Green Microfinance.
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Abstract

In recent years, development practice has seen that microfinance institutions (MFIs), beyond their financial and social objectives, start considering their environmental bottom line. Yet, little is known on the characteristics of institutions involved in environmental management. For the first time, this paper empirically identifies the characteristics of these 'green' MFIs on a sample of 160 microfinance institutions worldwide. Basing our analysis on various econometric tests, we find that larger MFIs and MFIs registered as banks tend to perform better in environmental policy and environmental risk assessment. Furthermore, more mature MFIs tend to have a better environmental performance, in particular in the provision of green microcredit and environmental non-financial services. On the other hand, financial performance is not significantly related to environmental performance, suggesting that 'green' MFIs are not more or less profitable than other microfinance institutions.

Key words: Microfinance, Environment, Microcredit, Corporate Social Responsibility, Size, Financial Performance

JEL codes: D22, G21, Q01, Q56

1. Introduction

Microfinance institutions (MFIs) have developed rapidly during the last decade on the promise of reaching a double bottom line: "in addition to a financial objective, they also have a developmental or social objective" (Copestake, 2007). Next to these two traditional bottom lines, some microfinance donors and experts have now included a third objective related to the environment (FMO, 2008; GreenMicrofinance, 2007; Hall, et al, 2008; Rippey, 2009; Schuite & Pater, 2008; Van Elteren, 2007). While environmental goals are traditionally pursued by businesses as part of their Corporate Social Responsibility (CSR) strategy (Carroll, 2008), the transposition to microfinance is more recent. To reach this goal, some microfinance institutions have started to adopt new strategies such as the design of financial products to promote environmentally-friendly activities and technologies, the organization of campaigns promoting pro-environmental behaviors, or the screening of loan applications along environmental criteria. One of the most famous cases is Grameen Shakti, which has brought solar energy to hundreds of thousands of households in rural Bangladesh through microcredit (Komatsu et al., 2011). Another example is that of Génesis, in Guatemala, which has disbursed 4,000 microcredits with subsidized rates in early 2012 to support small coffee and cocoa farmers using environmentally-friendly production techniques, such as organic fertilizers, soil conservation, and agroforestry.

Even though there is an increased environmental awareness in the microfinance sector (Anderson & Locker, 2002), there is no empirical evidence yet on the characteristics of 'green' MFIs, the institutions performing best in the environmental bottom line. In their discourse, promoters of 'green microfinance' do not specify whether the triple bottom line approach concerns all types of MFIs. Yet, the microfinance sector encompasses a great variety of institutions, in terms of size, status, maturity, performance, or mission.

For the first time, this paper seeks to identify the characteristics of MFIs involved in environmental management. More specifically, we assess the relationships between MFIs' environmental performance and their size, financial performance, age, and legal status. We opted to focus on these variables because they are identified as determining factors of environmental performance in the literature on Corporate Social Responsibility and corporate environmental performance (Elsayed & Paton, 2007; Orlitzky, 2001; Stanwick & Stanwick, 1998). Furthermore, their relationship to environmental performance is a main concern for both practitioners and researchers in the microfinance sector (as revealed by an inductive qualitative pre-study and by an extended literature review). In particular, the literature on green microfinance often emphasizes that developing environmental programs may be costly and challenging at the technical and operational level for microfinance institutions (Araya & Christen, 2002; Coulson & Dixon, 1995; Wenner, 2002). One could thus assume that only the more 'solid' MFIs (the larger, more profitable, mature, regulated institutions) would be in a position to manage their environmental bottom line. This paper looks at this assumption by assessing how MFIs' environmental performance relates to their size, financial performance, age,

and legal status. Identifying the characteristics of MFIs active in environmental management will help understand what are the drivers or barriers to environmental performance in the microfinance sector. It will also help donors and technical assistance providers identify where to orient their technical and financial support for the promotion of a triple bottom line approach.

Today, MFIs engage in environmental management through different strategies: defining an environmental policy paper, setting objectives to reduce their internal energy and paper consumption, adopting environmental criteria to screen loan applications, offering microcredit to promote clean energies and activities, training clients on environmentally-friendly practices, etc. A specific methodology has been developed by Allet (2012a) to assess the environmental performance of MFIs along this variety of strategies: the Microfinance Environmental Performance Index (MEPI). Building on a review of existing environmental measures in the literature, this index is based on management performance indicators that have been adapted to the specificities of the microfinance sector. It assesses MFIs' environmental performance along five dimensions: (1) Environmental Policy; (2) Ecological Footprint; (3) Environmental Risk Management; (4) Green Microcredit; and (5) Environmental Non-financial Services. We decided to apply this methodology for the first time to a sample of 160 MFIs worldwide.

Our key findings show that larger MFIs and MFIs registered as banks tend to perform better in environmental policy and environmental risk assessment, which are two strategies of environmental management that enable to respond to donors' and investors' expectations. More mature MFIs tend to have a better environmental performance, in particular in more positive and innovative strategies of environmental management, such as the provision of green microcredit and environmental non-financial services. On the other hand, prior financial performance is not significantly related to environmental performance, suggesting that 'green' MFIs are not more or less profitable than other microfinance institutions.

The rest of the article is structured as follows. Section 2 describes our theoretical framework and the hypotheses to be tested. Section 3 presents the database, descriptive statistics, and econometric analysis used. Section 4 displays the empirical results, while the final section deals with specific recommendations and final conclusions.

2. Theoretical framework and hypotheses on green MFIs' characteristics

Factors that can potentially influence the environmental performance of MFIs are numerous. One may think for instance of the structure of the local market (high competitiveness leading to a need for differentiation) (GreenMicrofinance, 2007; Hall, et al., 2008), the presence of an environmental champion within the institution (D'Amato & Roome, 2009; Hemingway & Maclagan, 2004; Logsdon & Yuthas, 1997; Rok, 2009), the influence of peer organizations (mimetic isomorphism) (DiMaggi & Powell, 1983; López Rodriguez, 2009), the international origin of the institution or its managers (Cole

et al, 2008), location in areas particularly prone to environmental degradation (Jones, 1991), the relative weight of donors and investors in the funding structure (Céspedes et al., 2003; Williamson et al., 2006), etc. All these variables would be worth investigating further. However, within the frame of this paper, we decided to focus, in a first step, on the factors that are the most at the heart of researchers and practitioners' concerns today.

These concerns were identified from an extensive review of the environmental performance literature as well as from a qualitative study conducted by one of the authors for previous research work (Allet, 2012b). Results from the study suggested that several MFIs' managers were reluctant to engage in environmental management because they considered that their institution was too small and thus did not have the (financial, human, operational) capacity to launch this type of program. Others mentioned that they were still struggling for financial sustainability and that going green would imply financial trade-offs that they could not afford. Some MFIs' managers mentioned that they would not go green because their institution was too young and had other priorities to handle. Finally, other interviewed managers stated that environmental management was not part of their mission since they were not MFIs registered as NGOs.

Interestingly, these concerns stemming from the field find a clear echo in the literature on environmental performance. To define our hypothesis, we build mostly on theories and arguments from the literature on business environmental performance, which makes clear links between size, financial performance, age, and environmental performance. We also base our reflection more broadly on the literature on Corporate Social Responsibility (CSR). This literature is interesting since many actors tend to regard CSR as including both social and environmental performance (Willums, 1999). Recent research reviews indeed suggest that CSR is often equated with community involvement, philanthropic donations, good corporate governance, implementation of 'green' policies, and a wide variety of other organizational actions (Crane et al., 2008). In a content analysis of CSR definitions, Dahlsrud (2008) find that the environmental dimension is explicitly mentioned in 59% of the cases, and even more systematically for more recent definitions. The assumption that environmental responsibility is an integral element of CSR is not very controversial today (Orlizky et al., 2011) and most CSR studies indeed measure corporate social performance through indicators, such as the *Fortune Corporate Reputation Index*, that include an environmental component (Moore, 2001; Waddock & Graves, 1997). Finally, to define our hypothesis, we looked at the literature on microfinance social performance as well. More specifically, we focus on studies where the environmental dimension is included in the measure of social performance, as it is the case for studies based on Social Performance Indicators tools (Bédécarrats et al, 2011), making it relevant to draw parallels with our more specific topic of research.

This section provides an overview of assumptions and findings from the literature and presents the hypotheses related to size, financial performance, age, and legal status that we defined for this study.

2.1. Size of the institution

Building on the literature, there could be various reasons why size would have an influence on MFIs' environmental performance. More specifically, academic papers often assume that larger firms are more likely to perform better environmentally. They emphasize several explanations for a positive relationship between environmental performance and size: reputation risk, access to resources, and scale economies.

First, many authors assume that larger firms are more likely to engage in CSR or in environmental management because they tend to be more visible and attract more attention from various stakeholder groups (Arora & Cason, 1996; Chen & Metcalf, 1980; Erlandsson & Tillman, 2009; Orlitzky, 2001; Stanwick & Stanwick, 1998). This is also the argument stressed by Scholtens & Dam (2007) in a study on the characteristics of banks that adopted the Equator Principles[1], where they found that adopters of Equator Principles are significantly larger than non-adopters. Scholtens & Dam (2007) indeed explain their results by assuming that larger banks, because they are more visible, have to manage a higher reputation risk and stronger pressures from their investors and other stakeholders, making them more likely to engage in environmental management. For Udayasankar (2008), larger firms not only have to respond to stronger pressures but they can also gain more recognition and benefits from corporate social responsibility initiatives than smaller companies that are less visible.

