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The effects of environmental sustainability and R&D on corporate risk-taking: International evidence

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ABSTRACT

In this paper, we ask an important question: can firm-level environmentally sustainable practices and research and development (R&D) intensity individually and jointly affect corporate risk-taking? Using firm-level data from 41 countries spanning 2002–2013, we find environmentally sustainable practices and R&D intensity enhance the risk-taking of firms. Voluntary sustainable practices generate a positive and significant effect on corporate risk-taking. We also find that country-level determinants play a complementary role. Firms operating in countries with better intellectual property rights protection and overall infrastructure benefit more from environment-friendly practices and R&D intensity. Further, we find that ESI has a positive effect on risk taking in countries with higher CO_2 emissions per capita, energy usages per capita and more stringent environmental policies. These results are robust after correcting for potential endogeneity, alternative measures of R&D intensity or ESI score. Overall, our findings provide key insights on policy recommendations at the national and international levels.

1. Introduction

Corporate risk-taking[1] is an essential part of value-enhancing risk-management and largely considered as a key decision-making strategy used by firms to expand and grow. Stulz (2015) argues that although taking excessive risk is often considered a poor managerial decision, without some level of risk there is no reward. This is because without some level of risk-taking, uncertain but potentially value-enhancing projects cannot be undertaken resulting in suboptimal utilisation of capital. Thus, risk-taking is an essential part of shareholders' wealth maximisation.[2] However, risk-taking augments a firm's growth when other value-enhancing firm-level attributes are successfully implemented. For example, literature suggests that risk-taking firms are better in adopting good governance structures and better capital regulations (John et al., 2008; Laeven and Levine, 2009). The question now arises, can environmentally sustainable practices also enable firms to take more risk and in turn, positively affect the firm's growth?

This is an important question in light of deteriorating environmental conditions worldwide. Recently, major initiatives have been taken by many international organisations, such as the United Nations, to promote sustainable practices by firms. For instance, at the recent United Nations Climate Change Conference (COP21) held in Paris in 2015, around 195 countries volunteered to address climate change concerns by adopting energy policies and targets. Similarly, Portfolio Decarbonisation Coalition (PDC), which was co-founded in 2014 by the United Nations Environment Programme (UNEP) and its Finance Initiative (UNEP FI), continually encourages global investors to commit towards managing investment risks associated with climate change.[3] Since inception, PDC signatories have already committed over US$ 600 billion to decarbonise[4] asset under management (AUM).

Thus, firms may perceive that undertaking environmentally sustainable practices eventually leads to shareholder wealth maximisation and also pre-empts scrutiny from stakeholders. Since firms are increasingly undertaking environmentally sustainable practices and joining

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[1] Risk-taking behaviour is associated with the uncertainty associated with risky but value-enhancing investments by firms. Thus, corporate risk-taking measures the firm's capability of undertaking risky projects. While risk-taking capability is unobservable, actual risk-taking may be observed via its effects on earnings. Under the assumption that all firms, who have the capacity to take risk are actually taking higher risks, these two terms are identical. We use the term 'risk-taking' in our paper following John et al. (2008).

[2] Similarly, Porter (1980) find firms need to undertake some level of risk-taking in order to remain competitive.

[3] http://unepfi.org/pdc/

[4] UNEP-FI defines portfolio decarbonisation as, "systematic efforts by investors to align their investment portfolios with the goals of a low carbon economy. It includes, but is not limited to, efforts to reduce the carbon footprint of investment portfolios, to increase investment in areas such as renewable energy, to withdraw capital from high energy consumption activities and to encourage companies and other entities to reduce their emissions and support the transition to a low carbon economy."

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supranational organisations in addressing greenhouse gas emissions, the shareholders interest are not in conflict with the interest of other stakeholders. Despite risk-taking playing an important role in corporate decision-making processes, the extant literature is almost silent on the effects of environmentally sustainable practices on corporate risk-taking. Without a clear understanding, organisations such as UNEP-FI, PDC, and firms will continuously face challenges in convincing the new signatories and investors of the benefits of a decarbonising investment portfolio or undertaking environmentally sustainable practices. Moreover, banks and other lending agencies are increasingly relying on Environment, Social, and Governance (ESG) indicators for lending money to firms. If the firms have a poor record of ESG practices, access to capital will become difficult and costly. This eventually may constraint the firms to undertake either suboptimal investments or to postpone value-enhancing investments.

The second aspect of value-enhancing risk management that we consider in this study is the R&D intensity of firms. One of the implications that originates from the theory of resource-based view (RBV) of competitive advantage is with the proper use of intangible assets (including R&D), a firm could differentiate their products from its competitors and gain sustained competitive advantages in the long run (Hart, 1995; Barney, 2000; Rothaermel, 2013). However, R&D expenditure is typically considered as a risky investment by firms. Here, the investor takes more risk by reallocating firm's resources from tangible assets towards intangible assets, such as R&D (Bhagat and Welch, 1995; Kothari et al., 2002; Coles et al., 2006). However, there is no certainty that these innovations will be value-enhancing and offset the cost associated with them.

