



Master's degree thesis in International Business

Shaping environmental responsiveness

The influence of national institutions on SMEs of varying sizes

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ABSTRACT

A growing recognition of the significant aggregate impact that SMEs have on the environment has fuelled research into the factors influencing their environmental responsiveness. Although previous studies have identified several important predictors at the level of the individual and the firm, much less is known about the influence of the institutional context. In this thesis, I address this shortcoming by exploring the relationship between several elements of the national institutional context and SMEs' adoption of environmental practices. Additionally, I extend previous research into the effects of firm size by arguing that the influence of the institutional context may not be the same for SMEs of different sizes. I research the influence of the institutional context on SMEs of varying sizes by using unique data for over 5000 SMEs originating from 14 European countries. The results of multiple ordinal logistic regression analyses show that SMEs operating in distinct institutional contexts vary significantly in their adoption of environmental practices. Moreover, the influence of certain national institutions differs for micro, small, and mediumsized firms. My findings point to the existence of a 'business case' for environmental responsiveness among SMEs, where this was previously only assumed to exist among large firms.

Key words: small and medium-sized enterprises, institutional theory, corporate social responsibility, environmental practice adoption, empirical research

Preface

This thesis was written as the completion of the master's specialisation in International Business at the Radboud University. Upon starting with my master's degree in IB at the beginning of September, a concern I had was the thesis project at the end of the year. I had completed the master's specialisation in Marketing at the Radboud University just a month earlier, which included the writing of a master's thesis as well. Although this project was for me the highlight of the year, I was in doubt as to whether I overestimated my motivation to start writing a new thesis 'from scratch'. However, right from the moment professor Saka-Helmhout and I first sat down to discuss the possibilities for me to conduct research under her supervision, I couldn't be more eager to start. She helped me tremendously by continuously asking critical questions, but even more important for me was the interest she took in my research and the enthusiasm with which she supervised it. I want to thank professor Saka-Helmhout for all this guidance, which inspired me to try and make the research something special.

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Introduction

The past couple of decades have seen the rise of corporate social responsibility (CSR) issues to the forefront of the agenda for many policy-makers, academics, and practitioners. Businesses are expected to move past their efforts to satisfy shareholders alone, and instead balance a multiplicity of interests of various stakeholders. Where multinational enterprises (MNEs) previously dominated the CSR literature, there has recently been a surge in academic attention to the CSR practices of small and medium-sized enterprises (SMEs). SMEs are defined as firms with a staff headcount less than 250, a maximum turnover of EUR 50 million, or a balance sheet total equal to or lower than EUR 43 million (EU Recommendation 361, 2003). In 2015, SMEs accounted for over 99% of all businesses in the European Union, employing around two-thirds of its inhabitants (European Commission, 2019). Moreover, they are often important players in local communities (Stoian & Gilman, 2017; Perrini, Russo, & Tencati, 2007). Therefore, they are crucial actors in developing a comprehensive understanding of the business world's engagement in CSR practices.

Due to the large body of research on the socially responsible practices of MNCs, several academics have been tempted to judge the practices of SMEs from the perspective of their larger counterparts (Sen & Cowley, 2013). However, as SMEs are not simply "little big companies" (Tilley, 2000), the theories and findings of this research on MNCs do not necessarily apply to their circumstances (Pedersen, 2009). SMEs differ from larger companies in critical ways, which emphasizes the need for a new body of research using a SME-tailored approach in order to understand their engagement in CSR (Russo & Perrini, 2010; Spence, 2007).

In line with these arguments, several academics propose that the inherent difference in size between SMEs and MNCs results in substantially different approaches of these firms to CSR-related issues (Williamson, Lynch-Wood, & Ramsay, 2006; Jenkins, 2004). *Size* in itself may refer to much more than merely a variation in employee headcount, as it has been shown to correlate with a firm's availability of resources (Dean, Brown, & Bamford, 1998), the nature of its stakeholder relationships (Darnall, Henriques, & Sadorsky, 2010), and its visibility in the society in which it operates (Etzion, 2007; Jiang & Bansal, 2003), among others. These size-related outcomes, in turn, influence the firm's attitude towards and engagement in CSR. As an example, stakeholder expectations regarding CSR may be perceived as a burden and a threat especially by SMEs (Morsing & Perrini, 2009; Stoian & Gilman, 2017), because their constraints on resources and capabilities make it impossible to meet these expectations without

losing their competitive edge (Maloni & Brown, 2006). On the other hand, there may also lie fruitful opportunities for SMEs in engaging in socially responsible practices, due to their embeddedness in local communities and the positive effects these have on financial performance and reputation building (Nejati, Quazi, Amran, & Hazlina Ahmad, 2017). In light of these seemingly opposite findings in the literature, it seems appropriate to adopt a perspective that focuses more on specific elements of SMEs and CSR.

Multiple of such perspectives can be taken to analyse SMEs' socially responsible behaviour. CSR is a broad concept, and is generally used as an umbrella term for socially responsible behaviours towards a multitude of stakeholders, such as employees, customers, the community, the marketplace and the environment (Campbell, 2007). Accordingly, the research on SMEs' involvement in socially responsible practices has focused both on general issues such as the motivation to engage in CSR (Kusyk & Lozano, 2007; Spence, 2007) and the outcomes of CSR on business performance (Nejati et al., 2017), as well as on more specific CSR practices such as SME engagement in environmental practices (Williamson, Lynch-Wood, & Ramsay, 2006). This last issue is an interesting avenue for research, since firms' environmental responsiveness is becoming an increasingly prominent matter in global policy-making. The UN decided on climate action as being one of its Sustainable Development Goals (UN Resolution 70/1), placing it firmly into the agenda of its member states. Consequently, firms are now more than ever being judged on their environmental performance.

Parallel to these societal developments, the academic literature has researched drivers of SMEs' environmental responsiveness on the individual, organisational, and institutional level (Soundararajan, Jamali, & Spence, 2018). A large body of academic literature has researched individual-level predictors, such as the owner-manager's beliefs, values, attitudes, and preferences (e.g. Rawlings, 2011), and organisational drivers such as the mission of the firm (e.g. Murillo & Lozano, 2006). However, in order to obtain a comprehensive image of the forces shaping SMEs' environmental responsiveness, a crucial element to consider is the institutional environment in which the firm operates. Institutional theory has been applied to explain larger firms' adoption of environmental practices (Campbell, 2007), and some initial efforts have been made to incorporate the influence of institutional pressures in explaining SMEs' environmental responsiveness in developing economies (Hamann, Smith, Tashman, & Marshall, 2017). However, a recent meta-analysis by Soundararajan, Jamali, and Spence (2018) indicates that large-scale empirical research into the influence of institutional pressures on SMEs' environmental practice adoption still appears to be lacking.

Research into the influence of such institutional pressures may therefore advance our knowledge on SMEs and their environmental practice adoption. However, similar to the arguments made by academics advocating distinct CSR research in the SME context, recent studies also propose that considering SMEs as a homogenous group may lead to overlooking important differences among these firms. Indeed, SMEs are not little big firms, but a medium-sized firm is not a scaled-up version of a small firm either (Preuss & Perschke, 2010). SMEs of varying sizes differ in their use of external capital and degree of local embeddedness (Preuss & Perschke, 2010), as well as in their availability of slack resources (Udayasankar, 2008). Combining the focus on institutional pressures with a view of SMEs that considers their underlying size-related differences may therefore contribute to creating a nuanced, context-sensitive approach to understanding their environmental responsiveness.

In conclusion, in spite of the recent contributions to the literature, there still remain interesting possibilities to contribute to the emerging theory of CSR in SMEs. This research aims to develop a better understanding of what drives SMEs to adopt environmental practices by looking into the influence of the institutional context, and examining whether this influence differs for SMEs of varying sizes. As such, this research addresses the following research questions:

(1) What is the influence of national institutions on SMEs' adoption of environmental practices?

(2) Does the influence of national institutions on SMEs' adoption of environmental practices vary according to the size of the SME?

By addressing these questions, this research contributes to the literature in several ways. First, studies on SMEs' engagement in CSR are mainly characterized by interpretative approaches and theory building, which strengthens the case for explanatory research that avoids the problems of generalizability (Stoian & Gilman, 2017). Second, by focusing on the influence of the institutional context among a large-scale sample, this research responds to the call by Soundararajan, Jamali, and Spence (2018) for more cross-national comparative studies that highlight the impact of different contextual environments on SMEs' engagement in CSR. Third, this thesis extends previous research into the effects of size-related organisational differences on CSR (e.g. Perrini, Russo, & Tencati, 2007) by looking into differences among firms *within* the SME category, instead of treating such firms as a homogenous group.

Research into this topic also offers valuable insights for policy-makers and managers in practice, since the environment is a critical component of CSR and sustainable development. Identifying specific areas of the institutional context that promote or impede SMEs' tendency to adopt environmental practices may help policy-makers to focus their attention to the areas of the institutional context that are currently most problematic. Furthermore, the insights of this research may improve managers' understanding of factors outside the boundaries of the firm influencing the SMEs' environmental responsiveness.

The remainder of this thesis is organised as follows. The next chapter reviews the literature on SMEs' engagement in CSR, with a specific focus on environmental practices. Building on previous research, this chapter presents the hypotheses of this research, which are illustrated in a conceptual model. Following this, the third chapter discusses the sample and methodology of this research. The subsequent chapter presents the results obtained from the analyses. Next, these results are interpreted and discussed in the light of previous literature. The final chapter provides concluding remarks, and discusses the main implications of this research. It also identifies the main limitations of this research, which are tied to promising avenues for further research.

Theoretical framework

This chapter starts off by discussing the prior literature and the previously used theoretical perspectives on SMEs and environmental practice adoption. Hereafter, institutional theory is introduced as the theoretical lens through which this research examines SMEs' environmental practice adoption. Subsequently, the literature examining the effects of firm size is discussed. The theoretical framework ends by visualizing the hypothesized relationships in a conceptual model.

2.1 Prior literature: SMEs and environmental practice adoption

The environment is one of the three pillars underpinning the development of socially responsible business practices (i.e. environment, economy, and society; Williamson, Lynch-Wood, & Ramsay, 2006). This research views environmental practices as "activities undertaken by firms aimed at reducing the impact of their operations and their products and services on the environment" (Hoogendoorn, Guerra, & Van der Zwan, 2015, pp. 760-761). Examples of such activities are saving water and energy, and the reuse of materials inside the company. Firms are increasingly expected to adopt such practices and thereby incorporate environmentally responsible elements in their way of doing business, instead of merely focusing on achieving economic objectives. Accordingly, policy-makers such as the European Union (EU) have spent considerable effort to spread the idea of environmental strategy throughout society, by means of numerous initiatives and the establishment of formal definitions of socially responsible practices (Perrini, 2006). Parallel to these societal developments, the management literature has also seen the rise of environmental practice adoption to the forefront of its research agenda. Significant academic attention has been paid to issues such as the factors influencing the adoption of environmental strategies, and the outcomes of such strategies on firms' financial performance (Aguinis & Glavas, 2012).

Traditionally, this academic attention has mainly focused on large corporations, in particular on MNEs (Preuss & Perschke, 2010). Although large corporations have a significant direct impact on the environment, the importance of understanding the environmental activities of SMEs cannot be understated. Several reasons can be given that warrant a research focus on SMEs. First, SMEs are the predominant organisational form, and normally constitute 95% of private-sector firms (Soundararajan, Jamali, & Spence, 2018; Quinn, 1997), generating nearly 65% of employment worldwide (Vázquez-Carrasco & López-Pérez, 2013). Therefore, discerning the conditions under which they may adopt environmental practices, and adjusting

policy-making accordingly, may result in tremendous improvements in the business contribution to sustainable development. Second, the predictors and outcomes of responsible practices may not be the same for SMEs and large corporations. Small firms have distinguishing characteristics pertaining to their size that may influence their socially responsible behaviour (Morsing & Perrini, 2009). In conclusion, it is crucial to focus on SMEs in order to develop a comprehensive understanding of firms' adoption of environmental practices. Academics increasingly acknowledge this fact, which has led to a surge in scientific research in the area in recent years (Soundararajan, Jamali, & Spence, 2018).

2.1.1 Theoretical perspectives

Multiple theoretical perspectives have been adopted to analyse SMEs' adoption of socially responsible behaviour. Since the turn of the 21st century, research into SMEs' socially responsible practices has adopted a strategic management orientation (Soundararajan, Jamali, & Spence, 2018), focusing on the relationship between strategic antecedents and outcomes of CSR adoption, such as firm growth (e.g. Stoian & Gilman, 2017) and financial performance (e.g. Jenkins, 2006). The enlightened self-interest model, stakeholder theory, and social capital theory are the dominant theoretical perspectives used for analysing SMEs' CSR activities.

The *enlightened self-interest model* is an ethical philosophy which states that one who acts in the interests of others, ultimately serves their own self-interest (Soundararajan, Jamali, & Spence, 2018). In that sense, socially responsible behaviour can be good for business through reputation gains or an improved societal standing (Keim, 1978). As an example, Besser (1999) found that among SMEs in small towns in Iowa, managers of firms involved in the community perceived their business to be significantly more successful than managers whose firms were hardly involved. Besser (1999) draws on the enlightened self-interest model to explain their socially responsible behaviour, by arguing that business support of the community will be 'rewarded' by that same community through their roles as, amongst others, customers.

Stakeholder theory suggests that a firm's financial performance is linked to the way in which it manages relationships with its various stakeholders (Donaldson & Preston, 1995; Freeman, 1984). Based on their own interests, stakeholders can pressure a firm into adopting environmental practices. Adopting such practices may then result in achieving external legitimacy, which in turn creates wealth and competitive advantages for the firm (Darnall, Henriques, & Sadorsky, 2010; Esty & Winston, 2006; Hart, 1995, 2005; Hart & Milstein, 2003). For example, several studies have pointed at the potential of microfinance institutions in promoting microenterprises' environmental strategies, since they are an important

stakeholder for these small firms and may help them overcome financial barriers to engaging in environmental initiatives (Blackman, 2006; Schuite & Pater, 2008).

Another stream of literature has argued that in the context of SMEs, instead of focusing on the role of stakeholders or the actions these firms undertake out of self-interest, it is more appropriate to focus on the concept of *social capital*. Social capital refers to the value that relationships and networks in the business environment, and the reciprocities that arise from them, can create for firms (Sen & Cowley, 2013). Because SMEs operate in more informal ways and in a more personal setting, trust, norms, and interpersonal relationships are argued to be more important for them than stakeholder pressures (Perrini, 2006). Likewise, Sen and Cowley (2013) suggested that for SMEs, participation in CSR is mainly about building relationships and networks with a wide range of actors, with a focus on the social capital these actors can create for their business.

These diverse theoretical perspectives are not mutually exclusive, and the argument has been presented that they may complement each other in explaining SMEs' socially responsible behaviour. As an example, Preuss & Perschke (2010) advocate the complementarity of stakeholder theory and social capital. The former represents an organisation-level approach to addressing stakeholder pressures on the firm, whereas the latter focuses more on the individual and their ties to other individuals within and beyond the organisation.

Although the use of these three theoretical perspectives has significantly furthered our knowledge on SMEs' engagement in CSR practices, there is a call for more research that can accommodate for the role of contextual influences (Soundararajan, Jamali, & Spence, 2018). Such research can provide a context-sensitive approach, looking beyond the level of the individual manager and the firm. In specific, institutional theory can help to gain such a nuanced understanding of SMEs' engagement in CSR across national contexts (Soundararajan, Jamali, & Spence, 2018). Laying the foundation for such research, the next section of this thesis introduces institutional theory and discusses its application with regard to SMEs and CSR.

2.2 Institutional theory

Institutional theory states that organisations are embedded within a broad set of political and economic institutions that enable and constrain certain parts of their behaviour (Campbell, 2007). North (1990, p. 97) defines such institutions as "the humanly devised constraints that structure political, economic, and social interaction." These comprise both informal institutions, such as traditions, and formal institutions, such as laws and regulations (North, 1990). Institutionalists acknowledge that institutions beyond the market are often necessary to

move firms to engage in socially responsible behaviour (Campbell, 2007; Scott, 2003). The institutional environment influences how the needs, expectations, and interests of stakeholders within that environment are conceptualized (Ioannou & Serafeim, 2012). Therefore, certain CSR practices are more likely to be adopted and be effective than others, depending on the institutional environment in which they are embedded.

In recent years, a handful of studies have taken the perspective of institutional theory to analyse SMEs and their socially responsible practices (Soundararajan, Jamali, & Spence, 2018), which are briefly reviewed below. These studies can be summarized under two broad headings: (1) studies that focus on how SMEs adopt CSR activities through institutional entrepreneurship in ambiguous institutional environments, and (2) studies focusing on the specific outcomes of certain institutional pressures. First, several studies conducted in developing and emerging country contexts focus on the role CSR plays in realising institutional entrepreneurship. Institutional entrepreneurship refers to the "activities of actors who have an interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing ones" (Maguire, Hardy, & Lawrence, 2004, p. 657). Egels-Zandén (2017) researches the case of a Swedish SME, which engaged in institutional entrepreneurship through the adoption of a particular CSR activity: the payment of "living wages" to the workers of its Indian supplier. Living wages are commonly viewed as salaries able to cover a family's basic needs, such as the costs of nutritious foods, housing, clothing, education, and social security (Anker, 2011). Normally, the payment of such wages is rare and generally, firms engaging with it are driven by a Northern agenda focused mainly on reputation enhancements and limited involvement of local actors. However, several SME peculiarities make them particularly likely to adopt living wages and do so with limited Northern bias (Egels-Zandén, 2017). As an example, SMEs form stakeholder relationships on a more trusting, informal basis (Jenkins, 2004; Russo & Perrini, 2010), which was reflected in the way that the Swedish SME let the Indian supplier calculate and implement the living wages. A different perspective is given by Soundararajan, Spence, and Rees (2016), who find that SMEs can also actively evade institutional pressures for the adoption of CSR practices, in the case of their research being pressures for improved working conditions. This makes the influence of institutions on SMEs' adoption of responsible practices not as straightforward as previously assumed. Similarly, Jamali, Lund-Thomsen, and Khara (2017) find that SMEs can be selective in which CSR issues to respond to, with highly visible CSR issues often being the preferred ones to address because of their possibility to enhance the firm's reputation.

Second, other studies focus on the outcomes of certain institutional pressures on SMEs' CSR adoption. Carrigan, McEachern, Moraes, and Bosangit (2017) analyse the effects of institutional pressures on the embedding of socially responsible behaviour of SMEs specifically in the fine jewellery industry. El Baz, Laguir, Marais, and Staglianò (2016) show how differences in the institutional environments of France and Morocco result in differences in SMEs' CSR adoption in these countries. The focus on the institutional context is combined with an individual-level perspective by Roxas and Coetzer (2012), who research how the institutional context influences the attitudes of SME managers toward the natural environment. These managerial attitudes in turn affect the environmental sustainability orientation of the firm.

In summary, prior work taking the perspective of institutional theory has furthered our understanding of SMEs' CSR activities and institutional entrepreneurship, and ways in which national institutional contexts may influence SMEs' CSR engagement. However, what appears to be lacking are cross-national comparative studies that focus on the differential influences of varying contextual environments on SMEs' engagement in socially responsible practices (Soundararajan, Jamali, & Spence, 2018). To fill this gap in our understanding, this study explores the influence of critical elements of the national institutional context. The focus on these institutional elements is not arbitrary, but based on several studies that have identified that a few key institutions are critical for firms' socially responsible behaviour, and that of SMEs in particular, because of the ways these impact the relationship between the firm and its primary stakeholders (Campbell, 2007; Ioannou & Serafeim, 2012; Preuss & Perschke, 2010; Darnall, Henriques, & Sadorsky, 2010). This thesis looks into the influence of laws and regulations regarding competition and the protection of shareholder interests, environmental legislation, the availability of skilled labour, and the strength of labour unions. The following section discusses the influence of these national institutions and presents hypotheses on their relationship with SMEs' adoption of environmental practices.

2.3 The influence of national institutions

Based on institutional theory, this section discusses the influence of national institutions, specifically laws and regulations regarding competition and shareholder protection, environmental legislation, the availability of skilled labour, and union strength, on SMEs' environmental responsiveness.

2.3.1 Laws and regulations regarding competition

An important element of the institutional context in which SMEs operate is the degree to which the state interferes in the economy. States differ in the ways that they regulate a market's boundaries, entry and exit, and constrain the activities of economic actors (Ioannou & Serafeim, 2012). A particularly important area of state intervention for SMEs regards the laws and regulations the state imposes regarding competition within a country. Competition-promoting laws and regulations ultimately aim to reach higher levels of allocative efficiency, higher rates of innovation, and in total a greater societal welfare (Ioannou & Serafeim, 2012; Porter, 1985). Despite the positive effects these laws and regulations may have for society at large, the logical result for firms in general is a reduction in profit margin, which may subsequently influence their ability to invest in environmental practices (Campbell, 2007; Ioannou & Serafeim, 2012).

An increase in laws and regulations promoting competition will result in a decrease in SMEs' adoption of environmental practices, because of two reasons. First, as a result of these regulations, SMEs will have lower profit margins, which leaves them with lower slack resources. Slack resources have been shown to be crucial to engage with responsible practices (Cardon & Stevens, 2004). For SMEs, who are traditionally resource constrained, a reduction in slack resources as a result of increased competitive pressures may be a major hurdle to engaging in environmentally friendly practices. Increased competition will thus lower their environmental responsiveness through their reduced ability to spend resources on such practices (Campbell, 2007; Waddock & Graves, 1997). Second, under conditions of increasing competition firms will be more likely to 'cut corners' in trying to ensure their survival, and therefore they will be more likely to engage in socially irresponsible practices (Campbell, 2007). Firms operating in highly competitive environments have been shown to engage in a variety of socially irresponsible practices, such as compromising the safety of their products, and employment of sweated labour (Campbell, 2007). Building on these arguments, I argue that in countries where competition is promoted by laws and regulations, SMEs are less likely to adopt environmental practices.

Hypothesis 1: There is a negative relationship between the presence of laws and regulations that promote higher levels of competition, and SMEs' adoption of environmental practices.

2.3.2 Laws and regulations regarding shareholder protection

States can further influence a firm's environmental responsiveness through the laws and

regulations they invoke regarding the protection of shareholders. Such laws and regulations protect shareholders from actions undertaken by corporate insiders that do not necessarily meet the interests of shareholders, but more so the interests of other stakeholders or the firm itself. For example, research has shown that insiders may induce an organisation to over-invest in CSR initiatives, when they themselves bear little of the costs of engaging in these activities (Barnea & Rubin, 2010). In such cases, undertaking CSR may be primarily driven by managerial utility considerations, such as the satisfaction of personal or moral motives by a manager, instead of it being done to enhance shareholder value (Ioannou & Serafeim, 2012). Other research shows that shareholder value creation may not automatically go hand in hand with firms' socially responsible behaviour. The recent introduction of laws and regulations in India, forcing firms to spend at least 2% of their net income on CSR, has resulted in an average 4.1% drop in stock prices for Indian firms subject to these regulatory pressures (Manchiraju & Rajgopal, 2017). Similarly, the avoidance of "sin" industries or nuclear energy sources in the value chain has been shown to have a negative effect on shareholder value creation (Hillman & Keim, 2001).