In addition to reputation effects, various authors argue that larger companies may have a better CSR performance because they have access to greater slack resources (be they financial or human), whereas smaller firms would be constrained by fewer or inadequate resources (Erlandsson & Tillman, 2009; Udayasankar, 2008). In particular, CSR performance often implies meeting a host of CSR reporting formalities, and large institutions with specialized staff and more developed administrative structures may be in a better position to address these issues (Fassin, 2008).

Furthermore, in a study on the determinants of SMEs' environmental performance, Lefebvre et al (2003) assume that larger SMEs would be more likely to have a higher environmental performance because they can benefit from scale economies in their effort to go green. This potential explanation is also mentioned in other studies from the CSR literature (Elsayed & Paton, 2007; Orlitzky, 2001). Because they have a higher scale of operations, larger firms may be in a better position to effectively re-allocate resources for CSR initiatives and gain from scale economies (Udayasankar, 2008). For instance, when developing a new (green) product, larger firms can benefit from scale economies in the Research & Development phase (feasibility study, product design and testing) and in the advertizing phase (Acs & Audretsch, 1987).

Some authors argue that small firms would also have some reasons to perform well in CSR. Udayasankar (2008) emphasizes that small firms may find an interest in engaging in CSR initiatives as a differentiation strategy. For him, the relationship between size and corporate social performance could follow a U-shape, with medium-sized firms being less likely to engage in CSR (Udayasankar,

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[1] The Equator Principles are a banking industry framework for addressing environmental and social risks in project financing.

2008). According to Aragón-Correa et al. (2008), small firms would also have the advantage of being more flexible and more innovative.

However, most empirical studies have found that larger organizations are more likely to adopt proactive CSR or environmental practices, confirming the most-often mentioned hypothesis (Aragón-Correa et al., 2008; Arora & Cason, 1996; Buysse & Verbeke, 2003; Céspedes-Lorente et al., 2003; Stanwick & Stanwick, 1998). In the microfinance sector, Bédécarrats et al. (2011) identified that social performance increases with MFIs' size.

The same set of assumptions related to size and environmental performance could hold for the microfinance sector. Indeed, larger MFIs are more under the scrutiny of international stakeholders, making them more likely to go green. They usually have an easier access to resources and can reach scale economies more easily. Their cost to benefit ratio of going green would thus be lower than that of smaller MFIs, making them more likely to invest in environmental management.

If the reputation risk is the stronger driver, one would assume that larger MFIs are more likely to engage in the development of an environmental policy or in environmental risk management. These approaches are more visible to investors and donors, easy to communicate about, and they constitute a way for the MFI to protect itself from harmful impacts, without requiring too much effort. If scale economies are the stronger driver, one would assume that larger MFIs are more likely to engage in the provision of green microcredit to promote environmentally-friendly activities and technologies. Developing a new financial product entails important fixed upfront costs in research and development (Araya & Christen, 2004; Coulson & Dixon, 1995; Wenner, 2002) and may therefore not bring a clear return on investment for smaller microfinance institutions.

Building on the literature, we thus defined our first hypothesis as follows:

H1. Larger MFIs are likely to have a better environmental performance.

2.2. Financial performance

In addition to size, one of the most-often studied relationships in the literature is that of corporate social or environmental performance with financial performance. The hypothesis that is usually privileged in the literature is that of a positive association between corporate social/environmental performance and prior financial performance, along the slack resource theory developed by Waddock & Graves (1997). Waddock & Graves (1997, p.306) indeed assume that "better financial performance potentially results in the availability of slack (financial and other) resources that provide the opportunity for companies to invest in social performance domains." For them, firms that are in financial trouble may have little availability to make discretionary investments in social and environmental initiatives. Elijido-Ten (2007) and Husillos & Alvarez-Gil (2008) also suggest that organizations with a low profitability will primarily focus on the economic demand pushed forwards by their stakeholders and lack the financial capacity to undertake costly social and environmental programs. A better financial performance could thus be a predictor of better environmental performance.

Yet, results of empirical studies are broadly inconsistent, which may be due to CSR measurement, sample selection or other methodological issues (Al Tuwaijri et al, 2004; Elsayed & Paton, 2007; Russo & Fouts, 1997; Stanwick & Stanwick, 1998). Some studies find no correlation between profitability and corporate environmental performance (Elijido-Ten, 2007; Henriques & Sadorsky, 1996), while others reveal a significant positive relation between environmental performance and financial performance (Al Tuwaijri et al, 2004; Russo & Fouts, 1997) or between corporate social performance and financial performance (Stanwick & Stanwick, 1998; Waddock & Graves, 1997). The most comprehensive survey of evidence has been done by Orlitzky (2001) in a meta-analysis with a total sample size of over 15,000 observations. His key findings show that CSR and, to some extent, environmental responsibility are positively related to financial performance, even after controlling for firms' size.

Even if empirical results are ambiguous, one could assume that a better financial performance could also be a predictor of better environmental performance in the microfinance sector. Indeed, developing green microfinance programs implies some costs and investments for the MFI (Araya & Christen, 2004; Coulson & Dixon, 1995; Wenner, 2002): cost of research and development for the design of green microcredit, cost of acquiring new competences and developing new procedures, cost of training staff, cost of providing non-financial services generating no financial revenues, decreased staff productivity due to time spent on assessing environmental risks, promoting green microcredit or raising clients' awareness, etc. In her study on MFIs' motives for going green, Allet (2012b) indeed mentions that MFIs' decision to engage in environmental management is also influenced by the cost / benefit analysis they make. MFIs with a better financial performance may therefore be more likely to engage in environmental management. In particular, they may be more likely to engage in environmental management strategies that have higher upfront costs, such as the provision of green microcredit and environmental non-financial services. Our second hypothesis is thus the following:

H2. MFIs with a better financial performance are likely to have a better environmental performance.

2.3. Maturity of the institution

In addition to size and financial performance, the maturity of an institution could also influence its environmental performance. One could indeed assume that, as an institution grows and becomes more mature, it becomes more visible, has better management capacities and resources, and tends to institutionalize its management processes, making it more likely to engage and perform better in environmental management.

The literature on organizational life cycles provides an interesting framework to understand how maturity could influence corporate environmental performance. Organizational life cycle models "claim that all firms pass through predictable stages of growth and that their strategies, structures, and activities correspond to their stage of development" (Gray & Ariss, 1985, p.710). Even if the stages identified in the various models may be named or categorized in slightly different ways, most authors

identify four main stages in organizational life cycles: (a) the birth / early growth / start-up stage; (b) the rapid growth / emerging growth stage; (c) the maturity stage; and (d) the decline / redevelopment / transition stage (Elsayed & Paton, 2007; Gray & Ariss, 1985; Jawahar & McLaughlin, 2001; Quinn & Cameron, 1983).

Several authors emphasize that innovation may be greater in companies that are in the start-up stage, since they need to create a market "niche" for themselves (Gray & Ariss, 1985; Quinn & Cameron, 1983). Elsayed & Paton (2007) suggest that companies in their initial growth stage could indeed be more likely to engage in environmental management because they seek "to achieve differentiation in the market by exhibiting a unique ethical behaviour to be used as a competitive edge over their rivals" (Elsayed & Paton, 2007, p.399). However, other authors argue that companies in their start-up stage are primarily concerned with survival (Lippitt & Schmidt, 1967). According to Jawahar & McLaughlin (2001), young companies thus focus primarily on shareholders, creditors and customers' expectations and tend to ignore other stakeholder groups such as environmental groups.

In the rapid growth stage, most authors agree that companies tend to focus on short-term performance and dismiss environmental initiatives and stakeholders (Elsayed & Paton, 2007; Jawahar & McLaughlin, 2001). On the other hand, the literature suggests that, when they reach a maturity stage, companies are more likely to be proactive in environmental management, because they have more slack resources that provide opportunities for investing in social and environmental domains and because they are more visible and need to accommodate environmental stakeholders' expectations (Elsayed & Paton, 2007; Jawahar & McLaughlin, 2001).

The influence of maturity on corporate social or environmental performance has however been little empirically explored by the CSR literature. A reason may be because there is no simple, easily accessible variable to assess the level of maturity of an organization. One proxy could be the age of the organization. This proxy is relevant in the sense that young organizations are not likely to be mature. However, it is also limited because older organizations do not systematically reach maturity stages. One could also think that size, along with age, could be a proxy for maturity, since young organizations usually start small and may gain maturity as they grow. Nevertheless, here again, the link is far from being systematic (one can find very large organizations that are far from having mature management processes). In the absence of better proxy, and acknowledging its limit, age however remains the most practical variable to be used to assess maturity level. The few studies that have used age as a proxy for maturity have found mixed results: while Moore (2001) identifies a positive relation between age and social performance in the UK supermarket industry, Cochran & Wood (1984) find a highly significant negative correlation between age of corporate assets and social performance ranking in their sample of 39 manufacture firms. One reason they mentioned for this negative result was that older firms may be less flexible and responsive in adapting to social change than younger firms.

