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Authors
Delmas, Magali A
Pekovic, Sanja

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Resource Efficiency Strategies and Market Conditions

Magali A. Delmas, Sanja Pekovic

In this paper we analyze the factors that drive the adoption of innovative resource efficiency strategies to reduce energy and material use, under different market conditions. We uncover the "paradox" of lower adoption of resource efficiency strategies in an economic downturn and identify the characteristics of firms that adopt these strategies. Using data from a French survey with responses from 5,877 firms, we show that only 10% of the firms in our sample adopt resource efficiency strategies in perceived economic downturn as compared to 46% in perceived steady or growing market conditions. However, the probability of adopting such strategies in downturn conditions rises to 24% for firms that focus on cost leadership strategies, have adopted environmental standards, conduct their research internally and are vertically integrated. We provide recommendations to encourage more widespread adoption of resource efficiency strategies.

Introduction

In the literature on business and the environment, important headway has been made in understanding the factors that drive firms to adopt environmental strategies, such as pollution prevention activities and international environmental management standards (Darnall et al., 2000; Delmas, 2001; Hart, 2005). However, less attention has been paid to the determinants of the adoption of innovative resource efficiency strategies that aim to reduce the use of energy, resource and/or material per unit of production. Such strategies include the introduction of product or services innovation, or process or marketing innovation that result in the reduction of the use of raw material or energy consumed by unit produced.

Energy and resource efficiency strategies have been recognized since the early 1970s with the potential for significant cost savings (Arny et al., 1998; Clinch and Healy, 2000), and the recent economic downturn further enhances the appeal of the adoption of such frugal strategies to gain efficiencies in constrained times (Von Weizsäcker et al., 2010). The promise of energy conservation and resource efficiency strategies as key in the effort to counteract the effects of climate change (IPCC, 2007) also adds to their desirability. However, evidence suggests that a significant proportion of energy and resource efficiency improvement potential remains untapped and that many energy and resource efficiency investments are not undertaken despite their apparent profitability (DeCanio, 1993; Blass et al., 2011; Expert Group on Energy Efficiency, 2007). Are firms more likely to invest in resource efficiency strategies in an economic downturn? Are changes in the economic context sufficient drivers of changes in firms' strategies regarding resource efficiency?

In this paper, we investigate the factors that drive the adoption of innovative energy and resource efficiency strategies in different market conditions. We build on the contingency theory, which contends that firm strategies need to be tailored to the particular internal and external circumstances faced by an organization in order to achieve success (Porter, 1980; Pearce, 1983; Day, 1984; Miller and Friesen, 1986). In this perspective, businesses that manage their strategies in response to economic environmental changes are better able to thrive. However, these relationships become less clear during economic downturns because of the increasing economic environmental uncertainty and the need for firms to downsize (Bailey and Szerdy, 1988; Boyle and Desai, 1991). An economic decline might have differing impacts on firm strategies and performance depending on the firm capabilities and structures (Hamel and Prahalad, 1994). It is therefore very important to clarify the link between a given strategy, economic environmental preconditions and organizational factors (Wu et al., 2007).

In exploring this link theoretically as well as empirically, the paper takes a first step towards studying the effect of market conditions on the adoption of energy and resource efficiency strategies, an issue that has received relatively little systematic analysis. We argue that firms' decisions to adopt energy and resource strategies may differ according to the market conditions under which they operate, and that such strategic choices may be contingent on the fit between the characteristics of the external market environment and the organization of the firm. Building on contingency theory, we contend that the successful adoption of innovative resource efficiency strategies by firms in perceived downturn economic conditions require complementary capabilities in innovation and environmental management, a suitable organizational structure and a compatible competitive strategy.

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In order to test the impact of market conditions on the adoption of energy and resource efficiency strategies, we use data from a large representative sample of 5,877 French firms with more than twenty employees; the data is drawn from three French cross-sectional surveys: the Organizational Changes and Computerization Survey (COI, 2006), the Community Innovation Survey (CIS, 2008) and the Annual Firm Survey (EAE, 2006). This allows us to introduce many factors that can be considered as significant incentives in a firm decision to adopt energy and resource efficiency strategies.