The state can therefore introduce laws and regulations that limit firms in investing in issues that are hurting shareholders' wealth. This is a typical feature of the neoclassical view, which states that the primary purpose of firms is to maximize shareholder value (Friedman, 1970). Any other investments that may benefit the interests of stakeholders other than shareholders, including those in CSR, can be seen as rent-seeking behaviour. Although scholars have argued that shareholders less important as a stakeholder for SMEs as for large firms (Russo & Perrini, 2010), research has shown that SMEs still see them as a key stakeholder with regard to CSR (Jenkins, 2006). Consistent with the empirical evidence and reasoning above, I predict that SMEs operating in countries in which the state imposes more laws and regulations protecting the interests of shareholders will be less inclined to invest in issues affecting other stakeholders, including the environment.

Hypothesis 2: There is a negative relationship between the presence of laws and regulations that promote higher levels of shareholder protection, and SMEs' adoption of environmental practices.

2.3.3 Environmental legislation

Whereas the aforementioned legislative instruments may influence SMEs' environmental responsiveness indirectly, the actual environmental legislation in a country directly addresses

firms' environmentally responsible behaviour. The past couple of decades have seen a continuing increase in the amount of environmental regulations (United Nations, 2019), showing the faith governments put in regulations to influence firms' environmental responsiveness. Such regulations may exert significant pressures on firms, through their ability to influence the firm's license to operate, or to enforce penalties following non-compliance (Hoogendoorn, Guerra, & Van der Zwan, 2015). Consistent with these arguments, a number of studies have shown environmental legislation to be a key driver for environmental initiatives for firms in general (Dechant & Altman, 1994; Henriques & Sadorsky, 1996) and for SMEs in specific (Williamson, Lynch-Wood, & Ramsay, 2006; Darnall, Henriques, & Sadorsky, 2010; Hoogendoorn, Guerra, & Van der Zwan, 2015). A qualitative study among SMEs in the United Kingdom's manufacturing industry showed that these firms' environmental initiatives were principally aimed at complying with the country's environmental legislation, mainly because of the potential financial penalties that would be incurred in the case of non-compliance (Williamson, Lynch-Wood, & Ramsay, 2006).

Environmental legislation has thus been shown to matter significantly. However, it is important to take the areas of organisational behaviour on which such legislation focuses into account. Research has found that most laws and regulations on the subject of environmentally responsible practices focus on operational processes, such as means and performance standards, environmental taxes and emission trading, information disclosure, and management-based regulation (Coglianese & Anderson, 2012; Hoogendoorn, Guerra, & Van der Zwan, 2015). Considering that this research views environmental practices as the activities SMEs undertake to reduce the impact of their operations, I expect that environmental legislation may be an especially important predictor of SMEs' environmental responsiveness.

Hypothesis 3: There is a positive relationship between the stringency of a country's environmental legislation, and SMEs' adoption of environmental practices.

2.3.4 The availability of skilled labour

Employees are one of the firm's primary stakeholders (Freeman, Harrison, & Wicks, 2007). SMEs are more locally embedded and rely more on the local labour market to recruit employees than MNEs, who may source highly skilled employees from other areas as well (Preuss & Perschke, 2010). Therefore, for SMEs, the availability of skilled labour as brought forth by the educational system of the country is a particularly relevant element of the institutional context.

According to signalling theory and social identity theory, firms can use their environmental activities as a tool to attract highly skilled employees (Ioannou & Serafeim, 2012; Greening and Turban, 2000). Signalling theory suggests that potential employees do not have complete information about the firm, and therefore instead use 'signals' that they receive to judge an organisation's working conditions (Breaugh, 1992; Rynes, 1991). A firm's environmental activities may serve as a signal on the values and beliefs of the firm, making them more attractive for prospective employees (Greening & Turban, 2000). Social identity theory further argues that a highly environmentally responsive firm may be viewed as an attractive employee because of the expected enhancements in self-image that potential employees may get (Greening & Turban, 2000; Ashforth & Mael, 1989; Dutton, Dukerich, & Harquail, 1994).

In the context of SMEs, these theories are supported by studies that find evidence for a positive relationship between SMEs' CSR activities and their reputation and public image (Fuller & Tian, 2006; Jenkins, 2006). Corresponding to social identity theory, Worthington, Ram, and Jones (2006) found that the conducting of responsible practices by Asian SMEs resulted in improvements in employees' loyalty, commitment, and motivation. SMEs' CSR practices have been shown not only to positively influence current employees' attitudes towards the firm, but also those of potential recruits (Perrini, Russo, & Tencati, 2007; Jenkins, 2006).

Therefore, an SME can use its environmental responsiveness as a competitive advantage to attract high-quality employees. Although social identity theory dictates that SMEs may benefit from a good reputation regardless of whether skilled labour is abundant or scarce, SMEs operating in a context characterized by a scarcity of skilled labour may be even more incentivized to invest in environmental practices. They may use their environmental responsiveness to distinguish themselves from other firms competing for highly skilled employees. This makes SMEs' environmental responsiveness inversely related to the availability of skilled labour in a country.

Hypothesis 4: There is a negative relationship between the availability of skilled labour in a country, and SMEs' adoption of environmental practices.

2.3.5 Union strength

Employees' status as a primary stakeholder makes the labour unions representing their interests an important stakeholder for the firm as well (Ioannou & Serafeim, 2012). Although few studies

have examined employee-related drivers of SMEs' environmental responsiveness (Soundararajan, Jamali, & Spence, 2018), employees' environmental concerns have been shown to be a crucial factor for SMEs' in implementing environmental management systems (McKeiver & Gadenne, 2005). Labour unions have the potential to amplify these concerns, making the adoption of environmental practices more likely. Spence, Jeurissen, and Rutherfoord (2000) also point to the role of labour unions as an intermediate organisation between the government and SMEs. Unions can facilitate dialogue and negotiation between these two actors, who sometimes may have conflicting interests. This enables the development of environmental objectives for SMEs that are concrete and attainable (Spence, Jeurissen, & Rutherfoord, 2000).

On the other hand, labour unions may also pose constraints on firm's resources, by emphasizing the needs of employees and thereby shifting away the attention from environmental issues. However, this assumes an unrealistic trade-off between stakeholder interests, since it is unlikely that employees are concerned only with their own interests and not with issues associated with the local community or the environment (Ioannou & Serafeim, 2012). Consequently, I argue that the union strength within a country is positively associated with SMEs' environmental responsiveness.

Hypothesis 5: There is a positive relationship between union strength and SMEs' adoption of environmental practices.

By testing the hypotheses mentioned above, this study explores the effects of several key elements of the institutional context in which SMEs operate. Additionally, I propose that the effects of these institutions may not be the same for every firm. While "variation in socially responsible behaviour is probably associated with sticks and carrots ... [institutions] provide to constrain and enable such behaviour" (Campbell, 2007, p. 952), these sticks and carrots may appeal differently to various kinds of SMEs. Aside from the institutional context, firm-level predictors of SMEs' engagement in socially responsible practices have been shown to matter significantly as well (Soundararajan, Jamali, and Spence, 2018). Accordingly, scholars have called for research looking into the interaction effects between these firm-level predictors and drivers on the institutional level (Ioannou & Serafeim, 2012). While it is beyond the scope of this research to consider all such possible interactions, I focus my attention to a specific firm-level characteristic that may play an interesting role: *firm size*. The next section discusses the

role firm size may play with regard to the influence of national institutions on SMEs' adoption of environmental practices.

2.4 Firm size

Conventional wisdom regarding firms' environmental responsiveness indicates that larger firms are more environmentally responsive (Darnall, Henriques, & Sadorsky, 2010). As an example, Bowen (2000) conducted a review of academic research on firms' environmental responsiveness while controlling for size, and found that 9 out of 10 studies found a positive relationship between firm size and environmental performance. However, size in itself may not be the determining factor, and instead be indicative of more complex phenomena that ultimately influence firms' environmental responsiveness (Etzion, 2007).

Several explanations have been given for the positive relationship between firm size and engagement in environmental practices. Larger firms have greater societal visibility, which may intensify stakeholder requests for their adoption of environmentally sound practices (Etzion, 2007; Bowen, 2002; Jiang & Bansal, 2003). Further, larger firms have greater access to resources, and generally have greater slack resources, which increases the firm's possibilities to invest in the environment (Etzion, 2007; Darnall, Henriques, & Sadorsky, 2010). By contrast, research has also proposed several features of larger firms that may impede their environmental responsiveness. Larger firms are known to be more rigid, in the sense that they employ more standard operating procedures, which may impede local initiative and may negatively affect environmental responsiveness (Etzion, 2007; King & Shaver, 2001).

In conclusion, although the research on firm size and environmental responsiveness has generally found evidence for a positive relationship between these two variables, scholars have also pointed to features of larger firms that may impede their environmental responsiveness. This makes it an interesting feature to examine in conjunction with other influences on SMEs' environmental responsiveness, such as institutional pressures (Darnall, Henriques, & Sadorsky, 2010; Bowen, 2002).

2.4.1 Firm size within the SME category

SMEs can be distinguished in micro (less than 10 employees), small (less than 50 employees), and medium-sized (less than 250 employees) firms (EU Recommendation 361, 2003). Traditionally, research looking into the effects of firm size in the context of SMEs has focused on the differences between large corporations and SMEs (e.g. Perrini, Russo, & Tencati, 2007). In line with Hoogendoorn, Guerra, and Van der Zwan (2015) and Uhlaner, Berent-Braun,

Jeurissen, and De Wit (2012), I contend that differences in firm size may also play a significant role *within* the SME category. Although the majority of research has contrasted SMEs with larger firms, I still expect these findings to be to a certain extent applicable to size differences within the SME category. Larger SMEs will naturally possess more similar characteristics with large firms than smaller SMEs do (Uhlaner et al., 2012), even though this size effect may be less pronounced as the upper end of the range is sharply attenuated.

Several studies looked into the effects of size differences within the SME category and their relation with the adoption of environmental practices. These studies serve excellently to further tailor the theoretical basis for the interaction effects hypothesized in this research. Hoogendoorn, Guerra, and Van der Zwan (2015) empirically tested the relationship between SME size and their engagement in greening processes in a large-scale sample in the EU. They found that these environmental practices are most likely to be conducted by small as opposed to micro and medium-sized firms, suggesting an inverted U-shaped relationship. By contrast, Uhlaner and colleagues (2012) found that medium-sized enterprises are significantly more likely than micro and small enterprises to engage in environmental management practices. However, they found this effect to be indirect, which warrants the use of a careful deliberation of the specific characteristics that SMEs have pertaining to their size. This result contrasts with the reasoning of Udayasankar (2008), who proposes that because of differences in their visibility, resource access, and scale of operations, medium-sized firms, as opposed to small and large firms, will be the least motivated to participate in CSR.

Conclusively, the research on the environmental responsiveness of SMEs of varying sizes has yielded inconsistent results, significantly more so than the research contrasting large firms with SMEs. Researching the effects of SME size in conjunction with the institutional context may further our understanding in this area.

2.5 SME size and the influence of national institutions

In order to investigate whether SME size interacts with the influence of the institutional environment, the next section presents my hypotheses on the influence that the aforementioned elements of the institutional context have on the environmental practice adoption of SMEs of varying sizes.

2.5.1 SME size and laws and regulations regarding competition

Laws and regulations regarding competition may influence SMEs' environmental responsiveness through the resource constraints they impose. The razor-thin profit margins that

arise due to high levels of competition may have a more negative effect on the environmental responsiveness of smaller SMEs. Smaller SMEs are traditionally resource-constrained, and therefore a cut in their profits may hit them especially hard (Preuss & Perschke, 2010). They have low slack resources, which is known to be detrimental to environmental performance (Etzion, 2007). Because of this limited access to resources, increasing levels of competition may result in a direct threat to the survival of the firm. This will cause other issues to predominate the minds of management, and a shift of resources towards improving the firm's financial rather than its environmental performance (Henriques & Sadorsky, 1996). On the contrary, in line with the resource-based view of the firm, larger SMEs traditionally have more financial resources, and therefore are able to invest more in CSR (Uhlaner et al., 2012). Their relatively high slack resources make larger SMEs able to absorb the shocks of change or business downturns more easily (Schiffer & Weder, 2001). In conclusion, for smaller SMEs, the effects of competition may lead more quickly to a shift of focus in their resources, away from investments in environmental practices.

Hypothesis 6: Firm size moderates the relationship between the presence of laws and regulations that promote higher levels of competition, and SMEs' adoption of environmental practices, such that the relationship is stronger for smaller SMEs.

2.5.2 SME size and laws and regulations regarding shareholder protection

When shareholder protection is high, this will leave an SME less incentives to address the interests of other stakeholders, which may reduce their environmental responsiveness. However, the degree to which an SME is inclined to abandon the interests of certain stakeholders in favour of those of shareholders may differ according to the size of the firm. Smaller firms have been shown to be more responsive to diverse stakeholder pressures (Darnall, Henriques, & Sadorsky, 2010). This can be explained by several characteristics these firms have pertaining to their smaller size. First, smaller firms face a *liability of smallness*, as they are associated with higher rates of failure, fewer resources, more managerial weaknesses, fewer support from creditors, and fewer well-established relationships with other external stakeholders as opposed to larger firms (Freeman, Carroll, & Hannan, 1983; Aldrich & Auster, 1986). Smaller firms will consequently more likely comply with the expectations of relevant stakeholders, because their liability of smallness makes legitimacy a crucial factor for the survival of the firm (Ivanova & Castellano, 2012). Second, because larger firms have less resource constraints, they are more likely to build up organisational slack which they can use

as a buffer against stakeholder pressures for environmental behaviour (Uhlaner et al., 2012; Bowen, 2002). Such buffers may be used to resist these pressures, by, for example, lobbying activities. On the contrary, smaller firms will not invest the scarce resources at their disposal in political activities resisting stakeholder pressures, but will more likely address the immediate environmental concern (Bowen, 2002). Third, because of their flattened organisational structure, smaller firms are less bureaucratic and have a more simplified decision-making process than larger firms (Preuss & Perschke, 2010). This simplified process may help these firms to communicate stakeholders' environmental concerns more simply up the organisational chain, informing managers or owners about these issues (Darnall, Henriques, & Sadorsky, 2010).

It follows, then, that while laws and regulations protecting shareholder interests may induce firms to shift their focus to shareholder wealth creation, these pressures may be less effective for smaller firms, who naturally distribute their responsiveness among a multitude of stakeholders. Therefore, for smaller SMEs, these laws and regulations may lead less quickly to an abandonment of environmental initiatives than for larger SMEs.

Hypothesis 7: Firm size moderates the relationship between the presence of laws and regulations that promote higher levels of shareholder protection, and SMEs' adoption of environmental practices, such that the relationship is weaker for smaller SMEs.

2.5.3 SME size and environmental legislation

Under the presence of highly stringent environmental legislative measures, an SME is expected to be more likely to adopt environmental practices. However, following an extensive amount of literature focusing on the asymmetrical impact of governmental regulation on firms of varying sizes, I propose that this effect is not consistently strong for SMEs of different sizes.

Opposing claims can be made with regard to the influence of regulatory pressures on SMEs of varying sizes. On the one hand, non-compliance with environmental legislation may pose a threat to a firm's reputation (Fuller & Tian, 2006). Since larger SMEs have greater societal visibility (Etzion, 2007), a negative reputation obtained through such non-compliance may result in more negative effects than it may for smaller SMEs. On the other hand, a firm's response to regulatory pressures may also depend on their access to resources. Larger firms, through their larger access to resources, may be more able to respond to regulatory pressures by investing in lobbying and litigation (Darnall, Henriques, & Sadorsky, 2010). By contrast, smaller, more resource-constrained firms may not have the resources to engage in these

activities. Furthermore, they are likely to perceive the threat of financial penalties associated with non-compliance to be greater than do more resourceful firms. In line with this argument, Darnall, Henriques, and Sadorsky (2010) find that smaller firms adopt significantly more environmental practices in response to regulatory pressures than larger firms.

Weighing the relevance of these two opposing arguments in the context of this research, I propose that for SMEs, resource constraints will predominate their reactions to regulatory pressures over reputation concerns. SMEs in general have been shown to be driven more by resource constraints than larger firms (Nisim & Benjamin, 2008). Furthermore, smaller firms are less concerned with their reputation than larger firms (Williamson, Lynch-Wood, & Ramsay, 2006), because they are less societally visible (Etzion, 2007). Considering that smaller SMEs are more resource constrained than larger SMEs, I expect that these firms will be more responsive to environmental legislation.

Hypothesis 8: Firm size moderates the relationship between the stringency of a country's environmental legislation, and SMEs' adoption of environmental practices, such that the relationship is stronger for smaller SMEs.

2.5.4 SME size and the availability of skilled labour

In an institutional context that is characterized by a scarcity of skilled labour, SMEs may be incentivized to use their environmental responsiveness as a tool to attract a high-quality workforce. However, research has shown that smaller firms may be less inclined to propagate their environmentally friendly behaviour. In a qualitative study of the perception and communication of CSR among SMEs in the United Kingdom, Jenkins (2006) found that smaller firms are sometimes uncomfortable with actively promoting and communicating their efforts for sustainable operations. They feel that this is something that belongs more to larger firms, since their environmental practices are often not driven by a desire to attract employees or improve their image, but more so by an ethical motive of the owner-manager. For smaller firms, attracting quality employees is therefore less of an incentive to be environmentally responsive than for larger firms.

Additionally, smaller firms are also expected to be less successful in using their environmental practices as a tool to attract high-quality employees. A major assumption that is made when arguing that a firm's environmental initiatives make it more attractive for potential recruits is that these initiatives are getting noticed. Research tells us that larger firms have more societal visibility, which increases the potential reputation benefits they may have due to the environmental activities they engage in (Etzion, 2007; Jiang & Bansal, 2003). Smaller firms are less likely to employ someone in a marketing or PR-related role, which makes effective communication of environmental initiatives less obvious (Jenkins, 2006). Moreover, smaller firms do not rely on structured managerial practices that aim to make the firm more attractive to potential recruits (Perrini, Russo, & Tencati, 2007). Their approach is more flexible, as opposed to the structured ways in which larger firms communicate with employees through emails and newsletters. This flexible approach has the downside that opportunities can be lost to promote the firm to potential employees (Perrini, Russo, & Tencati, 2007). In conclusion, smaller firms naturally have a lower inclination to use their environmental practices to attract employees, and their efforts to do so are expected to be less successful in comparison with larger firms. Therefore, I expect that a shortage of skilled labour will less likely lead to an increase in smaller SMEs' environmental responsiveness, in comparison with larger SMEs.

Hypothesis 9: Firm size moderates the relationship between the availability of skilled labour in a country, and SMEs' adoption of environmental practices, such that the relationship is weaker for smaller firms.

2.5.5 SME size and union strength

Labour unions are expected to be important actors in influencing SMEs' environmental responsiveness, through their role as representatives of employees' concerns, and as intermediate organisations between the government and SMEs. However, the influence of labour unions may differ for firms of varying sizes. Studies have found evidence of a lack of unionisation among smaller firms. In general, the degree of workers' union membership declines with decreasing firm size (ILO, 2018). Spence, Jeurissen, and Rutherfoord (2000) found that in the United Kingdom, unions struggled significantly more to find membership among smaller firms as opposed to larger firms. In Europe, union membership of SME workers is consistently lower than among the employees of large firms, and this is particularly so for very small firms (Moore, Jefferys, & Cours-Salies, 2007). Results from surveys in Italy, Bulgaria, France and the United Kingdom showed that membership among the employees of micro firms is the lowest, with it being slightly more common among small and medium-sized firms, although still far less than among workers of large firms (Moore, Jefferys, & Cours-Salies, 2007; ISTAT, 2000; Kirov & Stoeva, 2003; Forth, Bewley, & Bryson, 2006). An explanation for the lower membership among smaller firms is that in such firms, voicing your complaints is a high-risk strategy considering the proximity of employers and workers.

Expressing discontent may undermine workplace relationships (Moore, Jefferys, & Cours-Salies, 2007). Considering that the degree of unionisation is lower among smaller SMEs, I expect that the influence these unions can exert on their adoption of environmental practices will be more limited than among large firms.

Hypothesis 10: Firm size moderates the relationship between the level of power of labour unions, and SMEs' adoption of environmental practices, such that the relationship is weaker for smaller firms.

2.6 Conceptual model

The hypotheses introduced in the previous section are visually represented in a conceptual model (see Figure 1). The influence of the institutional context (on the left side of the figure) on SMEs' environmental practice adoption (on the right side of the figure) is moderated by the size of the SME (in the middle of the figure).



Figure 1 Conceptual model.

Methods

This chapter starts by discussing the sample among which the hypotheses are tested. Subsequently, the operationalization of the variables is discussed. Following this, I present my statistical approach to analyse the data. This chapter ends by discussing several important considerations regarding research ethics, as well as issues regarding the reliability and validity of the research.

3.1 Data source and sample

In order to research SMEs' environmental practice adoption, this research relies on the data from the Flash Eurobarometer survey on "SMEs, resource efficiency and green markets" (no. 456), conducted on behalf of the European Commission (2018). The advantage of using the data from the Flash Eurobarometer 456 is that it is the first large-scale database on SMEs' resource efficient practices, making it suitable for cross-national comparative research such as the present study. SMEs were defined as those firms with a staff headcount below 250. A firm additionally qualifies as an SME when it meets the turnover ceiling or balance sheet ceiling identified by the European Union (EU Recommendation 361, 2003), but for simplification purposes I adopt the staff headcount ceiling in this research. Firms with a staff headcount above 249 are therefore excluded from the dataset. Telephone interviews were carried out among 15.019 firms in the 28 Member States of the European Union (which as of 2017 still included the United Kingdom), and additionally the countries of Albania, the Former Yugoslav Republic of Macedonia, Montenegro, Serbia, Turkey, Iceland, Moldova, Norway and the United States. This research focuses on the countries within the EU28, because of sample constraints of the countries outside of the EU28 and the importance of investigating differences between the Member States of the European Union as a political entity. Deleting the firms according to the country and staff headcount criteria leaves the sample with 13.117 firms.

Several restrictions were encountered regarding the availability of country-level data on the independent variables. In the end, 14 EU countries had scores on all relevant variables, representing a total sample of 7.009 SMEs. These SMEs were equally spread over Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.

The survey was carried out by the TNS Political & Social network, between the 11th and the 27th of September 2017. TNS is the global leader in custom market research, and has been in charge of the fieldwork for standard Eurobarometer surveys since 2004. The

organisation has been in charge of the Flash Eurobarometer surveys since 2011, including other surveys on SMEs' resource efficiency conducted during that period (FL342 in 2012, FL381 in 2013, and FL426 in 2015). It therefore has experience in conducting such research and is a credible source of information. TNS used a centralized e-call centre to carry out the surveys.

Firms approached for the survey were randomly selected from an international business database, with some additional samples from local sources in countries where necessary, and were subdivided among dimensions of firm size (three categories: 1 - 9 employees, 10 - 49 employees, and 50 - 249 employees) and industry sector. The survey covers businesses employing one or more people that are active in the sectors manufacturing (NACE C), retail (NACE G), services (NACE H/I/J/K/L/M), and industry (NACE B/D/E/F). There were quotas applied to both firm size and the sector in which they operated, and adjusted when needed to ensure enough observations in each cell.

The data from the Flash Eurobarometer 456 dataset was combined with several other datasets containing information on country-level institutional pressures. The following section discusses the operationalization of the variables in this research, as well as the additional datasets used for their data on institutional pressures. The variable descriptions, as well as their measurement and data sources are displayed in Table 1.

