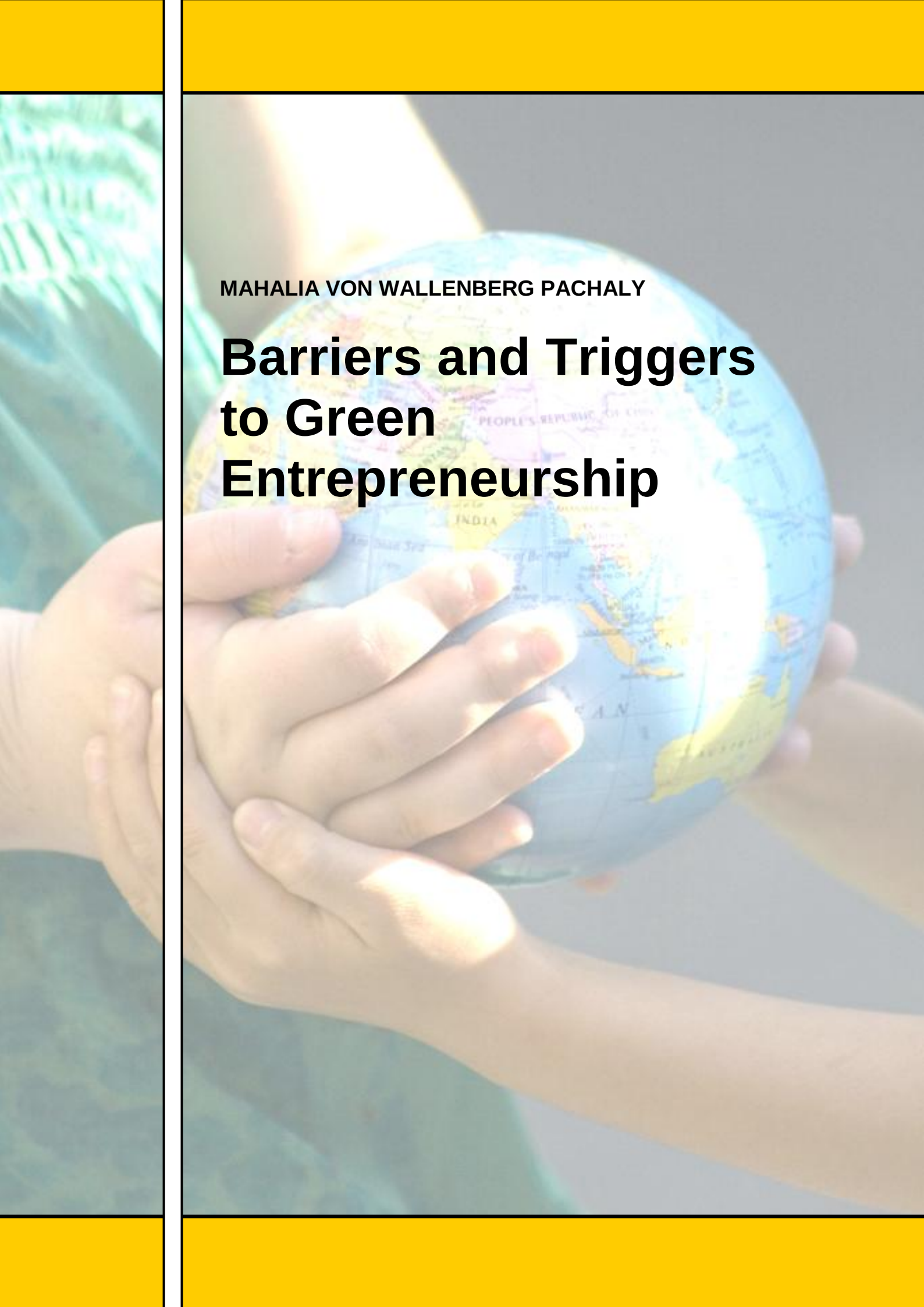

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Barriers and Triggers to Green Entrepreneurship

Barriers and Triggers to Green Entrepreneurship: An Exploratory Study

Thesis

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Abstract:

Green entrepreneurs have considerable potential to contribute to mastering the pressing environmental problems of our time through the introduction of new, environmentally friendly products (Schaper, 2005) and through catalysing an overall shift of business strategies towards more sustainable products and processes (York and Venkataraman, 2010). The present study extends the current knowledge on barriers and triggers to green entrepreneurship, which is one of the numerous essential fields in the domain of green entrepreneurship that currently remains under-researched and is dominated by qualitative studies. For this purpose novel data from the Flash Eurobarometer Survey No. 342 is used, which constitutes the first large-scale, cross-country dataset of green entrepreneurs that is available for research purposes. The survey has specifically been conducted to examine SMEs' green activities and allows for a unique measure of nascent green entrepreneurship. This is, the data allows for comparing nascent green entrepreneurs, i.e. entrepreneurs who are planning to introduce green products or services, with entrepreneurs that are not planning to take steps regarding green product or service offerings. For the purpose of generating empirically driven propositions regarding barriers, triggers and combinations of barriers and triggers perceived by nascent green entrepreneurs, descriptive and econometric techniques are applied. Particular attention is paid to barriers and triggers in reach of policy action, so that results may not only form a valuable starting point for further research, but also provide valuable insights for policy makers. Results suggest that there are two barriers that are specifically perceived by nascent green entrepreneurs and that several triggers are perceived as valuable with respect to introducing green products or services. Furthermore, combinations of triggers appear to play a role, which does not seem to hold for barriers. Lastly, results indicate that with respect to both triggers and the possible removal of barriers there seems to be room for policy action.

Keywords: Flash Eurobarometer 342, green entrepreneurship, nascent green entrepreneurship, barriers, triggers, combinations of barriers and triggers.

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1 Introduction

Given the growing concerns about global warming there is a pressing need to change current business practices – which are widely understood to be the main cause of pollution and environmental degradation – and reach more sustainable modes of operation. To date, research concerning business and the environment has mostly been conducted in the scholarly field of sustainability and focused on greening large, existing enterprises (Schaper, 2002; Lenox and York, 2011). Recently however, also researchers in the field of entrepreneurship have increasingly devoted their attention to the interrelation between businesses and the environment, in particular, to the role of entrepreneurs and their small and medium sized enterprises in the development towards a more sustainable commercial and economic system (Hall, Daneke and Lenox, 2010, Lenox and York, 2011). Compared to research on commercial entrepreneurs, who are widely understood to be individuals who act self-interestedly and who recognise, exploit and create future markets for goods and services (Venkataraman, 1997) and thereby contribute to economic growth, research on green entrepreneurs adds a further layer of analysis. Specifically, research into the emerging field of green entrepreneurship examines whether and to what extent entrepreneurs with an environmental focus can not only contribute to economic growth, but also to reduced environmental degradation (Hall, Daneke and Lenox, 2010). In fact, researchers' interest is driven by the conviction that green entrepreneurs have considerable potential to contribute to mastering environmental challenges through the introduction of new, environmentally friendly products (Schaper, 2005; Brown, 2006; Homer-Dixon, 2006). Moreover, green entrepreneurial activity has been recognised as important driver in the overall shift of business strategies towards more sustainable products and processes (O'Neill, Hershauer and Golden, 2009; York and Venkataraman, 2010). Thus, research in this field provides valuable insights on the impact of entrepreneurial activity beyond its contribution to economic growth.

However, despite the fact that green entrepreneurship has received increasingly more attention from entrepreneurship scholars in the past years, available literature is scarce and, most importantly, there is still a lack of large-scale empirical research. Specifically, past research has mostly been theoretical or based on relatively few case studies, rather than empirical and based on large-scale data, which is hampering the progress of the field (Hall, Daneke and Lenox, 2010; Lenox and York, 2011; Thompson, Kiefer and York, 2011). Accordingly, the knowledge about green entrepreneurship and the related process individuals pass through when setting up a green business remains limited, leaving many informative research areas to be explored (Hall, Daneke and Lenox, 2010; Lenox and York, 2011).

In an attempt to address these gaps in the literature, this paper adopts an econometric approach to identify barriers, triggers as well as combinations of barriers and triggers to actual green entrepreneurship. Due to the lack of relevant literature in the field to date, this paper adopts an exploratory proposition-generating approach, rather than a hypothesis-testing approach. Thereby, particular attention is paid to barriers and triggers in reach of policy action. Specifically, four research questions will be examined in more detail in this paper: (1) Which barriers are perceived by nascent green entrepreneurs and are these in reach of policy action?, (2) Which triggers are perceived by nascent green entrepreneurs and are these in reach of policy action?, (3) Are there certain combinations of barriers that are frequently perceived by nascent green entrepreneurs and, in particular, are barriers that might be addressed by the government perceived in combination with barriers that might be difficult to address or even be out of reach of policy action?, (4) Are there certain combinations of triggers that are frequently perceived by nascent green entrepreneurs and, in particular, are triggers that might be provided by the government perceived in combination with triggers that might be difficult to provide for or even be out of reach of policy action?

By using the first available large-scale, cross-country dataset on green entrepreneurship from the Flash Eurobarometer Survey No. 324 this study contributes to a better understanding of the process surrounding green entrepreneurship and, specifically, of barriers and triggers which may play a substantial role in this process but remained largely unexplored to date. By applying rigorous econometric techniques, this paper derives empirically grounded propositions that may not only form a valuable starting point for further research, but also provide valuable insights for policy makers. Moreover, this study contributes to the creation of a solid body of empirically grounded research in the field of green entrepreneurship.

Results suggest that there are two barriers which are specifically perceived by nascent green entrepreneurs, which may arise from the fact that the nature of their business poses particularly difficult challenges. Moreover, it seems that a variety of triggers is perceived as valuable with respect to the introduction of green products or services. Furthermore, combinations of triggers appear to play a role, while combinations of barriers seem to be of negligible importance. In addition, it seems that with respect to both triggers and barriers there is room for policy action aiming to foster green entrepreneurship.

The paper is structured as follows. Section two establishes the theoretical background for this study. Section three provides details on the data used and the methodology applied in this paper. In the third section descriptive and econometric results are presented. Section four discusses the results from the analysis. Finally, section five concludes.

2 Theoretical background

The present section will provide a theoretical background on green entrepreneurship and thereby create a basis for the further exploration of barriers and triggers to actual green entrepreneurship. This is done throughout several subsections.

The first subsection will frame the field of green entrepreneurship by drawing clear boundaries towards other types of entrepreneurship and by placing green entrepreneurship in perspective with them. The second subsection will review how the phenomenon of green entrepreneurship is understood in extant literature and establish a definition of the former that is applied throughout this paper. Eventually, the third subsection summarises literature in the field of green entrepreneurship to date, in particular, regarding barriers and triggers to green entrepreneurship. Moreover, the third subsection identifies gaps in literature that deserve further attention.[1]

2.1. Framing the research field

Next to traditional commercial entrepreneurship (Knight, 1921; Schumpeter, 1934; Kirzner, 1973; Hayek, 1978), researchers have identified several other types of entrepreneurship in the past years. These include *social* entrepreneurship (Mair and Marti, 2006; Weerawardena and Mort, 2006), *sustainable* entrepreneurship (Young and Tilley, 2006; Parrish, 2007) and *green* entrepreneurship. When reviewing literature on green entrepreneurship, it can be recognised that researchers in the field of green entrepreneurship often mention or refer to these other forms of entrepreneurship without placing them into a clear perspective with their own field of research. Consequently, boundaries between green entrepreneurship and these other types of entrepreneurship appear blurry and inevitably the question arises whether and to what extent these different types of entrepreneurs share similarities, so that insights from one field could be transferred to another, or whether they should be considered separate species. Evidently, for the relevance of applied research this is a crucial question, since a lack of defined boundaries may lead to overall confusion and hamper the progress of the field. In addition, a lack of clarity may lead to an overlap of research with respect to both theory building and empirical research and the unnecessary occupation of research capacities which could be directed towards more relevant and pressing questions, such as concerning the role these entrepreneurs play in catalysing or inducing societal change (Venkataraman, 1997). Therefore, the literature review of this paper is started at this point with a review of research examining the differences and similarities between green entrepreneurship, on the one side,

[1] For an exhaustive review of literature on green entrepreneurship see Lenox and York (2011) and Thompson, Kiefer and York (2011).

and social and sustainable entrepreneurship on the other side. Lastly, green entrepreneurship, which is the main focus of this paper, is compared to commercial entrepreneurship. This approach allows for drawing clear boundaries between green entrepreneurship and other types of entrepreneurship as well as for placing green entrepreneurship in perspective with these other types of entrepreneurship and with commercial entrepreneurship. This, in turn, will result into a clear research frame for this paper.

To define the research field of green entrepreneurship this paper draws on a recent paper by Thompson, Kiefer and York (2011), who extensively review and analyse existing literature to identify similarities and differences between social, commercial, and green entrepreneurs in an attempt to provide clarity and to highlight distinguishing features of these three areas, in which literature "struggles with the synonymous use of the terms" (p.217). The authors do this by identifying and comparing the key concepts, disciplinary roots, applied methodologies and key question addressed in each of the three entrepreneurship fields.

Thompson, Kiefer and York (2011) find that the three fields share a number of similarities. For example, they are all relatively young fields that constitute alternative paradigms to commercial entrepreneurship. Moreover, they are all multidisciplinary and still suffer from a lack of empirical evidence and quantitative-based analyses. However, Thompson and his co-authors (2011) also suggest that the fields can be differentiated by means of unique conceptual characteristics. One of these distinguishing characteristics is the primary focus these different entrepreneurs. In particular, the authors find that social entrepreneurs focus primarily on *"people today"*, whereas sustainable entrepreneurs focus on a *"triple bottom line"* (Elkington, 1998) and hence thrive to optimise the interplay between people, the planet and profit. Lastly, green entrepreneurs focus on the simultaneous creation of both "*economic and ecological benefits"* (Thompson, Kiefer and York, 2011). A second distinguishing characteristic that is identified by the same group of authors is the approach to opportunity exploitation and the resulting organisational form of the venture. This is, social entrepreneurs exploit opportunities altruistically and do not focus on commercial dimensions, for which reason their ventures may include different types of organisations, amongst others, not-for-profit, non-profit or nongovernmental organisations (Weerawardena and Mort, 2006). Sustainable entrepreneurs, in contrast, exploit opportunities while pursuing a combination of objectives that they seek to accomplish by designing their venture accordingly, namely the simultaneous creation economic, social and environmental benefits (Young and Tilley, 2006). Lastly, green entrepreneurs exclusively exploit opportunities that create both economic and ecological benefits and set up commercially oriented ventures (Lenox and York, 2011).

Hence, the authors conclude that the three concepts can and should be clearly distinguished from each other. In particular, the authors emphasise that sustainable entrepreneurship should not be seen as a sub-category of social entrepreneurship, as suggested by Dacin, Dacin and Matear (2010), and that green entrepreneurship should not be seen as a sub-category of sustainable entrepreneurship, as advanced by Dean and McMullen (2007), but that all three types of entrepreneurship should be considered separate categories.

Having established that green entrepreneurship can be clearly differentiated from the other types of entrepreneurship, it can be asked whether green entrepreneurship should be considered as a separate research-field, in addition to that of commercial entrepreneurship. Thompson, Kiefer and York (2011) state that this would be reasonable if green entrepreneurs significantly differed in core concepts, such as in their role in the society, in their motivations and in the methods applied to exploit opportunities. Based on an analysis of related literature the authors conclude that for all types of entrepreneurship, hence also for green entrepreneurship, entrepreneurship itself is the "key mechanism in discovering opportunities that drive prices, inputs, outputs, and resource allocation in an economy" (Thompson, Kiefer and York, 2011, p.222) as has been described by Kirzner (1973, 1997). They regard this as important shared concept and, therefore, conclude that green entrepreneurship, just as social or sustainable entrepreneurship, should not be understood as separate research field, but be considered as part of the larger domain of commercial entrepreneurship. In other words, research in the sub-field green entrepreneurship can add to the overall understanding of entrepreneurship, but then applied to a distinct setting (Thompson, Kiefer and York, 2011). In practice, this could work as follows. Insights stemming from large-scale econometric research that examines the role of green entrepreneurs in catalysing the invention and adoption of sustainable products could add to the greater understanding of how entrepreneurial activity affects society beyond job creation and economic growth. Thus, even though the three types of entrepreneurship can and should be clearly distinguished from each other, they should be seen as part of the greater research field of entrepreneurship.