Even though energy and resource efficiency strategies have the potential to lead to cost savings, we find that the, the adoption of these efficiency strategies is significantly lower under perceived downturn market conditions, as compared to perceived steady or growing conditions. However, firms with complementary environmental strategies, internal R&D, that are vertically integrated, or that pursue general cost leadership strategies, tend to invest more in energy and resource efficiency strategies in these downturn market conditions.

In both its theoretical and empirical domains, this paper extends existing research. We still have limited understanding of how firms are developing strategies to cope with resource constraints while maintaining or even improving their economic sustainability. Building on the literature analyzing the organizational factors that drive the adoption of sustainable or environmental strategies (Darnall and Edwards, 2006; Delmas and Toffel, 2008), our research highlights the links between existing organizational capabilities, market conditions and resource efficiency strategies. We show that energy and resource efficiency strategies are not adopted in isolation but operate in synergy with existing organizational capabilities and competitive strategies. Our findings also have important policy implications, as they can enable policy-makers to better formulate and effectively apply energy and resource efficiency policies.

Literature review

Energy, material and resource efficiency strategies aim at reducing the footprint of industrial activities (Kounetas and Tsekouras, 2008), and may be regarded as a constituting a significant share of all environmental innovations (Rennings and Rammer, 2009). *Energy efficiency* strategies include all changes that result in decreasing the amount of energy used to produce one unit of economic output or services (e.g., Patterson, 1996). *Material and resource efficiency* strategies refer to changes that result in reducing the amount or quantity of material and natural resources required to produce a unit of economic output or services. For the remainder of this paper, we will use the term resource efficiency as a generic umbrella term that covers energy efficiency on the one hand and material efficiency on the other hand.

Resource efficiency strategies are part of pollution prevention methods (Hart, 1995; Hart and Milstein, 2003). Not only can they reduce the negative environmental impact of a firm's activities, but may also be translated into lower procurement and waste management costs, and into more general cost savings (Von Weizäcker et al., 1997; Hinterberger et al., 1997; Schleich, 2009). However, recent research has highlighted that such environmental impacts and cost savings might be contingent on external factors as well as the organizational structure of the firm (Aragón-Correa and Rubio-López, 2007), and some resource efficiency strategies could potentially lead to a rebound effect (Berkhout et al., 2000; Holm and Englund, 2009). It is therefore important to understand the external and organizational factors that lead to the adoption of resource efficiency strategies that favor efficiency gains.

Research indicates that, in spite of what would seem to be significant opportunities for profitability, many energy efficiency practices are not adopted; and a notable amount of energy efficiency improvement potential remains unrealized (Expert Group on Energy Efficiency, 2007; DeCanio, 1993). For example, Blass et al., (2011) found that only 35% of energy efficiency recommendations with an average payback of a year were adopted by small and medium enterprises, as part of the Department of Energy's Industrial Assessment Center Program. Many explanations have been provided in the literature for this phenomenon, ranging from economic factors and complexity of regulation (Mueller, 2006) to organizational barriers, such as misplaced incentives, risk aversion and shortsightedness of management (Blumstein et al., 1980; DeCanio, 1993). For instance, scholars have argued that underinvestment in energy by firms is explained by the so-called "split incentive" problem, involving "transactions or exchanges where the economic benefits of energy conservation do not accrue to the person who is trying to conserve" (Golove and Eto, 1996). Another cause for underinvestment may be the alleged myopia of management (DeCanio, 1993; Jaffe and Stavins, 1994; Thollander, 2008), which would explain why energy-efficient investments require shorter payback periods or very high internal hurdle rates as compared to other investments (DeCanio, 1993; Ross, 1986; Sorrell et al., 2004). This literature also suggests that energy conservation may not attract top management interest, and may therefore be given lower priority than other investments with similar payback (Sassone and Martucci, 1984). Although the literature focuses on cognitive or psychological factors, it has paid less attention to the question of how market conditions can influence the attractiveness of resource efficiency strategies, as well as to the question of how such conditions interact with organizational factors.