In the microfinance sector, Bédécarrats et al (2011, p.13) identify that social performance (SP) increases with age. According to them, this positive relationship can be explained by the formalization of processes as the MFI grows: "At the beginning, MFIs rely on a small and committed team and

flexible processes. Therefore most of the practices related to social mission remain informal and are not taken into account by SP assessments, which evaluate institutionalized processes. Nevertheless, as they grow, institutions tend to manage only what they can measure and systematize. MFIs wanting to pursue initial objectives of poverty reduction or development ultimately formalize their practices."

In line with Elsayed & Paton (2007), one could assume, on the one hand, that MFIs in their start-up stage may be likely to engage in green microfinance as a differentiation strategy. As the microfinance sector has significantly expanded in the past decades, in many countries, newcomers face tough competition on the local market and need to adopt strategies to stand out from competitors. Green microfinance could be one of these strategies. However, pressures on MFIs to reach financial objectives are very high in the sector, making us assume that young microfinance institutions are more likely to primarily focus on their short-term performance objectives and postpone the management of environmental issues for later stages. Furthermore, financial costs and technical complexity are often perceived as significant barriers to MFIs' engagement in environmental management. One could then assume that mature MFIs, because they have reached a growth stage where they are more visible and have more slack resources (Elsayed & Paton, 2007; Jawahar & McLaughlin, 2001) or because they have developed more formal processes (Bédécarrats et al, 2011), would be likely to perform better in environmental management. Therefore, we defined our third hypothesis as follows:

H3. Mature MFIs are likely to have a better environmental performance.

2.4. Legal status

Finally, if we want to assess whether the environmental bottom line only concerns certain types of MFIs, we need to consider the influence of MFIs' legal status as well. Among the four legal status widely used to categorize MFIs (banks, non-bank financial institutions, cooperatives, non-government organisations), two of them in particular could be related to a better environmental performance: the bank status, because of its higher exposure to environmental liability, and the NGO status, because of its positive relation with an integrated approach of microfinance.

In the past two decades, many governments have introduced laws on the environmental liability of financial institutions (Boyer & Laffont, 1997; Coulson & Dixon, 1995; Thompson & Cowton, 2004). These laws affirm the responsibility of financial institutions for pollution damages caused by the activities that they finance and provide for fining or charging them with clean-up costs (UNEP-FI, 2007; Wenner, 2002). As these laws have been defined for the traditional banking sector, which finances bigger (and potentially more harmful) projects, they apply directly to the MFIs that are registered as banks (and eventually non-bank financial institutions) but may not consider MFIs under other legal status, such as cooperatives or NGOs. Because they are under the scrutiny of environmental liability regulations, MFIs registered as banks could thus be likely to perform better in environmental management. In particular, they may tend to adopt measures to reduce their exposure to environmental risks through the adoption of an exclusion list and environmental screening criteria for

instance. They may also be more likely to offer green microcredit products in order to improve the environmental performance of their portfolio.

While MFIs registered as banks may be more oriented towards environmental strategies enabling them to minimize their exposure to environmental risks, MFIs with a NGO status may be prone to develop more positive strategies aiming to promote environmentally-friendly activities, technologies, and practices. For FAO (2005), MFIs that have a NGO status could be more sensitive to environmental issues than commercial banks. In particular, one could assume that they would be more likely to provide environmental non-financial services, such as training and awareness-raising on eco-practices. In the microfinance sector, some institutions have indeed opted for a 'Microfinance Plus' approach: in addition to their core financial business, they decided to provide their clients with other social services like literacy training, health services or business development services. In a study on 'Microfinance Plus', Lensink & Mersland (2009) already find significant correlations between NGO status and the provision of 'Microfinance Plus' services. The same could hold regarding environmental non-financial services, with a higher propensity for NGOs to engage outside of the core financial business and adopt a positive approach to environmental management.

As for MFIs registered as non-bank financial institutions or cooperatives, their likelihood to engage in environmental management broadly depends on the interest and willingness of their respective shareholders or members to address environmental issues, making it hazardous to formulate any predictive hypothesis.

We thus defined the two following hypotheses related to MFIs' legal status:

H4. MFIs registered as banks are likely to have a better environmental performance, in particular through environmental risk assessment.

H5. MFIs with a NGO status are likely to have a better environmental performance, in particular through the provision of environmental non-financial services.

Table 1. Summary of hypotheses

	Hypotheses to test	Variables used
H1	**Larger MFIs** are likely to have a better environmental performance.	Number of active borrowers
H2	MFIs with a better **financial performance** are likely to have a better environmental performance.	OSS
H3	**Mature MFIs** are likely to have a better environmental performance.	Age
H4	**MFIs registered as banks** are likely to have a better environmental performance, in particular through environmental risk assessment.	Legal status (dummies)
H5	**MFIs with a NGO status** are likely to have a better environmental performance, in particular through the provision of environmental non-financial services.	Legal status (dummies)

3. Database and Methodology

3.1. Assessing the environmental performance of MFIs

As the issue is still new in the microfinance sector, there is no standardized methodology yet to assess the environmental performance of MFIs. Microfinance rating agencies, such as M-Cril, Microfinanza and PlaNet Rating, have included a couple of environmental responsibility indicators in their Social Performance Rating, but they still remain quite vague and limited. The MIX Market is progressively starting to collect data on the environmental performance of its member MFIs, but information is only provided on a voluntary basis by few MFIs and also remains very general. To assess actual practices in environmental management and identify the characteristics of green MFIs, we thus needed to collect first-hand data. We used the Microfinance Environmental Performance Index (MEPI) developed by Allet (2012a). MEPI builds on the literature on corporate environmental performance and microfinance social performance (Azzone, et al., 1996; Doligez & Lapenu, 2006; Hashemi, 2007; Henri & Journeault, 2008; Ilinitch, et al., 1998; Jasch, 2000; Lapenu, et al., 2009). It is composed of management performance indicators specifically adapted to the microfinance sector (See Annex 1). The index is build along five dimensions that reflect the variety of strategies adopted by MFIs to go green: (1) Environmental Policy; (2) Ecological Footprint; (3) Environmental Risk Management; (4) Green Microcredit; and (5) Environmental Non-financial Services.

The Environmental Policy dimension refers to the existence of a formalized environmental strategy creating a favorable framework for the implementation of environmental programs. This formalization can be done through the inclusion of environmental statements in the official mission of the MFI, the adoption of a written policy document, the appointment of a person in charge of environmental issues and/or the implementation of an incentive system to encourage staff to achieve specific environmental objectives.

The Ecological Footprint dimension relates to all internal actions made by the MFI to reduce the direct environmental impact of its operational activities, such as conducting an environmental audit, setting up specific objectives to reduce energy consumption, carbon emissions, or waste releases, raising employees' awareness on good practices, and including environmental performance indicators in annual reports.

The Environmental Risks Assessment dimension refers to the effort made by the MFI to monitor all loans according to environmental criteria. This can be done through the use of an exclusion list, the use of specific toolkits to evaluate the environmental risks of clients' activities, the training of loan officers on environmental risk management, and the inclusion of tracking indicators into the MIS.

The Green Microcredit dimension relates to the provision of financial products that have been adapted in order to promote environmentally-friendly activities and technologies.

Finally, the Environmental Non-Financial Services dimension refers to the provision of non-financial services aiming to raise clients' awareness of environmental issues and good practices. This can be

done through an environmental chart to be signed by clients, awareness-raising campaigns, promotion actions such as fairs, and specific trainings on environmentally-friendly practices.

The Microfinance Environmental Performance Index (MEPI) thus provides a good framework for analyzing MFIs' current level of environmental performance.

3.2. Data collection

In order to get first-hand data on the environmental performance of MFIs, we conducted a survey elaborated on the basis of MEPI. The survey was submitted to a sample of 426 MFIs from the MIX Market[2]. We selected all MFIs rated with 4 and 5 diamonds in February 2011. On the MIX Market, the number of diamonds reflects the level of transparency of the microfinance institution. MFIs that reach 4 to 5 diamonds are the ones that provide lots of quality data on their financial, operational and social performance, backed up with rating and audit reports and regularly updated. Selecting MFIs with 4 and 5 diamonds was a guarantee to access quality data on the additional variables needed for our study.

Similar to Anderson and Locker (2002), MFIs were contacted individually through email in March 2011. Two reminders were sent in April 2011 to the ones that had not responded yet. The survey was to be filled in online. It was available in English, French and Spanish. In order to get a good response rate, an incentive was given to MFIs: they could choose to receive a free benchmark of their environmental performance at the end of the survey. By the end of April 2011, the survey had been answered by 165 MFIs. After clearing the database from questionnaires that could not be used (incomplete), we ended up with a total number of 160 surveys, equating to a response rate of 38%.

We then completed our database by collecting on the MIX additional data on respondent MFIs' characteristics: legal status, date of creation, number of active borrowers, number of rural clients, operational self-sufficiency, portfolio at risk at 30 days, average loan on GNI per capita, etc.