Hence, in accordance with the above analysis this paper should be seen as a contribution to a distinct aspect of the overall field of entrepreneurship, namely green entrepreneurship. In particular, applying a slightly modified version of the definition suggested by Thompson, Kiefer and York (2011, p.218), the domain of *green entrepreneurship research* is defined as follows for this paper: *"Green entrepreneurship research investigates how environmentally relevant institutions influence entrepreneurial action by examining how individuals recognise,*

[evaluate and] *exploit* [opportunities] *and create economic growth while simultaneously creating environmental."*[2]

Having framed the domain of green entrepreneurship research, the following subsection reviews how the phenomenon green entrepreneurship is understood in extant literature and establishes a definition of green entrepreneurship that is applied throughout this paper.

2.2. Defining green entrepreneurship

When reviewing relevant literature it can be noticed that terminology describing the relationship between the environment and entrepreneurship is used in a rather unstructured manner (Hall, Daneke and Lenox, 2010). Thus, to avoid any confusion of the reader, the present subsection reviews recurring terminology. Moreover, existing definitions of green entrepreneurs are reviewed and a definition of green entrepreneurship that is applied throughout this paper is introduced. Thus, the present subsection can be understood as complementary to the previous subsection, since it intends to further clarify relevant concepts in order to provide a clear basis for reviewing existing literature on green entrepreneurship and related barriers and triggers.

To date several different terms have been used by researchers while analysing the environment and entrepreneurship. Commonly used terms are *green entrepreneurship* (Berle, 1991), *ecopreneurship* (Schaper, 2002), *eco-entrepreneurship* (Schaper, 2002) and *environmental entrepreneurship* (Keogh and Polonsky, 1998). Schaper (2005) argues that these terms capture the same concept and may be used interchangeably. As explained in the previous subsection, *sustainable* entrepreneurship (Dean and McMullen, 2007) describes a somewhat different phenomenon and needs to be differentiated from these terms. Hence, in line with Schaper (2005), this paper assumes that the four terms mentioned above are interchangeable. In accordance with the latter and for the sake of clarity and readability, this paper will state any of these terms solely as *green* entrepreneurship.

As diverse as the terminology used by researchers to name the phenomenon, are the definitions of green entrepreneurship they advance. These definitions may be classified according to the dimensions of green entrepreneurship to which they relate. For example, Isaak (1997, p.80) defines green entrepreneurship as "system transforming, socially-committed environmental business characterised by breakthrough innovation". Hence, he seems to focus on the distinctive *organisational characteristics* of the venture and emphasises an environmental purpose of the latter. Others focus on the *process* involved in green

[2] Words written in square brackets have been inserted by the author of this paper to arrive at a more complete and concise definition.

entrepreneurship, such as Dean and McMullen (2007, p.53) who define green entrepreneurship as “the process of defining and exploiting economic opportunities that are present in environmentally relevant market failures”. Similarly, Kotchen (2009, p.28) suggests that green entrepreneurship can be defined as "the practice of starting new businesses in response to an identified opportunity to earn a profit and provide (minimise) a positive (negative) environmental externality". Lastly, there exist definitions who relate more to the dimension of *environmental outcomes* that green entrepreneurs aim for. For example, a rather broad definition is advanced by Anderson and Leal (1997, p.3) who define green entrepreneurship as “entrepreneurs using business tools to preserve open space, develop wildlife habitat, save endangered species and generally improve environmental quality”. Looking at these definitions it can be noted that researchers still seem to struggle with capturing the phenomenon of green entrepreneurship. This can be substantiated by the fact that to date there exists no generally accepted definition of green entrepreneurship (Hall, Daneke and Lenox, 2010; Lenox and York, 2011).

Schaper (2005) combines different existing thoughts on green entrepreneurs and provides a framework for defining green entrepreneurship. He derives that green entrepreneurship is diverse, but that in principle all green entrepreneurs can be distinguished by means of three distinctive features. Moreover, he argues that green entrepreneurs share the first feature with common entrepreneurs but distinguish themselves significantly from their counterparts in the second and third. This is in accordance with research by Thompson, Kiefer and York (2011), presented in the previous subsection, who state that green entrepreneurship is closely related to traditional entrepreneurship. In particular, the first feature mentioned by Schaper (2005) is that all green entrepreneurial activity is *entrepreneurial*. This is, green ventures involve risks, unpredictable outcomes and thus the ever present threat of failure. Moreover, he states that, just as their counterparts, green entrepreneurs need to identify suitable and feasible opportunities, gain access to the required resourced and rigorously plan and pursue their business plans. The second feature described by Schaper (2005), one that distinguishes green entrepreneurs from their commercial counterparts, is that the *net effect* of their commercial activity *on the natural environment* and on the change towards a more sustainable future is positive. This definition and the explicit focus on the net effect allows for a broad variety of green ventures. For example, a green venture may embrace an approach in which every component has a positive or at least neutral environmental impact, but likewise there may be ventures that only embrace green practices in parts of their operation while others still contribute to a certain extent of environmental degradation, as long as the net

effect of all operations remains positive (Schaper, 2005). However, he does not advance any suggestions of how to evaluate negative and positive impacts of green entrepreneurs. Given the manifoldness nature of their activities this might prove impossible in practice. The last feature that according to Schaper (2005) all green entrepreneurs share, and which also differentiates them from commercial entrepreneurs, is their *set of aspirations and values* which he summarises under the header intentionality. This is, all green entrepreneurs see the protection of the environment and the goal to embark on a more sustainable business strategy as an end in itself and not only as a means to an end. However, he states that these aspirations and values may differ among green entrepreneurs and may, at the extreme, even be of minor importance compared to economic business success. The rationale for acknowledging this third distinguishing feature lies in the possibility it provides to distinguish green entrepreneurs from so called "accidental" green entrepreneurs, which Schaper (2005) describes as commercial entrepreneurs who, as a by-product from other processes, operate in an environmentally-friendly manner without deliberately focusing on doing so. Hence, it can be summarised that, in principle, Schaper's research provides a clear idea of green entrepreneurs. However, some aspects, such as defining entrepreneurs according to a positive net impact on the environment might be impossible in praxis. Thus, overall it may be concluded that more research is needed to arrive at a concise, widely acknowledged definition that can be used in applied green entrepreneurship research.

Inspired by the definitions by Anderson and Leal (1997) and Dean and McMullen (2007) as well as by the thoughts of Schaper (2005), this paper employs the following definition of green entrepreneurship: *Green entrepreneurship concerns individuals and organisations engaged in entrepreneurial activities that create environmental benefits by offering green final products or services*. This rather broad definition is chosen since it provides for a number of assumptions that are underlying the empirical analysis of this paper. Firstly, green entrepreneurship is a process of entrepreneurial activities that comprises recognising, evaluating and exploiting opportunities, but it does not necessarily have to include new venture creation, as opportunities might be abandoned after evaluation. In other words, it also comprises nascent green entrepreneurial activity. Secondly, green entrepreneurs (intend to) offer green products and services. This allows for distinguishing between true green entrepreneurs that intentionally seek to contribute to reduced environmental degradation and firms that merely green their processes to become more sustainable (Schaper, 2005). Moreover, this focus on green final products allows for clearly separating green entrepreneurship from corporate social responsibility literature and theory, since the latter

focuses not on the production of green final products and services, but on environmental and societal benefits caused through greening existing processes within the organisation without this being the foremost business goal (Matten and Moon, 2008). Thirdly, green entrepreneurship constitutes any green initiative initiated by an individual. Thus, green entrepreneurship may take any organisational form, including different business models and legal forms and may belong to any sector. Lastly, green entrepreneurial activity intends to create environmental benefits. This must, however, not be the foremost goal of individuals and their ventures. The latter presumes a deliberate intention to create environmental benefits, but leaves room for a variety of motivations that drive this intention, including economic returns.

By framing the research field and establishing a definition of green entrepreneurship throughout the previous and the present subsection, this paper aimed at establishing a clear basis for reviewing existing literature. To position the research conducted in this paper, the following subsection summarises research conducted in the field of green entrepreneurship to date and identifies gaps in literature that deserve further attention. Thereby, particular attention is directed to the topics nascent green entrepreneurship and to triggers and barriers to green entrepreneurship.

2.3. Past research on green entrepreneurship

Literature on green entrepreneurship has hitherto predominantly focused on three main aspects (Lenox and York, 2011). Firstly, researchers have focused on the extent to which green entrepreneurial activity reduces environmental degradation in a way that differs from other environmental initiatives, such as those undertaken by social movements, governments or existing firms (Larson, 2000; Anderson and Leal, 2001; Craig and Dibrell, 2006; Cohen and Winn, 2007; Dean and McMullen, 2007; Leca, Battilana and Boxenbaum, 2008; Pacheco, Dean and Sarasvathy, 2010). Literature that examines this aspect stems from a variety of different backgrounds, such as (environmental) economics or institutional entrepreneurship and focuses on a variety of only remotely related questions. Thus, results can still be characterised as fragmented and inconclusive. The second aspect literature has focused on are motives that induce individuals to engage in green entrepreneurship (Keogh and Polonski, 1998; Pastakia, 1998; Linnanen, 2002; Choi and Gray, 2008; Kuckertz and Wagner, 2010; Schlange, 2010). Results from this stream of literature point at the fact that motivations of green entrepreneurs partially differ from those of traditional entrepreneurs, as green entrepreneurs are to a certain extent motivated by not only economic, but also environmental concerns. However, the studies do not examine what implications different motivations could

have, for example, on the process of green entrepreneurship. In addition, merely one study uses empirical techniques (Kuckertz and Wagner, 2010), so results still seem to be in a premature state. The third and last aspect that has received attention from scholars so far, is the role of private and public institutions for green entrepreneurship (Isaak, 1997; 2002; Russo, 2003; O'Neill, Hershauer and Golden, 2009; Sine and Lee, 2009; Meek, Pacheco and York, 2010). This stream of literature is mostly concerned with the questions of what may be inhibiting entrepreneurship and of whether and how green entrepreneurship may be fostered. However, the studies examine a variety of often specific policies and institutions and are mostly based on case studies, which makes a comparison of the results difficult. In addition, the few existing empirical studies have been conducted in specific country contexts in the renewable energy industry. For example, a study by Sine and Lee (2009) touches upon the issue of triggers to green entrepreneurships while empirically examining the emergence of the U.S. wind energy sector. They find that the presence of large-scale social movements – which are assumed to be present when environmental movement organisations count a high number of members – have a significant positive effect on nascent green entrepreneurial activity, since they propagate distinctive norms, values, and regulatory structures conductive to the former. Moreover, Sine and Lee (2009) find that this effect is mediated by favourable regulatory policy, which is approximated by the number of regulatory policies adopted by a certain state to promote renewable energy and energy conservation. Hence, it seems that studies from the renewable energy sector might provide first, interesting insights on barriers and triggers to green entrepreneurship, but they cannot yet provide a deeper understanding of the matter that is of utmost importance to policy makers. Nevertheless, an interesting theoretical contribution with respect to barriers to green entrepreneurship is made by Linnanen (2002). In particular, he advances a basic framework for barriers to green entrepreneurship. Linnanen states that there are three categories of barriers that all green entrepreneurs need to overcome in order to succeed in introducing green product offerings. Interestingly, he states that these barriers differ from barriers to other types of entrepreneurship. The first barrier described by Linnanen (2002) is the *challenge of market creation*. He argues that there is still a lack of environmental awareness among the general population and that consumer behaviour is only changing slowly (Meffert and Kirchgeorg, 1993), which he attributes to the fact that consumers are not confronted with immediate, direct effects of their environmentally-unsustainable actions. Hence, realising a green business-idea often involves the need to create a market for the new product or service in the first place. This is described to be further complicated by the requirement of successful timing

to make the introduction of green products or services a success. The second barrier, identified by Linnanen (2002) is the *financing barrier*. Most interestingly, he finds that there seems to be a mismatch between green entrepreneurs in need of funding, on the one hand, and investors who are looking for trustable and promising ventures to invest in, on the other hand. Linnanen provides a variety of reasons for this mismatch, such as that many green entrepreneurs seem to be unfamiliar with the investment community and thus struggle to obtain capital; but also, that many investors have prejudices towards green entrepreneurs and their ability and willingness to act in the interest of investors. He also states that green ventures are often not attractive to venture capitalists, as product development and the time for products to become commercially viable often exceeds the targeted investment horizon of venture capitalists. Nevertheless, Linnanen (2002) sees an important role for business angels in financing green ventures, as they might form an appropriate match in terms of environmental and social beliefs and, therefore, have an understanding for "double dividends" (Randjelovic, O'Rourke and Orsato, 2002). Lastly, the third barrier identified by Linnanen (2002) is green entrepreneurs' *ethical justification for existence*. He describes that many green entrepreneurs distinguish themselves by their distinct set of values, i.e. their explicit concern for the environment and their ethical reasoning. Linnanen states that high ethical standards undoubtedly have positive effects, but may also complicate business operations, such as hiring and firing procedures or the attraction of capital, since investors usually define the success of the venture in terms of financial returns, while the green entrepreneur may apply multi-dimensional success criteria. It is worth mentioning that Linnanen (2002) provides case studies to support his reasoning but that his insights stem from a much broader sample of cases. In particular, Linnanen collected more than ten years of valuable experience in the field of green entrepreneurship by working at a leading Finnish energy and environmental management consultancy before he switched to academia in 2000. In his study he draws on his practical experience to suggest a framework for green entrepreneurship. Hence, the results may be considered more suitable for generalisation than those resulting from other qualitative case-studies with a more limited scope, but yet they lack the quality of empirical results. In addition, the barriers described by Linnanen are rather broad and he leaves the question of how they could be approximated in empirical research that intends to test their validity unanswered.

Since hardly any literature has been published on triggers and barriers to green entrepreneurship it could be argued that commercial entrepreneurship might provide a suitable starting point. However, it should be recalled that in an earlier section of this paper it has been

argued by that green entrepreneurs are driven by a different set of motivations and set up slightly different types of business than other entrepreneurs and that it may, therefore, be reasonable to assume that the process of green entrepreneurship differs as well (Lenox and York, 2011). Moreover, it was suggested that barriers faced by green entrepreneurs differ (Linnanen, 2002). Therefore, literature pertaining to the field of commercial entrepreneurship will not be reviewed in more detail here to derive testable hypothesis. Instead, this paper will adopt an exploratory rather than a hypothesis-testing approach to identify barriers and triggers to actual green entrepreneurship.

Taking a look at the published literature as a whole, it can be concluded that despite the fact that green entrepreneurship has received increasingly more attention from scholars in the past years, academic literature examining green entrepreneurship is still scarce, as the overall number of available studies is limited. Examining the level of analysis in the published studies, it can be found that merely five of the twenty-one studies that were referred to in this subsection applied econometric techniques to arrive at conclusions (see Table 1). The remaining studies constitute theoretical contributions or derive their results from a single or a small number of case studies, which renders them largely invalid for generalisation purposes. In addition, some of the empirical studies are based on specific country and/or industry settings, causing doubts with respect to the applicability of the results to other settings. Even though it is questionable to derive trends from such a small amount of publications, it seems that in recent years more empirical studies have been published. Moreover, they have been published in well known journals in the field, which may point at their importance. Hence, it can be concluded that there is still an overall, urgent need and apparent demand for large-scale empirically grounded evidence in the field of green entrepreneurship.