3.2 Dependent variable: SMEs' environmental practice adoption

In order to measure SMEs' environmental practice adoption, I rely on the level of SMEs' investment in greening processes. Investments in greening processes are measured by SMEs' investments in optimizing the resource efficiency of their production process. This approach was used in other research by Hoogendoorn, Guerra, and Van der Zwan (2015) with an earlier version of the Flash Eurobarometer dataset (no. 342) that included the same variable. SMEs were asked to indicate the level of average investment in resource efficient practices per year over the past two years, as part of their annual turnover. Using SMEs' investment in greening processes as a proxy for their environmental responsiveness is in line with the description of sustainable development by the World Commission on Environmental impact by improving its efficiency in using resources.

The questionnaire first asks SMEs which actions the company undertakes to be more resource efficient, on which the answer possibilities are: saving water; saving energy; using predominantly renewable energy; saving materials; minimising waste; selling scrap material;

Category	Variable	Measurement	Source
Dependent	Environmental	Average yearly investments in	FL456 ^a (2018)
variable	practices adoption	greening processes, as part of annual turnover (measured in 2017)	
Institutional	Within-country	Economy-wide Product Market	OECD (2018)
context	competition	Regulations indicator (measured in 2018)	
	Shareholder protection	Disclosure requirement index (measured in 2001)	La Porta et al. (2006)
	Environmental	Global Competitiveness Index	World Economic
	legislation	'Stringency of Environmental Legislation' variable (measured in 2017)	Forum (2018)
	Availability of skilled labour	Mean years of schooling of adults older than 24, ISCED level 1 or higher (measured in 2017)	UIS (2017)
	Union strength	Percentage of the total workforce affiliated to labour unions (measured in 2017)	OECD (2017)
Moderating variable <i>Controls</i>	SME size	SME size measured in employee headcount (measured in 2017)	FL456 (2018)
Industry level	Sector tangibility	Categorization based on NACE code (measured in 2017)	FL456 (2018)
Firm level	Age	Year of establishment (measured in 2017)	FL456 (2018)
	External support	Any external financial or non- financial support obtained for the firm's environmental practices (measured in 2017)	FL456 (2018)
	Market type	Sales to the consumer market, business market, public administration market, or multiple markets (measured in 2017)	FL456 (2018)

Table 1 Variable descriptions, measurement, and data sources

^a Flash Eurobarometer 456

recycling; designing products that are easier to maintain, repair or use; none. Respondents are also able to indicate any other resource efficient actions they undertake. If they undertake at least one resource efficient practice, a follow-up question asks respondents how much they invest in these practices. The answer possibilities to this follow-up question are: nothing; less than 1% of annual turnover; 1% - 5% of annual turnover; 6 - 10% of annual turnover; 11% - 30% of annual turnover; more than 30% of annual turnover. I transform these intervals in the following categories: no investments (less than 1%), little investments (between 1% and 5% of annual turnover), and substantial investments (more than 5% of annual turnover).

3.3 Explanatory variables

The explanatory variables consist of several proxy variables measuring the institutional context in a country.

3.3.1 Laws and regulations regarding competition

In order to measure the degree to which laws and regulations promote competition within a country, this research relies on the Economy-wide Product Market Regulations (EPMR) indicator, made available by the Organisation for Economic Co-operation and Development. The EPMR indicator is a composite of a comprehensive and internationally-comparable set of indicators that measure the degree to which policies promote or inhibit competition in the areas of the product market where competition is viable (OECD, 2018). The information used to construct the EPMR indicator is collected through the 2018 PMR questionnaire, including over 1000 questions on economy-wide regulatory provisions. The lower the indicator value, the more competition friendly the regulatory regime in a country is.

3.3.2 Laws and regulations regarding shareholder protection

In order to measure the degree of shareholder protection present in a country, I rely on a composite variable measuring firms' disclosure requirements. This index is based on research by La Porta, Lopez-de-Silanes, and Shleifer (2006), and measures the degree to which a firm is obligated to provide information to (potential) investors (measured as of 2001). The disclosure requirements index (DRI) is calculated based on the average of six variables measuring the firm's obligations to (1) deliver a prospectus of any securities to-be-issued to potential investors in advance, and provide information on (2) insiders' compensation, (3) ownership by large shareholders, (4) inside ownership, (5) contracts outside the normal course of business, and (6) transactions with related parties. This DRI was constructed based on extensive research in cooperation with attorneys from each represented country (La Porta, Lopez-de-Silanes, & Shleifer, 2006). The higher the index, the more disclosure requirements there exist in a specific country, indicating a higher protection of shareholder interests.

3.3.3 Environmental legislation

For measuring the stringency of a country's environmental legislative measures, I rely on a country-specific measure capturing differences in environmental policies, following Hoogendoorn, Guerra, and Van der Zwan (2015). The stringency of environmental legislation was measured by relying on a measure from the yearly questionnaire of the World Economic Forum for the Global Competitiveness Index, assessing country experts' opinion on the

question "How would you assess the stringency of your country's environmental regulations?" (World Economic Forum, 2017). These experts can indicate scores from 1 (very lax) to 7 (among the world's most stringent). Higher values on this index are thus associated with more stringent environmental legislation.

3.3.4 The availability of skilled labour

A country's availability of skilled labour is measured by looking at educational statistics, since it is dependent on the quality of the educational system (Ioannou & Serafeim, 2012). In specific, I rely on statistics on the mean years of schooling of a country's citizens, measured by the UNESCO Institute for Statistics (UIS). This measure indicates the average mean years of schooling of adults older than 24, in primary education and all levels above (following the ISCED levels of education; UIS, 2020). Several countries (Denmark, Greece, Italy, The Netherlands, and Spain) did not have data available for the year 2017. For these countries, the 2017 scores were calculated based on the mean changes in previous years (Appendix 1), so that ultimately, all countries had data from the same year. In this research, I associate countries with higher mean years of schooling as having a higher availability of skilled labour.

3.3.5 Union strength

In order to measure the strength of labour unions present in a country, I follow Ioannou and Serafeim (2012) by relying on the degree of union density. Specifically, I rely on OECD data indicating the percentage of the total workforce affiliated to labour unions (OECD, 2017). The OECD index had 2017 data for all countries but two (Greece and Portugal). The scores for 2017 were calculated based on the mean changes in previous years, similar to the 2017 scores of the mean years of schooling data (Appendix 2). Countries with higher degrees of union density were seen as having more union strength.

3.4 Moderating variable: SME size

In measuring SME size, I distinguish between micro firms (between 1 and 9 employees); small firms (between 10 and 49 employees) and medium-sized firms (between 50 and 249 employees). Using this operationalisation of SME size, I follow the definition of micro, small and medium-sized firms by the European Union (EU Recommendation 361, 2003).

In the literature on the effects of firm size, several operationalizations of firm size are employed (Etzion, 2007). To see whether an alternative operationalization would result in any substantial changes in the results, a robustness check was performed using SMEs' sizes as measured by their most recent annual turnover as an indicator. In order to measure a firm's financial resources, I relied on the following question from the Flash Eurobarometer 456 survey: "What was your turnover last year?" The answer categories to this question are: 100.000 euros or less; more than 100.000 to 500.000 euros; more than 500.000 to 2 million euros; more than 2 to 10 million euros; more than 10 to 50 million euros; more than 50 million euros. To transform these categories to the corresponding SME sizes, I relied on the definition of SMEs by the European Union, similarly to the categorization I adopted based on staff headcount (EU Recommendation 361, 2003). I distinguished between micro (less than 2 million euros in annual turnover), small (between 2 and 10 million euros), and medium-sized firms (over 10 million euros).

3.5 Control variables

Control variables on the industry- and firm-level are included to mitigate any influence from omitted variable bias. Below follow the theoretical arguments justifying their inclusion in this research. More details on the exact measurement of these control variables can be found in Appendix 3.

On the industry-level, I control for the influence of *sector tangibility*. In resourceintensive or tangible sectors, business logic makes greening processes more attractive, since these are more likely to be associated with significant reductions in production costs. Moreover, firms in these industries are more likely to be closely monitored by interest groups, considering the high levels of environmental damage they are able to cause (Hoogendoorn, Guerra, & Van der Zwan, 2015). SMEs operating in the tangible product sector (e.g. manufacturing) have been shown to be the most engaged in greening processes, followed by SMEs in tangible service sectors (e.g. wholesale and retail) and SMEs in intangible service sectors (e.g. information and communication services; Hoogendoorn, Guerra, & Van der Zwan, 2015).

On the firm-level, the *age of the firm* has been argued to have an impact on its environmental responsiveness. Since new firms have to deal with the liability of newness, a relative scarcity of resources, and are mainly occupied with the survival of the firm, they are less likely to be environmentally responsive than older firms (Neubaum, Mitchell, & Schminke, 2004). On the other hand, new entrants have been shown to pursue sustainable opportunities more than incumbents in the early stages of an industry's sustainability transformation, suggesting that young firms may be more environmentally responsive (Hockerts & Wüstenhagen, 2010). Although there is no empirical evidence of this relationship yet, based on the arguments above I include it in my analysis.

The form of *external support* an SME gets has been shown to influence its engagement in greening processes. Financial constraints are a major obstacle for SMEs in engaging in environmental practices (Pimenova & Van der Vorst, 2004), making actors who provide the firm which financial support a major stakeholder pressuring them into being environmentally responsive (Hoogendoorn, Guerra, & Van der Zwan, 2015). Indeed, SMEs receiving external financial support in relation to their environmental actions have been shown to engage significantly more in greening processes than SMEs receiving external non-financial support, or no external support at all (Hoogendoorn, Guerra, & Van der Zwan, 2015).

Finally, the *type of market* an SME serves may influence its engagement in environmental practices. An SME will likely tailor its environmental practices to the stakeholder groups most important to them, among which are their customers. Although they do not provide a theoretical explanation for their finding, Hoogendoorn, Guerra, and Van der Zwan (2015) find that SMEs that sell their products or services exclusively to public administration are significantly less likely to invest in greening processes than firms selling either to consumers or to other businesses.

3.6 Multivariate analysis method

The categorical nature of my outcome variable makes a logistic regression method appropriate (Hair, Black, Babin, & Anderson, 2014). Considering the dependent variable in this research has three categories, and that these outcome categories are ranked, I chose to conduct an ordinal logistic regression analysis (Winship & Mare, 1984). Ordinal logistic regression makes it possible to predict the probability of belonging to a certain outcome category and all others above it in the ordinal ranking, without making unverifiable assumptions about continuity in the data. Moreover, it is able to fit both the continuous and categorical predictors present in my data, as well as the interactions between these variables (McCullagh, 1980). This analysis is conducted in IBM SPSS Statistics 26. The complete syntax of my SPSS analyses can be found in Appendix 4.

3.7 Research ethics

Prior to conducting my research, I paid attention to various ethical considerations. These considerations were based on the guidelines of the Ethics Assessment Committee (EACLM) of the Radboud University (Nijmegen School of Management, n.d.).

This research relies on secondary data conducted by TNS, on behalf of the EU Commission. The surveys were conducted by phone, in the language of the participant. This minimized any difficulties that participants should have with understanding the questions, as well as the possibility of confounds occurring in the data. Before the survey was conducted, participants were informed that the survey was conducted on behalf of the European Commission, with the goal of gaining insights in the sustainable practices of SMEs in the EU and several other countries. Furthermore, they were given the possibility not to answer any questions, to indicate that they did not know the answer, and to withdraw from the research at any time they would like. Participants were guaranteed complete anonymity, and the obtained data was treated confidentially (European Commission, 2018). All participants of the research were able to access the data as well as a summarizing document via the Flash Eurobarometer website.

I used the data from the Flash Eurobarometer dataset solely for the purpose of this research. Full transparency is provided to anyone interested in non-included results, or anyone further interested in other aspects of my research. Any societal actors who may benefit from this research are granted full accessibility.

3.8 Reliability and validity

I paid explicit attention to reliability and validity concerns. In order to ensure reliability of my research results, I conducted several robustness checks that altered the variables in various ways, to see if the results would be similar. Further, I took the issue of sample size into account prior to conducting my analyses, and ensured that the number of SMEs analysed per country was relatively similar.

My research employs six different datasets with a number of proxies for national institutions and firm-level characteristics and outcomes. To ensure validity, I based the majority of my proxy variables on previous research, employing the same variables. The proxies for national institutions were mainly based on research employing institutional theory, such as that of Ioannou and Serafeim (2012). I based my operationalization of firm-level characteristics on research looking into the environmental responsiveness of SMEs, such as that of Uhlaner and colleagues (2012) and Hoogendoorn, Guerra, and Van der Zwan (2015), of which the latter employed an earlier version of the Flash Eurobarometer surveys. Statistical validity can be further endangered by not meeting the assumptions of a statistical test, which is why I ensured all the assumptions were met prior to conducting the ordinal logistic regression analyses.

Analysis

This chapter presents the results obtained from multiple ordinal logistic regression analyses. First, the descriptives of the sample are presented and discussed. After examining the data, this chapter discusses the assumptions that have to be met prior to conducting the analysis. Hereafter, the hypotheses are tested. Finally, this chapter presents the results of two robustness checks.

4.1 **Descriptive statistics**

An initial examination of the univariate descriptive statistics reveals a large number of missing data, warranting further examination (Appendix 5). Considering that the data transformation process as a result of missing value analysis alters the univariate statistics, I first discuss the process of dealing with missing data, before interpreting the descriptives.

4.1.1 Missing value analysis

A substantial number of missing values is present in the dataset, all stemming from responses on the Flash Eurobarometer 456 survey. To deal with this missing data, I considered the use of listwise deletion and, alternatively, an imputation of missing values. Williams (2015) recommends the use of listwise deletion, as this method generally deals better with missing data than any other method. However, an obvious downside of listwise deletion is the potentially dramatic reduction in sample size, which would make the use of an imputation method more attractive (Hair et al., 2014). The use of imputation methods, in turn, can potentially introduce bias in the model, warranting caution from the part of the researcher (Hair et al., 2014).

First, the cases with missing values on the dependent variable are deleted, to avoid any bias or artificial increase in relationships with independent variables. Additionally, the number of variables per case is examined. Individual cases with over one missing value on the moderating, control, and robustness variables (which amounted to more than 10 percent of missing values in total for that case) are deleted, following the suggestion by Hair and colleagues (2014).

The remaining cases exhibit missing values on several variables. The variables *Age* and *Market type* exhibit missing values under 5%, which makes these cases candidates for listwise deletion. Deleting cases with missing values on these variables does not result in a substantial reduction of the sample size. On the contrary, over 5% of cases has missing values on the
variables *External support* and *SME size (measured in resources)*. Deleting these cases would reduce the sample size substantially, making the use of an imputation method more appropriate.

Several imputation methods exist to deal with missing data on categorical variables. In this research, I rely on Rubin's (1987) method of multiple imputation. Multiple imputation is a regression-based approach in which simulations are run on missing data, based on the available data, in an attempt to replace the missing data. The method looks at the available data and makes a probability judgment as to what values the missing data are most likely to have, after which it replaces this data with imputed values, ultimately creating a complete dataset (Sterne et al., 2009; Schafer, 1999, Yuan, 2011). The conventional procedure of multiple imputation starts by examining whether there exist any problematic patterns in the missing values of the data, indicating non-randomness. Hereafter, several plausible imputed datasets are created, through which missing values are estimated multiple times. Finally, the parameter estimates from all imputed datasets are averaged, creating a single pooled dataset based on which analyses can be run. This way, approximately unbiased estimates of parameters and highly accurate estimates of standard errors can be obtained (Sterne et al., 2009). Although performing the analysis following this method is preferable and yields the most reliable results, multiple imputation as a method is yet to be fully incorporated in SPSS (IBM, 2018), which limits my use of this method slightly. I therefore impute the data using this method only once, which still allows me to analyse the missing values' randomness, and to impute their parameter estimates. To ensure that this limited use of the method does not introduce any unwanted bias into the model, I check for the robustness of the results obtained from the imputed dataset by running a separate regression in which I delete all cases with missing values listwise (Appendix 6).

Before missing data can be imputed, it should first be established that there are no nonrandom patterns present (Hair et al., 2014). Normally, this is only checked for the data that is later imputed, but I also examine the missing values on the variables *Age* and *Market type* prior to deleting these. An examination of missing value patterns revealed no patterns (Appendix 7), after which I conclude my data is missing completely at random (MCAR; Hair et al., 2014). Hereafter, missing values on *Age* and *Market type* are handled through listwise deletion, and the remaining missing values are imputed.

4.1.2 Descriptives of the final sample

The descriptive statistics of the final sample can be found in Table 2. The number of SMEs analysed per country can be found in Appendix 8. The treatment of missing values leaves my

sample with 5281 valid responses, roughly equally spread across countries. First, the variables' skewness and kurtosis are checked to examine any unusual patterns. The control variable *Age* exhibits an unusually high kurtosis of 4.27, which falls well outside of the critical value of 3. A closer look at the frequency distribution of this variable reveals that only 30 cases (0.6%) fall into the category of firms aged 2 years and younger. This is deemed too little to constitute a separate category, which is why I merge this category with the category of firms aged 3 to 5 years. Also, the control variable *External support* exhibits a kurtosis level just over the critical value (3.07). Upon examining the frequencies of this variable, it appears that only 124 firms (2.3%) rely solely on external financial support. Although this is a fairly low amount, the category in itself is still valid and is therefore not merged with another category, to avoid problems in interpretation. The remaining skewness and kurtosis values show no problematic results.

A closer look at the frequencies of the variables showed that most of the SMEs do not invest in greening processes (57%), with around 32% making little investments, and 11% investing in more substantial ways. The majority of SMEs are micro firms (45%), followed by small firms (35%) and medium-sized firms (20%).

4.2 Ordinal logistic regression assumptions

Performing an ordinal logistic regression analysis has to be preceded by meeting a number of

Variable	Mean	SD	Median	Mode	Skew.	Kurt.	Min.	Max.
Greening processes	1.540	0.680	1.000	1	0.888	-0.414	1	3
SME size	1.750	0.767	2.000	1	0.458	-0.467	1	3
SME size (resources)	1.537	0.746	1.000	1	0.987	-0.519	1	3
EPMR	1.306	0.229	1.360	1.57	-0.328	-0.467	0.79	1.71
DRI	0.522	0.153	0.500	0.50	0.197	-0.576	0.25	0.83
Environmental leg.	5.458	0.623	5.500	6.20	-0.447	-0.957	4.30	6.20
Skilled labour	11.778	1.349	12.26	10.09	-0.238	-0.920	9.34	14.15
Union density	0.315	0.203	0.230	0.17	0.779	-1.046	0.09	0.66
Controls								
Sector tangibility	1.794	0.733	2.000	2	0.342	-1.085	1	3
Age	3.736	0.587	4.000	4	-2.238	4.265	1	4
External support	1.430	0.900	1.000	1	2.093	3.069	1	4
Market type	2.734	1.244	2.000	4	-0.152	-1.664	1	4

Table 2 Descriptive statistics of the final sample

N = 5281, missing = 0

sample size requirements and assumptions. First, the sample size is evaluated. Hosmer and Lemeshow (2000) advise the researcher to employ an overall sample size of at least 400 cases. In addition, the sample size per group of the dependent variable has to be at least 10 for each estimated parameter (Hair et al., 2014). My dependent variable *Greening processes* has three categories, for which a maximum of 19 parameters are estimated per model (including interaction effects). The sample size per group of the dependent variable should therefore be at least 190 cases. The smallest group of the dependent variable in my sample (substantial investments) has 563 cases, so this requirement is met.

Second, the assumptions underlying the multivariate method are checked. There are four assumptions underlying ordinal logistic regression: (1) the presence of an ordinal-level dependent variable, (2) the presence of at least one independent variable of a continuous, categorical, or ordinal nature, (3) the absence of multicollinearity, and (4) the presence of proportional odds (Brant, 1990; O'Connell, 2006; Ananth & Kleinbaum, 1997). Evaluating the data reveals that the first two assumptions are met, but for the remaining two additional analyses are needed. Before running the analysis, potential concerns for the presence of multicollinearity are addressed, whereas the assumption of proportional odds can only be tested after running the analysis (Brant, 1990).

The presence of multicollinearity is checked by examining the correlations between the independent, moderating, and control variables, as well as the collinearity statistics of the sample. First, a bivariate correlation matrix is consulted. This matrix displays correlations between the predictor variables based on Spearman's rho, since the variables consist of nominal, ranked, and continuous predictors (Field, 2013). As Table 3 shows, no variables show correlations beyond the critical value of 0.80, indicating no threat of multicollinearity. The only noteworthy correlations occur between the two measures of firm size (0.69), the variables *Environmental legislation* and *Skilled labour* (0.72), and separate dummy variables belonging to the same categorical variable (*Tangible services* and *Tangible products*, -0.69; and *External non-financial support* and *No external support*, -0.69). Since the two measures of firm size are examined in different models, these correlations are no cause for concern.

In order to check whether the other correlations could be problematic, and to investigate more subtle forms of multicollinearity, a linear regression is run to inspect the variance inflation factor (VIF) values and tolerance statistics of the predictor variables (Field, 2013; Appendix 9). No tolerance values under 0.1, or VIF values over 10 are observed, indicating no presence of multicollinearity (Menard, 1995; Myers, 1990).

			2	4				0	0	10	11	10	12	1.4	1.7	16	17	10
Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. SME size																		
2. SME size (resources)	0,69																	
3. EPMR	0,01	-0,02																
4. DRI	-0,03	0,03	-0,33															
5. Environmental leg.	0,01	0,09	-0,14	-0,23														
6. Skilled labour	-0,02	0,10	-0,39	0,18	0,72													
7. Union density	0,00	0,09	-0,08	0,09	0,54	0,47												
8. Tangibility: tangible products	0,13	0,08	-0,01	0,02	0,00	-0,01	0,04											
9. Tangibility: tangible services	-0,09	-0,04	0,05	0,01	-0,05	-0,05	-0,06	-0,69										
10. Tangibility: intangible services	-0,04	-0,05	-0,05	-0,04	0,06	0,08	0,03	-0,38	-0,41									
11. Age	0,20	0,19	0,01	-0,02	-0,01	-0,02	-0,02	0,08	-0,04	-0,05								
12. External sup.: none	-0,20	-0,18	0,06	-0,05	-0,07	-0,10	0,00	-0,02	0,01	0,02	-0,05							
13. External sup.: non-financial	0,12	0,12	-0,07	0,08	0,02	0,07	0,02	0,00	-0,01	0,00	0,04	-0,69						
14. External sup.: financial	0,08	0,06	-0,04	-0,01	0,04	0,04	0,01	0,03	-0,01	-0,02	0,03	-0,26	-0,06					
15. External sup.: both	0,12	0,09	0,01	-0,02	0,06	0,06	-0,03	0,01	0,01	-0,03	0,02	-0,56	-0,12	-0,04				
16. Market type: consumers	-0,17	-0,20	-0,01	0,07	-0,12	-0,08	-0,09	-0,15	0,22	-0,09	-0,05	0,06	-0,04	-0,02	-0,03			
17. Market type: companies	0,15	0,16	-0,04	0,00	-0,03	-0,03	0,03	0,10	-0,15	0,06	0,05	0,02	0,00	-0,01	-0,03	-0,34		
18. Market type: public admin.	0,02	0,01	-0,01	0,02	-0,02	-0,01	0,03	0,04	-0,06	0,03	0,01	-0,01	0,01	-0,02	0,01	-0,07	-0,09	
19. Market type: multiple markets	-0,01	0,01	0,05	-0,07	0,13	0,10	0,04	0,02	-0,03	0,01	-0,01	-0,07	0,03	0,02	0,05	-0,48	-0,62	-0,12

 Table 3 Bivariate correlation matrix

N = 5434. Spearman's correlation coefficients are displayed.