3.3. Sample representativeness

As detailed in Table 2, our sample of 160 MFIs is representative of the microfinance sector in terms of regional location, legal status, size (number of borrowers), average age, average portfolio at risk, average financial performance, etc. Our sample is composed of 34% of MFIs from Latin America, 21% from Africa, 20% from Asia, 18% from Eastern Europe and Central Asia (EECA), and 8% from Middle East & North Africa (MENA). This is very close to the distribution of MFIs in the 2009 MFI Benchmark

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[2] The MIX Market (www.mixmarket.com) is a website that provides access to operational, financial and social performance information on more than 2,000 MFIs, covering 92 million borrowers globally. Being one of the most exhaustive databases of MFIs worldwide, the MIX Market is used as a source of data for many microfinance studies. However, the MIX data has limitations that need to be acknowledged. Indeed, the MIX only gathers data for institutions that consider themselves as MFIs and that expect a benefit from voluntary reporting to this database. The dataset is thus likely to under-represent smaller microfinance providers as well as other institutions providing financial services to low-income people, such as development banks, postal banks, rural banks, or savings and credit cooperatives.

Table 2. Profiles of respondent MFIs and their representativeness of the microfinance industry

		Sample (160 MFIs)	MIX[3] (1019 MFIs)
Region	Latin America & the Caribbean	34%	34%
	Africa	21%	15%
	Asia (South & East Asia)	20%	27%
	Eastern Europe & Central Asia	18%	19%
	Middle East & North Africa	8%	5%
Legal status	NGO (non-governmental organization)	45%	37%
	NBFI (non-bank financial intermediary)	34%	35%
	Credit union / cooperative	12%	14%
	Bank	9%	8%
	Rural bank	0%	6%
Size (outreach)	Small (<10,000 borrowers)	33%	49%
	Medium (10,000 to 30,000 borrowers)	23%	21%
	Large (>30,000 borrowers)	44%	29%
Mean	Number of active borrowers	104,477	85,269
	Age (years)	15.4	14
	Operational Self-Sufficiency (%)	115%	111%
	Cost per borrower (USD)	194	224
	Portfolio at Risk at 30 days (%)	5.2%	4.6%
	Average loan per GNI per capita (%)	55%	64%
	Percentage of female clients (%)	64%	63%

of the MIX, where 34% are from Latin America, 15% from Africa, 27% from Asia, 19% from EECA, and 5% from the MENA region. In our sample, we count 45% of NGOs, 34% of Non-Bank Financial Institutions (NBFIs), 12% of cooperatives, and 9% of banks, which is again very similar to the

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[3] Data comes from the 2009 MFI Benchmarks available on the MIX. This data set includes information from 1019 MFIs reaching over 85% of known microfinance borrowers. Even if the MIX Market claims to gather information for more than 2,000 MFIs, not all MFIs voluntary provide financial, operational, and social information every year to the MIX, which explains why the 2009 MFI Benchmarks only gathers data for 1019 MFIs. (http://www.themix.org/publications/mix-microfinance-world/2010/10/2009-mfi-benchmarks)

distribution of the MIX benchmark, where NGOs represent 37%, NBFIs 35%, cooperatives 14%, and banks 8%. Our sample has an average OSS ratio of 115%, comparable to the average ratio of 111% of the MIX; an average portfolio at risk at 30 days of 5.2% when that of the MIX is of 4.6%; an average loan size on GNI per capita amounting to 55% when the average ratio in the MIX is 64%; and an average of 64% of female clients, very close to the 63% average of the MIX sample. The only worth noting difference is that our sample has a slightly higher proportion of large MFIs compared to the distribution of MFIs in the MIX. Indeed, our sample is composed of 44% of MFIs with more than 30,000 clients, while they only represent 29% of the MIX sample.

Even if we carefully sought to avoid any selection bias, it is likely that our sample is biased towards MFIs with greater environmental commitment. Indeed, MFIs that already have an interest in environmental issues are the ones that will feel more concerned by the survey and will take time to answer it. Our results however show that, among our respondents, there are also MFIs that have no interest or very little interest in environmental issues. Even if the sample is likely to be slightly biased towards environmentally-committed MFIs, it is not a main problem for this study, since we do not aim at assessing the environmental performance of MFIs in absolute terms. We rather seek to relate their level of practices and environmental performance with their characteristics (which characteristic is linked to a higher MEPI score?). What is important is the relative variance in environmental performance in our MFI sample.[4]

3.4. Characteristics of MEPI scores

For research purpose, we assessed MFIs' environmental performance by giving an equal score of four points to each of the five dimensions described in section 2, making a total MEPI score out of twenty. We do not expect MFIs to score full points in every dimension of MEPI. Similar to the Social Performance Indicators (SPI) approach, results should rather reflect the MFI's self-defined mission and strategy (Doligez & Lapenu, 2006).

A limit of our survey is that we rely only on MFIs' declarations, since we did not have the resources to go and visit each MFI and check actual practices. The risk could be that some MFIs overestimated their level of environmental performance ('greenwashing discourse'). In order to avoid this bias, we included control questions[5] in the survey and adjusted in the database some of the answers provided by MFIs in order to make them consistent with answers to control questions.[6] Yet, respondents'

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[4] In order to test if our sample was statistically different from that of the MIX, it would have been interesting to conduct some probit tests and eventually correct for selection bias through Heckman's method. Unfortunately, the 2009 MFI Benchmarks MIX data only presents mean indicators and does not provide the whole database, which prevented us from conducting a Heckman correction.

[5] For instance, if an MFI stated that it had an environmental policy, we asked for the year when the policy was adopted. If an MFI declared that it was offering green microcredit for clean energy technologies, we asked what the type of technology promoted was and how many loans they had disbursed in the past year. The detailed list of control questions can be found in the appendix section of Chapter 1.

[6] We also reviewed the MFIs websites and annual reports to check for the information provided. However, these sources are quite limited since most MFIs do not communicate yet on their environmental management practices.

tendency to overestimate their performance may have been limited, since the overall MEPI scores for our sample remain low.

On average, MFIs only reach a total MEPI score of 4.14 points out of twenty (see Annex 2). Out of 160 respondents, 145 MFIs (91%) have a MEPI score below 10 points, of which 106 MFIs (66%) even have a score below 5 points and 24 MFIs (15%) have a score of zero. The same pattern appears when we look at the five dimensions of the index. Many MFIs from our sample indeed have a score equal to zero in the various MEPI dimensions: 46% of respondent MFIs for Dimension 1 (Environmental Policy); 45% for Dimension 2 (Ecological Footprint); 52% for Dimension 3 (Environmental Risk Assessment); 72% for Dimension 4 (Green Microcredit); and 60% for Dimension 5 (Environmental Non-financial Services). These low scores are consistent with the fact that MFIs have only started to look at their environmental bottom line very recently. They also suggest that the risk of 'greenwashing' answers from surveyed MFIs may have been slightly overestimated.

3.5. Data analysis for global MEPI scores

We conducted different types of statistical and econometric analysis, starting with Pearson correlation tests for all our variables. As none of our independent variable is strongly significantly correlated one with the other[7] (see Annex 5), we thus proceeded to OLS regression analysis where the global MEPI score was the dependent variable.

We included the following explanatory variables to test our different hypotheses: number of active borrowers (for size), Operational Self-Sufficiency[8] (for prior financial performance), age (for maturity), and legal status. An important concern was the risk of endogeneity of the financial performance variable. Indeed, there could be a risk of reversed causality, since better environmental management can potentially lead to higher financial performance if it enables the MFI to reduce inefficiency costs (e.g. thanks to energy savings), attract cheaper funding (e.g. Socially Responsible Investors), develop new markets (e.g. through energy lending), etc. It could also impact negatively the MFI's financial performance if environmental management leads to increased costs and reduced productivity. In order to mitigate the risk of endogeneity, we thus decided to lag our financial performance variable, taking OSS data from 2010, while environmental performance data is from 2011 (5-month lag). It is indeed more complicated to assume that actual environmental performance can determine previous financial performance. Unfortunately, we were not able to find any instrumental variable that could be used to control for endogeneity. However, since most MFIs have engaged in environmental management only recently and since most of them do so in a pilot way, the probability that their environmental performance has impacted their financial bottom line is still low.[9]

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[7] Correlations do not exceed 0.8, the level at which collinearity problems appear (Kennedy, 2008).

[8] Operational Self-Sufficiency is widely used as a proxy for financial performance in the microfinance sector (Cull et al., 2007; Lensink & Mersland, 2009; Mersland & Strom, 2010).

[9] We also checked the error term and found no autocorrelation or heteroskedaticity, which could have reflected a problem of endogeneity (cf Section 3.5).

In addition to our explanatory variables, we also included various control variables in our regression: region, international origin, percentage of rural clients, average loan size on GNI per capita, provision of non-financial services, and portfolio at risk at 30 days (PAR30). These control variables were included in our model because we assumed that they could have some influence on MFIs' environmental performance.