Similarly, the business and the environment literature to date has been limited in its analyses of the roles played by market and economic conditions in the adoption of pollution prevention strategies. Most studies have focused on the influence of external stakeholders, such as regulators, customers, or environmental non-governmental organizations, but have devoted less attention to the general economic conditions surrounding the firm. These studies have investigated how the adoption of pollution prevention strategies is influenced by environmental legislation and regulations (Carraro et al., 1996; Delmas, 2002a,b; Delmas and Montes-Sancho, 2010; Delmas, et al., 2007; Majumdar and Marcus, 2001; Rugman and Verbeke, 1998; Russo, 1992), customer demand (Christmann and Taylor, 2001; Delmas and Montiel, 2009), and the desire to improve or maintain relations with their communities (Florida and Davison, 2001; Henriques and Sadorsky, 1996). Other studies have

shown that managerial perceptions of the importance of various stakeholder pressures were associated with a more proactive environmental stance (Delmas, 2001; Henriques and Sadorsky, 1999; Sharma and Henriques, 2005). Several studies have found evidence that customer and/or buyer pressure has motivated firms to adopt environmental management practices (Delmas and Montiel, 2008; Henriques and Sadorsky, 1996). A recent empirical analysis found customer pressure to be an important determinant of the likelihood of adopting the ISO 14001 standard (Delmas and Toffel, 2008). Yet, there is comparatively less research on how general market conditions impact the adoption of such pollution prevention strategies (Aragon-Correa and Sharma, 2003; Marcus and Geffen, 1998; Russo and Fouts, 1997; Sharma et al., 2007). The research demonstrates that perceived munificence in the general business environment increases the likelihood that a firm will use its capabilities and resources to develop a proactive environmental strategy (Aragon-Correa and Sharma, 2003). However the impact of economic conditions on firms' ability to reap the benefits from proactive environmental strategies is less clear. Aragon-Correa and Sharma (2003) argue that perceived munificence in the business environment weakens the association between a proactive environmental strategy and competitive advantage, while Russo and Fouts (1997) find that firms are more likely to profit from environmental strategies when they are in high-growth industries rather than low-growth industries (Russo and Fouts, 1997). In addition, this research does not investigate how economic conditions impact the adoption of resource efficiency strategies.

Investigating the market conditions under which resource efficiency strategies are adopted is important, because this information might have implications for the costs and benefits of such strategies. The literature has identified several opportunities for proactive environmental strategies to benefit shareholders directly (McWilliams and Siegel, 2001; Siegel, 2009). These include value creation strategies achieved through the development of greener products (Klassen and Whybark, 1999; Reinhardt, 1998), benefits resulting from non-market strategies to influence government regulation so that their rivals are at a disadvantage (Shrivastava, 1995), and cost savings achieved by preventing pollution (Ambec and Lanoie, 2008; Hart, 1995). However, such opportunities might depend on the market conditions surrounding the firm. Indeed, value creation strategies through the development of greener products might be more attractive in growing market conditions, while cost savings achieved by preventing pollution might be more suited to declining economic conditions.

The lack of research on the factors that hamper or facilitate the adoption of resource efficiency strategies in downturn economic conditions, however, is problematic. Such economic conditions call for important changes in the way business is undertaking its activities (Von Weizsäcker et al., 2010), yet we still have little empirical evidence about the most favorable combination of organizational factors and market conditions that facilitate the successful adoption of resource efficiency strategies.

Hypotheses

We first develop competing hypotheses on the role of downturn market conditions on the adoption resource efficiency strategies. Second, building on contingency theory, we develop hypotheses on how organizational factors impact the adoption of such strategies independently or in relation to downturn market conditions.

Downturn market conditions

Downturn market conditions are marked with fewer market opportunities and general unpredictability of the economic environment (Anderson, 1988). There are two competing hypotheses regarding the impact of downturn market conditions on the adoption of innovative resource efficiency strategies.

The literature indicates that the adoption of energy resource efficiency strategies is associated with cost savings for firms in the light of expected high future energy prices, improved security of energy services, and other co-benefits such as employment or productivity gains and health benefits due to lower emissions of local pollutants — e.g., nitrogen oxides and sulfur (Schleich, 2009). We should thus expect that, in economic downturn conditions, firms would be more likely to resort to resource efficiency strategies in order to reduce their costs.