4.3 Ordinal logistic regression analysis

In order to test the hypotheses of this research, several ordinal logistic regressions are run. In Table 4, the results of these regressions are shown. I conduct an ordinal logistic regression analysis on several models, considering the varying types of effects estimated in my research. The first model includes only the control variables. Model 2 subsequently adds the remaining predictor variables of this research. Hereafter, separate models are created, each including one of the interaction variables (Models 3 to 7). This way, additional increases in the explanatory power of the models as a result of the addition of interaction variables can be observed.

In the following section, the results displayed in Table 4 are used to test the hypotheses of this research. Model 2 serves to identify the effects of the various national institutions. This model has a higher explanatory power than Model 1, in which only the control variables were included (Nagelkerke's R^2 of 0.079 as opposed to 0.047), thereby proving the value of institutional factors in predicting SMEs' environmental responsiveness. Furthermore, Model 2's statistically significant Chi-Square statistic ($p \le 0.001$) indicates that this model gives a significantly better prediction of SMEs' investments in greening processes than when this would simply be predicted based on the prevalence of the outcome categories, indicating that the model is appropriate.

Surprisingly, Model 2 shows that there exists a significantly negative relationship between the degree of product market regulation and SMEs' investments in greening processes (b = -1.169, $p \leq 0.001$). Therefore, in countries that are more competition-friendly, SMEs are more environmentally responsive, thereby contradicting hypothesis 1. Competition appears to fuel SMEs' adoption of environmental practices. Further, in countries with higher shareholder protection, SMEs invest significantly less in greening processes (b = -1.787, $p \le 0.001$). Therefore, hypothesis 2 is confirmed. Hypothesis 3 predicts that in countries with more stringent environmental legislation, SMEs will be more likely to adopt environmental practices. The model shows that this hypothesis is rejected, as the effect of environmental legislation is non-significant. Hypothesis 4 predicts that SMEs' environmental responsiveness would decline as the availability of skilled labour in a country rises. The model shows this is the case, as an increase in the availability of skilled labour results in a significant decrease in investments in greening processes (b = -0.131, $p \le 0.001$). Hypothesis 5, regarding the influence of labour unions in a country, is also confirmed. There exists a significant positive relationship between a country's degree of union density and SMEs' investments in greening processes (b = 0.496, $p \le 0.01$).

Table 4 Ordinal logistic regression. Dependent variable: greening processes

	Model 1		Model	2	Model	13	Model 4		
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	
SME size: micro ^a									
SME size: small			0.188**	(0.064)	0.186**	(0.064)	0.196**	(0.065)	
SME size: medium			0.380***	(0.077)	0.379***	(0.077)	0.393***	(0.078)	
EPMR			-1.169***	(0.145)	-0.827***	(0.198)	-1.187***	(0.145)	
DRI			-1.787***	(0.229)	-1.768***	(0.229)	-2.224***	(0.313)	
Environmental leg.			-0.121	(0.079)	-0.122	(0.079)	-0.122	(0.079)	
Skilled labour			-0.131***	(0.034)	-0.131***	(0.034)	-0.129***	(0.034)	
Union density			0.496**	(0.164)	0.483**	(0.164)	0.487**	(0.164)	
SME size: micro * EPMR ^a									
SME size: small * EPMR					-0.703*	(0.276)			
SME size: medium * EPMR					-0.476	(0.333)			
SME size: micro * DRI ^a									
SME size: small * DRI							0.592	(0.418)	
SME size: medium * DRI							1.033*	(0.490)	
SME size * Environm. leg. (5)									
SME size * Skilled labour (6)									
SME size * Union density (7)									
Controls									
Tangibility: intangible services ^a									
Tangibility: tangible services	0.257***	(0.080)	0.281***	(0.081)	0.276***	(0.081)	0.280***	(0.081)	
Tangibility: tangible products	0.598***	(0.079)	0.605***	(0.080)	0.596***	(0.080)	0.604***	(0.080)	
Age: < 5 years ^a									
Age: 5-10 years	-0.041	(0.132)	-0.066	(0.133)	-0.074	(0.133)	-0.071	(0.133)	
Age: > 10 years	-0.060	(0.112)	-0.151	(0.113)	-0.159	(0.114)	-0.155	(0.114)	
External sup.: none ^a									
External sup.: non-financial	0.388***	(0.081)	0.393***	(0.083)	0.386***	(0.083)	0.385***	(0.083)	
External sup .: financial	1.079***	(0.185)	1.001***	(0.187)	0.990***	(0.187)	0.994***	(0.187)	
External sup.: both	0.875***	(0.093)	0.888***	(0.096)	0.884***	(0.096)	0.886***	(0.096)	
Market type: consumers ^a									
Market type: companies	0.038	(0.081)	-0.077	(0.083)	-0.083	(0.083)	-0.084	(0.083)	
Market type: public adminis.	0.132	(0.216)	0.057	(0.219)	0.057	(0.219)	0.059	(0.219)	
Market type: multiple	0.153*	(0.074)	0.121	(0.076)	0.115	(0.076)	0.115	(0.076)	
Ν		5281		5281		5281		5281	
Pseudo (Nagelkerke) R ²		0.046		0.079		0.080		0.080	
Chi-Square	21	0.943***	36	1.324***	36	8.139***		366.272***	

Parameter estimates (including significance values) and standard errors (between parentheses) are displayed.

Non-included models in which interaction effects can be found are displayed between parentheses.

Ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Significance values: *** $p \leq 0.001;$ ** $p \leq 0.01;$ * $p \leq 0.05$ (two-sided).

^a Reference category.

	Model 5		Model	6	Model 7		
-	Coeff.	SE	Coeff.	SE	Coeff.	SE	
SME size: micro ^a							
SME size: small	0.190**	(0.064)	0.187**	(0.064)	0.187**	(0.064)	
SME size: medium	0.373***	(0.077)	0.381***	(0.077)	0.379***	(0.077)	
EPMR	-1.175***	(0.145)	-1.173***	(0.145)	-1.170***	(0.145)	
DRI	-1.778***	(0.229)	-1.784***	(0.229)	-1.785***	(0.229)	
Environmental leg.	-0.104	(0.094)	-0.119	(0.079)	-0.121	(0.079)	
Skilled labour	-0.131***	(0.034)	-0.125**	(0.041)	-0.131***	(0.034)	
Union density	0.492**	(0.164)	0.493**	(0.164)	0.509*	(0.232)	
SME size * EPMR (3)							
SME size * DRI (4)							
SME size: micro * Environm. leg.ª							
SME size: small * Environm. leg.	-0.111	(0.099)					
SME size: medium * Environm. leg.	0.115	(0.117)					
SME size: micro * Skilled labour ^a							
SME size: small * Skilled labour			-0.054	(0.045)			
SME size: medium * Skilled labour			0.062	(0.054)			
SME size: micro * Union density ^a							
SME size: small * Union density					-0.183	(0.310)	
SME size: medium * Union density					0.241	(0.360)	
Controls							
Tangibility: intangible services ^a							
Tangibility: tangible services	0.285***	(0.081)	0.281***	(0.081)	0.283***	(0.081)	
Tangibility: tangible products	0.609***	(0.080)	0.607***	(0.080)	0.607***	(0.080)	
Age: < 5 years ^a							
Age: 5-10 years	-0.070	(0.133)	-0.066	(0.133)	-0.065	(0.133)	
Age: > 10 years	-0.155	(0.113)	-0.154	(0.113)	-0.151	(0.114)	
External sup.: none ^a							
External sup.: non-financial	0.396***	(0.083)	0.394***	(0.083)	0.395***	(0.083)	
External sup.: financial	1.000***	(0.187)	0.996***	(0.187)	0.998***	(0.187)	
External sup.: both	0.892***	(0.096)	0.890***	(0.096)	0.889***	(0.096)	
Market type: consumers ^a							
Market type: companies	-0.077	(0.083)	-0.077	(0.083)	-0.076	(0.083)	
Market type: public adminis.	0.052	(0.219)	0.053	(0.219)	0.053	(0.219)	
Market type: multiple	0.122	(0.076)	0.122	(0.076)	0.122	(0.076)	
Ν		5281		5281		5281	
Pseudo (Nagelkerke) R^2		0.079		0.079		0.079	
Chi-Square	3	65.031***	30	65.890***	3	62.686***	

Table 4 (continued) Ordinal logistic regression. Dependent variable: greening processes

Parameter estimates (including significance values) and standard errors (between parentheses) are displayed.

Non-included models in which interaction effects can be found are displayed between parentheses.

Ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Significance values: *** $p \le 0.001$; ** $p \le 0.01$; * $p \le 0.05$ (two-sided).

^a Reference category.

As can be seen in Model 2, larger SMEs in general invest more in greening processes than smaller SMEs. Small firms invest significantly more than micro firms (b = 0.188, $p \le 0.01$), and this effect is even stronger and more significant for medium-sized firms as compared to micro firms (b = 0.380, $p \le 0.001$). In order to examine the potentially moderating effect of SME size, Models 3 to 7 subsequently proceeds to include the interaction effects between SME size and the various national institutions. Although the models added either very little or nothing in explanatory power (Nagelkerke's R^2 between 0.079 and 0.080), two significant interaction effects are observed.

Hypothesis 6 predicts that the effect of a country's competition-promoting laws on firms' environmental responsiveness is stronger for smaller SMEs. Surprisingly, this effect actually occurs in the opposite direction. Model 3 shows that the negative effects of EPMR on environmental responsiveness are significantly stronger for small firms as opposed to micro firms (b = -0.703, $p \le 0.05$). Medium-sized firms do not experience significantly different effects of competition-promoting laws than micro firms. Hypothesis 6 is therefore rejected.

Model 4 shows another surprising result, as medium-sized firms appear to experience significantly weaker negative effects of disclosure requirements as opposed to micro firms (b = 1.033, $p \le 0.05$). Small firms do not experience significantly different effects than micro firms. Hypothesis 7, predicting that the negative effect of shareholder protection would be more pronounced for larger SMEs, is therefore rejected.

Hypothesis 8 predicted that the positive effects of stringent environmental legislation would be stronger for smaller SMEs. Following the non-significant effect of environmental legislation in general, Model 5 shows that this effect does not differ according to the size of the SME. This hypothesis is therefore rejected. Further, Model 6 and 7 show that the negative influence of the availability of skilled labour, and the positive effect of union strength do not differ according to the size of the SME, thereby rejecting hypotheses 9 and 10.

4.3.1 Control variables results

After checking the hypotheses, I examine the influence of the control variables included in this research. Model 2 shows whether the control variables I include have any significant effect following the inclusion of the national institutional variables and SME size. On the industry level, sector tangibility proves to be of significant importance in predicting SMEs' environmental responsiveness. Consistent with previous literature (Hoogendoorn, Guerra, & Van der Zwan, 2015), SMEs operating in the tangible product sector are the most

environmentally responsive (b = 0.61, $p \le 0.001$), followed by SMEs operating in the tangible service sector (b = 0.28, $p \le 0.001$) and SMEs in the intangible service sector.

Regarding the firm-level control variables, an SME's age does not have any significant influence on their investments in greening processes. The type of external support they receive, however, does matter: SMEs' receiving external financial support invest the most (b = 1.001, $p \le 0.001$), followed by SMEs receiving both external financial and non-financial support (b = 0.888, $p \le 0.001$), SMEs that are supported in non-financial ways (b = 0.393, $p \le 0.001$) and SMEs that receive no external support at all. The type of market SMEs served does not have a significant influence on their environmental responsiveness. Model 1 shows that SMEs serving multiple markets are significantly more responsive than SMEs serving the consumer market (b = 0.153, $p \le 0.05$), but this effect diminishes upon including the institutional variables and accounting for the influence of SME size.

4.3.2 Assumption of proportional odds

A key assumption in ordinal logistic regression analysis is the presence of proportional odds. Because the outcome variable in my model is ordinal, the regression divides this variable into two different thresholds (i.e. small investments or above, substantial investments). The assumption of proportional odds states that the effects of the explanatory variables are consistent across the threshold levels of the outcome variable (Brant, 1990). The explanatory variables should therefore have the same effect on the odds of the model, regardless of the threshold. Were a set of binary logistic regressions fitted to the data, then the same odds ratios for an explanatory variable should be observed across all these regressions. SPSS tests this assumption via the test of parallel lines, in which an ordinal model with one set of coefficients for all thresholds is compared against an alternative model with separate coefficients for all thresholds. If the alternative model proves to be a better fit to the data, the assumption of proportional odds is rejected. The Chi-Square values of the alternative models following the regressions of Model 1 through 7 are all highly significant, thereby rejecting the assumption. This is not surprising, since the test of parallel lines has been described as anti-conservative, and inevitably leading to the rejection of the proportional odds assumption in the presence of large sample sizes or continuous predictor variables (O'Connell, 2006; Brant, 1990, Allison, 1999; Clogg & Shihadeh, 1994). Considering that both of those conditions are present in my data, I test this assumption using the more scientifically supported Wald test by Brant (1990).

I perform Brant's (1990) Wald test by conducting two separate binary logistic regressions, one for each threshold (Appendix 10). This way, the odds ratios for each

explanatory variable across the different thresholds in the data can be examined to determine how consistent they are, and whether a problem occurs regarding the assumption of proportional odds. Additionally, I conduct the test of parallel lines separately for each explanatory variable, to see which variables might have inconsistent odds across thresholds. Following Brant (1990), upon focusing on the independent variables, it appears that all these variables have significant parallel lines tests. However, the coefficients do not change directions in the different thresholds and remain significant. The significance of the parallel lines Chi-Square is therefore likely to be caused by the continuous nature of the independent variables, and not by problems with inconsistent odds ratios (Brant, 1990; O'Connell, 2006; Allison, 1999; Clogg & Shihadeh, 1994). In sum, I can rely on the results obtained by the ordinal logistic regressions in Model 1 to 7.

4.3.3 Robustness checks

I perform two robustness checks. First, considering that my use of multiple imputation is slightly limited, and that there is always a risk of introducing bias in the model when using an imputation method (Hair et al., 2014), the analysis is run deleting all missing values listwise (Appendix 6). Results are qualitatively similar, with relatively similar coefficients and significance values. Therefore, the use of multiple imputation can be assumed not to have introduced any unwanted bias in the models.

Secondly, a robustness check is performed using SMEs' sizes as measured by their most recent annual turnover as an indicator (Appendix 11). Results show that similarly to the original model, medium-sized firms invest the most in greening processes (b = 0.206, $p \le 0.01$), followed by small firms (b = 0.136, $p \le 0.05$) and micro firms. The main effects from the institutional variables remain qualitatively similar, with roughly equal coefficients and significance values. The interaction effects also occurred in the same pattern, with the only exception being that now, competition-promoting laws did not have a differential effect on SMEs of varying sizes. In conclusion, this alternative operationalization further strengthens the robustness of my results, but the results of the interaction effect regarding competition should be interpreted with slight caution.

Discussion

The analysis shows interesting results regarding the influence of the institutional context and the role of SME size. This chapter discusses these results, and interprets them in the light of previous research on SMEs' environmental responsiveness.

5.1 The influence of the national institutional context

Surprisingly, it appears that in countries where the prevalence of product market regulations is low, and that are therefore more competition-friendly, SMEs invest significantly more in greening processes. A potential explanation for the positive effect of competition is that environmental responsiveness can actually enhance SMEs' competitiveness, thereby becoming a more attractive option in competitive markets. This explanation follows the logic of the 'business case' for CSR, according to which CSR offers substantial benefits to firms by cost and risk reductions, reputation enhancements, or a better standing with regulators (Carroll & Shabana, 2010). Previous research has found evidence for the existence of the business case, since engagement in CSR-related issues has been linked to various beneficial outcomes for the SME (Soundararajan, Jamali, & Spence, 2018). As an example, Jenkins (2006) found that SMEs' engagement in CSR enhances their reputation, and consequently lowers their transaction costs. SMEs' CSR efforts have also been linked to improved financial performance (Jenkins, 2006) and attractiveness to investors (Perrini, Russo, & Tencati, 2007). Under increasing competitive pressures, SMEs may be motivated to look for alternative ways to make profits. Following business case logic, adopting environmental practices may offer solutions in this regard, which would explain SMEs' enhanced investments in greening processes under increasing competitive pressure.

Although the business case provides a potential explanation for SMEs' behaviour in competitive markets, scholars have argued that these firms' resource constraints prohibit them from viewing CSR as an investment. Therefore, business case drivers for CSR would likely be present predominantly among large firms (Preuss & Perschke, 2010). SMEs' investments in CSR would instead be driven by more specific 'business performance' drivers, which refer to the possibilities the adoption of environmental practices gives for immediate cost reductions (Williamson, Lynch-Wood, & Ramsay, 2006). This argument corresponds to research that has identified more instrumental reasons as drivers for SMEs to engage in CSR, such as potential cost savings (Høivik & Shankar, 2011) and increasing efficiency (Williamson, Lynch-Wood, & Ramsay, 2006). Looking at the operationalisation of environmental responsiveness adopted

in this research, greening processes can be seen as a way to reduce a firm's immediate operational costs. To illustrate this point, some of the categories that are marked as 'greening processes' are 'saving water', 'saving energy', and 'minimising waste'. Thus, SMEs' enhanced investments in environmental practices under increasing competitive pressures can be explained both by business case and business performance logic.

Consistent with the second hypothesis, SMEs invest significantly less in environmental practices in countries where shareholder interests are more protected by laws and regulations. Investments in environmental practices revert these resources away from investments that are to the direct benefit of shareholders (Ioannou & Serafeim, 2012). This finding supports the argument that in countries where shareholder interests are more protected by laws and regulations, SMEs therefore have less room to invest in issues benefiting other stakeholder groups, among which is also the environment. It also extends the findings of research providing evidence of the negative effect of shareholder protection laws on the corporate social performance of large firms (Ioannou & Serafeim, 2012).

Contrary to my hypothesis, the stringency of a country's environmental legislation does not have a significant influence on SMEs' environmental responsiveness. This is surprising, especially considering the increasing prevalence of such legislative measures in the past years (United Nations, 2019). Research has also proven the importance of environmental legislation as a driver of SMEs' environmental responsiveness, indicating that legislation "bridges the gap between the firm's profit-orientated self-interest and the interests of society" (Williamson, Lynch-Wood, & Ramsay, 2006). Paradoxically, it appears to be the firms' profit-orientated self-interests that are driving the investments in environmental legislation suggests that SMEs themselves perceive the benefits of environmental practice adoption to be sufficient. Legislation does not drive SMEs to meet a minimum standard of responsible operations, but they instead choose to meet this standard intrinsically. This perception of potential benefits by engaging in CSR corresponds to the business case and business performance logic.

The non-significant influence of environmental legislation and the positive effect of competitive pressures both point at SMEs' intrinsic motivation to engage in environmental initiatives. However, these findings fail to clarify whether SMEs' investments in environmental practices are driven by either business case drivers, or the more specific cost-reduction considerations associated with business performance logic.

The findings of this research regarding the influence of the availability of skilled labour may provide further insights as to what drives these firms. Consistent with the corresponding

hypothesis, SMEs are significantly less likely to invest in greening processes in countries where skilled labour is readily available. It follows that when skilled labour is scarce, SMEs perceive there to be additional incentives to investing in environmental practices. This indicates that SMEs' environmental practice adoption is aimed at more than simply reducing their immediate production costs. Business performance logic does not provide an explanation for this behaviour, where the logic of the business case does. The business case emphasizes the benefits of an increased attractiveness to future and current employees as a result of investments in responsible practices (Carroll & Shabana, 2010). Conclusively, the findings of this research suggest that SMEs' investments in environmental practices are likely to be driven by both business performance and business case drivers.

The findings regarding the influence of union strength on SMEs' environmental practice adoption confirm the corresponding hypothesis. In countries with a higher degree of union density, SMEs invest significantly more in greening processes. This finding supports previous research that underlines employees' environmental concerns as drivers for SMEs' environmental responsiveness (McKeiver & Gadenne, 2005). It also points at the potential of labour unions' role as intermediary organizations transforming governmental interests into actionable environmental objectives for SMEs (Spence, Jeurissen, & Rutherfoord, 2000).

The findings regarding the influence of the various elements of the institutional context thus provide interesting insights in the factors driving SMEs' environmental practice adoption. This thesis further examines the effects of the institutional context by taking into account the size of the SME. In the next section, I discuss the findings on these relationships.

5.2 The role of SME size

The results regarding the role of SME size are in sharp contrast with the hypotheses of this research, partly because of the surprising results on the effects of the institutional context. Contrary to the predictions of the corresponding hypothesis, it appears that the effect of competition on the environmental responsiveness of SMEs of different sizes is nonlinear: in highly competitive environments, small firms are more motivated to invest in environmental practices than both micro and medium-sized firms. I proposed that business case and business performance logic may lead SMEs to invest more in environmental practices when faced with competitive pressures. Following this reasoning, it appears that small firms see more benefits in engaging in environmental initiatives than do micro and medium-sized firms.

The finding that micro firms invest less in environmental practices than small firms under competitive pressures corresponds to the arguments behind my hypothesis on this relationship. Micro firms are generally more resource constrained than small firms (Uhlaner et al., 2012), which limits their ability to increase investments under higher levels of competition. Even though investments in environmental practice adoption may lead to cost reductions, as well as other benefits, it appears that for micro firms it is significantly harder to undertake such investments even when the competitive environment incentivizes them to.

Surprisingly, medium-sized firms appear to invest less in environmental practices than small firms under highly competitive conditions. Udayasankar (2008) theorizes about how small and medium-sized firms perceive the business case of CSR, and argues that because of differences in these firms' visibility and scope of operations, small firms are more inclined to invest in CSR than medium-sized firms. Small firms' lower visibility makes the marginal utility of enhanced legitimacy or a positive reputation as a result of CSR greater than for medium-sized firms (Udayasankar, 2008). Moreover, small firms' smaller scope of activities limits these firms' possibilities to benefit from economies of scale, which makes a differentiation strategy more attractive (Udayasankar, 2008). CSR may serve as one way of following a differentiation strategy (Jones, 1999). For these reasons, small firms could perceive there to be more benefits to-be-gained by investing in environmental practices than medium-sized firms. Under increasing competitive pressure, business case drivers would then appeal to them more than to medium-sized firms.

Contrary to what the corresponding hypothesis predicts, it appears that shareholder protection laws are in fact a larger constraint on micro firms' environmental practice adoption than that of medium-sized firms. This may be explained by considering that shareholder protection laws are actually pressures stemming from regulatory stakeholders. Research argues that smaller SMEs are more responsive to pressures from regulatory stakeholders because they have less resources to invest in activities such as lobbying and litigation (Darnall, Henriques, & Sadorsky, 2010). This makes it harder for them to resist these pressures. Additionally, more resource-constrained firms would perceive greater risks from potential financial penalties that are associated with non-compliance. This study therefore confirms the findings of previous research by Darnall, Henriques, and Sadorsky (2010), who showed that smaller firms are significantly more responsive to the needs of regulatory stakeholders.

The remaining three hypothesized interaction effects were absent, indicating that these institutional pressures did not have different effects on the environmental responsiveness of SMEs of varying sizes. Following the non-significant effect of the environmental legislation in a country, it appeared that these legislative pressures did not influence SMEs of varying sizes

in different ways. These findings underline the insignificance of environmental legislation in influencing the environmental responsiveness of the SMEs in this research.