Table 1 about here

A further gap in literature which can be identified after reviewing relevant studies is that the list of areas within the domain of green entrepreneurship that seem to be almost entirely unexplored appears lengthy, though answers are crucial for the understanding of the green entrepreneurs and the entrepreneurial process these individuals pass through. Two of these important, yet ill-understood areas seem to be barriers to green entrepreneurship, on the one hand, and triggers to green entrepreneurship, on the other hand; not to mention combinations of triggers and barriers. These areas may be classified as crucial, since an understanding of barriers and triggers is of paramount importance for policy makers that seek to foster green entrepreneurship. A further field that seems to be partially interrelated with barriers and

triggers to green entrepreneurship and, likewise, appears to be unexplored to date is the area of nascent green entrepreneurship. Interestingly, Schaper (2005) had already stressed not to neglect the domain of nascent green entrepreneurship several years ago. He believed it to be essential for the advancement of the green entrepreneurship field, as the nascent entrepreneurial stage forms an important part of the entrepreneurial process and precisely during this early period individuals reflect on their motivation, identify and evaluate opportunities and define their business model, goals and ambitions. Despite the obvious importance of the topic, to the knowledge of the author, no research focusing explicitly on nascent green entrepreneurship has been published to date in any of the leading entrepreneurship journals[3]. This is, however, not surprising as nascent entrepreneurship is also a still underexplored topic in the field of commercial entrepreneurship, which overall is already at a more mature stage than green entrepreneurship (Aldrich, 1999; Sine and Lee, 2009). Hence, it can be concluded that numerous gaps to be addressed by further research remain in the rather virgin field of green entrepreneurship research. This is in accordance with findings by Lenox and York (2011), who state that more research is needed to arrive at a comprehensive understanding of green entrepreneurship and, likewise, detect several specific gaps in literature that require further attention in the form of large-scale, empirically grounded research which can facilitate an advancement of the field (i.e. research into motivations of green entrepreneurs; how these differ from traditional entrepreneurs and whether and how these influence their perception of opportunities; comparative studies between environmental and commercial entrepreneurs to gain insights into whether and to what extent passion or risk perceptions differ; comparing the impact of environmental entrepreneurship on reduced environmental degradation to that of government actions, incumbents and social movements; research aiming at establishing a definition of the process involved in environmental entrepreneurship; research examining how different institutional environments affect the decisions of environmental entrepreneurs' to exploit given opportunities and whether and how environmental entrepreneurs induce institutional change at a socio-cultural or regulatory level).

Having reviewed existing literature on green entrepreneurship, it can be summarised that this study contributes in several ways to current literature: Firstly, as the unit of analysis in this paper is nascent green entrepreneurship this paper contributes to the understanding of

[3] As of 4th June 2012 no results are returned from searching for titles containing the words nascent+ green/environmental+ entrepreneurship or nascent+ ecopreneurship/eco-entrepreneurship in the following journals: International Small Business Journal, Entrepreneurship: Theory and Practice, Small Business Economics, Journal of Small Business Management, Family Business Review, Strategic Entrepreneurship Journal, Journal of Business Venturing.

this currently under-researched aspect of green entrepreneurship and to the understanding of the overall entrepreneurial process. Secondly, this paper identifies and analyses barriers and triggers to actual green entrepreneurship that are perceived by nascent green entrepreneurs and will, therefore, be able to provide valuable insights on the subject.[4] Thirdly, this paper contributes to the building of a solid body of econometrically-based literature, since a novel, large-scale dataset is used that allows for sophisticated econometric analyses and the generation of empirically grounded propositions. Lastly, this study does not only produce results that are valuable to policy makers, but they can also serve as suitable starting points for future research.

To summarise, in this second section it is argued that in line with the current state of conceptualisation green entrepreneurship can be viewed as a sub-form of traditional entrepreneurship. Nevertheless, the concept can and should be clearly distinguished from the latter and other forms of entrepreneurship. Moreover, a definition of green entrepreneurship was introduced, past research was summarised and various gaps in literature could be identified. In addition, it was stated that an exploratory, proposition generating approach appears more adequate for this paper than a hypothesis testing approach, as essentially not sufficient relevant literature is available to date to derive clear hypothesis. The next section will describe the methodology applied in the empirical analysis of this paper.

[4] It seems that no suitable theoretical perspective for examining barriers and triggers to green entrepreneurship is available or frequently applied in the field of (green) entrepreneurship. For this reason the author refrains from introducing a theoretical perspective in this paper, since an ill-suited theory may rather lead to confusion on the side of the reader instead of contributing to a better understanding of the subject.

3 Data and methodology

The present section will introduce the overall data, the specific variables this paper focuses on and the empirical approach that is applied to identify and analyse barriers and triggers perceived by nascent green entrepreneurs.

3.1. Data source and definitions

Recent data from the Flash Eurobarometer Survey No. 342 on "SMEs[5], Resource Efficiency & Green Markets" [6], which was published in March 2012, is used as data source to provide insights into barriers and triggers to actual green entrepreneurship that are perceived by nascent green entrepreneurs. The survey was conducted in January and February 2012 by the consortium TNS Political and Social on behalf of the European Commission. The Flash Eurobarometer Survey No. 342 comprises 32 questions that focus on two main areas of interest, which will be commented on in more detail at a later point of this section. The provision of the raw data, which made this paper possible, was a courtesy from the European Commission. Interestingly, the raw dataset that was provided contains, next to the survey answers, some additional variables that capture firm characteristics. These are not mentioned in the survey report that was published by TNS Political and Social (2012) but, nevertheless, are invaluable for the econometric analysis as they allow for the construction of firm-level control variables.

In particular, this paper uses the complete dataset which includes data for all 38 countries that participated in the survey, i.e. the 27 European member states as well as Albania, Croatia, Iceland, Liechtenstein, the former Yugoslav republic of Macedonia, Montenegro, Norway, the republic of Serbia, Turkey, Israel and the United States. Specifically, the dataset used in this paper comprises 8759 observations. The original survey data was collected by means of standardised telephone interviews and covers businesses employing one or more persons in the manufacturing (NACE[7] category C), retail (NACE category G), services (NACE categories I/J/K/H/L/M/) and industry (NACE categories B/D/E/F) sector. The sample was selected from a not further specified international business database and, where necessary, the samples for the different countries were completed using appropriate local sources. The method applied by the consortium to select respondents within firms is not specified in more detail. While collecting the data, quotas were applied with

[5] SMEs=Small and medium sized enterprises.
[6] The report on SMEs, Resource Efficiency & Green Markets containing survey results is freely available from the internet, see: ec.europa.eu/public_opinion/flash/fl_342_en.pdf (last accessed 4th June 2012).
[7] NACE (revision 1.1) is the classification of economic activities in the European community. For a complete list of NACE codes see: http://www.fifoost.org/database/nace/nace-en_2002c.php (last accessed 4th June 2012).

respect to company sizes and sectors to ensure adequate sample sizes of approximately 100 to 400 interviews per country. (TNS Political and Social, 2012).

As mentioned earlier, the survey investigates two main areas of interest with respect to small and medium sized firms. These are resource efficiency within firms, on the one hand, and the provision of green products and services, on the other hand. This paper focuses on the second part of the survey. In the survey, green products and services are defined as follows: "Green products and services are those with a predominant function of reducing environmental risk and minimising pollution and resources. This may also include products with environmental features (e.g. organically produced, eco-labelled, with an important recycled component, eco-designed, etc.)". At the beginning of the second part of the survey, a question is posed that asks whether the respondent's company offers green products or services (Question 19). This allows for the distinction of three types of firms. Firstly, there are firms that *offer* green products or services. Secondly, there are firms that do not offer green products or services, but are *planning* to do so in the next two years. And lastly, firms can be distinguished that do *not* offer green products and services and are also not planning to do so. Accordingly, firms that do not offer green products but are planning to do so in the next two years are referred to as *nascent green entrepreneurs* for the remainder of this paper.

The latter is in accordance with the definition of green entrepreneurship established in the previous section, as well as with research by Katz and Gartner (1988) on nascent entrepreneurship. In particular, they propose that there are four different indicators that can be regarded as milestones in the process that individuals pass through when setting up a business. They argue that either of their suggested indicators may be used to differentiate groups of individuals subject to analysis. In particular, they distinguish four indicators: Firstly, the formation of distinct goals, such as the deliberate *intention* to set up a business; secondly, the *existence of resources* to start up a business; thirdly, the *establishment of a concrete organisational boundary*, which in an applied setting could be the registration of a firm; and lastly, the *exchange of resource* across the established boundary, which can be understood as the firm starting to sell its products. Hence, according to Katz and Gartner (1988) individuals may be considered nascent entrepreneurs when they have the intention (Bird, 1989) to start up a business. The present paper proceeds in a similar fashion, as nascent green entrepreneurs are considered to be those individuals who are currently planning to offer green products or services in the near future. However, a small difference between the approach taken by Katz and Gartner (1988) and the approach of this paper is that the nascent green entrepreneurs examined in the present paper are already active as traditional entrepreneurs.

Having stated the data source and established a common denominator for nascent green entrepreneurship, the next subsection will introduce the variables used in the analysis.

3.2. Variables

This subsection will introduce four types of variables that are essential for the analysis.

3.2.1. Dependent variable

The first type of variable that is introduced indicates the group of individuals that is of primary interest to this paper. It is called *nascent green entrepreneur*. Moreover, this variable will be the dependent variable in the analysis. It is derived from question 19[8] of the Flash Eurobarometer Survey No. 342. Specifically, for the econometric analysis a binary variable is constructed that takes the value one for nascent green entrepreneurs – those who are *planning* to offer green products in the next two years – and the value zero otherwise, which here means that firms are not planning to offer green products. Unfortunately, due to data limitations those firms that already offer green products cannot be included in the dataset. The reason for the latter is that the questions on barriers and triggers to green entrepreneurship, which this paper focuses on, were not asked to those firms that answered that they were offering green products or services already. Therefore, no data on the subject is available for this group of entrepreneurs. Even though the restricted setup poses limitations, which will be discussed at a later point, it is believed that the data can provide valuable insights and is therefore worth investigating. Moreover, since this paper focus on SMEs, only those firms are included which employ at least one, but less than 250 employees. Hence, the reference category for nascent green entrepreneurs in this paper only includes those firms that answered "No and I am not planning to do so" to the question of whether their company was offering green products or services. In total, this paper looks at 1056 nascent green and 7703 other entrepreneurs, which constitutes an overall sample comprising 8759 observations.

3.2.2. Independent variables

The second type of variables that is introduced is a set of variables indicating barriers to green entrepreneurship perceived by nascent green entrepreneurs. Together with variables indicating triggers, which will be introduced in the next paragraph, these are the main variables of interest that will be studied with respect to green entrepreneurship. In total, eight different variables that represent different barriers will be examined in more detail. To facilitate the interpretation and discussion, the variables are grouped under three main headers, according to the degree to which they may possibly be influenced by the government through

[8] Recall question 19, which was introduced in the first subsection: "Does your company offer green products or services?"

appropriate policies. The first group includes variables which are widely understood to lie beyond the control of the government and will be named *economic concerns*. This group includes barriers that may arise as a consequence from the situation of the overall economy, such as a lack of demand for certain products which may be the result of an economic depression. The second group of variables is called *organisational concerns* and includes those barriers which may indirectly be under the control of the government, as governments can, for example, shape the business environment and the public opinion. The third and last group of variables is called *public concerns* and includes variables that indicate barriers which are directly under the control of the government. In addition, a variable indicating *other* perceived *barriers* than the ones that could be chosen from is included, as it may provide insights on whether other relevant barriers are perceived by nascent green entrepreneurs were excluded[9]. In particular, the variables indicating barriers were constructed from question 25, which asks "What are the main reasons your company is not offering green products or services?". For the sake of this paper, it is assumed that a main reason not to offer green products is equivalent to a *barrier* to green entrepreneurship, as it appears to be the main obstacle that currently hinders the individual in the entrepreneurial process. To account for the fact that up to three perceived barriers could be named by every respondent, independent dummy variables for each of the answer possibilities were constructed. In other words, this paper looks at eight binary variables for barriers that take the value one if a respondent answered that he perceived a given barrier and the value zero otherwise. Moreover, it should be noted that the original answer categories regarding the questions about barriers and triggers were rotated when conducting the interviews to avoid response-order effects.[10] Table 2 lists the eight variables under their corresponding headers. For the sake of brevity, these eight variables will be referred to by the words shown in italic font for the remainder of the paper. Tables with frequencies and percentages of the independent variables will be provided in the results section.

Table 2 about here

The third type of variables that is introduced is a group of variables that resemble triggers to green entrepreneurship. As mentioned earlier, triggers constitute the second group of variables that is of main interest to this paper. In particular, six variables were derived from question 30 of the Flash Eurobarometer Survey No. 342, which asks "What type of support

[9] Note that respondents could only indicate the option *others* and not name those other barriers, as the questions were closed.
[10] Response order effects describe the finding that the order in which response categories are offered may influence the survey results.

would help you the most to launch your range of green products or services?". The answer possibilities to this question relate to the provision of different types of support related to the *operation of the business*. Moreover, firms could answer that *other* than the types of support they could choose from would help them the most to launch their products and services, as well as that *no* type of support would help them. Thus, for the sake of this paper it is assumed that nascent green entrepreneurs who answered that any kind of support would help them are currently struggling with this aspect, so that the provision of the indicated type of support can be understood as *trigger* to actual green entrepreneurship. Similar as before, independent dummy variables for each of the answer possibilities were constructed to account for the fact that up to two answer possibilities could be named by every respondent. Specifically, five binary variables are examined that take the value one if a respondent answered that his launch of green products could be triggered by a certain type of support and the value zero otherwise. Table 3 lists the five variables indicating triggers to green entrepreneurship. For the sake of brevity, also these five variables will be solely referred to by the words shown in italic font for the remainder of the paper.

Table 3 about here

3.2.3. Control variables

The fourth and last type of variables that is introduced is a set of five control variables that will be applied in the econometric model to account for other factors, apart from barriers and triggers to green entrepreneurship, which might be of influence with respect to nascent green entrepreneurship. As mentioned earlier, all control variables are constructed from additional firm-level information which is included in the dataset provided by the European Commission. The first variable that is included is the *number of employees* the respondent's business employed at the time the survey was conducted[11]. By means of this variable it can be accounted for business size, which may be of interest since a larger business in terms of number of employees may be more likely to have the capacity in terms of staff to expand current activities and engage in nascent green entrepreneurial activity. For the econometric analysis a categorical variable is constructed that takes the value zero if the company employs *1-9 employees*, the value one if the company employs *10-49 employees* and the value two if a company employs *50-249 employees*. In the analysis the first category (1-9 employees) will be used as reference category. The second control variable that is included is called *sector* and

[11] Also all of the control variables will, for the sake of brevity, be referred to by the words shown in italic font for the remainder of this paper.

indicates in which sector the company is operating. It may be interesting to account for this, as the feasibility of introducing green products or services may differ across sectors. For the analysis a categorical variable is constructed that takes the value zero if the respondent's company is active in the *manufacturing* sector (NACE category C), the value one if it is active in the *retail* sector (NACE category G), the value two if it is active in the *services* sector (NACE categories I/J/K/H/L/M/) and the value three if it is active in the *industry sector* (NACE categories B/D/E/F). Here, the manufacturing sector will serve as reference category for the analysis. The third control variable is a binary variable that indicates how long a firm had been in business at the time the survey was conducted. Specifically, a binary variable is constructed that takes the value one if a business is an *established business*, which means it has been in business for more than three years, and the value zero if a firm constitutes a *young business*, which means it has been in business for three or less than three years. This variable was constructed on the basis of the operational definition of total early-stage entrepreneurial activity (TEA) applied in the context of the Global Entrepreneurship Monitor (Reynolds et al., 2005). They define young firms as those up to three and a half years old. However, since the dataset underlying the present paper does not allow for a more precise discrimination than that on year level, the boundary between young and established businesses has been drawn at the age of three years for the purpose of this paper. This variable is included as it could be expected that established businesses are more likely to engage in nascent green entrepreneurial activities, as entrepreneurs might have gathered relevant experience and built up financial capital to engage in new entrepreneurial challenges. The forth variable that is included to control for firm-level characteristics is called *turnover change*. In particular, a categorical variable is constructed that takes the value zero if, over the past two years before the survey was conducted, the company's annual turnover *increased*, the value one if the turnover *decreased*, the value two if the company's turnover remained *unchanged* and the value three if the respondent did not know (*DK*), the figures were not available or the question was not applicable (*NA*). Even though the forth category might not provide particularly valuable insights, it is included as the number of observations would decrease unnecessarily much if it was excluded. The variable turnover change is included as firms which experience an overall decrease in turnover could be expected to claim more easily that they lack financial support (for green products or services) if their overall business situation appears not to be favourable. Lastly, *country* dummies for all 38 countries are included, which take the value one for each respondent's country and the value zero otherwise. It is of interest to include country-level dummies, as they can provide first indications on whether and to what extent

different political and economic environments provide different incentives for green entrepreneurship. For this purpose, the U.S. which are commonly understood to be a rather entrepreneurial country and to have an environment that is conductive to entrepreneurship will serve as reference country. However, an in-depth analysis of the country dummies goes beyond the scope of this paper. Therefore, average marginal effects for the country dummies will only be shown in a table that will be included in the appendix, but the effects are not discussed in detail in this paper. Table 4 presents summary statistics and correlation coefficients for all variables. For binary variables means indicate the share of respondents that have given the answer that corresponds to the value one of a given variable.

