$	0.111** (3.03)	0.0275 (1.15)	0.102** (3.28)
$IntTotDebt_{t-1,k}$	-0.0145 (-0.29)	0.0585* (2.32)	0.0480 (0.84)
$ExtDebtGDP_{t-1,k}$	0.00770** (2.97)	-0.00277* (-2.16)	0.0105*** (3.65)
$CPI_{t-1,k}$	0.237** (2.61)	-0.0268 (-0.91)	0.449*** (3.90)
$CAGDP_{t-1,k}$	-0.241*** (-3.50)	0.00209 (0.05)	-0.515*** (-7.74)
$GDP_{t-1,k}$	-0.0375* (-2.34)	-0.00844 (-1.37)	-0.0533** (-2.88)
$\alpha$	0.0147 (0.08)	-0.0531 (-0.69)	0.0625 (0.28)
Observations	4084	4084	4084

$t$  statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Table B6**

Regression of FCLC spread, foreign currency yield and local currency yield on the political risk indicator with foreign investors interaction term

	(1)	(2)	(3)
	<i>FCLC<sub>t,i</sub></i>	<i>ForYield<sub>t,i</sub></i>	<i>DomYield<sub>t,i</sub></i>
<i>PolRisk<sub>t-1,k</sub></i>	0.0489 (0.59)	-0.405*** (-7.30)	0.419*** (4.83)
<i>PolRiskEM<sub>t-1,k</sub></i>	-0.0365 (-0.38)	0.394*** (7.91)	-0.256* (-2.33)
<i>ForeignPolRisk<sub>t-1,k</sub></i>	0.305* (1.97)	1.105*** (8.31)	-0.330* (-2.58)
<i>ForeignInvestors<sub>t-1,k</sub></i>	0.0309 (0.64)	-0.145*** (-4.80)	0.302*** (5.72)
<i>ForeignPolRiskEM<sub>t-1,k</sub></i>	-0.645*** (-3.98)	-0.852*** (-8.45)	-0.641*** (-3.84)
<i>MaturitySquared<sub>t,i</sub></i>	-0.0000864*** (-14.74)	-0.0000229*** (-12.50)	-0.0000938*** (-14.47)
<i>Maturity<sub>t,i</sub></i>	0.00869*** (24.82)	0.00270*** (25.03)	0.00993*** (24.98)
<i>AmountIssued<sub>t,i</sub></i>	0.0127*** (7.21)	0.000563 (0.78)	0.0145*** (7.10)
<i>GovDebt<sub>t-1,k</sub></i>	0.0524 (1.43)	0.100*** (4.04)	0.241*** (7.44)
<i>FXResExtDebt<sub>t-1,k</sub></i>	0.101** (2.73)	0.0336 (1.41)	0.0738* (2.27)
<i>IntTotDebt<sub>t-1,k</sub></i>	-0.0272 (-0.52)	0.0383 (1.46)	-0.0142 (-0.24)
<i>ExtDebtGDP<sub>t-1,k</sub></i>	0.00619* (2.34)	-0.00499*** (-3.93)	0.00733* (2.49)
<i>CPI<sub>t-1,k</sub></i>	0.249** (2.71)	0.0215 (0.76)	0.463*** (3.95)
<i>CAGDP<sub>t-1,k</sub></i>	-0.274*** (-3.90)	-0.0788 (-1.79)	-0.530*** (-7.87)
<i>GDP<sub>t-1,k</sub></i>	-0.0420** (-2.64)	-0.0111 (-1.80)	-0.0614*** (-3.35)
$\alpha$	0.0746 (0.39)	0.110 (1.44)	0.00890 (0.04)
<b>Observations</b>	<b>4084</b>	<b>4084</b>	<b>4084</b>

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Table B7**

Impact of Foreign Investors on the slope between the risk factor and the FCLC spread

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<i>Impact</i>			
<i>Variables</i>	<i>FCLC</i>	<i>Foreign Yield</i>	<i>Domestic Yield</i>
<b>Developed Economies</b>			
Low	0.147	-0.050	0.313
Mean	0.194	0.121	0.262
High	0.241	0.292	0.211
<b>Emerging Economies</b>			
Low	-0.077	1.133	-0.092
Mean	-0.112	1.148	-0.193
High	-0.147	1.164	-0.293

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**Table B8**  
The impact of PolRisk on Domestic Investors