The availability of skilled labour has a significant effect on SMEs' environmental responsiveness, but this does not differ for SMEs of varying sizes. Apparently, smaller SMEs see just as much benefit in adopting environmental practices under conditions of scarce skilled labour as larger SMEs do. One reason for this may be that smaller firms operating in a context where skilled labour is scarce still believe in the benefits of environmental responsiveness, because doing so may improve their reputation in the local community. Although smaller firms have less societal visibility (Etzion, 2007), they are strongly embedded in the local community (Preuss & Perschke, 2010). Because smaller firms rely more on local recruitment (Preuss & Perschke, 2010), they may rely on different forms of communicating their CSR efforts than larger firms, who aim to attract employees from a broader geographical scope (Russo & Tencati, 2009). Research shows that smaller firms rely less on structured communication efforts about their CSR practices than larger firms, but instead may use their employees to engage in word-of-mouth communication with internal and local stakeholders (Nielsen & Thomsen, 2009). In spite of their lower societal visibility, smaller firms may thus still benefit from a good reputation in their local community through other ways of communicating their CSR efforts. This would explain why a scarcity of skilled labour motivates smaller SMEs as much as larger SMEs to invest in environmental practices.

I do not find any statistically significant evidence that the positive effect of union strength on environmental responsiveness differs for SMEs of varying sizes. This is surprising, considering that research has indicated that workers among micro firms are generally less unionized than workers among small and medium-sized firms (Moore, Jefferys, & Cours-Salies, 2007). A potential explanation may be that labour unions do not exclusively influence firms which are highly unionized, but also impact non-union firms (McWilliams & Siegel, 2001). McWilliams and Siegel (2001) note that labour unions may influence the adoption of CSR even at non-union firms. This influence is analogous to the well-documented "threat effect" unions have on non-union wages (Freeman & Medoff, 1983). Nonunionized employers may perceive a threat of unionization when they underpay their workers, and therefore increase the earnings and benefits of their workers (Leicht, 1989). Similarly, non-union firms may adopt environmental practices to avoid unionization by dissatisfied employees. Therefore, even though smaller SMEs' employees are generally less unionized, the firms they work for may still be influenced by union pressures.

Conclusion

This chapter starts by reflecting on the aims of this research, and by answering the research questions. Subsequently, I discuss the main theoretical and practical implications of this research. Finally, I discuss important limitations of this research, and offer suggestions for future research on SMEs' environmental responsiveness.

6.1 Conclusion

Firms are increasingly expected to take responsibility for their role in preserving the environment. SMEs in particular, contributing between 60 and 70 percent of Europe's total industrial pollution, are critical players in the "green transformation" (OECD, 2019). The growing recognition of the substantial aggregate impact that SMEs have on the environment has fuelled research into the factors influencing SMEs' environmental responsiveness. An expanding body of literature has emerged that discusses the organizational- and firm-level drivers of SMEs' environmental practice adoption (Soundararajan, Jamali, & Spence, 2018). However, much less is known about the role of the institutional context, which has been shown to matter significantly in the context of large firms (Campbell, 2007; Ioannou & Serafeim, 2012). The first aim of this thesis was therefore to develop a better understanding of what drives SMEs to adopt environmental practices by looking into the influence of the institutional context, the following research question was addressed:

What is the influence of national institutions on SMEs' adoption of environmental practices?

The institutional context proves to have a significant influence on SMEs' adoption of environmental practices. Surprisingly, perhaps the most apparent element of the institutional context, the stringency of environmental legislation, did not exert an influence at all. Instead, other institutional pressures, being laws and regulations regarding competition and shareholder protection, the availability of skilled labour, and union strength, all play a role in shaping SMEs' environmental responsiveness. These results point at the existence of a business case for CSR among SMEs, offering interesting avenues for future research.

Furthermore, building on previous research (Preuss & Perschke, 2010; Udayasankar, 2008; Hoogendoorn, Guerra, & Van der Zwan, 2015), I argued that treating SMEs as a

homogenous group may lead to overlooking important size-related differences among the firms in this broad category. Hence, this thesis further aimed to examine whether the influence of the institutional context differed for SMEs of varying sizes. In this regard, I addressed the following question:

Does the influence of national institutions on SMEs' adoption of environmental practices vary according to the size of the SME?

When it comes to the influence of certain regulatory pressures, the size of the SME is shown to matter significantly. Micro, small, and medium-sized firms respond differently to laws and regulations regarding competition and shareholder protection. The other elements of the institutional context impacted all SMEs in similar ways. In conclusion, SMEs' size is shown to matter in their response towards specific institutional pressures, demonstrating the importance of accounting for firms' size-related differences.

6.2 Theoretical and practical implications

Recent years have seen a surge in academic interest into the environmental practice adoption of SMEs, as it is increasingly acknowledged that an understanding of their socially responsible behaviour is necessary to form a holistic picture of CSR in general. My research contributes to this literature by examining the influence of the institutional context. It broadens the diversity of the predominantly qualitative body of research by adopting a quantitative approach, using a large-scale sample of European SMEs that enabled a cross-national comparative analysis. As was shown in this thesis, national institutions form important drivers of these firms' environmental responsiveness, and therefore should be taken into account in subsequent research that examines the conditions under which SMEs adopt environmental practices.

Furthermore, the findings of this research point at the relevance of the business case in the context of SMEs. Previous research has attributed the significance of business case drivers mainly to larger firms, where smaller firms would more likely be driven by factors such as the ethical motives of the owner-manager (Preuss & Perschke, 2010). Notwithstanding the importance of such motives, it seems that business case logic plays a significant role for SMEs as well. The absence of any significant effect of the stringency of a country's environmental legislation, and the positive influence of competition-promoting laws and regulations, provide support for the relevance of business case drivers. The adoption of greening processes is not seen as simply a cost burden and as necessary for compliance with external pressures, but also

something that may benefit the SME in the long term. This underlines the importance of studies looking into the strategic motives and benefits of SMEs' socially responsible behaviour (e.g. Stoian & Gilman, 2017).

Furthermore, this research went beyond previous research aiming to identify specific drivers of SMEs' environmental practice adoption by examining the effect of such drivers on SMEs of varying sizes. It has been acknowledged that size differences within the SME category may result in important differences for their organizational behaviour, but empirical research that examines the relationship between these differences and their environmental responsiveness is scarce (Soundararajan, Jamali, & Spence, 2018). My findings show that micro, small, and medium-sized firms differ both in how much they invest in greening processes, as well as in to what extent they are motivated to do so by certain elements of the institutional context.

The findings of this thesis may be insightful to the managers of SMEs, who are increasingly expected to have their firm operate in environmentally friendly ways. For these managers, it is important that they know which factors influence the environmental responsiveness of their firms, especially those factors outside the boundary of the firm and thus beyond their immediate control. This research may contribute to their understanding of this issue by identifying several of such factors at the national institutional level.

This thesis may provide policy makers with relevant insights on how national institutions may significantly impact SMEs' environmental practice adoption. Policy makers should be aware of the power that institutions have on this type of organizational behaviour, since the encouragement of firms' environmentally friendly behaviour contributes directly to solving one of the world's most pressing matters.

6.3 Limitations and future research

This study has several limitations, which offer avenues for future research. First, this research uses a self-reported measure of environmental practice adoption. Although this is common practice (e.g. Hoogendoorn, Guerra, & Van der Zwan, 2015; Darnall, Henriques, & Sadorsky, 2010; Uhlaner et al., 2012), I acknowledge that managers' self-reported answers on questions around CSR-related issues may be subject to social desirability bias. The presence of social desirability was minimized by ensuring the respondents anonymity, but nevertheless, I cannot exclude the possibility that it may have influenced the results by overstating SMEs' environmental responsiveness. Future research could minimize the potential bias by relying on non-self-reported measures, such as independent company reports.

Second, the Flash Eurobarometer dataset includes data from all 27 member states of the European Union, as well as of the United Kingdom. However, since a substantial amount of these countries did not have available data on one or more of the institutional indexes, this research relied on data from 14 European countries. Even though this still leaves the sample of this research with over 5000 SMEs, future research of a quantitative comparative nature may increase the generalizability of its results by employing institutional indexes for which data of a wider range of countries is available. Going beyond the European context, it would be intriguing for future research to examine how institutional pressures would influence the environmental practice adoption of SMEs in developing and emerging markets. Most research in SMEs' socially responsible practices, and especially that of a quantitative comparative nature, focuses on western developed countries (Soundararajan, Jamali, & Spence, 2018).

Third, this research employed ordinal logistic regression as an analysis method because of the ranked nature of its outcome variable. Future research may examine the factors influencing SMEs' environmental responsiveness using different statistical methods that allow for multilevel analyses. These analyses may further specify the influence of national and firmlevel effects. Multinomial logistic regression may form a promising approach, requiring a change in outcome variables to one of a nominal nature (Hair et al., 2014).

Fourth, this research proved the significance of several distinct elements of the institutional context in influencing SMEs' environmental responsiveness. A promising avenue of future research would lie in examining how these institutions interact, and how such processes affect SMEs' environmental practice adoption. Institutional frameworks such as Whitley's (1999) national business systems (NBS) could be used to analyse these interrelations. Whitley (1999) distinguishes between the political system, the education and labour system, the financial system and the cultural system. The NBS framework discusses how cross-country differences between these systems, leading to distinct "types" of NBS, may lead to differences in organizational behaviour (Aguilera, Marano, & Haxhi, 2019). Future research may examine how differences between such NBS types influence SMEs' environmental responsiveness.

Fifth, future research could build on the findings of this research by examining how cross-national differences in institutional contexts affect different types of environmental practice adoption. In this research, I used SMEs' investments in greening processes as a proxy

for their environmental practice adoption. However, scholars have argued that different types of environmental strategies, such as greening processes and green product and service offerings, may be driven by different factors (Hoogendoorn, Guerra, & Van der Zwan, 2015). It would be interesting to examine how different institutional elements influence the adoption of distinct sorts of environmental practices.

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Appendix

Country	2013	2014	2015	2016	2017
Austria	11.90	12.09	12.18	12.19	12.26
Belgium	11.65	11.76	12.01	12.10	12.37
Denmark	12.83	12.47	12.61	12.80	(-0.01) 12.79
Finland	12.63	12.68	12.71	n/a	12.82
France	11.24	11.29	11.40	11.42	11.48
Germany	13.97	14.11	14.15	14.21	14.15
Greece	n/a	10.60	10.75	10.26	(-0.17) 10.09
Ireland	n/a	n/a	n/a	n/a	11.25
Italy	n/a	10.11	10.19	n/a	(+0.08) 10.27
The Netherlands	12.15	12.18	12.23	12.28	(+0.04) 12.32
Portugal	8.53	8.99	9.11	9.24	9.34
Spain	n/a	9.78	9.97	10.12	(+0.17) 10.29
Sweden	12.30	12.36	12.43	12.49	12.55
United Kingdom	12.89	12.94	n/a	n/a	13.24

Appendix 1: UIS 2017 scores calculation.

Non-available data is displayed as n/a.

Calculated scores for the year 2017 are displayed in italics (based on mean increase or decrease in previous years; correction between parentheses).

Country	2013	2014	2015	2016	2017
Austria	27.8	27.7	27.4	26.9	26.7
Belgium	55.1	53.8	54.2	52.8	51.9
Denmark	67.8	67.4	67.1	65.5	66.1
Finland	68.2	67.6	66.4	64.9	62.2
France	9.0	9.0	9.0	9.0	8.9
Germany	18.0	17.7	17.6	17.0	16.7
Greece	23.1	n/a	n/a	20.2	(-2.9) 17.3
Ireland	30.5	n/a	n/a	25.6	24.5
Italy	36.8	36.4	35.7	34.4	34.3
The Netherlands	18.2	18.1	17.7	17.3	16.8
Portugal	n/a	n/a	16.1	15.3	(-0.8) 14.5
Spain	17.9	16.8	15.2	14.8	14.2
Sweden	68.0	67.7	67.8	66.9	65.6
United Kingdom	25.4	25.0	24.2	23.7	23.2

Appendix 2: Union density 2017 scores calculation.

Non-available data is displayed as n/a.

Calculated scores for the year 2017 are displayed in italics (based on mean increase or decrease in previous years; correction between parentheses).

Appendix 3: Control variables measurement

The section below elaborates on the measurement of the industry- and firm-level control variables.

A3.1 Industry-level controls

This research controlled for *sector tangibility* by distinguishing between tangible products, tangible services, and intangible services, thereby following the approach by Uhlaner and colleagues (2012) and Hoogendoorn, Guerra, and Van der Zwan (2015). Sector tangibility is defined as a sector's potential environmental pollution level, and its use of natural resources. The tangible product sector included NACE categories B (mining and quarrying), C (manufacturing), D (electricity, gas, steam, and air conditioning), E (water supply, sewerage, and waste management) and F (construction). Tangible service sectors include NACE categories G (wholesale and retail), H (transportation and storage), and I (accommodation and food service). The intangible service sector included NACE categories J (information and communication services), K (financial and insurance activities), L (real estate activities) and M (professional, scientific, and technical activities). Sectors representing intangible services were treated as the reference category.

A3.2 Firm-level controls

This research controlled for several variables at the firm level. First, the *age of the firm* was measured by a categorical variable, distinguishing between SMEs that had been established after January 1, 2017 (approximately 9 months in existence at the time of measurement), between January 1, 2013 and January 1, 2017 (10 months - 2 years, 9 months), between January 1, 2010 and December 31, 2012 (7 years, 9 months - 4 years, 10 months) and SMEs established before January 1, 2010 (more than 7 years, 10 months in existence). Firms approximately 9 months in existence were treated as the reference category.

Second, the *external support* provided to SMEs in relation to their environmental activities was measured by relying on two questions in the Flash Eurobarometer 456 survey. SMEs were first asked "Which type of support does your company rely on in its efforts to be more resource efficient?", upon which they could answer in the following categories: own financial resources; own technical expertise; and external support. When they answered that they received external support, a follow-up question asked "More precisely, which type of external support is it?", upon which the answer possibilities were: public funding; private funding from a bank, investment company or venture capital fund; private funding from friends and relatives; advice or other non-financial assistance from public administration; advice or other non-financial assistance from business associations. The above categories were recoded into no external support (the first two categories of the first question), external financial support (the first three

categories of the second question) and external non-financial support (the last three categories of the second question). Firms receiving no external support were treated as the reference category.

Third, the *type of market served* by SMEs was measured by a categorical variable, distinguishing between the consumer market, the business market, the public administration market, or multiple markets. This variable was based on a question in the Flash Eurobarometer 456 survey: "Is your company selling its products or services ... ?" The answer categories were: directly to consumers; to other companies; to public administration; consumers only; consumers and companies; and companies and administration. SMEs could fill in multiple categories. Considering this non-exclusivity, I treated 'consumers only' as the reference category (consumer market), and compared this with SMEs (partly) serving the business market ('to other companies'), the public administration market ('to public administration'), or multiple markets ('consumers and companies', 'companies and administration'). I left out the 'directly to consumers' category.

Appendix 4: SPSS syntax.

* Encoding: UTF-8.
* Created on April 7, 2020
Bas van Heerwaarden - Master's thesis
Supervisor: Prof. dr. A. U. Saka-Helmhout
Second assessor: Dr. F. Ciulli
MSc International Business | 2019 - 2020
Radboud University
Shaping environmental responsiveness: The influence of national institutions on SMEs of varying sizes.

*------ DATA TRANSFORMATIONS -------

* Rename relevant variables.

rename variable (scr10t = size_employees) (scr12t = age) (scr14 = size_resources) (q3 = percbenefits) (q4 = efficiencyinvest).

variable labels size_employees 'Firm size in employees' age 'Firm age' size_resources 'Firm size in resources' perceived financial benefits' efficiencyinvest 'Investments in resource efficiency'.

* Recode resource efficient actions into 'resourceefficiency_yesno' variable.

DATASET ACTIVATE DataSet1.

$$\label{eq:computeresource} \begin{split} \text{COMPUTE resource} ficiency_total = q1.1 + q1.2 + q1.3 + q1.4 + q1.5 + q1.6 + q1.7 + q1.8. \\ \text{EXECUTE.} \end{split}$$

recode resourceefficiency_total (0=0) (1=1) (2=1) (3=1) (4=1) (5=1) (6=1) (7=1) (8=1).

IF (q1.9=1) AND (resource efficiency_total=1) resource efficiency_total = 1.

IF (q1.9=1) AND (resource efficiency_total=0) resource efficiency_total = 99.

IF (q1.10=1) AND (resource efficiency_total=0) resource efficiency_total = 0.

IF (q1.11=1) AND (resource efficiency total=0) resource efficiency total = 99.

variable labels resource efficiency_total 'Did the firm engage in any resource efficient actions?'.

value labels resourceefficiency_total 0 'No' 1 'Yes' 99 'DK/NA'.

exe.

* Recode dependent variable 'efficiencyinvest'.

DATASET ACTIVATE DataSet1.

RECODE efficiencyinvest (1=1) (2=1) (3=2) (4=3) (5=3) (6=3) (7=99) (9=1).

IF (resourceefficiency_total=99) efficiencyinvest = 99.

EXECUTE.

value labels efficiencyinvest 1 'No investments (<1%) and no 1 in resourceefficiency_total' 2 'Small investments (1-5%)' 3 'Substantial investments (>6%)'

99 'DK/NA'.

missing values efficiencyinvest (99). exe.

* Recode 'size_employees' into 'SMEsize' to focus on SMEs only.

RECODE size_employees (1=1) (2=2) (3=3) (4=0) (5=9) INTO SMEsize. VARIABLE LABELS SMEsize 'SME size'. VALUE LABELS SMEsize 1 'Micro' 2 'Small' 3 'Medium' 9 'DK/NA'. missing values SMEsize (9). variable level SMEsize (ORDINAL). EXECUTE.

* Recode 'size_resources' into 'SMEsize_resources' for robustness checks.

recode size_resources (1=1) (2=1) (3=1) (4=2) (5=3) (6=3) (7=9) (8=9) INTO SMEsize_resources. variable labels SMEsize_resources 'SME size measured in resources (turnover last year)'. value labels SMEsize_resources 1 '<2m micro' 2 '2-10m small' 3 '>10 m medium'. missing values SMEsize_resources (9). variable level SMEsize_resources (ORDINAL). exe.

* Recode 'scr12a' into firm age categorical variable 'firmage'.

DATASET ACTIVATE DataSet1.

RECODE scr12a (9999=9) (2017 thru 2019=1) (2014 thru 2016=2) (2009 thru 2013=3) (Lowest thru 2008=4) INTO firmage.
VARIABLE LABELS firmage 'Firm age'.
value labels firmage 1 '0 - 2 yr' 2 '3 - 5 yr' 3 '5-10 yr' 4 '> 10 yr' 9 'DK/NA'.

missing values firmage (9).

variable level firmage (ORDINAL).

EXECUTE.

* Recode type of market dummies into 'markettype' categorical variable.

COMPUTE markettype= 0.

IF (scr15.1=1 and scr15.2=0 and scr15.3=0) markettype = 1.

IF (scr15.1=0 and scr15.2=1 and scr15.3=0) markettype = 2.

IF (scr15.1=0 and scr15.2=0 and scr15.3=1) markettype = 3.

IF (scr15.1=1 and scr15.2=1 and scr15.3=0) markettype = 4.

IF (scr15.1=1 and scr15.2=0 and scr15.3=1) markettype = 4.

IF (scr15.1=0 and scr15.2=1 and scr15.3=1) markettype = 4.

IF (scr15.1=1 and scr15.2=1 and scr15.3=1) markettype = 4.

IF (scr15.4=1) markettype = 9.
variable labels markettype 'Type of market served'. value labels markettype 1 'Consumers' 2 'Other companies' 3 'Public administration' 4 'Multiple markets' 9 'DK/NA'. missing values markettype (9). exe.

* Recode type of support dummies into 'externalsupport_yesno' variable.

COMPUTE externalsupport_yesno = 0. IF (q5.3=1) externalsupport_yesno = 1. IF (q5.3=0) externalsupport_yesno = 0. IF (q5.5=1) externalsupport_yesno = 9.

variable labels externalsupport_yesno 'Did the firm receive external support?'. value labels externalsupport_yesno 0 'No' 1 'Yes' 9 'DK/NA'. exe.

* Recode type of external support dummies into 'externalsupport' categorical variable.

COMPUTE externalsupport = 1.

IF (externalsupport_yesno=9) externalsupport = 9.

IF (externalsupport_yesno=0) externalsupport = 1.

IF (q6.1=1 OR q6.2=1 OR q6.3=1) AND (q6.4=1 OR q6.5=1 OR q6.6=1) externalsupport = 4.

IF (q6.1=1 OR q6.2=1 OR q6.3=1) AND (q6.4=0 AND q6.5=1 AND q6.6=1) externalsupport = 3.

IF (q6.1=0 AND q6.2=0 AND q6.3=0) AND (q6.4=1 OR q6.5=1 OR q6.6=1) externalsupport = 2.

IF (q6.1=0 AND q6.2=0 AND q6.3=0 AND q6.4=0 AND q6.5=0 AND q6.6=0 AND q6.7=1) externalsupport = 9.

IF (q6.8=1) externalsupport = 9.

variable labels externalsupport 'External support'.

value labels externalsupport 1 'No external support' 2 'External non-financial support' 3 'External financial support' 4 'Both external non-financial and financial support'

9 'Other/DK/NA'.

missing values external support (9).

exe.

* RECODE nace_a TO sectortang FOR SECTOR TANGIBILITY VARIABLE.

RECODE nace_a (1=1) (2=1) (3=1) (4=1) (5=1) (6=2) (7=2) (8=2) (9=3) (10=3) (11=3) (12=3) (13=9) INTO sectortang.

VARIABLE LABELS sectortang 'Sector tangibility'.

VALUE LABELS sectortang 1 'Tangible product sector' 2 'Tangible service sector' 3 'Intangible service sector'. missing values sectortang (9).

variable level sectortang (NOMINAL).

* CREATE NEW Economy-wide PMR VARIABLE BASED ON COUNTRY CODES (2018).

DATASET ACTIVATE DataSet1.

RECODE country (1=1.57) (2=1.71) (3=1.22) (4=1.11) (5=1.35) (7=1.07) (8=1.41) (9=0.79) (11=1.57)

(12=1.04) (13=1.36) (16=1.41) (17=1.17) (18=1.47) INTO EPMR.

VARIABLE LABELS EPMR 'Economy-wide PMR'.

EXECUTE.

* CREATE NEW Disclosure requirements index VARIABLE BASED ON COUNTRY CODES (2001).

RECODE country (1=0.75) (2=0.416667) (3=0.5) (4=0.416667) (5=0.666667) (7=0.583333) (8=0.666667) (9=0.833333) (11=0.333333)

(12=0.5) (13=0.416667) (16=0.5) (17=0.583333) (18=0.25) INTO disclosure.

VARIABLE LABELS disclosure 'Disclosure requirements index'.

EXECUTE.

* CREATE NEW Environmental regulation VARIABLE BASED ON COUNTRY CODES (2017).

RECODE country (1=5.1) (2=5.5) (3=5.8) (4=6.0) (5=4.3) (7=5.8) (8=5.2) (9=5.4) (11=4.4)

(12=4.8) (13=5.3) (16=6.2) (17=6.2) (18=6.2) into envreg.