However, the innovation literature indicates that innovation often occur in periods during which a strategic window is opened, which is characterized by market growth (Abell, 1978; Lilien and Yoon, 1990). As Freeman et al., (1982) indicate, in adverse market environments, investments and innovation are likely to be reduced because of low profit margin, low cash flow and a general "pessimistic mood", while in periods of market expansion there are opportunities for innovation to emerge. Furthermore, because of the general unpredictability of the economic environment, managers might favor shorter-term investment and or delay investment decisions in general (Dixit and Pindyck, 1994), including decisions to invest in resource efficiency strategies. We therefore provide two competing hypotheses on the relationship between market conditions and the adoption of resource efficiency strategies.

H1a: Firms are more likely to adopt resource efficiency strategies when they perceive that the market is down.

H1b: Firms are less likely to adopt resource efficiency strategies when they perceive that the market is down.

As we argue below, market conditions alone cannot determine the success of resource efficiency strategies. The adoption of such strategies, like the adoption of other strategies undertaken by the firm, need to be associated with capabilities and aligned with the main strategy of the firm. Contingency theorists have highlighted the importance of the fit of a firm's strategy with the environmental or organizational contingencies facing that firm (Andrews, 1971; Hofer and Schendel, 1978, Scholz,

1987), in order to improve firm performance (Ginsberg and Venkatraman, 1985; Miles and Snow, 1994). Recent research has also demonstrated how organizational factors moderate the external economic and regulatory pressures faced by firms and play an important role in the adoption of environmental management strategies (Aragon-Correa and Sharma, 2003; Darnall and Edwards, 2006; Delmas and Toffel, 2008).

General Strategy (Strategic Fit). Porter's (1980, 1985) generic business-level strategies, cost leadership, differentiation, and focus have become a dominant paradigm in the business policy literature. A cost leadership strategy involves the firm winning market share by appealing to cost-conscious or price-sensitive customers. This is achieved by having the lowest prices in the target market segment. To succeed at offering the lowest price while still achieving profitability, the firm must be able to operate at a lower cost than its rivals. This is attained by providing high volumes of standardized products and by limiting customization of service. Production costs can be kept low by using fewer components, or standardized components, and by limiting the number of models offered to increase economies of scale. Overheads can be kept low by paying lower wages, by encouraging a cost-conscious culture, and so on. Maintaining this strategy requires a continuous search for cost reductions in all aspects of the business. Because resource efficiency strategies should lead to cost reduction, such strategies should be more attractive to firms that are pursuing cost leadership strategies than to those pursuing quality or differentiation strategies. Indeed a strategy of differentiation aims to create a product that consumers perceive as unique and thus enables the firm to command a premium price that exceeds the accumulation of extra costs generated during product development. A differentiation strategy is usually supported by substantial investments in research, product or service design, and marketing (Miller, 1988) and firms focusing and such strategies are therefore less concentrated on cost reduction. We therefore hypothesize that:

H2a: Cost leadership strategy oriented firms will be more likely to adopt resource efficiency strategies.

H2b: Quality/differentiation strategy oriented firms will be less likely to adopt resource efficiency strategies.

Complementary Capabilities. Research has shown that knowledge in one field can ease the absorption of new knowledge in related fields (Cohen and Levinthal, 1990; Delmas et al., 2011). Firms that have developed organizational capabilities to acquire new knowledge will be better able to acquire knowledge related to resource efficiency strategies than firms that have not developed such capabilities (Marcus and Geffen, 1998; Darnall and Edwards, 2006). For example, given the conceptual similarity between environmental management systems that aim at reducing the firm environmental impact and resource efficiency that aims at reducing overall resource usage, it may be possible to accelerate the accumulation of resources in the former by integrating it into the latter. In firms that do not have well-developed environmental management systems, there could be barriers to implementing resource efficiency strategies, because of a lack of coordination between different units regarding the firm's environmental impact. Similarly, firms with R&D activities that are conducted in house should also be more prepared to invest in novel resource efficiency strategies as they have developed internal capabilities to innovate (Conrad, 1997; McWilliams and Siegel, 2001). We therefore hypothesize the following:

H3a: Firms that have adopted environmental standards are more likely to adopt resource efficiency strategies.