	(1)	(2)	(3)	(4)
	<i>DomInvestors<sub>t,k</sub></i>	<i>DomNonbank<sub>t,k</sub></i>	<i>DomBank<sub>t,k</sub></i>	<i>DomCB<sub>t,k</sub></i>
<i>PolRisk<sub>t-1,k</sub></i>	0.182*** (3.64)	0.207*** (4.10)	-0.0138 (-0.34)	-0.00490 (-0.51)
<i>PolRiskEM<sub>t-1,k</sub></i>	-0.143 (-1.68)	-0.290** (-2.78)	0.182* (2.16)	-0.0391 (-1.20)
<i>GovDebt<sub>t-1,k</sub></i>	0.0866* (1.96)	0.0966* (2.11)	-0.0311 (-0.77)	0.0257** (2.67)
<i>FXResExtDebt<sub>t-1,k</sub></i>	-0.0450* (-2.10)	0.0250 (0.87)	-0.0885*** (-3.43)	0.0178 (1.35)
<i>IntTotDebt<sub>t-1,k</sub></i>	-0.484*** (-5.99)	-0.301*** (-3.43)	-0.177** (-2.79)	0.000344 (0.02)
<i>ExtDebtGDP<sub>t-1,k</sub></i>	-0.0143** (-3.00)	-0.00443 (-0.94)	-0.00874** (-2.65)	-0.00149 (-1.78)
<i>CPI<sub>t-1,k</sub></i>	0.132 (1.02)	0.239 (1.45)	-0.199 (-1.74)	0.0959* (2.51)
<i>CAGDP<sub>t-1,k</sub></i>	0.0112 (0.14)	0.0515 (0.58)	-0.0345 (-0.48)	0.00373 (0.20)
<i>GDP<sub>t-1,k</sub></i>	0.0354 (1.36)	0.0946** (2.85)	-0.0515* (-2.38)	0.000592 (0.09)
$\alpha$	0.170 (0.56)	-0.848* (-2.22)	0.900*** (3.59)	0.0238 (0.32)
<b>Observations</b>	<b>389</b>	<b>389</b>	<b>389</b>	<b>389</b>

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Table B9**  
The impact of PolRisk on Foreign Investors

	(1)	(2)	(3)	(4)
	<i>ForInvestors<sub>t,k</sub></i>	<i>ForNonBank<sub>t,k</sub></i>	<i>ForBank<sub>t,k</sub></i>	<i>ForOfficial<sub>t,k</sub></i>
<i>PolRisk<sub>t-1,k</sub></i>	-0.182*** (-3.64)	-0.504*** (-6.80)	-0.228*** (-5.25)	0.560*** (7.43)
<i>PolRiskEM<sub>t-1,k</sub></i>	0.143 (1.68)	0.280** (2.84)	0.219*** (3.83)	-0.359*** (-3.86)
<i>GovDebt<sub>t-1,k</sub></i>	-0.0866* (-1.96)	-0.0159 (-0.32)	-0.217*** (-7.53)	0.132** (2.64)
<i>FXResExtDebt<sub>t-1,k</sub></i>	0.0450* (2.10)	0.0133 (0.80)	0.0390*** (3.56)	-0.0100 (-0.66)
<i>IntTotDebt<sub>t-1,k</sub></i>	0.484*** (5.99)	0.0658 (0.81)	0.0467 (1.03)	0.365*** (5.17)
<i>ExtDebtGDP<sub>t-1,k</sub></i>	0.0143** (3.00)	-0.000239 (-0.05)	0.000444 (0.15)	0.0143** (3.00)
<i>CPI<sub>t-1,k</sub></i>	-0.132 (-1.02)	0.0332 (0.27)	0.0675 (0.99)	-0.212* (-2.02)
<i>CAGDP<sub>t-1,k</sub></i>	-0.0112 (-0.14)	-0.195* (-2.04)	-0.153** (-2.58)	0.342*** (3.66)
<i>GDP<sub>t-1,k</sub></i>	-0.0354 (-1.36)	0.0603* (2.55)	-0.00457 (-0.37)	-0.0939*** (-4.63)
$\alpha$	0.830** (2.72)	-0.255 (-0.90)	0.348* (2.34)	0.771** (3.18)
<b>Observations</b>	<b>389</b>	<b>389</b>	<b>389</b>	<b>389</b>

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## 8 Conclusion

I show that financial markets value the ESG performance of firms and sovereigns. The first chapter finds that negative ESG news have an impact on the cost of debt of firms. Moreover, this impact is smaller when the firm has a sound overall ESG performance. The second chapter finds that ESG scores integrated in portfolios do not change the financial performance ex post. The third chapter shows how ESG performance is linked to a lower cost of debt of emerging sovereigns. The fourth chapter shows how governance performance influences the spread of debt denominated in local and foreign currency.

However, these are purely empiric and econometric result and should thus be treated with caution. For example, all my measures of ESG performance are aggregates. It is highly likely, that some issues have a bigger impact than others even though they have the same weighting in my ESG measure. Further research should elaborate which issues have the biggest impact on the cost of debt to better guide fund managers as well as firm managers and politicians.

There are several practical implications. First, firms that allocate resources to their stakeholder management might have financial benefits compared to those firms who care less about ESG issues. Sovereigns that improve their ESG performance might also benefit from lower default risk and thus lower cost of debt, i.e. they would have financial advantages if pollution is reduced or health care improved for instance.

The second implication is for fund managers. The financial advantage of a good ESG performance is important to take into consideration when designing strategic asset allocations across countries or bond selection of firms. It also suggest that

tactical reallocations that aim at anticipating changes in countries or firms ESG performance might improve the financial performance of bond portfolios.