- REGION: MFIs could engage in environmental management in a mimetic trend if they are located in regions where other stakeholders and MFIs are implementing environmental programs, in line with the mimetic isomorphism theory (DiMaggio & Powell, 1983).
- INTERNATIONAL ORIGIN: The assumption here is that firms with a foreign origin (OECD countries) may apply more performing environmental management systems because they comply with the standards of the home country, which tend to have more stringent environmental regulations when they come from OECD countries (similar to the results of Cole et al, 2008). MFIs with an international origin may apply standards from the country of origin of the founders, and therefore have a higher MEPI score.
- RURAL CLIENTS: Environmental degradation exists in urban and peri-urban areas, but it is often more visible in rural areas, where farmers are particularly affected by chemical pollution and soil degradation (Nishat, 2004). As MFIs tend to be more sensitive to one or two specific environmental issues that are closest to their daily concerns (what Jones, 1991, identifies as the moral intensity of an issue), MFIs that are more active in rural areas may be more likely to engage in environmental management.
- AVERAGE LOAN SIZE ON GNI PER CAPITA: MFIs with larger average loan size may feel more exposed to credit risks linked to environmental risks, and therefore engage in environmental management.
- NON-FINANCIAL SERVICES: MFIs with an integrated approach may be more likely to engage in environmental management, as emphasized in Allet (2012b). The dummy "provision of non-financial services" is used as a proxy for MFIs' positioning between a minimalist and an integrated approach.
- PAR30: MFIs that face portfolio problems have other priorities to manage than their environmental impact. One could thus assume that only MFIs with a stable, good portfolio will be likely to develop new products and services linked to the environment.

Our regression was thus defined as follows:

$$\mathbf{MEPI}_i = \alpha_i + \beta_1 \times SIZE_i + \beta_2 \times OSS_i + \beta_3 \times AGE_i + \beta_4 \times STATUS_i + \beta_5 \times REGION_i + \beta_6 \times INT'L_i + \beta_7 \times RURAL_i + \beta_8 \times AVERGLOAN_i + \beta_9 \times NONFINSERV_i + \beta_{10} \times PAR30_i + \varepsilon_i$$

where SIZE is the number of active borrowers; OSS is the prior operational self-sufficiency ratio of the MFI (for 2010, while MEPI scores were computed in 2011); AGE is the number of years of existence of the MFI; STATUS is the legal status of the MFI (bank, cooperative, non-bank financial institution, non-government organization); REGION is the region (Asia, Sub-Saharan Africa, Eastern Europe and Central Asia, Latin America, or Middle-East and North Africa); INT'L is a dummy related to the international origin of the MFI; RURAL is the percentage of active clients in rural area; AVERGLOAN is the average loan size divided by the GNI per capita; NONFINSERV is a dummy related to the offer of non-financial services by the MFI; and PAR30 is the portfolio at risk at 30 days. Following Rys & Vaneecloo (2005), for the STATUS and REGION dummies, we kept as a reference the category that was the most frequent in our sample, respectively NGOs and Latin America. [10; 11]

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[10] We also tested a regression where we controlled for country-level environmental performance. In this perspective, we used the Environmental Performance Index (EPI) developed by Yale researchers and largely used by international organisations such as the UNDP (in its Human Development Index) and the G20. This index ranks countries on performance indicators gauging

In the following section, we present our results when all explanatory and control variables are included in the regression. We tested different models and found that our results overall remained robust when removing our control variables.

After running our regression, we furthermore conducted several tests to check the validity of our results (Gujarati, 2004). We computed the Variance Inflation Factors (VIF) for each of our explanatory variable and were able to confirm the absence of perfect multicollinearity since the VIF were all below 2. Furthermore, we conducted a Durbin-Watson test that is very close to 2 (it amounted to 2.083) and therefore shows the absence of residual autocorrelation. We also checked that the mean value of the error term is equal to zero, which validates another of the assumptions under which the OLS model holds. Finally, we verified that our residual term follows a normal distribution by drawing a Q-Q plot graph and conducting a Shapiro-Wilk normality test which turned out significant.

3.6. Data analysis for disaggregated MEPI dimensions

In their study on SMEs' environmental performance, Lefebvre et al (2003, p.263) emphasize that their "results demonstrate that firms' environmental performance cannot be viewed as a one-dimensional concept and that determinants of firms' environmental performance depend on the dimension retained." Similarly, regarding MFIs' social performance, Bédécarrats et al (2011, p.11) also stress that "different institutions prioritize different facets of social performance, depending on their objectives and context. This is why it is so important to refine analysis beyond the aggregated score and analyze each dimension." Following the same logic, we considered important to look not only at global MEPI scores but also at each of the five dimensions of the Microfinance Environmental Performance Index.

For each MEPI dimension, the values of the dependent variable only range from 0 to 4, making an OLS model not appropriate. We therefore opted for ordinal models, starting with ordinal logit analysis. However, the tests of parallel lines were always significant, pointing that the model was not adequate. One explanation could be that our data is concentrated towards low values for our dependent variables (as indicated in section 3.4). We then opted for negative log-log regressions, which are supposed to be most adapted to data with a high probability of low scores. However, here again, the tests of parallel lines turned out significant, stressing that the model was not adapted. Similar to Scholtens & Dam (2007), we therefore decided to conduct t-tests for equality of means in order to identify which are the groups whose environmental performance scores are significantly different for each of the five MEPI dimensions.

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government policies on environmental public health and ecosystem vitality. This variable however was not significantly related to MEPI scores and was not contributing to the explanatory power of our model. We thus decided to remove it.

[11] It could have been interesting to also include Social Performance Indicators (SPI) scores as a control variable. One could indeed assume that MFIs with a high social performance (as it is measured by the SPI) would be likely to have a higher environmental performance. However, it was not possible to include such control variable since, after coordinating with CERISE, we identified that only 24 MFIs from our sample of 160 had conducted an SPI assessment in 2010.

4. Findings

This section presents the results obtained for each of our hypotheses. Tables 3 and 4 display the results of our tests for equality of means for the various disaggregated dimensions of environmental performance, while Table 5 present the results of our global OLS regression, with MEPI as the dependent variable.

4.1. Size

Results from our tests for equality of means reveal that larger MFIs perform better than smaller ones on some of the disaggregated dimensions of MEPI. Indeed, Table 3 shows a significant difference between small and large MFIs[12] for the Environmental Policy, Ecological Footprint, and the Environmental Risk Assessment dimensions. These results confirm the assumption that larger MFIs engage in environmental management, probably because they are more visible and have to take actions to respond to donors' and investors' expectations (Arora & Cason, 1996; Chen & Metcalf, 1980; Erlandsson & Tillman, 2009; Orlitzky, 2001; Stanwick & Stanwick, 1998), in particular in terms of environmental risk management.

Yet, contrarily to what we expected, results show that larger MFIs are not more likely than smaller MFIs to design and offer green microcredit, whereas they could benefit from clear scale economies in this area. Udayasankar (2008) suggests that smaller firms may decide to engage in CSR as a differentiation strategy. The same phenomenon could apply here: smaller MFIs may also decide to offer green microcredit as a niche strategy, which would then counterweight the scale economies effect and explain the absence of significant difference on this dimension.

As for the Environmental Non-financial Services dimension, Table 3 shows significant differences between medium-sized MFIs on the one hand, and small and large MFIs on the other hand. On this dimension, the relationship between size and environmental performance thus seems to follow the U-shape suggested by Udayasankar (2008), with medium-sized MFIs performing less. Small MFIs may develop such 'Microfinance Plus' services as a differentiation strategy or because they are more innovative (Aragón-Correa et al, 2008), while large MFIs may be in a position to offer non-financial services because they have more slack resources available (Waddock & Graves, 1997).

Nevertheless, results from our OLS regression do not show any significant relationship between MFIs' size and their global environmental performance (Table 5). We could thus assume that our hypothesis stating that larger MFIs are likely to have a better environmental performance is only partially confirmed for some specific dimensions of environmental performance.

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[12] The groups were defined along the MIX peer group definition: small MFIs are those with less than 10,000 active borrowers; medium MFIs are those with 10,000 to 30,000 active borrowers; and large MFIs are MFIs with more than 30,000 active borrowers.

Table 3. Tests of equality of means per MEPI dimension

MEPI mean scores per size, financial performance, and maturity

		N	Dimension 1. Environmental policy	Dimension 2. Ecological footprint	Dimension 3. Environmental risks assessment	Dimension 4. Green microcredit	Dimension 5. Environmental non-financial services
SIZE							
Means	**SMALL** (<10,000 active borrowers)	46	0.76	0.67	0.48	0.57	0.61
	MEDIUM (10,000 to 30,000 borrowers)	33	0.94	0.85	0.73	0.79	0.30
	LARGE (>30,000 active borrowers)	68	1.28	1.01	1.13	0.76	0.94
T-Tests	*SMALL-MEDIUM*		*-0.79*	*-0.88*	*-1.41*	*-0.78*	***1.71****
	MEDIUM-LARGE		*-1.48*	*-0.72*	***-1.90****	*-0.08*	***-3.73*****
	SMALL-LARGE		***-2.47*****	***-1.73****	***-3.62*****	*-0.89*	*-1.61*
FINANCIAL PERFORMANCE							
Means	**LOW** (OSS < 100%)	27	0.85	0.70	0.59	0.74	0.56
	MEDIUM (OSS 100-120%)	71	1.03	0.93	0.80	0.73	0.72
	HIGH (OSS > 120%)	42	1.26	0.90	1.10	0.71	0.83
T-Tests	*LOW - MEDIUM*		*-0.71*	*-0.97*	*-0.91*	*0.03*	*-0.71*
	MEDIUM - HIGH		*-1.02*	*0.12*	*-1.44*	*0.07*	*-0.57*
	LOW - HIGH		*-1.52*	*-0.80*	***-1.80****	*0.90*	*-1.07*
MATURITY							
Means	**YOUNG** (<8 yrs)	27	0.78	0.74	0.93	0.44	0.44
	MATURE (8-20 yrs)	103	1.06	0.85	0.86	0.81	0.71
	VERY MATURE (>20 yrs)	28	1.11	0.93	0.54	0.86	1.07
T-Tests	*YOUNG-MATURE*		*-1.13*	*-0.54*	*0.27*	***-1.76****	*-1.17*
	MATURE-VERY MATURE		*-0.20*	*-0.34*	*1.50*	*-0.14*	*-1.56*
	YOUNG-VERY MATURE		*-1.10*	*-0.68*	*1.45*	*-1.27*	***-2.38*****