Table 4 about here

3.3. Empirical approach

To investigate the research questions and to generate empirically grounded propositions both descriptive and econometric analysis will be conducted.

To get a first impression of respondents' answers the survey results on barriers and triggers to green entrepreneurship will be tabulated. Thereby, it will be distinguished between nascent green entrepreneurs and other entrepreneurs and multiple responses will be taken into account. The latter allows for examining the responses not only with respect to the total number of observations, but also with respect to the total number of responses. Moreover, separate Pearson Chi2 statistics will be calculated for each trigger or barrier, i.e. each response category. In other words, a significance-test is carried out for each barrier or trigger to establish whether the probability of observing a certain response depends on whether the respondent is a nascent green entrepreneur or not. Hence, the test provides first insights on whether barriers and triggers perceived by nascent green entrepreneurs differ from those perceived by individuals in the reference category and seem, therefore, to be particularly attributable to nascent green entrepreneurs. However, descriptive analysis may provide a useful first impression of the results, but does not allow for controlling for other factors or for the interpretation of concrete signs and magnitudes. For this reason, regression analysis will be conducted as well.

The regression model is based on the variables described in the previous subsection. In particular, *nascent green entrepreneur* is employed as the binary dependent variable, the variables indicating triggers and barriers constitute the main independent variables and the variables describing firm-specific characteristics, as well as the country dummies constitute the control variables. Since the dependent variable is binary, a logit model is applied using

robust standard errors. Alternatively, a probit model could be applied, however, a logit model is chosen over a probit model since it seems to fit the data better as a slightly superior value for the log-likelihood could be obtained. In fact, the variables indicating barriers and triggers will be included stepwise, which allows for observing in more detail whether and in what manner perceived barriers and triggers relate to each other and to nascent green entrepreneurship. Specifically, *three* models are estimated. The first model includes all variables indicating barriers to green entrepreneurship, as well as the complete set of control variables. The second model includes all variables indicating triggers to green entrepreneurship and also the complete set of control variables. Lastly, the third model constitutes the full model and therefore includes both the variables indicating barriers and variables indicating triggers to green entrepreneurship as well as the control variables. In fact, for all three regression models the average marginal effects will be shown in the results section instead of displaying the coefficients that are obtained from the logit estimation. This is done, since the average marginal effects do not only allow for reading-off signs and significance levels, but also the magnitude of the effects.

By means of the earlier described descriptive analysis and the regression analysis research questions one and two can be answered. Recall:

Question 1: Which barriers are perceived by nascent green entrepreneurs and are these in reach of policy action?

Question 2: Which triggers are perceived by nascent green entrepreneurs and are these in reach of policy action?

To answer research questions three and four both descriptive and regression analysis is conducted as well. Recall:

Question 3: Are there certain combinations of barriers that are frequently perceived by nascent green entrepreneurs and, in particular, are barriers that might be addressed by the government perceived in combination with barriers that might be difficult to address or even be out of reach of policy action?

Question 4: Are there certain combinations of triggers that are frequently perceived by nascent green entrepreneurs and, in particular, are triggers that might be provided by the government perceived in combination with triggers that might be difficult to provide for or even be out of reach of policy action?

In particular, in the descriptive analysis all combinations of answers that were given by respondents are examined to detect whether there are frequently recurring answer patterns.

The latter will provide clear insights on whether respondents perceived just one or several barriers as important. Since this paper focuses on barriers and triggers perceived by nascent green entrepreneurs, and for the sake of clarity, the descriptives are only based on responses given by nascent green entrepreneurs. Specifically, different combinations of the variables on barriers and triggers to green entrepreneurship perceived by nascent green entrepreneurs are examined in three steps. Firstly, combinations of barriers are studied. Secondly, combinations of triggers are examined. Lastly, combinations of both barriers and triggers are looked at in more detail. Hence, descriptives concerning combinations of barriers and triggers to green entrepreneurship can provide first insights on the subject. However, as stated above, the descriptives only examine responses provided by nascent green entrepreneurs. Therefore, no comparative insights can be gained on whether and to what extent combinations of barriers and triggers perceived by nascent green and other entrepreneurs differ. Thus, to be able to derive qualified policy implications on the subject, additional regression analysis is conducted.

Specifically, one additional regression model is estimated that is based on the full model described earlier and beyond that includes three different sets of interaction terms. In particular, the first two sets of interaction terms investigate whether barriers captured under the header *public concerns*, are perceived in combination with other barriers that are captured under the remaining headers. This analysis will provide insights on whether *public concerns* are perceived together with other barriers that may be less easily influenced by policy action, which could complicate the latter. In order to investigate these combinations of barriers, interaction terms that capture all possible combinations between the first variable under the header *public concerns*, i.e. *compliance*, and all other examined barriers are introduced in addition to the independent and control variables included in the full regression model described earlier. Likewise, the second set of interaction terms includes terms that capture all possible combinations between the second variable under the header *public concerns*, i.e. *public support*, and all other barriers examined in this paper. Lastly, by means of the third set of interaction terms it is examined whether the trigger *financial incentives*, which may be rather easily provided by the government, is perceived in combination with other triggers that may require more intricate action or may even be out of reach of government action. In order to do this, interaction terms that represent all possible combinations between *financial incentives* and the other triggers examined in this paper are constructed and introduced to the model. Similar as before average marginal effects will be estimated and shown in the results section as they allow for interpretation of magnitudes, in addition to reading-off signs and

significance levels. It is worth mentioning here that average marginal effects of interactions between two dummy variables are somewhat more difficult to calculate and interpret that ordinary interaction effects between continuous variables. In fact, due to the binary nature of the variables the average marginal effects do not vary independently from the single binary variables.[12] Thus, the effects for the interaction effects have to be calculated separately.

Having introduced the data, the specific variables and the empirical approach, the following section will present the results.

[12] For this reason - using the software package Stata 11 - the average marginal effects for the interaction effects will not be shown when the corresponding command is applied to the logit model including the interactions, but only the effects for the single variables. However, the shown effects are calculated while taking into account that the underlying model includes interaction terms. Therefore, the average marginal effects for the single variables can be interpreted as usual and, most importantly, independently of the effects for the interaction terms. In fact, the average marginal effects for the interaction terms need to be calculated separately by holding the variables of interest, i.e. *compliance*, *public support* or *financial incentives*, at the value one. This way, average marginal effects for the interaction terms can be obtained. In fact, they constitute average marginal effects for the remaining barriers and triggers, given that individuals indicated that they perceive the corresponding barrier or trigger.

4 Results

This section presents the results from the analysis of barriers and triggers to green entrepreneurship. The two main subsections will state results concerning barriers and triggers, on the one hand, and results concerning combinations of barriers and triggers, on the other hand. Within each subsection, first descriptive results will be stated followed by results from the regression analysis.

4.1. Barriers and triggers

4.1.1. Descriptive results

Tables 5 and 6 provide details about individuals' responses regarding barriers and triggers to green entrepreneurship while taking into account that respondents could give up to three answers. It can be seen that the sample used in this paper comprises a total of 8759 entrepreneurs, of which 1404 are nascent green entrepreneurs and 8010 are not involved in nascent green entrepreneurial activities. In both tables, counts of answers are shown as well as their percentages for both nascent green entrepreneurs and the control group. In addition, numbers under the header rank indicate the importance of the different barriers and triggers to nascent green and other entrepreneurs.

It can be seen from Table 5 that nascent green entrepreneurs perceive *insufficient demand* as the most important barrier to green entrepreneurship as it received 26 percent of the responses given by nascent green entrepreneurs. The second most named barrier is *public support*, followed by *competitive advantage*, *core value*, *image*, *catching up*, *other barriers* and *compliance* which can be found on the last rank, with eight percent of the responses given by nascent green entrepreneurs. When looking at the different types of barriers it can be seen that the groups *economic concerns* and *public concerns* comprise barriers that rank both high and low. Moreover, barriers under the header *organisational concerns* rank in the middle, while *other barriers* rank lowest. In total, 1509 answers with respect to the examined barriers were given by 1056 nascent green entrepreneurs. Hence, each respondent named, on average, 1.4 barriers.

Taking a look at those entrepreneurs not involved in nascent green activities it can be seen that the answers regarding the main reason why a company does not offer green products or services rank differently than they did for nascent green entrepreneurs. In particular, *image* is with 19 percent of the answers given by individuals in the reference group, stated as most important barrier and *insufficient demand* as second most important barrier. The third most frequently perceived barrier is *core value*, followed by *other barriers*, *competitive advantage*, *catching up*, *compliance* and *public support*, which ranks last with seven percent of all

answers given by entrepreneurs in this group. When taking a look at the different groups of barriers it can be seen that *organisational concerns* rank high, followed by *other barriers* and *economic concerns* which, except for the barrier *insufficient demand* which ranks second, rank in the middle. Lastly, *public concerns* received the least responses and therefore rank lowest. In total, 9450 responses were given by 7703 entrepreneurs who are not involved in nascent green entrepreneurial activities. This constitutes, on average, a number of 1.2 responses per individual. Hence, other entrepreneurs named slightly less barriers per respondent than nascent green entrepreneurs.

The Chi2 values indicate whether responses concerning perceived barriers differ significantly for nascent green and other entrepreneurs. It can be seen that two out of the three responses for barriers under the header *economic concerns* differ significantly at the five percent level. Barriers under the header *organisational concerns* differ significantly at the one percent level. For *public concerns*, only answers regarding *public support* differ significantly at the one percent level, whereas answers regarding *compliance* do not differ. Answers regarding *other barriers* also differ significantly at the one percent level.

Table 5 about here

Table 6 provides details on responses regarding triggers to green entrepreneurship that relate to the operation of the business, while taking into account that respondents could give up to two answers.

Taking a look at the answers given by nascent green entrepreneurs it can be seen that *financial incentives*, which received 41 percent of all responses, rank first. With about 20 percent the second largest amount of responses can be attributed to ide*ntifying markets or customers*, closely followed by *technical expertise*. *Marketing or distribution* ranks fourth, followed by *other barriers* and *none*, which ranks last with merely two percent of the responses. In total, 1404 responses were given by 1056 nascent green entrepreneurs. This is equivalent to an average of approximately 1.3 responses per individual.

With respect to entrepreneurs who are not involved in nascent green entrepreneurial activities it can be said that the ranking differs only in the middle range. This is, the trigger named most frequently, which here reflects 30 percent of the responses, is again *financial incentives*; and the trigger named least frequently is, just as before, *none*, which received five percent of all responses. *Other triggers* rank third, followed by *technical expertise*, *identifying markets or customers* and *marketing or distribution*. Overall, a total of 8010 responses were

given by 7703 entrepreneurs. This equals an average of approximately 1.0 response per individual.

Table 6 about here

Having provided first insights on barriers and triggers to green entrepreneurship based on descriptive statistics, the next subsection will present the results from the econometric analysis.

4.1.2. Regression results

Table 7 shows average marginal effects that have been derived from the three different logit models that were introduced in the previous section and that use *nascent green entrepreneur* as dependent variable. Since all models comprise the same number of observations and an equal share of nascent green entrepreneurs to other entrepreneurs, the predicted probability of being a nascent green entrepreneur is approximately 0.160 for all three models, i.e. 16 percent.

Table 7 about here

Model 1 – The first model includes barriers to green entrepreneurship as well as the full set of control variables. From the three barriers captured under the header *economic concerns* only the first one, called *insufficient demand*, is significant (at the 1 percent level) and shows a positive sign. Since marginal effects are shown, the size of the effect can be read-off as well. This is, on average, entrepreneurs that perceive *insufficient demand* as a barrier have a 7.7 percentage point higher predicted probability of being a nascent green entrepreneur than those that do not perceive this barrier, given all the other variables, which implies a total predicted probability of 23.7 percent. The two barriers stated under the header *organisational concerns* show both negative average marginal effects and are highly significant.

Specifically, perceiving *image* as a barrier decreases the predicted probability of being a nascent green entrepreneur, on average, by 5.9 percentage points to 10.1 percent, given all the other variables. Similarly, given all the other variables, entrepreneurs that perceive *core value* as a barrier have, on average, a 2.4 percentage point lower predicted probability of being a nascent green entrepreneur than those that do not perceive this as a barrier, i.e. a predicted probability of 13.6 percent. From the two variables under the header *public concerns* only one variable, namely *public support*, is highly significant and shows a positive sign. This means that perceiving the former as a barrier increases the predicted probability of

being a nascent green entrepreneur which is 0.160, on average, by 14.9 percentage points to 30.9 percent, given all the other variables. Hence, this effect almost doubles the predicted probability that an entrepreneur is a nascent green entrepreneur. The average marginal effect for *other barriers* is not significant. Hence, taking a look at all barriers that are significant, it can be said that *public support* has the largest average marginal effect. Moreover, it can be said that similar variables show to be significant in the regression analysis as in the descriptive analysis (see Table 5), since only the barriers *competitive advantage* and *other barriers* are not significant in the regression model, which controls for other factors, but the four remaining variables indicating barriers are still highly significant.

The control variables in model one show only to a limited extent significant coefficients. This is, with respect to *number of employees* only the last category is significant at the five percent level and shows a positive coefficient. However, the magnitude of the effect is rather small. This is, relatively large firms with *50-249* employees have, on average, a 2.1 percentage point higher predicted probability of being a nascent green entrepreneur than firms in the reference category, i.e. small firms with *1-9* employees, given all the other variables. Moreover, the average marginal effects of the *retail* sector and the *industry* sector are positive and highly significant. This implies that, on average, firms in the *retail* and *industry* sector have respectively a 2.4 and 2.7 percentage point higher predicted probability of being a nascent green entrepreneur than firms in the *manufacturing* industry, which constitutes a total predicted probability of 18.4 and 18.7 percent respectively. In contrast, firms that constitute an *established business* have, on average, a 2.7 percentage point lower predicted probability of being a nascent green entrepreneur than *young businesses*, since the average marginal effect for *established business* is negative and highly significant. Similarly, the categories *decreased* and *DK/NA* of the variable *turnover change* show negative average marginal effects which are significant at the one and five percent level respectively. This implies that, on average, entrepreneurs whose turnover *decreased* have a 2.4 percentage point lower predicted probability of being a nascent green entrepreneur than those whose turnover *remained unchanged*, given all the other variables.