In this context, we can also look at the combined effect of R&D intensity and environmentally sustainable practices on corporate risk-taking. The relationship between the variables becomes much more complex. If we believe that to comply with a higher regulatory standard, firms consume valuable resources to conduct environment specific innovations, a trade-off may exist between undertaking measures on better environmental practices and engaging in higher R&D related activity (Palmer et al., 1995). Since undertaking R&D activities are costly, firms need to first ensure that they are fully compensated against the cost associated with these practices before they commit to reducing their greenhouse gas emissions. In other words, if firms are unsure, then R&D and environmentally sustainable practices may turn out as bad investments and crowd out other types of investments on process, product innovation and diversification. Consequently, these firms may lose their competitive edge in their respective industries. This suggests that the combined effect of R&D and environmentally sustainable practices on corporate risk-taking can turn out to be insignificant or in extreme cases could also be negative.

In contrast, Porter (1991) in his seminal research suggests that stringent environmental regulations will stimulate firm-level innovations and in return will enhance the economic performance of a country. Further, Porter and van der Linde (1995, p. 116) state that "success (of firms) must involve innovation-based solutions that promote both environmentalism and industrial competitiveness." This positive relationship between R&D intensity and environmental regulations, henceforth the 'Porter Hypothesis', implies correctly designed regulations will promote more cost-saving innovations among firms and when properly implemented, will be value-enhancing for firms. Therefore, if the 'Porter Hypothesis' holds, then the individual and joint effects of R&D and environmentally sustainable practices on corporate risk-taking are expected to be positive.

Thus, the central question we investigate in this study is how environmentally sustainable practices and R&D intensity in firms individually and jointly affect corporate risk-taking. This paper uses a comprehensive dataset covering 41 countries spanning 2002–2013, and examines the question by capturing multiple dimensions of environment sustainability and institutional factors. The paper contributes to the literature in multiple ways. First, to the best of our knowledge, this is the first study to look at the joint effects of R&D intensity and environmentally sustainable practices on corporate risk-taking. Moreover, unlike previous studies, we consider a larger sample of firms, which includes firm-level observations from developed, developing and transitional economies. This allows us to exploit cross-country differences in environment-friendly practices and R&D, and their overall effects on corporate risk-taking.

Second, while examining the effects on corporate risk-taking, this study presents two distinct firm-level environmental performance scores. The two scores distinguish between the mandatory and voluntary compliance of environmental regulations mandated by a country. This is important to consider because environment-specific laws and regulations vary across countries and the assumption that all firms within a country or industry follow the same environmentally sustainable practices may be inappropriate.

Third, there is almost no evidence if the relationship between environmentally sustainable practices, R&D intensity and risk-taking of firms is stable when we control for country-level differences in institutional factors. For instance, Dixon-Fowler et al. (2013) suggest that a firm's environmentally sustainable practices are influenced by social norms, public pressures, legal and political factors that vary across countries. The effect may also vary between developing and developed countries and within the group of developing countries. This is particularly important since availability of environment related infrastructures and R&D related support provided by government may facilitate firms to undertake riskier but potentially value-enhancing investments.

Our findings suggest that environment-friendly firms are more risk-taking. Moreover, R&D intensity has a positive effect on corporate risk-taking. Next, we find that if a firm adopts environmentally sustainable practices and also engages in R&D activity, the joint effect on corporate risk-taking is positive and augments the individual effects. Additionally, our results support the 'Porter hypothesis' and indicate that substantial benefit arises from undertaking environment-friendly practices targeted at emission reduction over product innovation and resource reduction. When we look at the effects of mandatory versus voluntary compliance of environmental laws, we find that voluntary sustainable practices generate positive effects on corporate risk-taking. The effect is similar for countries where institutional support related to environmental practices and R&D, such as political, financial and economic stability, protection of intellectual property rights and overall infrastructure, is stronger. We also find firms operating in countries with high levels of CO_2 emission per capita or energy usage per capita benefit more in terms of increasing risk-taking behaviour. These results are robust when we control for potential endogeneity and use alternative measures of environmentally sustainable practices and R&D.

The rest of the paper is organised as follows: Section 2 discusses the relevant literature and develops the hypotheses. Data and methodology is presented in Section 3. In Section 4 we present the empirical results and their implications. Finally, Section 5 summarises the research findings and conclusions.

2. Prior literature and hypothesis development

It is important to clarify here that by 'corporate risk-taking' we are not referring to risk that is detrimental to a firm's value-creation, rather a riskier but value-enhancing investment. Stulz (2015) argues that all risks are not bad – good risk management reduces uncertainty and yields positive returns on investments. We define them as value-enhancing risks. Although it is difficult to judge risk *ex ante*, good risk management is closely associated with good governance structures, such as better investor protection and creditor's rights, tight ownership structures and better capital regulations (John et al., 2008; Laeven and Levine, 2009). There is also some evidence that better environmentally sustainable practices by firms are value-enhancing. For example, based on portfolio rankings on environmental practices by firms, Yamashita et al. (1999) show that firms which have better environment