*p<0.10; **p<0.05; ***p<0.01

4.2. Financial performance

As illustrated in Table 3, financial performance is not significantly correlated with MFIs' environmental performance for any of the disaggregated dimensions. Similar to Waddock & Graves (1997), we had expected that MFIs with a better financial performance would have the resources to engage in environmental management, especially in the strategies that entail higher upfront costs, such as the Green Microcredit and Environmental Non-financial Services dimensions. However, our results did not confirm our second hypothesis: MFIs with a better financial performance overall do not appear to have a better environmental performance. The only exception is for the Environmental Risk Assessment dimension, where more profitable MFIs tend to perform better environmentally than less profitable MFIs (Table 3). However, this is not the dimension which would entail the higher upfront costs for an MFI, since integrating environmental screening criteria within the MFI's procedures requires less financial investments than the research and development needed to design adapted green microcredit. Results from our OLS regression furthermore confirm this findings since financial performance does not appear as a significant explanatory variable for global MEPI (Table 5).

One explanation for the overall absence of significant relationship between financial performance and environmental performance may be linked to a specificity of the microfinance sector. The CSR literature almost exclusively focuses on commercial sectors (mostly manufacture and trade), which rely on their own revenues and resources to set up social and environmental initiatives. The microfinance sector is quite different in that it is highly subsidized (Hudon & Traca, 2011), with many MFIs still requiring subsidies to cover their costs and finance their loans (UNCDF, 2005) and around USD 1 billion of subsidies given by private and public donors per year over the last 20 years (CGAP, 2006). We could therefore assume that proactive MFIs are able to mobilize funding from outside their institution in order to set up environmental management programs. If these MFIs can have access to financial support from donors, a low OSS would not be a limiting factor for going green.

4.3. Maturity

Our third hypothesis, stating that mature MFIs are likely to have a better environmental performance, is validated by results from our OLS regression: age indeed appears significantly and positively correlated to global MEPI score (Table 5). The positive relationship is particularly significant for the Green Microcredit and Environmental Non-financial Services dimensions, where more mature MFIs tend to perform better (Table 3). Contrarily to the Environmental Policy, Ecological Footprint or Environmental Risk Assessment dimensions where a high score may reflect a greater formalization of environmental management processes within the MFI, these two dimensions are evaluated along the concrete provision of environmental products or services by the MFI. As a consequence, the argument of Bédécarrats et al (2011), stating that the positive relationship between social performance and age can be explained by the formalization of processes as the MFI grows, may not apply here regarding our results on environmental performance. We would rather suggest that our results are in line with Elsayed & Paton (2007)'s hypotheses on firm life cycles. During their rapid growth stage, MFIs would

primarily focus on short-term performance and growth, therefore dismissing environmental initiatives. When they reach a maturity stage, MFIs then have more available slack resources and more visibility, making them more likely to address environmental issues, in particular those implying high upfront costs (green microcredit and environmental non-financial services).

4.4. Legal status

Finally, our study shows several significant results related to MFIs' legal status. Results from our tests for equality of means first reveal that MFIs registered as banks have mean scores that are significantly higher than NGOs, NBFIs and cooperatives for the Environmental Policy and Environmental Risk Assessment dimensions (Table 3). Results of our OLS regression confirm that MFIs registered as banks tend to perform better in terms of global environmental performance: Table 5 indeed shows a positive, significant relationship between banks and MEPI scores at the global level. These results thus validate our fourth hypothesis, according to which MFIs registered as banks may be more under the scrutiny of environmental regulations and therefore more likely to set up processes to limit their exposure to environmental risks, such as adopting an exclusion list or screening loans along environmental criteria.

Table 4. Tests of equality of means per MEPI dimension
MEPI mean scores per legal status

		N	Dimension 1. Environmental policy	Dimension 2. Ecological footprint	Dimension 3. Environmental risks assessment	Dimension 4. Green microcredit	Dimension 5. Environmental non-financial services
LEGAL STATUS							
Means	**BANK**	14	2.07	1.43	1.57	1.14	0.86
	COOP	19	1.00	0.74	0.37	0.84	0.79
	NBFI	55	0.96	0.91	0.98	0.76	0.53
	NGO	71	0.85	0.72	0.65	0.65	0.83
T-Tests	*BANK-COOP*		*2.47***	*1.64*	*3.64****	*0.53*	*0.16*
	BANK-NBFI		*3.37****	*1.27*	*1.73**	*0.78*	*1.13*
	BANK-NGO		*3.78****	*1.75**	*3.27****	*1.04*	*0.08*
	COOP-NBFI		*0.13*	*-0.73*	*-2.79****	*0.22*	*0.99*
	COOP-NGO		*0.54*	*0.08*	*-1.21*	*0.59*	*-0.14*
	NBFI-NGO		*0.62*	*1.10*	*1.80**	*0.53*	*-1.67**

*p<0.10; **p<0.05; ***p<0.01

On the other hand, results also show that NGOs tend to perform better than NBFIs for the Environmental Non-financial Services dimension, while there is no significant difference with banks and cooperatives. Our fifth hypothesis is thus only partially confirmed: MFIs with a NGO status do have a better environmental performance than NBFIs regarding the provision of environmental non-financial services, but they are not more engaged in this specific 'Microfinance Plus' approach than banks and cooperatives, contrarily to Lensink & Mersland (2009)'s results.

Interestingly, cooperatives turn out to have mean scores significantly lower than banks and NBFIs for the Environmental Risk Assessment dimension. We could assume that cooperatives may be more reluctant to use environmental criteria to screen their portfolio because their relationship to their clients is based on membership.

Table 5. Regression results for Global MEPI

(OLS 1)

		Unstandardized coefficient	Standardized coefficient	t-test	p-value
Size	Nb of active borrowers	2.042E-006	.138	1.417	.159
Financial performance	OSS	.009	.058	.598	.551
Maturity	Age	.109**	.217**	2.000	.048
Legal status	BANK	3.197**	.251**	2.374	.019
	COOP	-1.949	-.148	-1.553	.123
	NBFI	.570	.070	.681	.497
Control variable: Region	AFRICA	1.159	.097	.941	.349
	ASIA	2.037**	.206**	2.014	.046
	EECA	1.525	.159	1.507	.135
	MENA	.316	.024	.239	.812
Other control variables	International origin	.529	.068	.760	.449
	Rural clients	.697	.059	.616	.539
	Average loan size / GNI per capita	.728	.136	1.321	.189
	Non-financial services	1.359	.157	1.608	.111
	PAR30	-.054	-.081	-.798	.427

R^2: 0.252

*p<0.10; **p<0.05; ***p<0.01

Dependent variable: Global MEPI

Explanatory variables: SIZE, AGE, OSS, STATUS, REGION, INT'L, RURAL, AVERGLOAN, NFINSERV, PAR30.

Reference variables for dummies: NGO (Legal status dummy), LAM (Region dummy).

4.5. Other significant variables

Besides the five hypotheses that we decided to test, our study reveals significant relationships between environmental performance and some other variables. Table 5 indeed shows that Asian MFIs tend to have a better environmental performance than MFIs located in other regions, especially for the Environmental Risk Assessment, Green Microcredit, and Environmental Non-financial Services dimensions (see Annex 3). One explanation could be that Asian MFIs are more likely to go green in a mimetic trend since they are located in a region already active in Clean Development Mechanism projects[13] (Flamos, 2010; Lecocq & Ambrosi, 2007) and where leaders such as Grameen Shakti, which provides microcredit for clean technologies (solar home systems, efficient cook stoves, biogas digesters), are paving the way (Barua, 2001; Islam, et al, 2006; Komatsu, et al, 2011).

We furthermore identified that environmental non-financial services are particularly developed in MFIs active in rural areas (Annex 3). Environmental degradation exists in urban and peri-urban areas, but it is often more visible in rural areas, where farmers are particularly affected by soil degradation (Nishat, 2004). We can thus assume that MFIs active in rural areas would be more aware of the importance of environmental degradation and in consequence more likely to develop specific services, such as training their farmer clients on agro-ecological practices.

Finally, we found that environmental risk assessment is a strategy that is more likely to be adopted by MFIs with an international origin and by MFIs with higher average loan size (Annex 3). The former may decide to engage in such a strategy to comply with the standards of their home country, which tend to have more stringent environmental regulations when they come from OECD countries (Cole et al, 2008). The latter may decide to screen loans along environmental criteria because, as they provide bigger loans, they may be exposed to greater environmental risks.