Model 2 – The second model includes the variables indicating triggers to green entrepreneurship as well as the full set of control variables. The average marginal effects for *financial incentives*, *identifying markets or customers*, *technical expertise* and *marketing or distribution* are all positive and highly significant. Moreover they show a similar magnitude, which varies between 5.8 and 7.0 percentage points. Hence, on average, these triggers decrease the predicted probability that individuals are nascent green entrepreneurs by 5.8-7.0

percentage points, given all the other variables. Hence, the total predicted probability for these individuals lies between 9 and 10.2 percent. In contrast, the variable *other triggers* has a negative sign and is highly significant. Hence, perceiving *other triggers* as supportive decreases the predicted probability of being a nascent green entrepreneur, on average, by 7.8 percentage points to a total of 8.2 percent, given all the other variables. Similar to the results on barriers in model one, the results on triggers that can be derived from model two are similar to the results from the descriptive analysis (see Table 6). In fact, only *other triggers* are not significant in the regression, whereas they are significant in the descriptive analysis.

The control variables in model two all show the same sign as they did in model one. Likewise, the magnitudes of the effects are very similar. Also the significance levels are very similar, with the exception of the variable *50-249 employees*, which is not significant anymore in model two whereas it was significant at the five percent level in model one.

Model 3 – The third and last model constitutes the full model, which includes both the variables indicating barriers and the variables indicating triggers to green entrepreneurship, as well as the full set of control variables.

The signs of the coefficients indicating barriers to green entrepreneurship are the same as in model one, with the exception of *catching up*, which is, however, not significant in either of the models. Also significance levels are the same, with the exception of *competitive advantage* which was not significant in model one, but is significant at the ten percent level in model three. Likewise, the magnitudes of the average marginal effects indicating barriers have only changed marginally. The largest changes have occurred with respect to the variables *insufficient demand*, which had a magnitude of 7.7 percentage points in model one opposed to 4.7 percentage points in model three, and with respect to *public support* which had a magnitude of 14.9 percentage points in model one that declined to 9.1 in model three.

Similar statements can be made regarding sign, significance and magnitude of the variables indicating triggers to green entrepreneurship. In fact, both signs and significance levels are identical to those in model two. Moreover, magnitudes are very similar, as they changed by less than two percentage points for all variables indicating triggers.

Also the average marginal effects for the control variables are very similar to the results obtained in models one and two what regards sign, significance and magnitude. Similar as before, this model also includes country dummies. However, average marginal effects for the examined countries are not presented in detail, but can be found in Table 1A of the appendix. Overall, it seems that the results are rather robust and that the variables indicating barriers and

triggers are independently from each other related to nascent green entrepreneurship, as effects do not change majorly upon the inclusion of the one or the other.

Taking a closer look at the summary statistics of the three models it can be seen from the Chi2 values that the variables in all models are jointly significant. Moreover, it can be seen that the value of the Pseudo R2 measure increases with each model, which indicates that the model fit increases with each model specification.

Thus, having stated the results regarding triggers and barriers to green entrepreneurship that are significantly more or less often perceived by nascent green entrepreneurs, the next subsection will state results from the analysis of combinations of barriers and triggers to green entrepreneurship.

4.2. Combinations of barriers and triggers

4.2.1. Descriptive results

This subsection will present the results from the analysis of combinations of triggers and barriers to green entrepreneurship. As stated earlier, the descriptive analysis is conducted in three steps.

Firstly, Table 8 shows the ten most frequent answer combinations that were given by nascent green entrepreneurs with respect to barriers to green entrepreneurship. Answer patterns are depicted by means of ones for perceived barriers and zeros otherwise. Next to the actual answer patterns the table does not only provide frequencies and percentages, but also cumulative values, since they facilitate the interpretation. It can be seen that nine out of the ten most frequent answer patterns include each only *one* barrier. Jointly, these patterns with one barrier account for a cumulative percentage of 69 percent[13] of all responses given by nascent green entrepreneurs. In other words, despite the fact that up to three answers could be given, more than two thirds of the respondents answered that they perceived only one barrier. In total, 76 unique answer patterns were given by nascent green entrepreneurs. The most frequently perceived barrier is *insufficient demand*, which was named by 15 percent of the examined respondents. The second most perceived barrier is *public support*, which was named by 12 percent of all nascent green entrepreneurs, followed by *other barriers* which were named by nine percent of the respondents. On the forth rank an answer pattern with only zeros can be observed. This means that respondents did no perceive any of the stated patterns. Recall that it was stated earlier that a ninth response category exists, namely *don't know/not applicable*, which is not examined in more detail in this paper. Hence, respondents that did

[13] The cumulative percentage of 69 is computed by adding up the single percentages that each of the nine answer combinations accounts for.

not perceive any of the examined barriers chose this answer category which, by definition, could not be chosen in combination with other barriers. On the fifth rank, with six percent of the responses, *core values* can be found, followed by *image* and *competitive advantage* with five and four percent of the responses respectively. On the eighth rank the only pattern that includes more than one barrier can be found. This pattern names *insufficient demand* together with *public support* as perceived barriers and was given by 38 of 1056 respondents, which constitutes about four percent of all answers. On the second last rank *competitive advantage* can be found, which is followed by *catching up* on the last rank. Both received approximately three percent of the answers.

Table 8 about here

Table 9 shows the ten most frequent answer patterns given by nascent green entrepreneurs concerning triggers to green entrepreneurship. These ten depicted patterns account for a cumulative percentage of 92 percent of all the answers, which indicates that almost all nascent green entrepreneurs have given one of the shown response patterns. In fact, merely 15 unique answer combinations were given by respondents. It can be noted that four out of the ten most frequent answer patterns include more than one trigger, i.e. two triggers. The most frequently indicated trigger is *financial incentives*, which received approximately 24 percent of all answers given by nascent green entrepreneurs. The second most given response pattern includes both *financial incentives* and *technical expertise* and was named by about 12 percent of respondents. The third most frequent answer pattern includes *financial incentives* and *identifying markets or customers* and was named by 128 out of 1056 respondents, which constitutes approximately 12 percent of all responses. On the forth rank the single trigger *technical expertise* can be found, followed by *identifying markets or customers* as single trigger. Also here, an answer pattern with only zeros can be observed, namely on rank six, which is due to the same reason as stated in the previous paragraph explaining Table 8. On rank seven, with seven percent of the answers, *other triggers* can be found. On the eights rank, with about six percent of all answers a pattern with two triggers, i.e. *financial incentives* and *marketing or distribution* can be found. *Marketing or distribution* alone ranks on place nine, followed by the combination *identifying markets or customers* and *technical expertise*, which ranks last with about four percent of the answers. Overall and in comparison with the response patterns given concerning barriers to green entrepreneurship, it can be noticed that respondents named relatively many combinations of triggers to green entrepreneurship. Moreover, relatively many triggers are named not only alone, but also several times in

combination with other triggers. For example, *financial incentives* is ranked on the first place as single trigger, but also in combination with *technical expertise*, *identifying markets or customers* and *marketing or distribution*.

Table 9 about here

Table 10 is the last table examining answer patterns and looks at combinations of both barriers and triggers to green entrepreneurship together. The ten most frequent answer patterns account cumulatively for approximately 23 percent of all answers. This comparatively low percentage may be due by the fact that now there are 14 barriers and triggers that can be indicated in a vast variety of ways, as for the eight barriers three answers and for the six triggers two answers could be given by respondents. In fact, a total of 326 unique answer combinations were given by respondents. Moreover, it can be seen that the last answer pattern accounts for merely one percent of all answers. This implies that all the following answer patterns, which are not listed here, do likewise not account for more than a maximum of approximately one percent of the answers given by nascent green entrepreneurs. Moreover, it can be seen that all patterns include one barrier and one or two triggers, except for the combination on rank six which consists, for the same reasons as stated earlier, only of zeros. Specifically, seven combinations include each one barrier and one trigger and two combinations include one barrier and two triggers.

The most frequent answer pattern that can be observed when looking at both triggers and barriers includes *insufficient demand* (barrier) and *financial incentives* (trigger) and accounts for approximately four percent of all responses given by nascent green entrepreneurs. On rank two a combination of *public support* (barrier) and *financial incentives* (trigger) can be found, which also accounts for about four percent of all answers. The third most frequent answer pattern includes *other barriers* and *financial incentives* (trigger), followed by the combination *insufficient demand* (barrier) and *technical expertise* (trigger). On the fifth rank, accounting for about two percent of all answers, *insufficient demand* (barrier) and *identifying markets or customers* (trigger) can be found. On the seventh and eighth rank again combinations of one barrier and one trigger can be found, namely of *competitive advantage* (barrier) and *financial incentives* (trigger) and of *insufficient demand* (barrier) and *marketing or distribution* (trigger). Lastly, on the last two ranks combinations of one barrier and two triggers can be found. The first one includes *public support* (barrier), *financial incentives* (trigger) and *technical expertise* (trigger) and accounts for about two percent of all answers given by nascent green entrepreneurs. The second combination includes

public support (barrier) and *financial incentives* (trigger), as well as *technical expertise* (trigger).

Overall, it can be noted that *insufficient demand* is included in four answer combinations and therewith the most frequently named barrier. The second most named barrier is *public support*, which constitutes part of three answer combinations. With respect to triggers to green entrepreneurship, *financial incentives* is by far the most mentioned trigger, since it is included in six answer combinations. The triggers *identifying markets or customers* and *technical expertise* are the second most indicated triggers, being included in each two answer combinations.

Table 10 about here

4.2.2. Regression results

Table 11 presents the average marginal effects from the logistic regression with *nascent green entrepreneur* as dependent variable and various interaction terms. As stated earlier, the model has been estimated based on the full model presented in specification three in Table 7. Accordingly, variables for barriers and triggers to green entrepreneurship are included as independent variables, but also several interaction terms to investigate combinations of barriers and triggers. In particular, the table shows a model specification that includes three different sets of interaction variables, separated by dotted lines, which are included to investigate combinations of barriers and triggers to green entrepreneurship in more detail.

Since average marginal effects are estimated for binary variables, the effects for the single variables indicating barriers and triggers can be read-off directly from the table, independent of the interaction effects. Thus, taking a closer look at the independent variables for barriers and triggers, it can be seen that there are no noteworthy changes with respect to signs and significance when comparing the results with the results that were obtained from the earlier regressions shown in Table 7. The same holds for the control variables which, likewise, show no significant deviations in terms of sign and significance. In other words, the results that were obtained previously, when investigating barriers and triggers (see Table 7), did not change significantly upon the inclusion of interaction effects.

The first set of interactions comprises interaction terms between the first barrier under the header *public concerns*, namely *compliance*, and all other barriers to green entrepreneurship. Overall, it can be seen that only three of the seven interaction terms are significant. The first interaction effect that is significant at the one percent level is *compliance_insufficient demand*, which has a positive sign. This suggests that individuals

who perceive not only *compliance* as a barrier, but also *insufficient demand*, have on average a 5.0 percentage point higher predicted probability of being a nascent green entrepreneur, given all the other variables. *Compliance_competitive advantage* is the second interaction term that is significant, at the five percent level. It shows a negative sign which implies that perceiving *competitive advantage* as a barrier, given that individuals also perceive *compliance* as a barrier, decreases the predicted probability of being a nascent green entrepreneur, on average, by 4.6 percentage points, given all the other variables. A similar statement can be made with respect to the third and last interaction of this set which is significant and called *compliance_core values*. It also shows a negative sign and is significant at the one percent level. Accordingly, perceiving not only *compliance*, but also *core values* as barrier decreases the predicted probability of being a nascent green entrepreneur, on average, by 7.3 percentage points from 16 to 8.7 percent, given all the other variables. Thus, only one of the three significant interaction terms shows a positive, significant sign.

The second set of interactions comprises interaction terms between *public support*, the second barrier recorded under the header *public concerns*, and the remaining barriers to green entrepreneurship. It can be seen that of the seven included interaction terms four are significant. In particular, *public support_competitive advantage* is the first interaction that is significant at the five percent level. Moreover, it shows a negative sign. The latter implies that given that individuals perceive *public support* as a barrier, perceiving *competitive advantage* as a barrier as well decreases the predicted probability that an individual is a nascent green entrepreneur, on average, by 5.6 percentage points, given all the other variables. In other words, individuals that perceive this combination of barriers are less likely to be nascent green entrepreneurs. The second interaction that is significant at the one percent level is *public support_image*. Similar as before this implies that perceiving *image* as a barrier, given that the entrepreneur perceives *public support* as a barrier, decreases the predicted probability of being a nascent green entrepreneur, on average, by 11.7 percentage points from 16 to a total of 4.3 percent, given all the other variables. Similar as before, this implies that entrepreneurs that perceive this combination of barriers are less likely to be nascent green entrepreneurs. The third interaction effect that seems to play a role is *public support_core value*, which also has a negative sign and is significant at the ten percent level. This means that entrepreneurs who perceive this combination of barriers have, on average, a 5.6 percentage point lower predicted probability of being nascent green entrepreneurs, given all the other variables. The same holds for the combination *public support_compliance*, as the perception of this combination of barriers likewise decreases entrepreneurs' predicted probability of being a nascent green

entrepreneur, on average and given all the other variables, by 7.7 percentage points to a total of 8.3 percent. Thus, all combinations of the barrier *public support* and the four barriers stated above are perceived significantly less often by nascent green entrepreneurs.

The third and last set of interactions consists of four interaction terms between the trigger *financial incentives*, which may be provided rather easily by the government, and the remaining triggers to green entrepreneurship. It can be seen that two of the four included interaction terms are significant. In particular, the first term is *financial incentives_identifying markets or customers*, which shows a positive sign and is significant at the one percent level. The latter suggests that individuals who perceive not only the trigger *financial incentives* as conductive to their nascent green entrepreneurial activities, but also the trigger *identifying markets or customers*, have on average a 5.6 percentage point higher predicted probability of being a nascent green entrepreneur, given all the other variables. The second effect that is significant at the five percent level is *financial incentives_technical advice*. Similar as before, perceiving both of these triggers increases the predicted probability that an entrepreneur is a nascent green entrepreneur, on average, by 4.0 percentage points from 16 to 20 percent, given all the other variables. In other words, entrepreneurs that perceive these two triggers in combination are significantly more likely to be nascent green entrepreneurs.

Taking a closer look at the summary statistics of the model shown in Table 11, it can be seen from the Chi2 value that the variables in the models are jointly significant. Furthermore, it can be seen that the Pseudo R2 value of this model is larger than the R2 values in the models shown in Table 7. This indicates that the model fit has increased with the inclusion of the interaction effects.

Having presented the descriptive and the regression results from the analysis of barriers and triggers to green entrepreneurship, as well as results concerning combinations of barriers and triggers, the subsequent section discusses the results and derives propositions.

Table 11 about here

5 Discussion

The present section will discuss the results, derive propositions and state limitations of this paper. This is done throughout three main subsections. The first subsection discusses results concerning barriers and triggers, while the second subsection discusses results concerning combinations of barriers and triggers to green entrepreneurship. Lastly, the third subsection considers limitations.

5.1. Barriers and triggers

This paper examines nascent green entrepreneurs and their perceptions towards barriers and triggers to green entrepreneurship to gain first insights into this widely unexplored research area.

From the results it appears that there are several barriers and triggers that were investigated in the Flash Eurobarometer Survey No. 342 that play a role for nascent green entrepreneurs. Whereas at first it seemed from the descriptives that almost all of the examined barriers played a role, it can be seen from the regression analysis, which controls for other factors, that only four of the eight examined barriers appear to play a significant role in the process nascent green entrepreneurs pass through when introducing green products or services.