H3b: Firms with R&D investments are more likely to adopt resource efficiency strategies.

Vertical Integration

Research has shown that firms with centralized decision-making are more likely to invest in resource efficiency because centralization provides the necessary coordination to resolve split incentives issues (Howarth and Sanstad, 1995; Sorrell et al., 2004). Misplaced, or split, incentives are transactions or exchanges where the economic benefits of energy conservation do not accrue to the person who is trying to conserve (Howarth and Sanstad, 1995). Vertical integration can also facilitate the flow of information necessary to put into place resource efficiency strategies (Golove and Eto, 1996). As Williamson has argued (1985), the key issue surrounding information is not its public goods character, but rather its asymmetric distribution combined with the tendency of those who have it to use it opportunistically. Outside of vertical integration, accurate information may be difficult to obtain because those who have information have strategic reasons to manipulate it in order to inflate its value (Golove and Eto, 1996). We therefore hypothesize that:

H4: Vertically integrated firms are more likely to adopt resource efficiency strategies.

Downturn Market Conditions, Cost Leadership Strategy, Complementary Capabilities and Vertical Integration. Here we argue that investment in resource efficiency strategies requires a fit between overall cost leadership strategies, market downturn and innovative capacity.

First, a low-cost strategy should be more attractive in a downturn environment. This is consistent with Murray (1988), who argued that a low-cost strategy is most viable when customers are sensitive to price and the firm can sustain its cost advantage with economies of scale, or access to cheap materials or channels of distribution. Wu et al., (2007) also argued that a low-cost strategy might be particularly beneficial in hostile economic environments that contain fewer opportunities and are more competitive than usual. They provided empirical evidence that differentiation-oriented firms underperformed efficiency-oriented firms in downturn economic conditions (Wu et al., 2007).

Second, firms that possess the existing capabilities to reduce their cost, but also those that have adopted green and innovative strategies might have already a lead in downturn conditions to adopt resource efficiency strategies. This is because

in such constrained economic times, the cost of adopting resource efficiency strategies might be relatively lower for them since they already have complementary capabilities. Indeed, the pre-existence of complementary capabilities might reduce the information and search costs of resource efficiency strategies. In addition, the uncertainty of the success of resource efficiency strategies might be lower for firms with complementary capabilities since they already have some experience in developing related competencies. Firms that are vertically integrated should also have an advantage to access information in downturn condition marked by increased uncertainty and competition. This is consistent with Sharma et al., who argued that perceived uncertainty in a general business environment increases the likelihood of a firm's deploying its organizational learning, cross-functional integration capability, continuous innovation capability to generate a proactive environmental strategy (Sharma et al., 2007). We therefore hypothesize the following:

H5a: Cost strategy oriented firms will be more likely to adopt resource efficiency strategies in perceived downturn market conditions as compared to those that are not cost leadership oriented.

H5b: Quality/differentiation oriented firms will be less likely to adopt resource efficiency strategies in perceived downturn market conditions as compared to those that are not adopted Quality/differentiation oriented.

H5c: Firms that have adopted environmental standards are more likely to adopt resource efficiency strategies in perceived downturn market conditions as compared to those that have not adopted environmental standards.

H5d: Firms with R&D investments are more likely to adopt resource efficiency strategies in perceived downturn market conditions as compared to those that have not invested R&D.

H5e: Vertically integrated firms are more likely to adopt resource efficiency strategies in perceived downturn market conditions as compared to non-vertically integrated firms.

Our framework is summarized in Figure 1. We highlight the role of a firm's external environment, competitive strategies, organization and resources as drivers of the adoption of resource efficiency strategies. We hypothesize that firms that are more likely to invest in resource efficiency strategies in downturn market conditions are those that have adopted cost leadership strategies, invested in environmental standards and internal R&D, and are vertically integrated. The combination of these characteristics makes these firms more likely to be able to adopt such strategies and to benefit from their implementation.