4.6. Robustness tests

To check whether our OLS results still hold when we modify the specification of the model, we conducted several robustness tests. We first run regressions to test the robustness of results related to size, by replacing our variable Number of Active Borrowers by the Gross Loan Portoflio (OLS 2) and Assets variables (OLS 3). To test for the robustness of results related to financial performance, we replaced the OSS variable by the Return on Assets (ROA) one (OLS 4). We furthermore ran a regression where we added AGE^2 as an explanatory variable to check whether the relation between MEPI and AGE is linear (OLS 5).

Aggregating indicators within a single index (as it is the case of MEPI) raise controversies related to the weighting of indicators, which may be perceived as arbitrary or biased. We therefore decided to run three more regressions to check the robustness of our results, where we replaced our dependent variable MEPI by three other computations of MEPI scores: "Minimalist MEPI" (OLS 6), "Defensive

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[13] According to UNFCCC (2012): 82.57% of all registered CDM projects are located in Asia and the Pacific, while only 2.14% are implemented in Africa.

MEPI" (OLS 7), and "Positive MEPI" (OLS 8). For each of these new MEPI scores, indicators were differently weighted, according to the following rationales:

- "Minimalist MEPI": In the microfinance sector, some professionals consider that MFIs should have a minimalist approach, meaning that they should only focus on the provision of financial services (their core business) and that activities related to awareness-raising or social services should be devoted to other organizations (Bhatt & Tang, 2001). Following this vision, MFIs' environmental engagement should only be related to the institution's internal footprint (e.g. consumption of energy or paper) and should not interfere with clients' practices in any way. To reflect this position, we thus doubled the weight given to Dimension 2 indicators (Ecological Footprint) and divided by two the weights given to Dimension 3 (Environmental Risk Management) and Dimension 5 (Non-financial Environmental Services).

- "Defensive MEPI": Some other microfinance professionals acknowledge that MFIs need to take into account environmental issues in order to protect themselves against environmental risks and minimize liability and reputation risks. They promote a more defensive or negative approach, similar to the first "green" investment funds in the traditional banking sector (UNEP-FI, 2007). To reflect this position, we thus doubled the weight of Dimension 1 (Environmental Policy) and Dimension 3 (Environmental Risk Management) indicators.

- "Positive MEPI": Finally, other microfinance practitioners promote an integrated approach (Bhatt & Tang, 2001) and claim that it is their role to support clients in improving their living conditions, taking into account economic, social, and environmental issues. According to this viewpoint, it would thus be more important for the MFI to engage in positive strategies (UNEP-FI, 2007) to help clients upgrade to more environmentally-friendly practices. To reflect this position, we doubled the weight of Dimension 4 (Green Microcredit) and Dimension 5 (Non-financial Environmental Services) indicators.

The results from these robustness tests, displayed in Table 6, overall confirm the results of our first OLS regression. They indeed show the absence of significant relation between financial performance and environmental performance in all cases, confirming that MFIs with a better financial performance are not particularly likely to perform better in environmental management. Furthermore, robustness tests systematically reveal a positive and significant relation between age and environmental performance, confirming the hypothesis that more mature MFIs tend to have a better environmental performance. Results regarding size and legal status are a bit more ambiguous. Size becomes a significant variable when Number of Active Borrowers is replaced by Gross Loan portfolio or Assets (OLS 2 and 3) or when Positive MEPI is used as the dependent variable (OLS 8). These variations are not inconsistent with our previous findings, since we had identified that larger MFIs perform better in some specific dimensions of environmental performance. Small changes in model specification reveal that the relationship between size and environmental performance might be positive and significant at the global level as well. As for legal status, most of our regressions confirm that MFIs registered as banks perform better in environmental performance, except for OLS 2 and 3

Table 6. Robustness tests for Global MEPI
(OLS regressions)

		OLS 2	OLS 3	OLS 4	OLS 5	OLS 6	OLS 7	OLS 8
Dependent variable		*MEPI*	*MEPI*	*MEPI*	*MEPI*	*Minimalist MEPI*	*Defensive MEPI*	*Positive MEPI*
Robustness test		*(Gross Loan Portfolio)*	*(Assets)*	*(ROA)*	*(AGE^2)*			
Size	**Nb of active borrowers**	-	-	0.125	0.138	0.098	0.121	**0.164***
	Gross Loan Portfolio	**0.323*** **	-	-	-	-	-	-
	Assets	-	**0.349*** **	-	-	-	-	-
Financial performance	**OSS**	0.077	0.083	-	0.065	0.043	0.048	0.066
	ROA	-	-	-0.005	-	-	-	-
Maturity	**Age**	**0.185***	**0.246** **	**0.240** **	**0.544***	**0.190***	**0.235** **	**0.201***
	Age^2	-	-	-	-0.349	-	-	-
Legal status	**BANK**	0.120	0.109	**0.281*** **	**0.243** **	**0.265** **	**0.234** **	**0.254** **
	COOP	**-0.159***	-0.120	-0.115	-0.116	-0.141	-0.146	-0.145
	NBFI	0.030	0.047	0.102	0.081	0.108	0.029	0.087
Control variable: Region	**AFRICA**	0.140	0.194*	0.090	0.119	0.015	0.096	0.123
	ASIA	**0.241** **	**0.270*** **	**0.211** **	**0.223** **	0.108	**0.249** **	**0.204** **
	EECA	0.144	0.166	0.140	0.159	0.067	0.159	**0.197***
	MENA	0.010	0.056	0.040	0.025	-0.032	0.034	0.042
Other control variables	**International origin**	0.070	0.061	0.045	0.064	0.033	0.042	0.103
	Rural clients	0.086	0.060	0.055	0.042	-0.004	0.093	0.053
	Average loan size / GNI per capita	0.072	0.039	0.119	0.152	0.121	0.076	**0.192***
	Non-financial services	0.103	0.100	0.135	0.139	**0.205** **	0.140	0.149
	PAR30	-0.092	-0.048	-0.027	-0.081	-0.071	-0.057	-0.108
	R^2	*0.302*	*0.320*	*0.242*	*0.262*	*0.220*	*0.283*	*0.240*

*p<0.10; **p<0.05; ***p<0.01 (Standardized coefficients)

(where Number of Active Borrowers is replaced by Gross Loan portfolio or Assets). Annex 4 however indicates a positive, significant, and rather strong correlation between Bank status and Gross Loan portfolio, as well as between Bank and Assets. This may explain why Bank does not appear as a significant variable in regressions where size does (OLS 2 and 3). However, these variations do not question our overall findings regarding legal status, which on the whole remain robust.

5. Conclusion

This article sought to identify the characteristics of microfinance institutions active in environmental management. More particularly, we assessed whether the environmental bottom line only concerns larger, profitable, mature, and regulated MFIs. Our key findings first show that size is positively associated with environmental performance for some specific dimensions: larger MFIs indeed tend to perform better in environmental policy, ecological footprint, and environmental risk assessment. Second, we find that financial performance is not significantly related to environmental performance in our sample, suggesting that MFIs willing to go 'green' might be able to secure external funding from donors. Third, we identify a positive relation between age and environmental performance, with more mature MFIs performing better globally. Finally, our results reveal that MFIs registered as banks are more likely to have a better environmental performance, in particular for the Environmental Policy and Environmental Risk Assessment dimensions.

When interpreting these results in the light of the different strategies adopted by 'green' MFIs, we notice that larger MFIs, which are more visible and therefore subject to greater pressures from stakeholder groups, tend to opt for defensive strategies that will give a positive signal to their stakeholders, such as the adoption of an environmental policy, the use of an exclusion list, or the screening of loans along environmental criteria. These are also the strategies adopted by MFIs registered as banks. The latter are more under the scrutiny of environmental regulations and therefore tend to adopt strategies that will also give the right signal on their willingness to comply with regulatory requirements.

For more positive strategies, such as the provision of green microcredit or environmental non-financial services, we would have expected financial performance and size to be significant predictors of environmental performance. Indeed, these strategies imply higher upfront costs and may bring better return on investment to large MFIs benefiting from scale economies. However, our results did not show any significant relation with size and financial performance. We rather identified age as a determinant factor, with more mature MFIs being more likely to offer green microcredit and environmental non-financial services. This suggests that younger MFIs may not be in a position to develop such environmental products and services because they first have priorities in terms of growth and financial sustainability. On the other hand, in line with Elsayed & Paton (2007)'s framework, mature MFIs may have the slack resources to invest in these positive and more innovative strategies, not only in terms of financial resources, but also in terms of time, priority, and human resources. We furthermore identified that MFIs with a NGO status and MFIs active in rural areas are more likely to

develop environmental non-financial services. These results suggest that social mission may be influent in the decision to go green through a 'Microfinance Plus' approach.

Building on our findings, donors willing to promote environmental management within MFIs could play a key role by providing the financial support that has already helped pioneer MFIs, whatever their financial performance is, to engage in green microfinance. Additionally, they would have a key role to play in supporting less mature MFIs, which lack the time and human resources to develop environmental management programs, through the provision of technical assistance. Beyond pressures to comply with basic environmental requirements, donors could thus play a more active role to support the development of adapted green microcredit and environmental non-financial services.