VARIABLE LABELS envreg 'Environmental regulation'. exe.

* CREATE NEW Skilled labor VARIABLE BASED ON COUNTRY CODES (2017).

RECODE country (1=11.48) (2=12.37) (3=12.32) (4=14.15) (5=10.27) (7=12.79) (8=11.25) (9=13.24) (11=10.09) (12=10.29) (13=9.34) (16=12.82) (17=12.55) (18=12.26) INTO mean_school. VARIABLE LABELS mean_school 'Skilled labor'. exe.

* CREATE NEW Union density VARIABLE BASED ON COUNTRY CODES (2017).

RECODE country (1=0.09) (2=0.52) (3=0.17) (4=0.17) (5=0.34) (7=0.66) (8=0.25) (9=0.23) (11=0.17) (12=0.14) (13=0.15) (16=0.62) (17=0.66) (18=0.27) INTO uniondensity. VARIABLE LABELS uniondensity 'Union density'. EXECUTE.

* DELETE HELPER AND IRRELEVANT VARIABLES.

delete variables q1.1 TO q1.11. delete variables scr15.1 TO scr15.4. delete variables q5.1 TO q5.5. delete variables q6.1 TO q6.8. delete variables studyno doi version edition survey caseid nace nace_b uniqid tnscntry size scr10at scr10a scr10b
scr11 scr12a scr12b scr13 q1t
 q2.1 TO q2t q7.1 TO wex q6t1 q6t2.
delete variables size_employees.
delete variables size_resources.
delete variables serialid.
delete variables nace_a.
delete variables age.
delete variables age.

* EXCLUDE IRRELEVANT COUNTRIES.

RECODE country (1=1) (2=1) (3=1) (4=1) (5=1) (7=1) (8=1) (9=1) (11=1) (12=1) (13=1) (16=1) (17=1) (18=1) (ELSE=0) INTO filtercountry. VARIABLE LABELS filtercountry 'Filter variable relevant countries'. EXECUTE.

select if filtercountry ne 0. exe.

* EXCLUDE IRRELEVANT FIRMS (> 250 EMPLOYEES).

recode SMEsize (1=1) (2=1) (3=1) (9=1) (4=0) INTO filterfirm. VARIABLE LABELS filterfirm 'Filter variable relevant firms'. EXECUTE.

select if filterfirm ne 0. exe.

* Center metric independent variables prior to ordinal logistic regression.

```
* create mean variables.
aggregate outfile * mode addvariables
/mean_EPMR = mean(EPMR).
exe.
aggregate outfile * mode addvariables
/mean_disclosure = mean(disclosure).
exe.
aggregate outfile * mode addvariables
/mean_mean_school = mean(mean_school).
exe.
aggregate outfile * mode addvariables
/mean_uniondensity = mean(uniondensity).
```

exe. aggregate outfile * mode addvariables /mean_envreg = mean(envreg). exe.

* subtract mean from original variables.

```
compute cent_EPMR = EPMR - mean_EPMR.
exe.
compute cent_disclosure = disclosure - mean_disclosure.
exe.
compute cent_mean_school = mean_school - mean_mean_school.
exe.
compute cent_uniondensity = uniondensity - mean_uniondensity.
exe.
compute cent_envreg = envreg - mean_envreg.
exe.
```

* add variable labels to centered variables.

variable labels cent_EPMR 'Centered EPMR'. variable labels cent_disclosure 'Centered disclosure'. variable labels cent_mean_school 'Centered mean school'. variable labels cent_uniondensity 'Centered uniondensity'. variable labels cent_envreg 'Centered environmental regulation'.

* check results.

descriptives EPMR cent_EPMR disclosure cent_disclosure mean_school cent_mean_school uniondensity cent_uniondensity envreg cent_envreg.

* delete helper variables.

delete variables mean_EPMR mean_disclosure mean_mean_school mean_uniondensity mean_envreg.

* Check descriptive statistics (and frequencies).

DATASET ACTIVATE DataSet1.

DESCRIPTIVES VARIABLES= efficiencyinvest SMEsize SMEsize_resources firmage markettype

externalsupport sectortang EPMR disclosure mean_school uniondensity envreg

/STATISTICS=MEAN STDDEV RANGE MIN MAX KURTOSIS SKEWNESS.

FREQUENCIES VARIABLES= efficiencyinvest SMEsize SMEsize_resources firmage markettype
externalsupport sectortang EPMR disclosure mean_school uniondensity envreg
/STATISTICS=STDDEV RANGE MINIMUM MAXIMUM MEAN MEDIAN MODE SKEWNESS SESKEW
KURTOSIS SEKURT
/ORDER=ANALYSIS.

* Delete cases with missing data on dependent variable efficiencyinvest. select if not (efficiencyinvest=99). exe.

* Multiple imputation of control variable (externalsupport) and moderating variable (SMEsize_resources) with more than 5% missing variables.

* Analyze potential patterns in missing values.

DATASET ACTIVATE DataSet1.

MULTIPLE IMPUTATION SMEsize SMEsize_resources firmage markettype externalsupport

/IMPUTE METHOD=NONE

/MISSINGSUMMARIES OVERALL VARIABLES (MAXVARS=25 MINPCTMISSING=10) PATTERNS.

* Check missing values per case.

count mis_1 = efficiencyinvest SMEsize SMEsize_resources firmage markettype externalsupport sectortang (missing).

variable labels mis_1 'Missing values per case on dependent, moderating, and control variables'. frequencies mis_1.

* Delete cases with 2 or more missings.

USE ALL. COMPUTE filter_\$=(mis_1 > 1). VARIABLE LABELS filter_\$ 'mis_1 = > 1 (FILTER)'. VALUE LABELS filter_\$ 0 'Not Selected' 1 'Selected'. FORMATS filter_\$ (f1.0). FILTER BY filter_\$. EXECUTE.

select if filter_\$ ne 1. filter off.

* Check remaining missing values per variable. DATASET ACTIVATE DataSet1. FREQUENCIES VARIABLES=SMEsize_resources firmage markettype externalsupport sectortang EPMR disclosure mean_school uniondensity envreg /ORDER=ANALYSIS.

* Set Random Number Generators to settings suitable for multiple imputation

(Active Generator = Mersenne Twister; Active Generator Initialization = Fixed Value 2000000). SET RNG=MT MTINDEX=2000000.

* Delete variables with missings on less than 5% of the data. select if not (firmage=9).

select if not (markettype=9).

select if not (SMEsize=9).

* Run multiple imputation on relevant variables with more than 5% missings (SMEsize_resources, externalsupport).

DATASET DECLARE imputed_FL456.

MULTIPLE IMPUTATION SMEsize_resources externalsupport SMEsize efficiencyinvest firmage

markettype sectortang EPMR disclosure mean_school uniondensity envreg

/IMPUTE METHOD=AUTO NIMPUTATIONS=1 MAXPCTMISSING=NONE

/CONSTRAINTS SMEsize efficiencyinvest firmage

markettype sectortang EPMR disclosure mean_school uniondensity envreg(ROLE=IND)

/MISSINGSUMMARIES NONE

/IMPUTATIONSUMMARIES MODELS DESCRIPTIVES

/OUTFILE IMPUTATIONS=imputed_FL456.

* Replace old file cases with cases from new file with imputed data.

DATASET ACTIVATE DataSet1. ADD FILES /FILE=* /FILE='imputed_FL456' /RENAME (Imputation_=d0) /IN=imputed /DROP=d0. VARIABLE LABELS imputed 'Case source is imputed_FL456'. EXECUTE.

*Delete original cases.

COMPUTE ID=\$CASENUM. EXECUTE.

RECODE ID (Lowest thru 10868=0) (10869 thru Highest=1) INTO filter_imputed.

VARIABLE LABELS filter_imputed 'Original and imputed values'. EXECUTE.

select if not (filter_imputed=0).
exe.

**-----DESCRIPTIVES------,

* Analyze descriptives and frequencies of the new dataset.

* Analyze descriptives.

DESCRIPTIVES VARIABLES=efficiencyinvest SMEsize EPMR disclosure envreg mean_school uniondensity SMEsize_resources sectortang firmage externalsupport markettype

/STATISTICS=MEAN STDDEV MIN MAX KURTOSIS SKEWNESS.

* Analyze frequencies.

FREQUENCIES VARIABLES=efficiencyinvest SMEsize EPMR disclosure envreg mean_school uniondensity SMEsize resources sectortang firmage externalsupport markettype

/STATISTICS=STDDEV MINIMUM MAXIMUM MEAN MEDIAN MODE SKEWNESS SESKEW KURTOSIS SEKURT

/ORDER=ANALYSIS.

* Analyze number of SMEs per country.

FREQUENCIES VARIABLES=isocntry /ORDER=ANALYSIS.

* Merge categories for firmage.

RECODE firmage (1=1) (2=1) (3=2) (4=3) (9=9). value labels firmage 1 '0 - 5 yrs' 2 '5 - 10 yrs' 3 '>10 yrs' 9 'DK/NA'. missing values firmage (9). exe.

**----- ANALYSES ------.

* Multicollinearity check.

* Step 1: Create dummy variables for nominal variables (Market type, External support, Sector tangibility) to include in bivariate analysis.

recode markettype (1=1) (ELSE=0) INTO markettype_consumers.

variable labels markettype_consumers 'Dummy market type consumers'.

exe.

recode markettype (2=1) (ELSE=0) INTO markettype_companies.

variable labels markettype_companies 'Dummy market type companies'.

exe.

recode markettype (3=1) (ELSE = 0) INTO markettype_pubadmin. variable labels markettype_pubadmin 'Dummy market type public administration'. exe. recode markettype (4=1) (ELSE=0) INTO markettype_multiple. variable labels markettype_multiple 'Dummy market type multiple markets'. exe.

recode externalsupport (1=1) (ELSE=0) INTO external_no. variable labels external_no 'Dummy no external support'. exe. recode externalsupport (2=1) (ELSE=0) INTO external_nonfin. variable labels external_nonfin 'Dummy non-financial external support'. exe. recode externalsupport (3=1) (ELSE=0) INTO external_fin. variable labels external_fin 'Dummy financial external support'. exe. recode externalsupport (4=1) (ELSE=0) INTO external_both.

variable labels external_both 'Dummy both external support'. exe.

recode sectortang (1=1) (ELSE=0) INTO sectortang_product. variable labels sectortang_product 'Dummy tangible product sector'. exe.

recode sectortang (2=1) (ELSE=0) INTO sectortang_tangservice.

variable labels sectortang_tangservice 'Dummy tangible service sector'. exe.

recode sectortang (3=1) (ELSE=0) INTO sectortang_intangservice.

variable labels sectortang_intangservice 'Dummy intangible service sector'. exe.

* Step 2: Produce correlation matrix for bivariate analysis with Spearman's rho.

DATASET ACTIVATE DataSet1.

NONPAR CORR

/VARIABLES=SMEsize SMEsize_resources EPMR disclosure envreg mean_school uniondensity sectortang_product sectortang_tangservice sectortang_intangservice firmage external_no external_nonfin external_fin external_both markettype_consumers markettype_companies markettype_pubadmin markettype_multiple /PRINT=SPEARMAN TWOTAIL SIG /MISSING=LISTWISE.

* Step 3a: Create dummy variables for the dependent ordinal variable 'efficiencyinvest' to be able to run linear regression.

recode efficiencyinvest (1=1) (ELSE=0) into dummy_noinvestments. variable labels dummy_noinvestments 'Dummy variable no investments'. value labels dummy_noinvestments 0 'Investments' 1 'No investments'. exe.

recode efficiencyinvest (2=1) (ELSE=0) into dummy_smallinvestments. variable labels dummy_smallinvestments 'Dummy variable small investments'. value labels dummy_smallinvestments 0 'No small investments' 1 'Small investments'. exe.

recode efficiencyinvest (3=1) (ELSE=0) into dummy_substantialinvestments. variable labels dummy_substantialinvestments 'Dummy variable substantial investments'. value labels dummy_substantialinvestments 0 'No substantial investments' 1 'Substantial investments'. exe.

* Step 3b: Create dummy variables for the ordinal variables to be able to run linear regression (first category as reference group).

recode SMEsize (2=1) (ELSE=0) into dummy_SMEsmall. variable labels dummy_SMEsmall 'Dummy small SME'. exe. recode SMEsize (3=1) (ELSE=0) into dummy_SMEmedium.

variable labels dummy_SMEmedium 'Dummy medium SME'. exe.

```
recode SMEsize_resources (2=1) (ELSE=0) into dummy_SMEresource2.
variable labels dummy_SMEresource2 'Dummy 500.001-2.000.000 SME'.
exe.
```

recode SMEsize_resources (3=1) (ELSE=0) into dummy_SMEresource3. variable labels dummy_SMEresource3 'Dummy >2.000.000 SME'. exe.

recode firmage (2=1) (ELSE=0) into dummy_5to10SMEs. variable labels dummy_5to10SMEs 'Dummy SMEs age 5-10'. exe. recode firmage (3=1) (ELSE=0) into dummy_10SMEs. variable labels dummy_10SMEs 'Dummy SMEs age 10'. exe. * Step 4: Check collinearity statistics using linear regression. DATASET ACTIVATE DataSet1. REGRESSION /MISSING LISTWISE /STATISTICS COLLIN TOL /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT dummy noinvestments /METHOD=ENTER dummy SMEsmall dummy SMEmedium dummy SMEresource2 dummy SMEresource3 EPMR disclosure envreg mean school uniondensity sectortang tangservice sectortang intangservice dummy 5to10SMEs dummy 10SMEs external nonfin external fin external both markettype companies markettype pubadmin markettype multiple. DATASET ACTIVATE DataSet1. REGRESSION /MISSING LISTWISE /STATISTICS COLLIN TOL /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT dummy smallinvestments /METHOD=ENTER dummy SMEsmall dummy SMEmedium dummy SMEresource2 dummy SMEresource3 EPMR disclosure envreg mean school uniondensity sectortang tangservice sectortang intangservice dummy 5to10SMEs dummy 10SMEs external nonfin external fin external both markettype companies markettype pubadmin markettype multiple. * Recode predictor variables to get right reference categories for ordinal regressions.

recode SMEsize (1=3) (2=2) (3=1) INTO SMEsize_reg. variable labels SMEsize_reg 'SME size for ord. reg.'. value labels SMEsize_reg 1 'Medium' 2 'Small' 3 'Micro'. variable level SMEsize_reg (ORDINAL). exe.

recode SMEsize_resources (1=3) (2=2) (3=1) INTO SMEsize_resources_reg. variable labels SMEsize_resources_reg 'SME size (resources) for ord. reg.'. value labels SMEsize_resources_reg 1 '>2.000.000' 2 '500.000-2.000.000' 3 '<500.000'. variable level SMEsize_resources_reg (ORDINAL). exe.

recode firmage (1=3) (2=2) (3=1) INTO firmage_reg. variable labels firmage_reg 'Firm age for ord. reg.'. value labels firmage_reg 1 '> 10 yrs' 2 '5-10 yrs' 3 '0-5 yrs'. variable level firmage_reg (ORDINAL). exe.

recode externalsupport (1=4) (2=3) (3=2) (4=1) INTO externalsupport_reg. variable labels externalsupport_reg 'External support for ord. reg.'. value labels externalsupport_reg 1 'Both financial and non-financial external support' 2 'Financial external support' 3 'Non-financial external support' 4 'None'. exe.

recode markettype (1=4) (2=3) (3=2) (4=1) INTO markettype_reg. variable labels markettype_reg 'Market type served for ord. reg.'. value labels markettype_reg 1 'Multiple markets' 2 'Public administration' 3 'Companies' 4 'Consumers'. exe.

* ORDINAL REGRESSION ANALYSIS.

* Model 1: Ordinal regression with control variables only.

```
DATASET ACTIVATE DataSet1.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6)

SINGULAR(1.0E-8)

/LINK=LOGIT

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.
```

* Model 2: Ordinal regression with controls and main effects only.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

```
SMEsize_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity
/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6)
SINGULAR(1.0E-8)
/LINK=LOGIT
/PRINT=FIT PARAMETER SUMMARY TPARALLEL
/SAVE=ESTPROB.
```

* Model 3: Ordinal regression with controls, main effects, and EPMR interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent_EPMR*SMEsize_reg /PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 4: Ordinal regression with controls, main effects, and DRI interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent_disclosure*SMEsize_reg /PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 5: Ordinal regression with controls, main effects, and CC interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent_envreg*SMEsize_reg

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 6: Ordinal regression with controls, main effects, and skilled labor interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent_mean_school*SMEsize_reg /PRINT=FIT PARAMETER SUMMARY TPARALLEL /SAVE=ESTPROB.

* Model 7: Ordinal regression with controls, main effects, and union density interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent_uniondensity*SMEsize_reg

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Interaction line graphs for significant interactions.

GRAPH

/LINE(MULTIPLE)=MEAN(efficiencyinvest) BY EPMR BY SMEsize.

GRAPH

/LINE(MULTIPLE)=MEAN(efficiencyinvest) BY disclosure BY SMEsize.

*-----PROPORTIONAL ODDS ASSUMPTION TESTING------.

* Dichotomize thresholds for resource efficiency.

recode efficiencyinvest (1=0) (2=1) (3=1) INTO thres1_smallinvestabove. variable labels thres1_smallinvestabove 'Threshold small investments and above'. value labels thres1_smallinvestabove 0 'No small investments or above' 1 'Small investments and above'. exe.

recode efficiencyinvest (1=0) (2=0) (3=1) INTO thres2_substantialinvest. variable labels thres2_substantialinvest 'Threshold substantial investments and above'. value labels thres2_substantialinvest 0 'No substantial investments' 1 'Substantial investments'. exe.

* Check frequencies. DATASET ACTIVATE DataSet1. FREQUENCIES VARIABLES=efficiencyinvest

/ORDER=ANALYSIS.

DATASET ACTIVATE DataSet1. FREQUENCIES VARIABLES=thres1_smallinvestabove /ORDER=ANALYSIS.

DATASET ACTIVATE DataSet1. FREQUENCIES VARIABLES=thres2_substantialinvest /ORDER=ANALYSIS.

* Dummify categorical variables.

recode sectortang (1=1) (ELSE=0) INTO sector_tangproduct. variable labels sector_tangproduct 'Tangible product sector'. recode sectortang (2=1) (ELSE=0) INTO sector_tangservice. variable labels sector tangservice 'Tangible service sector'.

recode firmage_reg (1=1) (ELSE=0) INTO age_10older. variable labels age_10older 'Firm age older than 10 years'. recode firmage_reg (2=1) (ELSE=0) INTO age_5to10. variable labels age_5to10 'Firm age 5 to 10 years'.

recode externalsupport_reg (1=1) (ELSE=0) INTO support_both. variable labels support_both 'Both financial and non-financial external support'. recode externalsupport_reg (2=1) (ELSE=0) INTO support_financial. variable labels support_financial 'Financial external support'. recode externalsupport_reg (3=1) (ELSE=0) INTO support_nonfinancial. variable labels support_reg (3=1) (ELSE=0) INTO support_nonfinancial.

recode markettype_reg (1=1) (ELSE=0) INTO market_multiple. variable labels market_multiple 'Market type multiple'. recode markettype_reg (2=1) (ELSE=0) INTO market_pubad. variable labels market_pubad 'Market type public administration'. recode markettype_reg (3=1) (ELSE=0) INTO market_companies. variable labels market companies 'Market type companies'.

recode SMEsize_reg (1=1) (ELSE=0) INTO SMEsize_medium. variable labels SMEsize_medium 'Medium SMEs'. recode SMEsize_reg (2=1) (ELSE=0) INTO SMEsize_small. variable labels SMEsize_small 'Small SMEs'. * 2 binary logistic regressions for each threshold (MODEL 1 proportional odds testing).

LOGISTIC REGRESSION VARIABLES thres1_smallinvestabove /METHOD=ENTER firmage markettype externalsupport sectortang /CONTRAST (firmage)=Indicator(1) /CONTRAST (markettype)=Indicator(1) /CONTRAST (externalsupport)=Indicator(1) /CONTRAST (sectortang)=Indicator /PRINT=GOODFIT /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES thres2_substantialinvest /METHOD=ENTER firmage markettype externalsupport sectortang /CONTRAST (firmage)=Indicator(1) /CONTRAST (markettype)=Indicator(1) /CONTRAST (externalsupport)=Indicator(1) /CONTRAST (sectortang)=Indicator /PRINT=GOODFIT /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

* separate ordinal regressions to conduct test of parallel lines for each control variable.
PLUM efficiencyinvest BY sector_tangservice
/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6)
SINGULAR(1.0E-8)
/LINK=LOGIT
/PRINT=TPARALLEL.

PLUM efficiencyinvest BY sector_tangproduct /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

PLUM efficiencyinvest BY age_5to10 /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

PLUM efficiencyinvest BY age_10older

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

PLUM efficiencyinvest BY support_nonfinancial /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

PLUM efficiencyinvest BY support_financial /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

PLUM efficiencyinvest BY support_both /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

PLUM efficiencyinvest BY market_companies /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

PLUM efficiencyinvest BY market_pubad /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

PLUM efficiencyinvest BY market_multiple /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

* 2 binary logistic regressions for each threshold (MODEL 2 proportional odds testing).

LOGISTIC REGRESSION VARIABLES thres1 smallinvestabove

/METHOD=ENTER firmage markettype externalsupport sectortang SMEsize EPMR disclosure envreg mean school uniondensity

/CONTRAST (firmage)=Indicator(1) /CONTRAST (markettype)=Indicator(1) /CONTRAST (externalsupport)=Indicator(1) /CONTRAST (SMEsize)=Indicator(1) /CONTRAST (sectortang)=Indicator /PRINT=GOODFIT

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES thres2_substantialinvest

/METHOD=ENTER firmage markettype externalsupport sectortang SMEsize EPMR disclosure envreg mean_school uniondensity /CONTRAST (firmage)=Indicator(1) /CONTRAST (markettype)=Indicator(1) /CONTRAST (externalsupport)=Indicator(1) /CONTRAST (SMEsize)=Indicator(1) /CONTRAST (sectortang)=Indicator /PRINT=GOODFIT

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

* separate ordinal regressions to conduct test of parallel lines for each independent variable.

PLUM efficiencyinvest BY cent_EPMR

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/PRINT=TPARALLEL.

PLUM efficiencyinvest BY cent_disclosure /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

PLUM efficiencyinvest BY cent_envreg /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

PLUM efficiencyinvest BY cent_mean_school /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

PLUM efficiencyinvest BY cent_uniondensity /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

* separate ordinal regressions to conduct test of parallel lines for SMEsize.

PLUM efficiencyinvest BY SMEsize_small

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

PLUM efficiencyinvest BY SMEsize_medium /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /PRINT=TPARALLEL.

* 2 binary logistic regressions for each threshold (MODEL 3 proportional odds testing).

LOGISTIC REGRESSION VARIABLES thres1_smallinvestabove

/METHOD=ENTER firmage markettype externalsupport sectortang SMEsize cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity SMEsize*cent_EPMR /CONTRAST (firmage)=Indicator(1) /CONTRAST (markettype)=Indicator(1) /CONTRAST (externalsupport)=Indicator(1) /CONTRAST (sectortang)=Indicator /CONTRAST (SMEsize)=Indicator(1) /PRINT=GOODFIT

LOGISTIC REGRESSION VARIABLES thres2_substantialinvest

/METHOD=ENTER firmage markettype externalsupport sectortang SMEsize cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity SMEsize*cent_EPMR /CONTRAST (firmage)=Indicator(1) /CONTRAST (markettype)=Indicator(1) /CONTRAST (externalsupport)=Indicator(1) /CONTRAST (sectortang)=Indicator /CONTRAST (SMEsize)=Indicator(1) /PRINT=GOODFIT /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

* separate ordinal regressions to conduct tests of parallel lines for SMEsize_small* EPMR and SMEsize medium* EPMR.