Method

Data. In order to test our hypotheses, we use data from three cross-sectional French surveys: the Organizational Changes and Computerization Survey[1] (COI, 2006), the Community Innovation Survey[2] (CIS, 2008) and the Annual Firm Survey[3] (EAE, 2006). Our sample includes 5,877 firms based on merging the data of these three surveys. Although the surveys were administered in 2006, a little before the main worldwide economic recession, France had been in a relatively depressed economic situation for some time at that point with a GDP growth significantly lower than the countries of the Organization for Economic Cooperation and Development (OECD),[4] but more importantly the surveys provide useful information about the general economic conditions surrounding the firms, as perceived by the respondent. This allows us to compare corporate behavior in different perceived economic conditions.

The COI survey is a matched employer-employee dataset on organizational change and computerization from the National Institute created this survey for Statistics and Economic Studies (INSEE), the Ministry of Labor and the Center for Labor Studies (CEE). The survey covers 7,700 firms from the private sector. This is a representative population of French firms from all industries except agriculture, forestry and fishing. Each firm completed a self-administered questionnaire regarding the utilization of information technologies and work organizational strategies in 2006, and concerning changes that had occurred since 2003. Firms were also interviewed about their economic goals and on the economic contexts in which organizational decisions were made.

The Community Innovation Survey (CIS) was administered by the French Institute for Statistics and Economic Studies over the period 2006–2008; the survey is based on the OECD Oslo Manual. Firms answered questions regarding innovations they had introduced within the past three years. The questionnaire was sent to 25,000 legal units and the response rate was also very high, 81%. The CIS survey is mandatory for firms with more with 250 employees or more so has a more important representation from firms with more than 250 employees.

The Annual Enterprise Survey is an annual survey conducted by the French Ministry of Industry to collect basic data on the structure of surveyed firms such as business activities, size and location. The EAE is a mandatory survey and the sample we use comprises 80,000 enterprises that are surveyed each year.

[1] More details about the design and scope of this survey are available on www.enquetecoi.net: Survey COI-TIC 2006-INSEE-CEE/Treatments CEE.

[2] More details about the design and scope of this survey are available on http://www.insee.fr/fr/methodes/default.asp?page=sources/sou-enq-communaut-innovation-cis.htm.

[3] More details about the design and scope of this survey are available on http://www.insee.fr/fr/methodes/default.asp?page=definitions/enquete-annuelle-entreprises.htm.

[4] From 2003 to 2006, the average annual real GDP growth was 1.9, which is almost a point lower than the OECD average annual real GDP growth (2.75) during that period (OECD, 2011).