A limitation of this study is that we rely on cross-sectional data only. However, it is the first empirical paper dedicated to MFIs' environmental performance and therefore still provides useful insights to understand some of the drivers and barriers to MFI's involvement in environmental management. Further research could focus on collecting additional information in order to constitute panel data, which would allow us to control for unobservable firm-specific effects and refine our analysis on the characteristics of 'green' MFIs.

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Annex

Annex 1. Microfinance Environmental Performance Index (MEPI)

1. ENVIRONMENTAL POLICY		4
MISSION / VISION / VALUES	Environmental protection mentioned in the official vision, mission, or values	1
ENVIRONMENTAL POLICY	Formal policy on environmental responsibility	1
ENVIRONMENTAL MANAGER	A person appointed to manage environmental issues	1
INCENTIVES	Incentive system to encourage employees to take into account specific environmental objectives	1

2. ECOLOGICAL FOOTPRINT		4
CARBON AUDIT	Previous realization of a carbon audit	1
FOOTPRINT OBJECTIVES	Specific objectives to reduce ecological footprint (e.g.: reduction in energy consumption, carbon emissions, waste, etc.)	1
STAFF AWARENESS	Toolkits to raise employees' awareness of good practices in paper, water, and energy consumption, transportation, waste management, etc.	1
REPORTING	Inclusion of environmental performance indicators in annual report (paper, water, and energy consumption, etc.)	1

3. ENVIRONMENTAL RISKS ASSESSMENT		4
EXCLUSION LIST	Use of an environmental exclusion list	1
SCREENING TOOLS	Use of specific toolkits to evaluate the environmental risks of clients' activities	1
STAFF TRAINING	Training module to teach loan officers how to evaluate the environmental risks of their clients' activities	1
MIS	Inclusion of indicators into Monitoring and Information System (MIS) to track the environmental performance of clients	1

4. GREEN MICROCREDIT		4
RE&EE LOANS	Provision of credits to promote access to renewable energy or energy efficient technologies (RE&EE)	2
GREEN IGAs LOANS	Provision of loans with reduced interest rates to promote the development of environmentally-friendly activities	2

5. ENVIRONMENTAL NON-FINANCIAL SERVICES		4
CLIENT CHART	Environmental chart to be signed by clients	1
CLIENT AWARENESS	Programs to raise clients' awareness on environmental risks	1
PROMOTION ACTION	Organization of actions to promote environmentally-friendly microenterprises	1
CLIENT TRAINING	Training and other services to support clients who want to develop environmentally-friendly activities	1

Source: Allet (2012a)

Annex 2. Descriptive statistics

	Number of observations	Minimum	Maximum	Mean	Standard error
Global MEPI	**160**	**0**	**18**	**4.14**	**3.89**
Dimension 1. Environmental Policy	160	0	4	1.02	1.14
Dimension 2. Ecological Footprint	160	0	4	0.84	1.00
Dimension 3. Environmental Risks Assessment	160	0	4	0.81	1.04
Dimension 4. Green Microcredit	160	0	4	0.75	1.30
Dimension 5. Environmental non-financial services	160	0	4	0.72	1.06
Number of active borrowers	147	448	2 500 000	104 476	316 798
Operational Self Sufficiency (OSS) (%)	140	55.86	271.40	115.15	24.49
Age (years)	158	3	49	15.41	7.63
BANK	159	0	1	0.09	0.28
COOP – Cooperatives	159	0	1	0.12	0.33
NBFI – Non Bank Financial Institutions	159	0	1	0.35	0.48
NGO – Non Governmental Organizations	159	0	1	0.45	0.50
AFRICA	160	0	1	0.21	0.41
ASIA	160	0	1	0.20	0.40
EECA – Eastern Europe and Central Asia	160	0	1	0.18	0.38
LAM – Latin America	160	0	1	0.34	0.48
MENA – Middle East and North Africa	160	0	1	0.08	0.26
International origin	158	0	1	0.49	0.50
Rural clients out of number of active clients (%)	131	0	100	50	33
Average loan size / GNI per capita (%)	146	3	408	55	72
Non-financial services	160	0	1	0.74	0.44
Portfolio at Risk at 30 days (PAR30) (%)	140	0	37.78	5.16	5.65
EPI 2010 – Yale Environmental Performance Index	157	32.10	86.40	56.09	11.62

Annex 3. Correlations between environmental performance and determinant variables

(Pearson correlation coefficients, bilateral tests)

		Global MEPI	Dimension 1. Environmental policy	Dimension 2. Ecological footprint	Dimension 3. Environmental risks assessment	Dimension 4. Green microcredit	Dimension 5. Environmental non-financial services
Size	Nb of active borrowers	.142*	.113	.085	.092	.071	.143*
	Gross Loan Portfolio	**.356***	**.373***	**.308***	**.286***	.123	**.195**
	Assets	**.374***	**.397***	**.324***	**.299***	.128	**.201**
Financial performance	OSS	.137	.146*	.082	.147*	.002	.118
	ROA	.046	.107	.039	.041	-.029	.015
Maturity	Age	.081	.101	.106	-.101	.039	.142*
Legal status	BANK	**.233***	**.289***	**.180**	**.227***	.093	.039
	COOP	-.039	-.004	-.041	**-.157**	.025	.023
	NBFI	-.001	-.031	.044	.119	.005	-.135*
	NGO	-.106	-.132*	-.118	-.141*	-.074	.091
Control variable: Region	AFRICA	-.115	-.131*	**-.168**	-.072	-.033	-.011
	ASIA	**.195**	.102	.000	**.181**	.144*	**.252***
	EECA	.034	.036	-.060	**.194**	.013	-.064
	LAM	-.068	.000	**.219***	**-.224***	-.073	-.144*
	MENA	-.047	-.005	-.051	-.040	-.055	-.014
Other control variables	International origin	.009	.028	-.027	**.198**	-.012	**-.153**
	Rural clients	.094	.036	-.109	.019	.145*	**.228***
	Average loan size / GNI per capita	.137*	**.233***	.128	**.233***	-.065	-.029
	Non-financial services	.085	.073	.109	-.120	.118	.101
	PAR30	-.053	-.119	-.014	-.053	-.019	.027

*p<0.10; **p<0.05; ***p<0.01

Annex 4. Correlation matrix of explanatory variables

(Pearson correlation coefficients, bilateral tests)

	RURAL	AFRICA	ASIA	EECA	LAM	MENA	INT'L	BANK	COOP	NBFI	NGO	ACTV BRWR	GROSS LN PORTF	ASSET	OSS	ROA	PAR30	AVRG LOAN	NFIN SERV	EPI 2010	AGE
RURAL	1																				
AFRICA	-.106	1																			
ASIA	.203**	-.255***	1																		
EECA	.108	-.235***	-.230***	1																	
LAM	-.119	-.369***	-.362***	-.333***	1																
MENA	-.112	-.145*	-.142*	-.131*	-.206***	1															
INT'L	.076	.022	.105	.105	-.057	.051	1														
BANK	-.223**	-.050	-.041	.089	.054	-.089	.004	1													
COOP	-.105	.242***	-.132*	-.069	.017	-.105	-.054	-.114	1												
NBFI	.133	-.242***	.143*	.219***	-.056	-.058	.063	-.226***	-.268***	1											
NGO	.067	.102	-.027	-.216***	.012	.174**	-.027	-.279***	-.331***	.653***	1										
ACTVBRWR	.061	-.083	.316**	-.123	-.073	-.042	-.183**	.136*	-.081	.070	-.097	1									
GROSSLN-PORTF	-.146*	-.179**	.003	.003	.117	.007	-.093	.440***	.001	.019	-.258***	.434***	1								
ASSET	-.154*	-.173**	.004	.046	.122	-.040	-.062	.502***	-0.20	.012	-.276***	.394***	.990***	1							
OSS	-.022	-.119	.053	-.083	-.028	.249***	-.036	.086	-.137	.029	.004	.131	.046	.048	1						
ROA	.011	-.066	-.049	-.054	.064	.125	.019	.067	-.127	.073	-.029	.190**	.047	.022	.823***	1					
PAR30	-.010	.106	-.127	.054	-.039	.028	-.143*	-.142*	.069	.056	-.013	.131	.105	.064	-.311***	-.273***	1				
AVRGLOAN	-.253***	.148*	-.086	.022	.001	-.106	.026	.271***	.244***	-.072	-.235***	-.129	.256***	.296***	-.058	-.095	.094	1			
NFINSERV	.187**	.122	.115	-.333***	.003	.113	-.051	-.121	.129	-.176**	.154*	.154*	.053	.033	-.024	.017	-.020	-.185**	1		
EPI 2010	.002	-.500***	-.238***	.092	.502***	.087	-.121	.003	-.023	.003	.010	-.084	.014	.004	-.004	.058	.004	-.301***	.045	1	
AGE	-.043	.005	-.109	-.210***	.288***	-.062	-.276***	-.020	.205***	-.251***	.116	.086	.201**	.167**	.025	.023	.215**	.269***	.159*	.108	1

*p<0.10; **p<0.05; ***p<0.01