PLUM efficiencyinvest BY SMEsize_small WITH cent_EPMR

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /LOCATION=SMEsize_small*cent_EPMR /PRINT=TPARALLEL.

PLUM efficiencyinvest BY SMEsize_medium WITH cent_EPMR

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /LOCATION=SMEsize_medium*cent_EPMR /PRINT=TPARALLEL.

* 2 binary logistic regressions for each threshold (MODEL 4 proportional odds testing).

LOGISTIC REGRESSION VARIABLES thres1_smallinvestabove

/METHOD=ENTER firmage markettype externalsupport sectortang SMEsize cent_EPMR cent_disclosure

cent_envreg cent_mean_school cent_uniondensity SMEsize*cent_disclosure

/CONTRAST (firmage)=Indicator(1)

/CONTRAST (markettype)=Indicator(1)

/CONTRAST (externalsupport)=Indicator(1)

/CONTRAST (sectortang)=Indicator

/CONTRAST (SMEsize)=Indicator(1)

/PRINT=GOODFIT

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES thres2_substantialinvest

/METHOD=ENTER firmage markettype externalsupport sectortang SMEsize cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity SMEsize*cent_disclosure /CONTRAST (firmage)=Indicator(1) /CONTRAST (markettype)=Indicator(1) /CONTRAST (externalsupport)=Indicator(1) /CONTRAST (sectortang)=Indicator /CONTRAST (SMEsize)=Indicator(1) /PRINT=GOODFIT /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

* separate ordinal regressions to conduct tests of parallel lines for SMEsize_small* disclosure and SMEsize_medium* disclosure.

PLUM efficiencyinvest BY SMEsize_small WITH cent_disclosure

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

 $/ LOCATION = SMEsize_small*cent_disclosure$

/PRINT=TPARALLEL.

PLUM efficiencyinvest BY SMEsize_medium WITH cent_disclosure

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6)
SINGULAR(1.0E-8)
/LINK=LOGIT
/LOCATION=SMEsize_medium*cent_disclosure
/PRINT=TPARALLEL.

* 2 binary logistic regressions for each threshold (MODEL 5 proportional odds testing).

LOGISTIC REGRESSION VARIABLES thres1_smallinvestabove

/METHOD=ENTER firmage markettype externalsupport sectortang SMEsize cent_EPMR cent_disclosure

cent_envreg cent_mean_school cent_uniondensity SMEsize*cent_envreg

/CONTRAST (firmage)=Indicator(1)

/CONTRAST (markettype)=Indicator(1)

/CONTRAST (externalsupport)=Indicator(1)

/CONTRAST (sectortang)=Indicator

/CONTRAST (SMEsize)=Indicator(1)

/PRINT=GOODFIT

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES thres2_substantialinvest

/METHOD=ENTER firmage markettype externalsupport sectortang SMEsize cent_EPMR cent_disclosure

cent_envreg cent_mean_school cent_uniondensity SMEsize*cent_envreg /CONTRAST (firmage)=Indicator(1) /CONTRAST (markettype)=Indicator(1) /CONTRAST (externalsupport)=Indicator(1) /CONTRAST (sectortang)=Indicator /CONTRAST (SMEsize)=Indicator(1) /PRINT=GOODFIT /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

* separate ordinal regressions to conduct tests of parallel lines for SMEsize_small* envreg and SMEsize_medium* envreg.

PLUM efficiencyinvest BY SMEsize_small WITH cent_envreg /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /LOCATION=SMEsize_small*cent_envreg /PRINT=TPARALLEL.

PLUM efficiencyinvest BY SMEsize_medium WITH cent_envreg /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /LOCATION=SMEsize_medium*cent_envreg /PRINT=TPARALLEL.

* 2 binary logistic regressions for each threshold (MODEL 6 proportional odds testing).

LOGISTIC REGRESSION VARIABLES thres1_smallinvestabove

/METHOD=ENTER firmage markettype externalsupport sectortang SMEsize cent_EPMR cent_disclosure

cent_envreg cent_mean_school cent_uniondensity SMEsize*cent_mean_school

/CONTRAST (firmage)=Indicator(1)

/CONTRAST (markettype)=Indicator(1)

/CONTRAST (externalsupport)=Indicator(1)

/CONTRAST (sectortang)=Indicator

/CONTRAST (SMEsize)=Indicator(1)

/PRINT=GOODFIT

/CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES thres2_substantialinvest

/METHOD=ENTER firmage markettype externalsupport sectortang SMEsize cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity SMEsize*cent_mean_school

/CONTRAST (firmage)=Indicator(1) /CONTRAST (markettype)=Indicator(1) /CONTRAST (externalsupport)=Indicator(1) /CONTRAST (sectortang)=Indicator /CONTRAST (SMEsize)=Indicator(1) /PRINT=GOODFIT /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

* separate ordinal regressions to conduct tests of parallel lines for SMEsize_small* mean_school and SMEsize_medium* mean_school.

PLUM efficiencyinvest BY SMEsize_small WITH cent_mean_school

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /LOCATION=SMEsize_small*cent_mean_school /PRINT=TPARALLEL.

PLUM efficiencyinvest BY SMEsize_medium WITH cent_mean_school

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT

/LOCATION=SMEsize medium*cent mean school

/PRINT=TPARALLEL.

* 2 binary logistic regressions for each threshold (MODEL 7 proportional odds testing).

LOGISTIC REGRESSION VARIABLES thres1_smallinvestabove

/METHOD=ENTER firmage markettype externalsupport sectortang SMEsize cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity SMEsize*cent_uniondensity /CONTRAST (firmage)=Indicator(1) /CONTRAST (markettype)=Indicator(1) /CONTRAST (externalsupport)=Indicator(1) /CONTRAST (sectortang)=Indicator /CONTRAST (SMEsize)=Indicator(1) /PRINT=GOODFIT /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

$LOGISTIC\ REGRESSION\ VARIABLES\ thres 2_substantial invest$

/METHOD=ENTER firmage markettype externalsupport sectortang SMEsize cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity SMEsize*cent_uniondensity

/CONTRAST (firmage)=Indicator(1)

/CONTRAST (markettype)=Indicator(1) /CONTRAST (externalsupport)=Indicator(1) /CONTRAST (sectortang)=Indicator /CONTRAST (SMEsize)=Indicator(1) /PRINT=GOODFIT /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

* separate ordinal regressions to conduct tests of parallel lines for SMEsize_small* uniondensity and SMEsize_medium* uniondensity.

PLUM efficiencyinvest BY SMEsize_small WITH cent_uniondensity /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /LOCATION=SMEsize_small*cent_uniondensity /PRINT=TPARALLEL.

PLUM efficiencyinvest BY SMEsize_medium WITH cent_uniondensity /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8) /LINK=LOGIT /LOCATION=SMEsize_medium*cent_uniondensity /PRINT=TPARALLEL.

*------ ROBUSTNESS CHECKS -------.

* ROBUST 1. Ordinal regression with missing values deleted listwise instead of multiple imputation.

select if not (efficiencyinvest=99).

select if not (firmage=9).

select if not (markettype=9).

select if not (SMEsize=9).

select if not (externalsupport=9).

* recode variable to be suitable for ordinal regression.

* Recode predictor variables to get right reference categories for ordinal regressions.

recode SMEsize (1=3) (2=2) (3=1) INTO SMEsize reg.

variable labels SMEsize_reg 'SME size for ord. reg.'.

value labels SMEsize_reg 1 'Medium' 2 'Small' 3 'Micro'.

variable level SMEsize_reg (ORDINAL).

exe.

recode SMEsize_resources (1=3) (2=2) (3=1) INTO SMEsize_resources_reg. variable labels SMEsize_resources_reg 'SME size (resources) for ord. reg.'. value labels SMEsize_resources_reg 1 '>2.000.000' 2 '500.000-2.000.000' 3 '<500.000'. variable level SMEsize_resources_reg (ORDINAL). exe.

recode firmage (1=3) (2=2) (3=1) INTO firmage_reg. variable labels firmage_reg 'Firm age for ord. reg.'. value labels firmage_reg 1 '> 10 yrs' 2 '5-10 yrs' 3 '0-5 yrs'. variable level firmage_reg (ORDINAL). exe.

recode externalsupport (1=4) (2=3) (3=2) (4=1) INTO externalsupport_reg. variable labels externalsupport_reg 'External support for ord. reg.'. value labels externalsupport_reg 1 'Both financial and non-financial external support' 2 'Financial external support' 3 'Non-financial external support' 4 'None'. exe.

recode markettype (1=4) (2=3) (3=2) (4=1) INTO markettype_reg. variable labels markettype_reg 'Market type served for ord. reg.'. value labels markettype_reg 1 'Multiple markets' 2 'Public administration' 3 'Companies' 4 'Consumers'. exe.

* run ordinal regressions model 1 and 2 as above.

* Model 1: Ordinal regression with control variables only.

DATASET ACTIVATE DataSet1.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 2: Ordinal regression with controls and main effects only.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 3: Ordinal regression with controls, main effects, and EPMR interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent_EPMR*SMEsize_reg /PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 4: Ordinal regression with controls, main effects, and DRI interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent_disclosure*SMEsize_reg

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 5: Ordinal regression with controls, main effects, and CC interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent_envreg*SMEsize_reg

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 6: Ordinal regression with controls, main effects, and skilled labor interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent_mean_school*SMEsize_reg

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 7: Ordinal regression with controls, main effects, and union density interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent_uniondensity*SMEsize_reg /PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

variable level SMEsize reg (ORDINAL).

* ROBUST 2. Ordinal regression with SMEsize_resources instead of SMEsize.

* Recode predictor variables to get right reference categories for ordinal regressions. recode SMEsize (1=3) (2=2) (3=1) INTO SMEsize_reg. variable labels SMEsize_reg 'SME size for ord. reg.'. value labels SMEsize reg 1 'Medium' 2 'Small' 3 'Micro'.

exe.

recode SMEsize_resources (1=3) (2=2) (3=1) INTO SMEsize_resources_reg. variable labels SMEsize_resources_reg 'SME size (resources) for ord. reg.'. value labels SMEsize_resources_reg 1 '>2.000.000' 2 '500.000-2.000.000' 3 '<500.000'. variable level SMEsize_resources_reg (ORDINAL). exe.

recode firmage (1=3) (2=2) (3=1) INTO firmage_reg. variable labels firmage_reg 'Firm age for ord. reg.'. value labels firmage_reg 1 '> 10 yrs' 2 '5-10 yrs' 3 '0-5 yrs'. variable level firmage_reg (ORDINAL). exe. recode externalsupport (1=4) (2=3) (3=2) (4=1) INTO externalsupport_reg.

variable labels externalsupport_reg 'External support for ord. reg.'.

value labels externalsupport_reg 1 'Both financial and non-financial external support' 2 'Financial external support' 3 'Non-financial external support' 4 'None'.

exe.

recode markettype (1=4) (2=3) (3=2) (4=1) INTO markettype_reg.

variable labels markettype_reg 'Market type served for ord. reg.'.

value labels markettype_reg 1 'Multiple markets' 2 'Public administration' 3 'Companies' 4 'Consumers'. exe.

* run ordinal regression models (all) as above with SMEsize_resources instead of SMEsize.

* Model 1: Ordinal regression with control variables only.

DATASET ACTIVATE DataSet1.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 2: Ordinal regression with controls and main effects only.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_resources_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 3: Ordinal regression with controls, main effects, and EPMR interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_resources_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_resources_reg

cent_EPMR cent_disclosure

cent_envreg cent_mean school

cent_uniondensity

cent_EPMR*SMEsize_resources_reg

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 4: Ordinal regression with controls, main effects, and DRI interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_resources_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_resources_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent disclosure*SMEsize resources reg

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 5: Ordinal regression with controls, main effects, and CC interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_resources_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_resources_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent_envreg*SMEsize_resources_reg

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

* Model 6: Ordinal regression with controls, main effects, and skilled labor interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_resources_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_resources_reg

cent_EPMRcent_disclosurecent_envregcent_mean_schoolcent_uniondensitycent_mean_school*SMEsize_resources_reg/PRINT=FIT PARAMETER SUMMARY TPARALLEL/SAVE=ESTPROB.

* Model 7: Ordinal regression with controls, main effects, and union density interaction.

PLUM efficiencyinvest BY sectortang firmage_reg externalsupport_reg markettype_reg

SMEsize_resources_reg WITH cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/LOCATION=sectortang firmage_reg externalsupport_reg markettype_reg SMEsize_resources_reg

cent_EPMR cent_disclosure cent_envreg cent_mean_school cent_uniondensity cent_uniondensity*SMEsize_resources_reg

/PRINT=FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

	Ν		
Variable	Valid	Missing	%
Greening processes	5752	694	10.8
SME size	6417	29	0.4
SME size (resources)	5557	889	13.8
EPMR	6446	-	
DRI	6446	-	
CC	6446	-	
Skilled labour	6446	-	
Union density	6446	-	
Controls			
Sector tangibility	6446	-	
Age	6096	350	5.4
External support	5943	503	7.8
Market type	6364	82	1.3

Appendix 5: Preliminary missing data examination.

	Model 1		Model	Model 2 Mc		Model 3		Model 4	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	
SME size: micro ^a									
SME size: small			0.158*	(0.065)	0.161*	(0.065)	0.169**	(0.066)	
SME size: medium			0.323***	(0.078)	0.325***	(0.078)	0.340***	(0.078)	
EPMR			-1.165***	(0.144)	-0.873***	(0.199)	-1.179***	(0.145)	
DRI			-1.732***	(0.233)	-1.717***	(0.233)	-2.237***	(0.321)	
Environmental leg.			-0.106	(0.080)	-0.108	(0.080)	-0.107	(0.080)	
Skilled labour			-0.120***	(0.035)	-0.119***	(0.035)	-0.118***	(0.035)	
Union density			-0.510**	(0.167)	0.498**	(0.167)	0.500**	(0.167)	
SME size: micro * EPMR ^a									
SME size: small * EPMR					-0.690*	(0.276)			
SME size: medium * EPMR					-0.413	(0.326)			
SME size: micro * DRI ^a									
SME size: small * DRI							0.694	(0.426)	
SME size: medium * DRI							1.162*	(0.497)	
SME size * Environm. leg. (5)									
SME size * Skilled labour (6)									
SME size * Union density (7)									
Controls									
Tangibility: intangible services ^a									
Tangibility: tangible services	0.250**	(0.081)	0.274***	(0.083)	0.269***	(0.083)	0.273***	(0.083)	
Tangibility: tangible products	0.591***	(0.080)	0.599***	(0.081)	0.592***	(0.082)	0.597***	(0.082)	
Age: < 5 years ^a									
Age: 5-10 years	-0.025	(0.134)	-0.046	(0.135)	-0.052	(0.135)	-0.052	(0.135)	
Age: > 10 years	-0.046	(0.114)	-0.128	(0.115)	-0.134	(0.116)	-0.132	(0.116)	
External sup.: none ^a									
External sup .: non-financial	0.429***	(0.082)	0.433***	(0.084)	0.427***	(0.084)	0.423***	(0.084)	
External sup .: financial	1.064***	(0.186)	0.996***	(0.188)	0.986***	(0.188)	0.986***	(0.188)	
External sup.: both	0.882***	(0.094)	0.902***	(0.097)	0.901***	(0.097)	0.902***	(0.097)	
Market type: consumers ^a									
Market type: companies	0.004	(0.082)	-0.097	(0.085)	-0.101	(0.085)	-0.105	(0.085)	
Market type: public adminis.	0.169	(0.218)	0.096	(0.220)	0.097	(0.220)	0.102	(0.220)	
Market type: multiple	0.149*	(0.075)	0.119	(0.077)	0.114	(0.077)	0.113	(0.077)	
Ν		5080		5080		5080		5080	
Pseudo (Nagelkerke) R ²		0.048		0.077		0.078		0.078	
Chi-Square	21	0.303***	34	0.238***	34	6.633***		346.399***	

Appendix 6: Ordinal logistic regression robustness check (all missing values deleted listwise)

Table A6.1: Models 1 to 4

Parameter estimates (including significance values) and standard errors (between parentheses) are displayed.

Non-included models in which interaction effects can be found are displayed between parentheses.

Ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Significance values: *** $p \leq 0.001;$ ** $p \leq 0.01;$ * $p \leq 0.05$ (two-sided).

^a Reference category.

Table A6.2: Model 5 to 7

	Model 5		Model	6	Model 7	
-	Coeff.	SE	Coeff.	SE	Coeff.	SE
SME size: micro ^a						
SME size: small	0.160*	(0.065)	0.157*	(0.065)	0.158*	(0.065)
SME size: medium	0.318***	(0.078)	0.323***	(0.078)	0.321***	(0.078)
EPMR	-1.170***	(0.145)	-1.169***	(0.145)	-1.164***	(0.145)
DRI	-1.726***	(0.233)	-1.731***	(0.233)	-1.730***	(0.233)
Environmental leg.	-0.086	(0.095)	-0.105	(0.080)	-0.105	(0.080)
Skilled labour	-0.120***	(0.035)	-0.113**	(0.042)	-0.120***	(0.035)
Union density	0.507**	(0.167)	0.506**	(0.167)	0.470*	(0.237)
SME size * EPMR (3)						
SME size * DRI (4)						
SME size: micro * Environm. leg.ª						
SME size: small * Environm. leg.	-0.103	(0.100)				
SME size: medium * Environm. leg.	0.089	(0.119)				
SME size: micro * Skilled labour ^a						
SME size: small * Skilled labour			-0.051	(0.046)		
SME size: medium * Skilled labour			0.051	(0.055)		
SME size: micro * Union density ^a						
SME size: small * Union density					-0.058	(0.314)
SME size: medium * Union density					0.261	(0.364)
Controls						
Tangibility: intangible services ^a						
Tangibility: tangible services	0.277***	(0.083)	0.274***	(0.083)	0.276***	(0.083)
Tangibility: tangible products	0.603***	(0.082)	0.602***	(0.082)	0.601***	(0.082)
Age: < 5 years ^a						
Age: 5-10 years	-0.050	(0.135)	-0.045	(0.135)	-0.047	(0.135)
Age: > 10 years	-0.132	(0.116)	-0.130	(0.116)	-0.129	(0.116)
External sup.: none ^a						
External sup.: non-financial	0.436***	(0.084)	0.434***	(0.084)	0.434***	(0.084)
External sup.: financial	0.998***	(0.188)	0.996***	(0.188)	0.994***	(0.188)
External sup.: both	0.906***	(0.097)	0.905***	(0.097)	0.902***	(0.097)
Market type: consumers ^a						
Market type: companies	-0.099	(0.085)	-0.098	(0.085)	-0.096	(0.085)
Market type: public adminis.	0.091	(0.220)	0.090	(0.220)	0.094	(0.220)
Market type: multiple	0.119	(0.077)	0.120	(0.077)	0.121	(0.077)
Ν		5080		5080		5080
Pseudo (Nagelkerke) R ²		0.077		0.077		0.077
Chi-Square	3	42.903***	34	43.701***	3	41.043***

Parameter estimates (including significance values) and standard errors (between parentheses) are displayed.

Non-included models in which interaction effects can be found are displayed between parentheses.

Ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Significance values: *** $p \leq 0.001;$ ** $p \leq 0.01;$ * $p \leq 0.05$ (two-sided).

^a Reference category.

Appendix 7: Missing data patterns in multiple imputation

After examining the descriptive statistics and frequencies of the variables in the dataset, several variables with missing values were observed. First, the cases with missing values on the dependent variable *Greening processes* were deleted, following the suggestion by Hair and colleagues (2014). Second, the remaining missing values were examined, to see whether there were any patterns present among them. I did this by running a multiple imputation pattern analysis. Normally, this analysis is only run for variables which have over 5% of missing data, but following best practice I run this analysis for all variables with missing data.

Figure A.1 shows that there were no patterns present in the missing values in my dataset. On the left side of the horizontal axis, the variable with the least missing values (*SME size*) is displayed. The variable with the most missing values (*SME size (measured in resources)*) is displayed on the right side of the horizontal axis. The rows of the table represent groups of cases with missing values on the same variables. The first row always consists of cases with no missing values, and thus remains empty. The second row displays cases with missing values only on the variable with the least missing values. The final rows consist of cases with missing values on the variable with the most missing values. Monotonicity, i.e. a non-random pattern of missing values, is present when there are clusters of missing values (indicated by red cells) in the upper left and the lower right area of the table (Rubin, 1987). In this case, certain questions in the Flash Eurobarometer 456 survey would have been systematically left unanswered by respondents. As can be seen in the figure, no such clusters are present. Therefore, monotonicity is absent.

Figure A.2 displays the frequencies of the ten most observed groups of cases with missing values on the same variables (the rows in Figure A.1). As this figure indicated, the majority of these groups (over 80% of cases) had no missing values, as they formed the first row of the table. The remaining groups of cases are relatively similar in size, indicating that there were no patterns present.







The 10 most frequently occurring patterns are shown in the chart.

Figure A7.2 Missing value patterns (2)

Appendix 8: SMEs analysed per country

Country	Sample size	Percent	SME population
Austria	393	7.4	323.882
Belgium	279	5.3	550.642
Denmark	392	7.4	212.861
Finland	417	7.9	221.275
France	393	7.4	2.905.995
Germany	389	7.4	2.172.107
Greece	430	8.1	671.928
Ireland	348	6.6	89.232
Italy	334	6.3	3.680.027
The Netherlands	426	8.1	1.037.663
Portugal	408	7.7	651.984
Spain	374	7.1	2.270.472
Sweden	400	7.6	630.488
United Kingdom	298	5.6	1.658.349
Total	5281	100	17.076.905

	Collinearity Statistics		
Variable	Tolerance	VIF	
SME size: micro ^a			
SME size: small	.641	1.560	
SME size: medium	.416	2.404	
SME size: < 2 million ^a			
SME size: 2 – 10 million	.646	1.548	
SME size: > 10 million	.480	2.083	
EPMR	.734	1.362	
DRI	.671	1.491	
Environmental legislation	.305	3.282	
Skilled labour	.342	2.921	
Union density	.699	1.431	
Controls			
Tangibility: tangible products ^a			
Tangibility: tangible services	.780	1.282	
Tangibility: intangible services	.816	1.226	
Age: < 5 years ^a			
Age: 5 – 10 years	.386	2.588	
Age: > 10 years	.377	2.655	
External sup.: none ^a			
External sup .: non-financial	.945	1.058	
External sup .: financial	.979	1.022	
External sup.: both	.944	1.060	
Market type: consumers ^a			
Market type: companies	.520	1.922	
Market type: public adminis.	.922	1.085	
Market type: multiple markets	.535	1.868	

Appendix 9: Multicollinearity statistics (VIF and tolerance values)

Dependent variable: Greening processes.