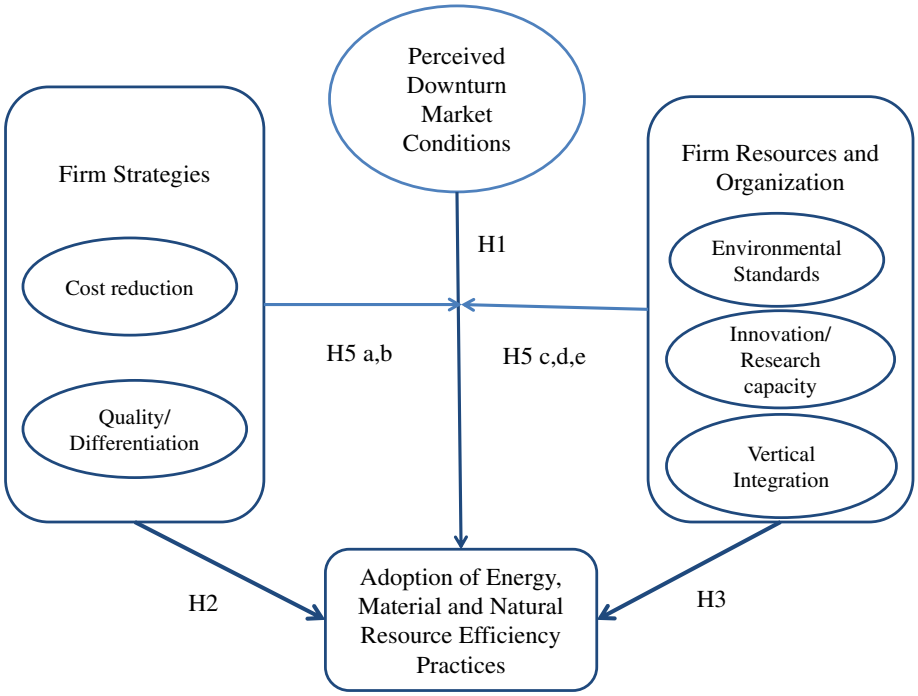

Figure 1. The drivers of resource efficiency strategies

The three datasets are linked by firm identification code named SIREN. After merging these surveys, we obtain a sample of 5,877 observations. Our sample contains firms that have a higher number of employees as compared to the CIS survey, which is expected since bigger firms tend to have more resources to respond to questionnaires or are mandated to do so as is the case with the CIS survey. However, our sample still includes a broad range of firm sizes (from 18 employees to more than 100,000). The surveys do not include the specific title of the respondent but we know that 40% in our sample belong to general and upper management and 30% from the finance and accounting department. The average years of seniority in the firm is 13.5.

We describe below the variables used in our study and provide references to the databases in Table 1.

Dependent variable

Resource efficiency strategies

In order to analyze the determinants of investments in energy and resource efficiency strategies, we construct a resource efficiency binary variable which takes the value of 1, if: a) the firm has introduced innovative strategies to reduce energy use per unit of output; and/or b) the firm has introduced innovative strategies to reduce material use per unit of output.[5]

Independent variables

Market conditions

In order to examine the impact of market conditions on firms' investments in resource efficiency, we use a variable indicating the evolution of the market conditions of the main activity of the firm since 2003. Three different market conditions are considered: 1) down market conditions; 2) steady market conditions; and 3) growing market conditions. Higher numbers for this variable signify more *unfavorable* market conditions.

Cost leadership strategy

We introduce a variable that represents the level of strategic importance attributed to providing competitively priced products and services. The variable is coded from 1, representing very low strategic importance, to 4, representing very high strategic importance.

[5] CIS industry questionnaire. Question 11a. In the last three years, has your firm introduced a product or service innovation, a process or marketing innovation bringing environmental benefits for the production of products or services? 1) Reduction in the use of raw material (including packaging) by unit produced, 2) Reduction of energy consumption by unit produced.

Table 1
Definition of variables and sample statistics

Variable	Description	Mean	SD	Min	Max
Resource efficiency[a]	The firm has adopted innovative strategies to reduce the use of energy, resource and/or material per unit of production	0.56	0.50	0.00	1.00
Energy efficiency[a]	The firm has adopted innovative strategies to reduce the use energy per unit of production	0.47	0.50	0.00	1.00
Material efficiency[a]	The firm has adopted innovative strategies to reduce the use of resource and/or material per unit of production	0.44	0.50	0.00	1.00
1. Independent 2. Variables					
Market Conditions[b]	Perceived evolution of the market of the main activity of the firm since 2003: DOWN (=3) STEADY (=2) GROWING (=1)	1.90	0.72	1.00	3.00
Resource efficiency × Market condition	=1 investment in resource efficiency practices when market performance is down; =2 investment in innovative resource efficiency strategies when market performance is steady; =3 investment in innovative resource efficiency strategies when market performance is growing; =0 no investment in innovative resource efficiency strategies	2.98	1.04	1.00	4.00
Cost leadership strategy[b]	Strategic importance attributed to competitive priced products and services	3.35	0.64	1.00	4.00
Quality/differentiation strategy[b]	Strategic importance attributed to product and service quality strategy	3.62	0.53	1.00	4.00
Environmental standards[b]	Registered for ISO 14001, organic labeling or fair trade Dummy variable	0.40	0.49	0.00	1.00
R&D[a]	R&D activities (internal or external)	0.56	0.50	0.00	1.00
Vertical integration[b]	Production organized internally	0.88	0.33	0.00	1.00
3. Controls					
Regulation[b]	Since 2003, the firm has been affected by change in regulations, standards (health, environment, worker rights, etc.)	0.27	0.82	1.00	4.00
Quality standard[b]	Registered with ISO 9000, EAQF, etc.	0.72	0.45	0.00	1.00
Holding[b]	Belongs to a holding group	0.83	0.37	0.00	1.00
Export[c]	Share of exports in total sales (€)	0.19	0.27	0.00	1.00
Profit[c]	Firm profit (€)	4,2095.49	34,3994.3	−571,691	6,619,330
Size[b]	Number of employees	2,727.59	9,824.86	18.00	111,956.00
Sector[b]	Agrifood, consumption goods, cars and equipment, intermediate goods, energy, construction, commercial, transport, financial and real-estate activities, business services and individual services				

[a] Variables were retrieved from the CIS database;
[b] Variables retrieved from the COI database;
[c] Variables retrieved from the EAE database.