In particular, the barrier that has the largest positive effect and is thus clearly perceived more frequently by nascent green entrepreneurs rather than by other entrepreneurs, is a lack of sufficient *public support* in terms of, for example, financial subsidies, tax incentives, etc. In other words, nascent green entrepreneurs in the present sample seem to struggle especially with financial issues. Considering the sample this paper examines, it can be argued that this is somewhat surprising, since this paper looks at nascent green entrepreneurs who are entrepreneurs in the traditional sense already. In other words, the nascent green entrepreneurs in this sample already own a business and thus would be expected to be able to reinvest their profits in green business activities and, thereby, be able to arrange for sufficient funding without having to rely on public support. Hence, it might be an interesting opportunity for further research to investigate whether and why profits are insufficiently reinvested to support additional, green business activities and whether differences can be observed between firms in different countries in which governments play a less or more prominent role with respect to environmental regulation. Nevertheless, the results of this paper concerning barriers are in accordance with qualitative findings from Linnanen (2002)[14], who states that all nascent green

[14] Recall that Linnanen draws upon his extensive practical experience in the field of green entrepreneurship to derive conclusions about green entrepreneurs.

entrepreneurs need to overcome a *financing barrier*. In addition, the strong perception of this barrier may constitute empirical support for Linnanen's hypothesis that there is a mismatch between green entrepreneurs in need of funding and investors who are looking for trustable and promising ventures to invest in. The latter appears, since nascent green entrepreneurs seem to see a strong role for the government with respect to the provision of funding, as they perceive particularly the absence of sufficient financial subsidies or tax incentives, which are under the control of the government, as significantly hindering their progress. Hence, this may, in turn, point at a limited availability of alternative, private funding sources. The latter finding is also in accordance with empirical research by Kouriloff (2000) who, amongst others, examines barriers perceived by nascent commercial entrepreneurs in Australia and identifies the financing barrier as second most important barrier perceived by these individuals. Hence, both green and commercial entrepreneurs seem to struggle to obtain capital, but, given the results of the analysis, nascent green entrepreneurs appear to experience even slightly more difficulties.

The second most important barrier that is perceived especially by nascent green entrepreneurs is the barrier *insufficient demand* from customers. Similarly as before, this seems to be in line with the qualitative findings by Linnanen (2002), who identifies a barrier called the challenge of *market creation.* As stated earlier when reviewing relevant literature, Linnanen proposes that realising a green business-idea often involves the need to create a market for the new product or service in the first place. Hence, it appears nascent green entrepreneurs in the present sample seem to find themselves in a similar position, as they are struggling to find sufficient customers for their products and services. Thus, *insufficient demand* or the challenge of market creation seems to be indeed a barrier that especially nascent green entrepreneurs struggle to overcome. This finding may, in fact, provide an interesting opportunity for further research. Specifically, research into the topic of the introduction of green products might offer interesting insights on how difficulties with respect to this barrier could be overcome by nascent green entrepreneurs. Thereby, for example, innovation literature that is concerned with the introduction of innovative products or microeconomic models that examine the price elasticity of demand might provide useful frameworks.

In addition to the two barriers described above that show a positive effect, the analysis has shown that for two barriers a significant negative effect can be identified. This implies that the corresponding barriers are perceived significantly less frequently by nascent green entrepreneurs than by other entrepreneurs that constitute the reference group for this paper. In

particular, the barrier that is most clearly of smaller importance to nascent green entrepreneurs compared to other entrepreneurs is that offering green products and services is not in line with the company's *image*. In fact, this barrier is perceived only half as frequently by nascent green entrepreneurs than by the entrepreneurs in the reference group. Similarly, nascent green entrepreneurs seem to not frequently perceive that offering green products or services is not important to or in line with their company's *core values*. There are two different arguments that may be advanced to explain why these effects appear to be less relevant with respect to nascent green entrepreneurship. On the one hand, it could be argued that nascent green entrepreneurs already overcame these barriers since they already took the decision to offer green products or services and are in the stage of actively planning to start offering green products or services. Thus, if offering green products or services would stand in contradiction with their core values or damage the firm's image they would probably not have made the decision to offer them unless they were obliged to, which cannot be known with certainty from the available data. On the other hand, it could be argued that green entrepreneurs do not engage in offering green products or services to *improve* the company's image, since they see the former as an end in itself and not as a means to an end, and that offering green products or services and the related desire to improve environmental matters reflects one of the common core values that green entrepreneurs share. In other words, the results from the analysis may provide empirical evidence for the notion that green entrepreneurs share a common set of values and aspirations, as suggested by Schaper (2005) and other researchers in the field. This is, true green entrepreneurs, opposed to individuals concerned with corporate social responsibility (Matten and Moon, 2008), intentionally and foremost seek to contribute to reduced environmental degradation (Schaper, 2005). In the light of the latter, it seems self-evident that nascent green entrepreneurs do explicitly not perceive *core value* and *image* as a barrier, since the provision of green products and services and related environmental improvements are not by-products from other activities but precisely in line with their core values and, simultaneously, define the entire image of their company. This finding seems to be in accordance with a theoretical contribution made by Schaltegger and Wagner (2011) who claim that "market innovations driving sustainable development do not necessarily occur by accident but can be created by leaders who put them into the core of their business activities" (p.223). Hence, green entrepreneurs appear to be such aspiring business leaders.

Taking a closer look at the different categories of barriers several aspects appear interesting. Firstly, it can be said that barriers that are comparatively more frequently perceived by nascent green entrepreneurs belong to the categories *economic concerns* and

public concerns. However, not all of the barriers that are examined are perceived significantly more often by nascent green entrepreneurs as only one of the barriers under the header *economic concerns* turned out to be significant and, likewise, only one of the barriers under the header *public concerns*. In contrast, barriers that are less frequently perceived by nascent green entrepreneurs can both be found under the header *organisational concerns*. Interestingly, it seems that no barriers that significantly hinder the progress of nascent green entrepreneurs have been neglected in the Flash Eurobarometer No. 342, as the variable *other barriers* has a very small effect that did not turn out to be significant in the analysis. Thus, given the dataset and the magnitudes of the effects, it seems that nascent green entrepreneurs are foremost struggling with *public concerns,* followed by *economic concerns*, which rank second. Interestingly, this seems to be in contrast with research on traditional nascent entrepreneurs conducted by Kouriloff (2000). He finds that more frequently perceived barriers to commercial entrepreneurship are not amenable to policy. This in turn, confirms the suggestion advanced by Linnanen (2002) that barriers perceived by green entrepreneurs differ from those perceived by traditional entrepreneurs.

Hence, with respect to the first research question it can be said that two barriers appear to be perceived especially by nascent green entrepreneurs: *public support* and *insufficient demand*. Moreover, it can be said that the clearly most frequently perceived and therewith most important barrier *public support* may be rather easily influenced by policy action. In addition, there also might be room for government policy to indirectly address the barrier *insufficient demand*, as governments might introduce policies, for example subsidies, to stimulate the demand for green products or services. Accordingly, the following proposition can be derived:

> *Proposition 1:* In the process of introducing green products or services nascent green entrepreneurs struggle foremost to overcome two significant barriers, namely the barrier of insufficient demand and the barrier of receiving adequate public support for their venture, where public support, which is directly amenable to government policy, is the most pronounced barrier.

Taking a look at the four examined triggers to green entrepreneurship, which all relate to the operation of the business, it can be said that they all seem to play a moderate but significant role with respect to nascent green entrepreneurship. This is, nascent green entrepreneurs have indicated significantly more frequently that the aspects captured by the different triggers would help them in the process of starting to offer green products and

services. Therefore, it seems that these triggers could be efficient to foster nascent green entrepreneurship. In addition, the magnitudes of the triggers are very similar, which points at the fact that neither of them seems to be clearly more appreciated by nascent green entrepreneurs than the others.

The trigger with the largest magnitude in the full model, which accordingly may be classified as most frequently perceived by nascent green entrepreneurs, is *identifying markets or customers*. The trigger with the second largest magnitude is *financial incentives* for developing products, services and new production processes. The latter seems to be in line with a theoretical contribution by Isaak (2002) who considers financial incentives, such as appropriate tax and other benefits as essential to motivate businesses to become sustainable and to be able to reach a critical mass of green entrepreneurs that could ensure global sustainable development. In addition, these findings on triggers seem to be in line with the findings on barriers, i.e. with the result that *insufficient demand* and lack of sufficient *public support* are the two most dominant *barriers*. However, whether the trigger *financial incentives*, is really the fitting counterpart to the examined barrier *public support* and whether the trigger *identifying markets or customers* is related to the barrier *insufficient demand* cannot be derived from the data and finding an answer would require additional qualitative research, which goes beyond the scope of this paper. Nevertheless, a closer look at the combinations of the barriers *insufficient demand* and *public support* and the triggers *identifying markets or customers* and *financial incentives*, respectively, will be taken in the following subsection, which discusses combinations of triggers and barriers, to infer whether respondents frequently named both together. In fact, three of the four triggers that are significantly more often perceived by nascent green entrepreneurs than by individuals in the control group appear to capture concepts that are of rather practical than financial relevance. Thus, it may be inferred that in addition to financial incentives nascent green entrepreneurs also perceive practical support related to introducing their green products or services as valuable. The fact that triggers related to the operation of the business are perceived significantly more often as valuable by nascent green entrepreneurs raises the question whether green entrepreneurs are relatively less capable of approaching these tasks and, therefore, find these triggers useful, or whether the field of green products and services poses extraordinary challenges. The earlier described finding that nascent green entrepreneurs struggle with complex barriers such as *insufficient demand*, which may be argued to be equivalent to the problem of market creation, might point at fact that introducing *green* products or services is more difficult than introducing non-green products or services.

However, to gain more substantiated insights additional research would be needed, which is not feasible within the scope of the present paper, but may be an interesting starting point for further, individual level research.

The analysis of triggers also included the variables *none* and *other triggers*. The option *other triggers* is not significant here, which may suggest that no triggers that are significantly more or less frequently perceived by nascent green entrepreneurs than by other entrepreneurs were excluded in the survey. Interestingly, the option *none* shows a relatively large magnitude and a negative sign, which indicates that significantly less nascent green entrepreneurs than others have chosen this option. One could argue that this confirms the argument that there are effective triggers to nascent green entrepreneurship, as individuals significantly less often indicate that none of the stated triggers would help them. However, it could also be argued that the significant differences in the response patterns arise from the fact that entrepreneurs that are not planning to offer green products or services probably have different reasons than the ones stated not to engage in nascent green entrepreneurship, which makes them less likely to be receptive to these triggers.

Surprisingly, also with respect to triggers to green entrepreneurship the one trigger that is perceived most clearly by nascent green entrepreneurs, i.e. *financial incentives*, appears to be rather easily amenable to policy action. However, also consultancy services that are related to the issues regarding the operation of the business, captured by the remaining triggers, could be provided by government agencies to foster green entrepreneurship. An example for such institutions can be found in Germany, where local chambers of industry and commerce (Industrie- und Handelskammern) provide free seminars and advice to nascent entrepreneurs.

Hence, given the dataset, it can be said with respect to the second research question that nascent green entrepreneurs perceive *financial incentives* as well as triggers related to operational matters, such as *identifying markets or customers*, *technical expertise* and *marketing or distribution* as most useful in the process of starting to offer green products or services. Moreover, it seems that at least one trigger that can be rather easily provided by the government, i.e. *financial incentives*, scores rather high. Accordingly, the following proposition can be derived:

Proposition 2: Financial incentives play a leading role with respect to fostering green entrepreneurship. Similarly, support with respect to operational matters concerning the introduction of green products and services helps nascent green entrepreneurs significantly to realise their ambitions.

Lastly, it can be said with respect to the chosen control variables that they appear to be of value with respect to nascent green entrepreneurship, as each variables shows at least some categories that may explain the occurrence of nascent green entrepreneurship in the present sample to a certain extent. Moreover, it can be said that the variables generally show sings that are in accordance with the expectations stated in an earlier section of this paper. Nevertheless, there seems to be one exception, namely regarding the sign of the variable *established business*, which shows a negative sign. The latter suggests that established businesses, which have been in business for more than three years, are slightly less likely to engage in nascent green entrepreneurship than their counterparts who have been in business for three or less years. This stands in contrast with the theory that established businesses may have a better starting position to engage in nascent green entrepreneurship, as they had the opportunity to gain valuable experience and accumulate capital necessary to start a new entrepreneurial venture (Lepoutre and Heene, 2006). However, it should be realised that the effect of this variable is rather small and not highly significant, so that in a different setting the effect might show the expected sign. Lastly, it can be said that the results on the country dummies, which are not discussed in detail here but shown in the appendix, seem to offer an interesting opportunity for further research, since there seem to be certain groups of countries, such as a number of Scandinavian or Mediterranean countries which are comparatively less conductive to nascent green entrepreneurship than the U.S., which serve as reference country. In addition, there seem to be interesting results, such as the fact that former socialist countries, for example, Poland, Slovakia or Slovenia seem *not* to be significantly less conductive to nascent green entrepreneurship than the U.S., even though it is argued that they have a rather hostile entrepreneurial environment (Smallbone and Welter, 2001).

Having discussed the results on barriers and triggers to green entrepreneurship, the following subsection will discuss the results on combinations of these.

5.2. Combinations of barriers and triggers

The present subsection starts with a discussion of the results on combinations of barriers to green entrepreneurship, which is followed by a discussion of the results regarding combinations of triggers. Lastly, results regarding combinations of both barriers and triggers to green entrepreneurship are discussed.

Taking a closer look at the results regarding combinations of *barriers* to green entrepreneurship it may be inferred that combinations of barriers do *not* seem to play a major role with respect to nascent green entrepreneurship. This may be said for several reasons. First

of all, it can be seen from the descriptives that the ten most frequent answer patterns include only *one* pattern that contains a *combination* of barriers, whereas all other answer patterns only contain one barrier. Most interestingly, the ten answer patterns, which mainly include only one barrier, account for a cumulative percentage of about 70 percent of all answers. It is rather surprising that numerous individuals have picked the same answer patterns, given the large amount of possible answer-combinations. In particular, given that three answers could be given and that there are eight answer possibilities, including the option of only giving one or two answers, there are approximately 500 possible answer combinations that could be given by the respondents. Hence, results indicate that the examined nascent green entrepreneurs perceive similar combinations of barriers. A further, related fact that supports the finding that combinations of barriers do not seem to play an important role is the result that per nascent green entrepreneur only 1.4 responses were given, even though three could be given in total. Thus, it seems that nascent green entrepreneurs are foremost struggling with single barriers instead of with combinations of barriers. The latter also seems to be supported by the regression results. Recall that the additional regression model shown in Table 11 tests whether any of the barriers under the header *public concerns*, i.e. *public support* and *compliance*, is perceived significantly more often in combination with other barriers by nascent green entrepreneurs than by other entrepreneurs. An analysis of combinations of these two particular barriers has deliberately been conducted, since gaining insights on this subject is particularly valuable for policy makers. In fact, insights into combinations of barriers may prevent the inefficient tackling of one barrier alone which is under the control of the government, but frequently perceived with another barrier which may not be amenable to policy action. In this case, only addressing both barriers would truly foster nascent green entrepreneurship. The fact that only one of the 14 interactions between the two barriers under the header *public support* and the remaining barriers shows a positive sign implies that nascent green entrepreneurs do not significantly more often perceive combinations of barriers, compared to the entrepreneurs in the reference group. In fact, six out of the seven significant interaction effects show a negative sign, which implies that nascent green entrepreneurs even perceive significantly less combinations of barriers. Thus, it appears that none of the barriers is perceived frequently in combination with another barrier by nascent green entrepreneurs. Nevertheless, one of the interaction effects shows a positive significant sign, i.e. *compliance_insufficient demand*. This suggests that nascent green entrepreneurs, who are currently planning to introduce green products, state that they have not yet put their plans to action because there is no pressure from national, regional or local laws and because they

perceive a lack of *insufficient demand*. This may point at the fact that removing the first cause for not offering green products or services, i.e. requiring it by law, would still leave nascent green entrepreneurs struggling with the barrier of *insufficient demand*, which appears more intricate to tackle. However, the combination of these two barriers does not appear within the ten most frequently given answer patterns, which suggests that this combination of barriers is perceived by, at most, three or less percent of all nascent green entrepreneurs in the sample, which is a rather small percentage. Hence, also with respect to the combination of these two barriers it may be said that this combination is of minor importance; which can generally be concluded with respect to the role of combinations of barriers to green entrepreneurship. The finding that there are no combinations of barriers perceived frequently by nascent green entrepreneurs appears to be in accordance with previous research by Dana (1992), who examines traditional nascent entrepreneurs in Austria and identifies that only one major barrier is perceived by nascent entrepreneurs instead of combinations of barriers. However, the results stand in contrast with research by Kouriloff (2000) who also studies commercial nascent entrepreneurs and detects by means of a profile analysis that combinations persist. Nevertheless, studies investigating combinations of barriers are also scarce in the field of commercial entrepreneurship and not extant with respect to nascent green entrepreneurship, so clearly more research is required.