^a Reference category.
Appendix 10: Assumption of proportional odds Brant tests

Model 1	Coefficients						
	Ordinal	Binary		Ordinal	Binary		Parallel lines
		Small +	Substantial		Small +	Substantial	Chi-Square
Controls							
Tangibility: intangible services ^a							
Tangibility: tangible services	0.258	0.298	-0.010	1.294	1.345	0.990	3.983*
Tangibility: tangible products	0.600	0.619	0.475	1.822	1.856	1.608	0.162
Age: < 5 years ^a							
Age: 5-10 years	-0.040	-0.019	-0.115	0.961	0.981	0.892	1.671
Age: > 10 years	0.061	-0.033	-0.269	1.063	0.968	0.764	4.164*
External sup.: none ^a							
External sup.: non-financial	0.389	0.472	0.018	1.476	1.603	1.018	13.098***
External sup.: financial	1.059	1.311	0.603	2.883	3.710	1.827	6.289*
External sup.: both	0.875	0.924	0.735	2.399	2.519	2.086	1.188
Market type: consumers ^a							
Market type: companies	0.039	0.056	-0.069	1.038	1.058	0.934	1.649
Market type: public admin.	0.134	0.266	-0.512	1.143	1.305	0.599	2.341
Market type: multiple	0.155	0.202	-0.094	1.168	1.224	0.910	5.595*
Chi-Square		223.171***	62.517***				
Hosmer & Lemeshow test		5.439	4.059				

Table A10.1: Proportional odds testing model 1

N = 5281.

Ordinal logistic regression (Ordinal): ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Binary logistic regressions (Binary): coefficients and odds ratios displayed for two thresholds: (1) Small investments and above; (2) Substantial investments.

Significance values: *** $p \le 0.001$; ** $p \le 0.01$; * $p \le 0.05$ (two-sided).

Model 2		Coefficients	8		Odds ratio		
	Ordinal	Bin	ary	Ordinal	Binary		Parallel lines
		Small +	Substantial		Small +	Substantial	Chi-Square
SME size: micro ^a							
SME size: small	0.187	0.216	0.057	0.121	1.241	1.058	0.028
SME size: medium	0.381	0.481	-0.050	1.464	1.617	0.965	20.303***
EPMR	-1.175	-1.260	-0.862	0.309	0.284	0.422	30.091**
DRI	-1.791	-1.795	-1.685	0.167	0.166	0.185	16.844*
Environmental leg.	-0.122	-0.090	-0.252	0.885	0.914	0.778	29.802***
Skilled labour	-0.130	-0.128	-0.161	0.878	0.880	0.851	30.765**
Union density	0.492	0.437	0.813	1.636	1.549	2.255	12.930
Controls							
Tangibility: intangible services ^a							
Tangibility: tangible services	0.283	0.326	-0.035	1.327	1.385	0.965	3.983*
Tangibility: tangible products	0.607	0.623	0.465	1.835	1.864	1.593	0.162
Age: < 5 years ^a							
Age: 5-10 years	-0.065	-0.060	-0.140	0.937	0.942	0.869	1.671
Age: > 10 years	-0.152	-0.114	-0.294	0.859	0.893	0.746	4.164*
External sup.: none ^a							
External sup.: non-financial	0.393	0.461	0.109	1.481	1.586	1.116	13.098***
External sup.: financial	0.987	1.210	0.674	2.683	3.352	1.962	6.289*
External sup.: both	0.889	0.932	0.869	2.433	2.539	2.385	1.188
Market type: consumers ^a							
Market type: companies	-0.075	-0.074	-0.121	0.928	0.929	0.886	1.649
Market type: public admin.	0.059	0.189	-0.567	1.061	1.208	0.567	2.341
Market type: multiple	0.124	0.164	-0.084	1.132	1.178	0.919	5.595*
Chi-Square		377.697***	117.938***				
Hosmer & Lemeshow test		13.168	11.925				

Table A10.2: Proportional odds testing model 2

N = 5281.

Ordinal logistic regression (Ordinal): ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Binary logistic regressions (Binary): coefficients and odds ratios displayed for two thresholds: (1) Small investments and above; (2) Substantial investments.

Significance values: *** $p \le 0.001$; ** $p \le 0.01$; * $p \le 0.05$ (two-sided).

Model 3		Coefficients		Odds ratios			
	Ordinal	Bin	ary	Ordinal	В	inary	Parallel lines
		Small +	Substantial		Small +	Substantial	Chi-Square
SME size: micro ^a							
SME size: small	0.184	0.216	0.056	1.202	1.241	1.058	0.028
SME size: medium	0.380	0.480	-0.050	1.462	1.616	0.951	20.303***
EPMR	-0.831	-0.814	-0.962	0.437	0.443	0.382	30.091**
DRI	-1.771	-1.768	-1.695	0.170	0.171	0.184	16.844*
Environmental leg.	-0.123	-0.094	-0.252	0.884	0.910	0.777	29.802***
Skilled labour	-0.130	-0.127	-0.162	0.878	0.881	0.851	30.765**
Union density	0.479	0.416	0.820	1.614	1.516	2.271	12.930
SME size: micro * EPMR ^a							
SME size: small * EPMR	-0.708	-0.899	0.130	0.493	0.407	1.139	10.747**
SME size: medium * EPMR	-0.474	-0.716	0.272	0.623	0.489	1.313	7.217*
Controls							
Tangibility: intangible services ^a							
Tangibility: tangible services	0.278	0.320	-0.034	1.320	1.377	0.967	3.983*
Tangibility: tangible products	0.598	0.613	0.468	1.818	1.845	1.597	0.162
Age: < 5 years ^a							
Age: 5-10 years	-0.073	-0.072	-0.138	0.930	0.931	0.871	1.671
Age: > 10 years	-0.160	-0.123	-0.292	0.852	0.884	0.747	4.164*
External sup.: none ^a							
External sup .: non-financial	0.385	0.451	0.112	1.470	1.569	1.119	13.098***
External sup.: financial	0.974	1.196	0.680	2.649	3.306	1.974	6.289*
External sup.: both	0.886	0.931	0.870	2.425	2.538	2.388	1.188
Market type: consumers ^a							
Market type: companies	-0.082	-0.081	-0.119	0.921	0.922	0.888	1.649
Market type: public admin.	0.059	0.191	-0.567	1.061	1.210	0.567	2.341
Market type: multiple	0.118	0.157	-0.083	1.125	1.170	0.920	5.595*
Chi-Square		388.584***	118.186***				
Hosmer & Lemeshow test		11.559	13.359				

Table A10.3: Proportional odds testing model 3

Ordinal logistic regression (Ordinal): ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Binary logistic regressions (Binary): coefficients and odds ratios displayed for two thresholds: (1) Small investments and above; (2) Substantial investments.

Significance values: *** $p \leq 0.001;$ ** $p \leq 0.01;$ * $p \leq 0.05$ (two-sided).

N = 5281.

Model 4		Coefficients		Odds ratios			
	Ordinal	Bin	ary	Ordinal	В	inary	Parallel lines
		Small +	Substantial		Small +	Substantial	Chi-Square
SME size: micro ^a							
SME size: small	0.195	0.224	0.062	1.215	1.251	1.064	0.028
SME size: medium	0.394	0.494	-0.045	1.483	1.638	0.956	20.303***
EPMR	-1.193	-1.282	-0.864	0.303	0.277	0.421	30.091**
DRI	-2.232	-2.252	-1.800	0.107	0.105	0.165	16.844*
Environmental leg.	-0.123	-0.094	-0.252	0.882	0.911	0.777	29.802***
Skilled labour	-0.128	-0.125	-0.161	0.880	0.882	0.852	30.765**
Union density	0.483	0.432	0.810	1.621	1.540	2.248	12.930
SME size: micro * DRI ^a							
SME size: small * DRI	0.602	0.614	0.203	1.823	1.848	1.225	0.115
SME size: medium * DRI	1.038	1.144	0.204	2.824	3.139	1.226	0.331
Controls							
Tangibility: intangible services ^a							
Tangibility: tangible services	0.282	0.325	-0.036	1.326	1.384	0.965	3.983*
Tangibility: tangible products	0.606	0.621	0.465	1.833	1.861	1.592	0.162
Age: < 5 years ^a							
Age: 5-10 years	-0.070	-0.063	-0.142	0.932	0.939	0.868	1.671
Age: > 10 years	-0.156	-0.116	-0.295	0.856	0.890	0.745	4.164*
External sup.: none ^a							
External sup .: non-financial	0.385	0.453	0.107	1.470	1.572	1.113	13.098***
External sup.: financial	0.980	1.204	0.672	2.664	3.334	1.958	6.289*
External sup.: both	0.888	0.929	0.896	2.430	2.532	2.385	1.188
Market type: consumers ^a							
Market type: companies	-0.083	-0.081	-0.123	0.920	0.922	0.884	1.649
Market type: public admin.	0.062	0.192	-0.567	1.064	1.212	0.567	2.341
Market type: multiple	0.117	0.157	-0.086	1.124	1.169	0.918	5.595*
Chi-Square		383.052***	118.042***				
Hosmer & Lemeshow test		12.952	10.657				

Table A10.4: Proportional odds testing model 4

Ordinal logistic regression (Ordinal): ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Binary logistic regressions (Binary): coefficients and odds ratios displayed for two thresholds: (1) Small investments and above; (2) Substantial investments.

Significance values: *** $p \leq 0.001;$ ** $p \leq 0.01;$ * $p \leq 0.05$ (two-sided).

N = 5281.

Model 5		Coefficients			Odds ratios		
	Ordinal	Bin	ary	Ordinal	В	inary	Parallel lines
		Small +	Substantial		Small +	Substantial	Chi-Square
SME size: micro ^a							
SME size: small	0.189	0.218	0.049	1.208	1.243	1.050	0.028
SME size: medium	0.374	0.475	-0.058	1.454	1.609	0.944	20.303***
EPMR	-1.181	-1.265	-0.868	0.307	0.282	0.420	30.091**
DRI	-1.781	-1.784	-1.684	0.168	0.168	0.186	16.844*
Environmental leg.	-0.105	-0.095	-0.165	0.900	0.909	0.848	29.802***
Skilled labour	-0.131	-0.129	-0.162	0.877	0.879	0.851	30.765**
Union density	0.488	0.434	0.813	1.629	1.543	2.254	12.930
SME size: micro * Env. leg.ª							
SME size: small * Env. leg.	-0.110	-0.093	-0.154	0.896	0.911	0.857	10.455**
SME size: medium * Env. leg.	0.116	0.205	-0.142	1.123	1.227	0.868	13.202***
Controls							
Tangibility: intangible services ^a							
Tangibility: tangible services	0.286	0.332	-0.036	1.331	1.394	0.965	3.983*
Tangibility: tangible products	0.611	0.629	0.465	1.842	1.875	1.592	0.162
Age: < 5 years ^a							
Age: 5-10 years	-0.069	-0.064	-0.144	0.933	0.938	0.866	1.671
Age: > 10 years	-0.156	-0.119	-0.294	0.856	0.888	0.745	4.164*
External sup.: none ^a							
External sup .: non-financial	0.395	0.462	0.113	1.484	1.588	1.120	13.098***
External sup.: financial	0.987	1.205	0.680	2.683	3.338	1.974	6.289*
External sup.: both	0.893	0.935	0.880	2.442	2.547	2.410	1.188
Market type: consumers ^a							
Market type: companies	-0.076	-0.076	-0.122	0.927	0.927	0.885	1.649
Market type: public admin.	0.054	0.186	-0.574	1.055	1.204	0.563	2.341
Market type: multiple	0.124	0.163	-0.083	1.132	1.177	0.920	5.595*
Chi-Square		383.233***	119.079***				
Hosmer & Lemeshow test		9.659	11.710				

Table A10.5: Proportional odds testing model 5

Ordinal logistic regression (Ordinal): ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Binary logistic regressions (Binary): coefficients and odds ratios displayed for two thresholds: (1) Small investments and above; (2) Substantial investments.

Significance values: *** $p \leq 0.001;$ ** $p \leq 0.01;$ * $p \leq 0.05$ (two-sided).

N = 5281.

Model 6		Coefficients			Odds ratio		
	Ordinal	Bin	ary	Ordinal	В	inary	Parallel lines
		Small +	Substantial		Small +	Substantial	Chi-Square
SME size: micro ^a							
SME size: small	0.186	0.216	0.033	1.204	1.241	1.034	0.028
SME size: medium	0.382	0.485	-0.058	1.465	1.624	0.943	20.303***
EPMR	-1.179	-1.264	-0.867	0.308	0.282	0.420	30.091**
DRI	-1.787	-1.789	-1.693	0.167	0.167	0.184	16.844*
Environmental leg.	-0.120	-0.088	-0.250	0.890	0.916	0.778	29.802***
Skilled labour	-0.125	-0.129	-0.120	0.882	0.879	0.887	30.765**
Union density	0.489	0.434	0.817	1.631	1.543	2.263	12.930
SME size: micro * Sk. lab. ^a							
SME size: small * Sk. lab.	-0.054	-0.047	-0.099	0.947	0.954	0.905	9.451**
SME size: medium * Sk. lab.	0.062	0.088	-0.030	1.064	1.092	0.971	10.351**
Controls							
Tangibility: intangible services ^a							
Tangibility: tangible services	0.283	0.328	-0.037	1.327	1.388	0.964	3.983*
Tangibility: tangible products	0.609	0.627	0.466	1.839	1.871	1.593	0.162
Age: < 5 years ^a							
Age: 5-10 years	-0.064	-0.060	-0.135	0.938	0.942	0.873	1.671
Age: > 10 years	-0.155	-0.117	-0.291	0.856	0.890	0.748	4.164*
External sup.: none ^a							
External sup.: non-financial	0.393	0.459	0.116	1.481	1.583	1.123	13.098***
External sup.: financial	0.983	1.203	0.676	2.672	3.329	1.966	6.289*
External sup.: both	0.891	0.932	0.880	2.438	2.541	2.412	1.188
Market type: consumers ^a							
Market type: companies	-0.075	-0.074	-0.122	0.928	0.928	0.885	1.649
Market type: public admin.	0.055	0.190	-0.578	1.057	1.209	0.561	2.341
Market type: multiple	0.124	0.164	-0.083	1.132	1.178	0.920	5.595*
Chi-Square		382.929***	119.852***				
Hosmer & Lemeshow test		13.137	8.756				

Table A10.6: Proportional odds testing model 6

Ordinal logistic regression (Ordinal): ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Binary logistic regressions (Binary): coefficients and odds ratios displayed for two thresholds: (1) Small investments and above; (2) Substantial investments.

Significance values: *** $p \leq 0.001;$ ** $p \leq 0.01;$ * $p \leq 0.05$ (two-sided).

N = 5281.

Model 7		Coefficients		Odds ratios			
	Ordinal	Bin	ary	Ordinal	В	inary	Parallel lines
		Small +	Substantial		Small +	Substantial	Chi-Square
SME size: micro ^a							
SME size: small	0.186	0.216	0.057	1.204	1.241	1.058	0.028
SME size: medium	0.380	0.481	-0.051	1.462	1.618	0.950	20.303***
EPMR	-1.175	-1.262	-0.862	0.309	0.283	0.422	30.091**
DRI	-1.788	-1.791	-1.685	0.167	0.167	0.185	16.844*
Environmental leg.	-0.122	-0.090	-0.252	0.885	0.914	0.777	29.802***
Skilled labour	-0.130	-0.128	-0.161	0.878	0.880	0.851	30.765**
Union density	0.502	0.467	0.832	1.652	1.596	2.298	12.930
SME size: micro * Un. dens. ^a							
SME size: small * Un. dens.	-0.180	-0.268	-0.015	0.835	0.765	0.985	0.696
SME size: medium * Un. dens.	0.249	0.330	-0.061	1.282	1.390	0.940	0.773
Controls							
Tangibility: intangible services ^a							
Tangibility: tangible services	0.285	0.329	-0.036	1.330	1.389	0.965	3.983*
Tangibility: tangible products	0.609	0.625	0.465	1.839	1.869	1.592	0.162
Age: < 5 years ^a							
Age: 5-10 years	-0.064	-0.058	-0.140	0.938	0.944	0.870	1.671
Age: > 10 years	-0.152	-0.112	-0.293	0.859	0.894	0.746	4.164*
External sup.: none ^a							
External sup .: non-financial	0.394	0.462	0.110	1.483	1.588	1.116	13.098***
External sup.: financial	0.985	1.209	0.674	2.678	3.351	1.962	6.289*
External sup.: both	0.890	0.935	0.870	2.435	2.547	2.386	1.188
Market type: consumers ^a							
Market type: companies	-0.075	-0.073	-0.122	0.928	0.929	0.885	1.649
Market type: public admin.	0.055	0.184	-0.568	1.057	1.202	0.567	2.341
Market type: multiple	0.125	0.166	-0.085	1.133	1.180	0.919	5.595*
Chi-Square		380.053***	117.949***				
Hosmer & Lemeshow test		12.446	13.940				

Table A10.7: Proportional odds testing model 7

Ordinal logistic regression (Ordinal): ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Binary logistic regressions (Binary): coefficients and odds ratios displayed for two thresholds: (1) Small investments and above; (2) Substantial investments.

Significance values: *** $p \leq 0.001;$ ** $p \leq 0.01;$ * $p \leq 0.05$ (two-sided).

N = 5281.

	Mode	11	Model	2	Mode	13	Mod	lel 4
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
SME size (res.): micro ^a								
SME size (res.): small			0.136*	(0.069)	0.134	(0.069)	0.149*	(0.069)
SME size (res.): medium			0.206**	(0.082)	0.206*	(0.082)	0.213**	(0.082)
EPMR			-1.183***	(0.145)	-1.036***	(0.177)	-1.201***	(0.145)
DRI			-1.820***	(0.228)	-1.795***	(0.229)	-2.184***	(0.271)
Environmental leg.			-0.119	(0.079)	-0.117	(0.079)	-0.124	(0.079)
Skilled labour			-0.138***	(0.034)	-0.137***	(0.034)	-0.132***	(0.034)
Union density			0.458**	(0.164)	0.444**	(0.165)	0.454**	(0.164)
SME size: micro * EPMR ^a								
SME size: small * EPMR					-0.509	(0.302)		
SME size: medium * EPMR					-0.153	(0.352)		
SME size: micro * DRI ^a								
SME size: small * DRI							0.662	(0.460)
SME size: medium * DRI							1.383*	(0.542)
SME size * Environm. leg. (5)								
SME size * Skilled labour (6)								
SME size * Union density (7)								
Controls								
Tangibility: intangible services ^a								
Tangibility: tangible services	0.258***	(0.080)	0.269***	(0.081)	0.268***	(0.081)	0.272***	(0.081)
Tangibility: tangible products	0.600***	(0.079)	0.616***	(0.080)	0.614***	(0.080)	0.617***	(0.080)
Age: < 5 years ^a								
Age: 5-10 years	-0.040	(0.132)	-0.059	(0.133)	-0.060	(0.133)	-0.061	(0.133)
Age: > 10 years	-0.061	(0.112)	-0.122	(0.113)	-0.124	(0.113)	-0.123	(0.113)
External sup.: none ^a								
External sup .: non-financial	0.389***	(0.081)	0.420***	(0.083)	0.419***	(0.083)	0.416***	(0.083)
External sup.: financial	1.059***	(0.183)	1.029***	(0.185)	1.021***	(0.185)	1.030***	(0.185)
External sup.: both	0.875***	(0.093)	0.931***	(0.095)	0.931***	(0.095)	0.929***	(0.095)
Market type: consumers ^a								
Market type: companies	0.039	(0.081)	-0.054	(0.084)	-0.055	(0.084)	-0.063	(0.084)
Market type: public adminis.	0.134	(0.216)	0.081	(0.219)	0.082	(0.219)	0.086	(0.219)
Market type: multiple	0.155*	(0.074)	0.133	(0.076)	0.132	(0.076)	0.127	(0.076)
Ν		5281		5281		5281		5281
Pseudo (Nagelkerke) R ²		0.046		0.075		0.076		0.077
Chi-Square	21	0.714***	34	4.627***	34	7.510***		352.098***

Appendix 11: Ordinal logistic regression robustness check (SME size measured in resources) Table A11.1: Models 1 to 4

Parameter estimates (including significance values) and standard errors (between parentheses) are displayed.

Non-included models in which interaction effects can be found are displayed between parentheses.

Ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Significance values: *** $p \leq 0.001;$ ** $p \leq 0.01;$ * $p \leq 0.05$ (two-sided).

Table A11.2: Models 5 to 7

	Model 5		Model	6	Model 7	
-	Coeff.	SE	Coeff.	SE	Coeff.	SE
SME size (res.): micro ^a						
SME size (res.): small	0.139*	(0.069)	0.141*	(0.069)	0.139*	(0.069)
SME size (res.): medium	0.188*	(0.083)	0.189*	(0.083)	0.201*	(0.082)
EPMR	-1.178***	(0.145)	-1.177***	(0.145)	-1.181***	(0.145)
DRI	-1.806***	(0.229)	-1.801***	(0.229)	-1.818***	(0.229)
Environmental leg.	-0.157	(0.085)	-0.125	(0.079)	-0.119	(0.079)
Skilled labour	-0.137***	(0.034)	-0.155***	(0.037)	-0.137***	(0.034)
Union density	0.442**	(0.165)	0.451**	(0.164)	0.434*	(0.211)
SME size * EPMR (3)						
SME size * DRI (4)						
SME size: micro * Environm. leg.ª						
SME size: small * Environm. leg	0.042	(0.109)				
SME size: medium * Environm. leg.	0.197	(0.126)				
SME size: micro * Skilled labour ^a						
SME size: small * Skilled labour			0.028	(0.050)		
SME size: medium * Skilled labour			0.102	(0.063)		
SME size: micro * Union density ^a						
SME size: small * Union density					-0.014	(0.325)
SME size: medium * Union density					0.137	(0.366)
Controls						
Tangibility: intangible services ^a						
Tangibility: tangible services	0.273***	(0.081)	0.273***	(0.081)	0.270***	(0.081)
Tangibility: tangible products	0.619***	(0.080)	0.619***	(0.080)	0.617***	(0.080)
Age: < 5 years ^a						
Age: 5-10 years	-0.060	(0.133)	-0.062	(0.133)	-0.059	(0.133)
Age: > 10 years	-0.124	(0.113)	-0.126	(0.113)	-0.122	(0.114)
External sup.: none ^a						
External sup.: non-financial	0.416***	(0.083)	0.414***	(0.083)	0.419***	(0.083)
External sup.: financial	1.022***	(0.185)	1.021***	(0.185)	1.027***	(0.185)
External sup.: both	0.928***	(0.095)	0.926***	(0.095)	0.930***	(0.095)
Market type: consumers ^a						
Market type: companies	-0.050	(0.084)	-0.053	(0.084)	-0.052	(0.084)
Market type: public adminis.	0.076	(0.219)	0.083	(0.219)	0.081	(0.219)
Market type: multiple	0.135	(0.076)	0.136	(0.076)	0.134	(0.076)
Ν		5281		5281		5281
Pseudo (Nagelkerke) R^2		0.076		0.076		0.075
Chi-Square	3	47.137***	34	47.392***	3	44.800***

Parameter estimates (including significance values) and standard errors (between parentheses) are displayed.

Non-included models in which interaction effects can be found are displayed between parentheses.

Ordinal dependent variable *Greening processes*: (1) No investments (<1% of annual turnover); (2) Small investments (1-5% of annual turnover); (3) Substantial investments (>5% of annual turnover).

Significance values: *** $p \leq 0.001;$ ** $p \leq 0.01;$ * $p \leq 0.05$ (two-sided).