Hence, with respect to the third research question it can be concluded that, given the data, there appear to be no combinations of barriers that are indeed frequently perceived by nascent green entrepreneurs. Therefore, it may be stated that the two barriers that may be most easily subject to policy action, i.e. *compliance* and *public support*, are also not frequently perceived in combination with other barriers neither. Accordingly, the following proposition can be derived:

> *Proposition 3:* Nascent green entrepreneurs are hindered by single barriers rather than by combinations of barriers in their progress in the entrepreneurial process. Hence, policy directed at the removal of single barriers can be efficient to support nascent green entrepreneurs.

In contrast to barriers, combinations of *triggers* to green entrepreneurship do seem to play a role for nascent green entrepreneurs. One the one hand, this can be seen from the descriptive results, which have shown that within the ten most frequent answer patterns four can be found that include two triggers. Moreover, nascent green entrepreneurs gave on average 1.33 responses per individual, while a maximum of two answers could be given. In

comparison with barriers, where nascent green entrepreneurs named on average 1.4 responses while three could be indicated, the average for triggers seems comparatively higher. Similar as before, combinations between the trigger that might be rather easily provided by the government, i.e. *financial incentives*, and other triggers have been investigated more closely by means of a regression analysis as this might be of particular interest with respect to policy implications. In fact, it seems that the trigger *public support* is significantly more often perceived by nascent green entrepreneurs in combination with either *identifying markets or customers* or with the trigger *technical advice*. Hence, the results from the regression analysis confirm the results from the descriptive analysis as the combination of *financial support* and *technical advice* was the second most indicated answer pattern by nascent green entrepreneurs, followed by the combination of *financial incentives* and *identifying markets or customers*, which is the third most frequent answer pattern. The finding that the triggers *financial advice* and *identifying markets or customers*, are particularly valued by nascent green entrepreneurs seems to be in line with qualitative research by Linnanen (2002), who concludes that "market creation is even more difficult for environmental business ideas than it is for non-environmental business ideas, because the financial community may not yet be mature enough to finance environmental innovations [...]." (p.80). Nevertheless, given that predominantly single barriers are perceived by nascent green entrepreneurs it seems to be an interesting result that combinations of triggers are frequently perceived as valuable. In other words, it seems that nascent green entrepreneurs frequently perceive single barriers as main obstacles to their progress, but at the same time perceive a combination of financial incentives and assistance concerning the operation of the business as particularly helpful in the entrepreneurial process. This may point at the fact that some barriers may be difficult to overcome and, therefore, require a combination of different support. Even though combinations appear to play a role, it can be seen from the results in Table 11 that the trigger *financial incentives* is still perceived as significantly helpful on its own when accounting for possible combinations of triggers. The same holds for the remaining triggers. Thus, there seems to be room for policy in form of *financial incentives* alone, as well as in form of *financial incentives* in combination with assistance regarding the operation of the business.

Accordingly, it may be concluded with respect to the fourth research question that there are a number of combinations of triggers that are frequently perceived by nascent green entrepreneurs. Most frequently, these are combinations of *financial incentives* and assistance regarding operational issues concerning the introduction of green products and services. Moreover, it can be concluded that the trigger *financial incentives*, which might be relatively

easily provided by the government, is both perceived as efficient on its own as well as in combinations with the triggers assistance with respect to *identifying markets or customers* and the trigger *technical advice*, which may be more difficult to provide for by the government. In accordance with this, the following proposition may be derived:

> *Proposition 4:* In addition to providing single triggers, policy action can reach more nascent green entrepreneurs if it consists of a combination of both financial incentives and assistance with respect to the introduction of green products or services.

With respect to combinations between both barriers and triggers it can be said that no outstanding answer patterns could be detected in the analysis. The ten most frequent patterns account each for a maximum of four percent of the responses provided by nascent green entrepreneurs, which is rather low, especially when compared with patterns of barriers and triggers. However, given the large amount of possible answer patterns, this is hardly surprising. What is, in contrast to the latter, indeed surprising is the fact that the combination of both the barrier *public support* and the trigger *financial incentives* has only been indicated by merely 43 out of 1056 nascent green entrepreneurs, while the descriptives on answer patterns regarding barriers and triggers show that 127 and 250 individuals have named *public support* as single barrier and *financial incentives* as single trigger. As the trigger and the barrier seem to look somewhat similar, it would be expected that more individuals would indicate both of them. The same holds with respect to the barrier *insufficient demand* and the trigger *identifying markets or customers*. As this is not the case here, this seems to be an interesting starting point for future, qualitative research. In fact, it shows that more research is needed regarding the question of how barriers perceived by nascent green entrepreneurs can be overcome and which triggers may be appropriate to assist individuals with the former.

5.3. Limitations

It should be realised that the present paper has several limitations that naturally arise from the design of the survey and the analysis conducted in this paper and that should be taken into account when interpreting the results. In particular, this subsection will elaborate on several empirical limitations with respect to measurement, generalisability and data availability.

Firstly, it may be said that green entrepreneurship is to date a concept on which little research has been published. Hence, green entrepreneurship is a rather nascent field of research which remains little understood and the concept itself is still ill-defined. The latter

gives rise to considerable measurement challenges. In particular, this paper uses the apparently first and only large-scale dataset that is available with respect to green entrepreneurship to date, which stems from a survey that was especially conduced to assess SMEs' green activities. Naturally, the latter comes along with numerous empirical limitations. Specifically, the first question that is posed at the beginning of the second part of the survey, to identify green entrepreneurs, stresses the *objective* of the organisation or initiative and therefore gives rise to some doubts about what it is the survey measures. The latter may be said for several reasons. First, of all, it cannot be derived from the methodology of the Flash Eurobarometer Survey No. 342 how the businesses that were interviewed for the survey were chosen. Hence, it can only be suspected from the fact that firms were interviewed that overall the occupational notion of entrepreneurs is applied, which defines entrepreneurs as individuals who own and manage a business for their own account and risk. However, it is not clear which individuals in the firm were interviewed, so that it cannot be said with certainty whose view on green entrepreneurship the survey results reflect. Second of all, green entrepreneurs are defined by the fact that they offer "green products or services with the predominant function of reducing environmental risk and pollution", which for the sake of the survey may also include products with environmental features, such as "organically produced, eco-labelled, with an important recycled content, eco-designed". This definition is rather broad and subjective and might define green entrepreneurs to broad or to narrowly. For example, it cannot be distinguished between green *entre*preneurship and green *intra*preneurship, which may influence the perception of barriers and triggers. Moreover, the survey does not refer to the behavioural notion of entrepreneurship, which identifies entrepreneurs as individuals that act pro-active, innovative, bear-risk and recognise opportunities. Instead, the firm's activity and the goal of the activity are stressed. Ambiguity about these terms that are frequently used in entrepreneurship research clearly hampers the interpretation of the results.

A second and major possible limitation is related to both the method that was applied when conducting the survey and the method applied in this paper, namely selection bias. Unfortunately, firms that could be identified as green entrepreneurs and those that could not be identified as such or as nascent green entrepreneurs were asked different sets of questions. Therefore, in this paper nascent green entrepreneurs can only be compared to those entrepreneurs that do not offer green products and are also not planning to do so and not to individuals that have overcome the nascent green entrepreneurial stage. Moreover, it cannot be distinguished whether entrepreneurs that are not planning to offer green products or

services are not planning to do so at all or simply not in the next two years. Hence, since the study is looking at a limited set of individuals, conclusions can only be generalised limitedly and the obtained results regarding barriers and triggers predominantly apply to the examined setting and may change if examined in a different context. However, it should be kept in mind that the study has an exploratory character that aims at generating proposition that can be tested in further research, rather than testing existing theory.

A further limitation that relates to both barriers and triggers to green entrepreneurship is the limited availability of data on these. In particular, respondents were only asked the basic question of whether they perceived certain barriers or triggers. Hence, combinations of barriers and triggers could only be investigated based on the number of responses the individuals gave. However, it cannot be said with certainty as how severe or how helpful a respondent perceives a certain trigger or barrier as no weight or order could be indicated by individuals in the survey. It may also be that triggers and barriers work in a sequential order. Hence, the results of the present study should be understood as indications for the fact that combinations might play role and are worth to be researched in more detail.

6 Conclusion

The present study applies an exploratory, proposition generating approach to examine barriers, triggers and combinations of barriers and triggers perceived by nascent green entrepreneurs. For this purpose novel data from the Flash Eurobarometer Survey No. 342 is used, which constitutes the first large-scale, cross-country dataset of green entrepreneurs that is available for research purposes.

The overall aim of this study is to extend the current knowledge on barriers and triggers to green entrepreneurship and to provoke further research into the emerging phenomenon of green entrepreneurship, which is believed to have the potential to make a great difference for the environment and society in the next century. Thus, based on descriptive and logistic regression analysis four propositions are generated: Two with respect to barriers and triggers to green entrepreneurship and two with respect to combinations of barriers and triggers. Even though these propositions still require rigorous testing, the results suggest that there are certain barriers that are specifically perceived by nascent green entrepreneurs. This seems to emerge from the fact that the nature of their business operations and the products and services they offer appear to pose intricate challenges to individuals that plan to offer green products or services. In addition, the analysis suggests that nascent green entrepreneurs may be triggered by providing both financial incentives and support with respect to operational issues that mainly concern the introduction of green products or services. Moreover, results indicate that there is room for policy action aiming at fostering green entrepreneurship since both barriers and triggers that are in reach of policy action could be identified as important. Moreover, combinations of barriers which could complicate policy action seem not to be of significance. Similarly, it is found that triggers may work alone as well as in combinations. Thus, this initial research has created several propositions to be explored in more detail, but also leaves many questions unanswered. For example, it is not known whether nascent green entrepreneurs that perceive certain barriers are less likely to succeed in introducing green products or services; or in how far different triggers can significantly enhance the probability of entrepreneurs succeeding with respect to the latter. Similarly, it is not known how economic and political country contexts influence the success of nascent green entrepreneurs and the efficacy of government policy.

Hence, even though this study is not free of limitations it makes valuable contributions to a nascent field of research that remains under-researched to date and is dominated by qualitative studies. By using the first available large-scale dataset on green entrepreneurship this study contributes to a better understanding of the process surrounding green

entrepreneurship and of barriers and triggers that may play a substantial role in this process, but remained largely unexplored to date. By applying rigorous econometric techniques, this study derives empirically grounded propositions that provide valuable first insights to policy makers on how green entrepreneurship may be fostered. Thus, this research contributes to establishing a solid body of empirically driven research. In addition, the results from this study suggest intriguing avenues for further exploration by researchers in the field of green entrepreneurship, where the generated propositions constitute sophisticated starting points for further research in the field that can enable future research to move beyond descriptive purposes.

7 Tables

Table 1 - Empirical literature on green entrepreneurship

Year	Authors	Journal
2010	Kuckertz and Wagner	Journal of Business Venturing
2010	Meek, Pacheco and York	Journal of Business Venturing
2009	Sine and Lee	Administrative Science Quarterly
2006	Craig and Dibrell	Family Business Review
2003	Russo	Strategic Management Journal

Note: Reviewed studies that use econometric techniques to arrive at conclusions.

Table 2 - Variables indicating barriers to green entrepreneurship

Barrier types	Variable no.	Variable description
Economic concerns	I.	*Insufficient demand* from customers (=1, otherwise=0)
	II.	It is not relevant in terms of *catching up* with main (=1, otherwise=0)
	III.	It does not create a *competitive advantage* or additional business opportunities (=1, otherwise=0)
Organisational concerns	IV.	Does not fit or is not important for the company's *image* (=1, otherwise=0)
	V.	It is not important to or in line with the company's *core values* (=1, otherwise=0)
Public concerns	VI.	It is not relevant in terms of *compliance* with national, regional or local laws (=1, otherwise=0)
	VII.	Lack of sufficient *public support* (financial subsidies, tax incentives, etc) (=1, otherwise=0)
Others	VIII.	*Other barriers* (=1, otherwise=0)

Note: The table shows the variables constructed for the empirical analysis that indicate barriers to green entrepreneurship, which have been constructed from Q25 of the survey.
Source: Flash Eurobarometer Survey No. 342.

Table 3 - Variables indicating triggers to green entrepreneurship

Variable no.	Variable description
I.	*Financial incentives* for developing products, services or new production processes (=1, otherwise=0)
II.	Expertise with respect to *identifying* potential *markets or customers* for these products or services (=1, otherwise=0)
III.	*Technical expertise* with respect to products, services development or production processes (=1, otherwise=0)
	Expertise with respect to *marketing or distribution* (=1, otherwise=0)
IV.	*Other triggers* (=1, otherwise=0)
V.	*None* (=1, otherwise=0)

Note: The table shows the variables constructed for the empirical analysis that indicate triggers to green entrepreneurship, which have been constructed from Q30 of the survey.
Source: Flash Eurobarometer Survey No. 342.

Table 4 - Summary statistics and correlations

Variable	Mean	S.D.	Min	Max	1	2	3	4	5	6	7	8	9	10
1 Nascent green entrepreneur	0.12	0.33	0	1	1.000									
2 Insufficient demand	0.22	0.41	0	1	0.130 ***	1.000								
3 Catching up	0.21	0.41	0	1	-0.085 ***	-0.114 ***	1.000							
4 Competitive advantage	0.10	0.30	0	1	0.204 ***	0.086 ***	-0.093	1.000						
5 Image	0.17	0.38	0	1	-0.040 ***	-0.072 ***	0.010	-0.071 ***	1.000					
6 Core value	0.15	0.36	0	1	0.022 **	0.104 ***	-0.062 ***	0.064 ***	-0.047 ***	1.000				
7 Compliance	0.11	0.31	0	1	0.015	0.055 ***	-0.048 ***	0.005	-0.039 ***	0.131 ***	1.000			
8 Public support	0.08	0.28	0	1	0.002	0.005	-0.057 ***	0.002	-0.037 ***	0.034 ***	0.083 ***	1.000		
9 Other barriers	0.15	0.36	0	1	-0.040 ***	-0.197 ***	-0.200 ***	-0.131 ***	-0.180 ***	-0.167 ***	-0.143 ***	-0.115 ***	1.000	
10 Financial incentives	0.33	0.47	0	1	0.161 ***	0.153 ***	-0.015	0.225 ***	-0.011	0.118 ***	0.068 ***	0.038 ***	-0.089 ***	1.000
11 Identifying markets or customers	0.15	0.36	0	1	0.109 ***	0.167 ***	-0.024 **	0.102 ***	0.028 ***	0.118 ***	0.063 ***	0.043 ***	-0.079 ***	0.041 ***
12 Technical expertise	0.15	0.36	0	1	0.104 ***	0.110 ***	-0.022 **	0.118 ***	0.006	0.057 ***	0.050 ***	0.045 ***	-0.045 ***	0.067 ***
13 Marketing or distribution	0.09	0.29	0	1	0.082 ***	0.077 ***	0.018 *	0.083 ***	-0.003	0.052 ***	0.049 ***	0.019 *	-0.068 ***	-0.024 **
14 Other triggers	0.26	0.44	0	1	-0.170 ***	-0.128 ***	0.083 ***	-0.157 ***	0.068 ***	-0.067 ***	-0.018 *	-0.017	0.066 ***	-0.435 ***
15 None	0.05	0.21	0	1	-0.041 ***	-0.079 ***	-0.023 **	-0.053 ***	-0.046 ***	-0.067 ***	-0.048 ***	-0.032 ***	0.237 ***	-0.151 ***
16 Number of employees	1.98	1.01	1	4	0.014	0.000	-0.033 ***	-0.035 ***	-0.035 ***	0.023 **	0.027 **	0.047 ***	0.034 ***	0.030 ***
17 Sector	2.44	1.11	1	4	0.013	-0.035 ***	0.011	0.022 **	0.017	-0.026 **	0.003	-0.005	-0.001	0.030 ***
18 Established business	0.93	0.25	0	1	-0.019 *	-0.014	-0.001	-0.007	-0.009	-0.008	-0.001	0.005	0.003	0.000
19 Turnover change	2.00	0.92	1	4	-0.009	-0.030 ***	0.000	-0.011	0.028 ***	-0.040 ***	-0.007	-0.022 **	-0.012	-0.014

Variable	11	12	13	14	15	16	17	18	19	20
11 Identifying markets or customers	1.000									
12 Technical expertise	-0.062 ***	1.000								
13 Marketing or distribution	0.012	-0.019 *	1.000							
14 Other triggers	-0.263 ***	-0.264 ***	-0.202 ***	1.000						
15 None	-0.097 ***	-0.091 ***	-0.074 ***	-0.138 ***	1.000					
16 Number of employees	0.023 **	0.032 ***	-0.013	-0.032 ***	-0.003	1.000				
17 Sector	-0.021 *	-0.004	-0.015	-0.006	-0.004	-0.133 ***	1.000			
18 Established business	0.007	0.011	-0.027 **	0.019 *	-0.010	0.154 ***	-0.040 ***	1.000		
19 Turnover change	-0.025 **	-0.016	-0.025 **	0.022 **	-0.009	-0.098 ***	0.036 ***	0.002	1.000	

Note: Spearman correlation coefficients based on the variables in the full model, i.e. model three. ***p<0.01, **p<0.05, *p<0.1.

Source: Flash Eurobarometer Survey No. 342.

Table 5 - Responses regrading barriers to green entrepreneurship

		Nascent green entr.			Other			Total		χ^2	
Barriers		Rank	Count	%	Rank	Count	%	Count	%		
Ec. concerns	Insufficient demand	1	398	26	2	1611	17	2009	18	147.858	***
	Catching up	6	134	9	6	862	9	996	9	2.070	
	Competitive advantage	3	189	13	5	1189	13	1378	13	4.247	**
Org. concerns	Image	5	137	9	1	1836	19	1973	18	62.778	***
	Core value	4	148	10	3	1442	15	1590	15	13.836	***
Public concerns	Compliance	8	91	6	7	652	7	743	7	0.028	
	Public support	2	293	19	8	647	7	940	9	362.845	***
Other	Other barriers	7	119	8	4	1211	13	1330	12	14.294	***
	Total responses		1509	100		9450	100	10959	100		
	No. of observations		1056			7703		8759			
	Responses/Observation		1.43			1.23		1.25			

Note: The table shows counts and percentages of responses given with respect to barriers by nascent green entrepreneurs and individuals in the reference group. The total number of responses exceeds the total number of observations, as multiple responses could be given. ***p<0.01, **p<0.05, *p<0.1.

Source: Flash Eurobarometer Survey No. 342.

Table 6 - Responses regrading triggers to green entrepreneurship

Triggers - related to the operation of the business	Nascent green entr.			Other			Total		χ^2	
	Rank	Count	%	Rank	Count	%	Count	%		
Financial incentives	1	575	41	1	2395	30	2970	32	226.113	***
Identifying markets or customers	2	280	20	4	1102	14	1382	15	104.173	***
Technical expertise	3	277	20	3	1119	14	1396	15	94.957	***
Marketing or distribution	4	175	12	5	699	9	874	9	58.118	***
Other triggers	5	70	5	2	2290	29	2360	25	251.753	***
None	6	27	2	6	405	5	432	5	14.448	***
Total responses		1404	100		8010	100	9414	100		
No. of observations		1056			7703		8759			
Responses/Observation		1.33			1.04		1.07			

Note: The table shows counts and percentages of responses given with respect to triggers by nascent green entrepreneurs and individuals in the reference group. The total number of responses exceeds the total number of observations, as multiple responses could be given. ***p<0.01, **p<0.05, *p<0.1.

Source: Flash Eurobarometer Survey No. 342.

Table 7 - Average marginal effects from locistic regression with nascent green entrepreneur as dependent variable

		(1)		(2)		(3)	
Predicted probability of nascent green entrepreneur		0.160		0.160		0.160	
Barriers							
Ec. Concerns	Insufficient demand	0.077	***			0.047	***
		(0.009)				(0.009)	
	Catching up	0.010				-0.003	
		(0.011)				(0.010)	
	Competitive advantage	-0.001				-0.016	*
		(0.009)				(0.009)	
Org. concerns	Image	-0.059	***			-0.060	***
		(0.008)				(0.007)	
	Core value	-0.024	***			-0.029	***
		(0.009)				(0.008)	
Public concern	Compliance	-0.002				-0.012	
		(0.012)				(0.011)	
	Public support	0.149	***			0.091	***
		(0.014)				(0.012)	
Other	Other barriers	-0.013				-0.007	
		(0.012)				(0.011)	
Triggers							
	Financial incentives			0.070	***	0.052	***
				(0.008)		(0.008)	
	Identifying markets or customers			0.068	***	0.053	***
				(0.011)		(0.011)	
	Technical expertise			0.064	***	0.050	***
				(0.010)		(0.010)	
	Marketing or distribution			0.058	***	0.045	***
				(0.013)		(0.012)	
	None			-0.078	***	-0.071	***
				(0.009)		(0.009)	
	Other triggers			-0.024		-0.021	
				(0.019)		(0.019)	
Controls							
Number of employees							
1-9		Reference		Reference		Reference	
10-49		0.009		0.006		0.006	
		(0.008)		(0.008)		(0.007)	
50-249		0.021	**	0.010		0.014	
		(0.010)		(0.010)		(0.010)	
Sector							
Manufacturing		Reference		Reference		Reference	
Retail		0.024	**	0.024	**	0.022	**
		(0.010)		(0.010)		(0.010)	
Services		-0.001		-0.003		-0.000	
		(0.009)		(0.009)		(0.009)	
Industry		0.027	***	0.022	**	0.021	**
		(0.017)		(0.010)		(0.009)	
Established business		-0.027	*	-0.029	*	-0.025	*
		(0.015)		(0.015)		(0.014)	
Turnover change							
Increased		-0.006		-0.006		-0.006	
		(0.009)		(0.009)		(0.009)	
Decreased		-0.024	***	-0.023	**	-0.024	***
		(0.009)		(0.009)		(0.009)	
Remained unchanged		Reference		Reference		Reference	
DK/NA		-0.033	**	-0.029	*	-0.025	
		(0.017)		(0.017)		(0.010)	
Country dummies		Yes		Yes		Yes	
Observations		8,759		8,759		8,759	
χ^2		660.41	***	592.55	***	771.91	***
Pseudo R^2		0.108		0.113		0.148	

Note: The Wald Chi2 statistic is reported from the corresponding logit model underlying the calculation of the average marginal effects. ***p<0.01, **p<0.05, *p<0.1. Robust standard errors are shown in parentheses.

Source: Flash Eurobarometer Survey No. 342.

Table 8 - Most frequent answer combinations for barriers to green entrepreneurship

Rank	Insufficient demand	Image	Public support	Core value	Competitive advantage	Catching up	Compliance	Other barriers	Frequency	Percentage	Cumulative Frequency	Cumulative Percentage
1	1	0	0	0	0	0	0	0	161	15	161	15
2	0	0	1	0	0	0	0	0	127	12	288	27
3	0	0	0	0	0	0	0	1	98	9	386	37
4	0	0	0	0	0	0	0	0	86	8	472	45
5	0	0	0	1	0	0	0	0	59	6	531	50
6	0	1	0	0	0	0	0	0	57	5	588	56
7	0	0	0	0	1	0	0	0	43	4	631	60
8	1	0	1	0	0	0	0	0	38	4	669	63
9	1	0	0	0	1	0	0	0	28	3	697	66
10	0	0	0	0	0	1	0	0	27	3	724	69

Note: The table shows the ten most frequently given response patterns with respect to barriers to green entrepreneurship. The underlying sample comprises 1056 nascent green entrepreneurs. In total, 76 unique answer combinations were given by nascent green entrepreneurs.
Source: Flash Eurobarometer Survey No. 342.

Table 9 - Most frequent answer combinations for triggers to green entrepreneurship

Rank	Financial incentives	Identifying markets or customers	Technical expertise	Marketing or distribution	Other triggers	None	Frequency	Percentage	Cumulative Frequency	Cumulative Percentage
1	1	0	0	0	0	0	250	24	250	24
2	1	0	1	0	0	0	130	12	380	36
3	1	1	0	0	0	0	128	12	508	48
4	0	0	1	0	0	0	84	8	592	56
5	0	1	0	0	0	0	78	7	670	63
6	0	0	0	0	0	0	75	7	745	71
7	0	0	0	0	1	0	70	7	815	77
8	1	0	0	1	0	0	65	6	880	83
9	0	0	0	1	0	0	53	5	933	88
10	0	1	1	0	0	0	40	4	973	92

Note: The table shows the ten most frequently given response patterns with respect to triggers to green entrepreneurship. The underlying sample comprises 1056 nascent green entrepreneurs. In total, 15 unique answer combinations were given by nascent green entrepreneurs.
Source: Flash Eurobarometer Survey No. 342.

Table 10 - Most frequent answer combinations for barriers and triggers to green entrepreneurship

Rank	Insufficient demand	Image	Public support	Core value	Competitive advantage	Catching up	Compliance	Other barriers	Financial incentives	Identifying markets or customers	Technical expertise	Marketing or distribution	Other triggers	None	Frequency	Percentage	Cumulative Frequency	Cumulative Percentage
1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	45	4	45	4
2	0	0	1	0	0	0	0	0	1	0	0	0	0	0	43	4	88	8
3	0	0	0	0	0	0	0	1	1	0	0	0	0	0	28	3	116	11
4	1	0	0	0	0	0	0	0	0	0	1	0	0	0	22	2	138	13
5	1	0	0	0	0	0	0	0	0	1	0	0	0	0	19	2	157	15
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	2	175	17
7	0	0	0	0	1	0	0	0	1	0	0	0	0	0	17	2	192	18
8	1	0	0	0	0	0	0	0	0	0	0	1	0	0	17	2	209	20
9	0	0	1	0	0	0	0	0	1	1	0	0	0	0	16	2	225	21
10	0	0	1	0	0	0	0	0	1	0	1	0	0	0	15	1	240	23

Note: The table shows the ten most frequently given response patterns with respect to triggers and barriers to green entrepreneurship. The underlying sample comprises 1056 nascent green entrepreneurs. In total, 326 unique answer combinations were given by nascent green entrepreneurs.

Source: Flash Eurobarometer Survey No. 342.

Table 11 - Average marginal effects from locistic regression with nascent green entrepreneur as dependent variable and interactions

Predicted probability of nascent green entrepreneur		0.160	
Barriers			
Ec. Concerns	Insufficient demand	0.050	***
		(0.009)	
	Catching up	-0.006	
		(0.010)	
	Competitive advantage	-0.015	*
		(0.009)	
Org. concerns	Image	-0.057	***
		(0.008)	
	Core value	-0.028	***
		(0.009)	
Public concerns	Compliance	-0.012	
		(0.015)	
	Public support	0.098	***
		(0.019)	
Other	Other barriers	0.006	
		(0.018)	
Triggers			
	Financial incentives	0.054	***
		(0.010)	
	Identifying markets or customers	0.053	***
		(0.011)	
	Technical expertise	0.049	***
		(0.010)	
	Marketing or distribution	0.041	***
		(0.012)	
	None	-0.064	***
		(0.010)	
	Other triggers	-0.001	
		(0.045)	
Interactions			
B: Compliance	Compliance_insufficient demand	0.050	***
		(0.011)	
	Compliance_catching up	0.035	
		(0.028)	
	Compliance_competitive advantage	-0.046	**
		(0.023)	
	Compliance_image	0.004	
		(0.031)	
	Compliance_core values	-0.073	***
		(0.024)	
	Compliance_public support	0.028	
		(0.036)	
	Compliance_other barriers	0.009	
		(0.088)	
B: Public Support	Public support_insufficient demand	-0.001	
		(0.023)	
	Public support_catching up	-0.038	
		(0.030)	
	Public support_competitive advantage	-0.056	**
		(0.024)	
	Public support_image	-0.117	***
		(0.029)	
	Public support_core value	-0.056	*
		(0.032)	
	Public support_compliance	-0.077	**
		(0.038)	
	Public support_other barriers	0.030	
		(0.098)	

(coninued)

Table 11 - Continued

T: Fin. Incentives	Financial incentives_identifying markets or customers	0.058	***
		(0.018)	
	Financial incentives_technical advice	0.040	**
		(0.017)	
	Financial incentives_marketing or distribution	0.034	
		(0.022)	
	Financial incentives_other triggers	0.014	
		(0.105)	
Controls			
	Number of employees		
	1-9	Reference	
	10-49	-0.013	
		(0.010)	
	50-249	-0.007	
		(0.010)	
	Sector		
	Manufacturing	Reference	
	Retail	0.022	**
		(0.010)	
	Services	-0.001	
		(0.009)	
	Industry	0.020	**
		(0.009)	
	Established business	-0.025	*
		(0.014)	
	Turnover change		
	Increased	-0.006	
		(0.009)	
	Decreased	-0.023	***
		(0.009)	
	Remained unchanged	Reference	
	DK/NA	-0.023	
		(0.018)	
	Country dummies	Yes	
	Observations	8759	
	χ^2	804.7	***
	Pseudo R^2	0.1540	

Note: Since average marginal effects are shown, the effects for the single triggers and barriers are the values shown for each barrier and trigger. The interaction effects show the effects for perceiving a second barrier or trigger, given that the first one (shown first in the interaction effect) is perceived. The Wald Chi2 statistic is reported from the corresponding logit model underlying the calculation of the average marginal effects. ***p<0.01, **p<0.05, *p<0.1. Robust standard errors are shown in parentheses.

Source: Flash Eurobarometer Survey No. 342.

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9 Appendix

Table 1A - Average marginal effects from locistic regression with nascent green entrepreneur as dependent variable

Predicted probability of nascent green entrepreneur	0.160				
Albania	0.018		Lithuania	-0.007	
	(0.042)			(0.031)	
Austria	-0.043		Luxembourg	0.010	
	(0.032)			(0.041)	
Belgium	-0.012		Macedonia	0.020	
	(0.032)			(0.037)	
Bulgaria	0.047		Malta	-0.074	**
	(0.033)			(0.035)	
Croatia	-0.003		Montenegro	-0.083	**
	(0.035)			(0.035)	
Czech Rep.	-0.065	**	Netherlands	-0.003	
	(0.029)			(0.033)	
Denmark	-0.066	**	Norway	-0.063	**
	(0.032)			(0.032)	
Estonia	-0.069	**	Poland	-0.009	
	(0.030)			(0.030)	
Finland	-0.053	*	Portugal	0.090	**
	(0.030)			(0.036)	
France	-0.035		Republic of Cyprus	0.167	***
	(0.029)			(0.047)	
Germany	-0.042		Republic of Serbia	-0.065	**
	(0.030)			(0.032)	
Greece	0.094	***	Romania	0.061	*
	(0.035)			(0.033)	
Hungary	-0.005		Slovakia	-0.042	
	(0.032)			(0.030)	
Iceland	-0.021		Slovenia	0.038	
	(0.035)			(0.034)	
Ireland	-0.033		Spain	-0.043	
	(0.032)			(0.029)	
Israel	0.036		Sweden	-0.044	
	(0.037)			(0.032)	
Italy	-0.033		Turkey	-0.003	
	(0.030)			(0.032)	
Latvia	-0.005		UK	-0.044	
	(0.031)			(0.030)	
Liechtenstein	-0.117	***	US	Reference	
	(0.029)			---	

Note: ***p<0.01, **p<0.05, *p<0.1. Robust standard errors are shown in parentheses.
Source: Flash Eurobarometer Survey No. 342.