Quality/differentiation strategy

We introduce a variable that represents the level of strategic importance the firm allocates to the quality of its products or services. The variable is coded from 1, very low strategic importance, to 4, very high strategic importance.

Environmental standards

We include a binary variable, coded 1, if the firm was registered according to one of the following standards in 2006: ISO 14001 standard; organic labeling; fair trade; another type of environment-related standard. Unfortunately, the database does not distinguish between these standards.

R&D

We introduce binary variable indicating whether the firm undertakes its R&D development activities internally (coded 1) or externally (coded 0).

Vertical integration

We introduce a binary variable, coded 1, if the firm organizes its production activities internally or if it they are subcontracted.

Controls

Regulation

Research has shown that the regulatory context is a significant driver of firm investments in green strategies (Kounetas and Tsekouras, 2008; Delmas and Montes-Sancho, 2010). Hence, we include a variable representing whether the firm has been affected by change in regulations, standards (health, environment, worker rights, etc.) since 2003.

Quality standards

Previous empirical findings support the notion that quality practices positively influence innovation performance, since quality practices, in both their human and technological dimensions, help to create an environment and a culture that support innovation (Darnall and Edwards, 2006; Pekovic and Galia, 2009). We therefore include a binary variable representing the adoption of quality standards by the firm.

Holding

Being part of a holding company could play an important role in resource efficiency investment. This might be because firms that belong to a holding have more financial resources available for investment in new technologies (Darnall and Edwards, 2006; Pekovic, 2010; Zyglidopoulos, 2002). Hence, we include a dummy variable that takes a value of 1 when the firm belongs to a holding.

Export

Research has shown firm exports to be a driver of the adoption of green strategies (Delmas and Montiel, 2009). We use a continuous variable representing the firm's volume of export divided by the firm's sales.

Profit

Limited access to capital may prevent resource efficiency measures from being implemented (Jaffe and Stavins, 1994; Kablan, 2003). We include a continuous variable that indicates a firm's profit.

Size

Most empirical studies have found that the probability of investing in resource efficiency strategies increases with firm size (e.g., Ley, 2010; Kounetas and Tsekouras, 2008; Brunnermeier and Cohen, 2003). Firm size is measured by a continuous variable representing the number of employees within the firm.

The variables used in estimation, as well as their definitions and sample statistics, are presented in Table 1. No problem of multicollinearity was detected (Appendix 1).

Estimation strategy

First, using a logit regression model, we investigate the determinants of firm's decision to invest in energy resource efficiency strategies. The logit regression takes the following form:

$$Y_i^* = \alpha + \sum_{i=1}^{13} \beta_i X_i + \mu_i, \quad i = 1, 2, ..., N. \tag{1}$$

where X_i represents the vector of variables for investment in energy efficiency strategies such as market conditions, cost leadership, Environmental Standards, R&D, vertical integration, regulation, quality/differentiation strategy, Quality Standards, holding, export, profit, size, sector activity; $\beta_1 - \beta_{13}$ are slope coefficients to be estimated and α and μ are the intercept and the disturbance term, respectively. The model of firms' energy resource efficiency investment choice is stated as a discrete-choice model, with the dummy variables indicating energy resource efficiency investment, as the dependent variables Y_i:

$$\begin{aligned} Y_i &= 1 \quad if \quad Y_i^* > 0, \\ Y_i &= 0 \quad otherwise. \end{aligned} \tag{2}$$

We specified logistic distributions for μ and maximized the log-likelihood of the logit models (Greene, 2003) to estimate models' parameters up to a positive constant.

Second, to investigate resource efficiency investment under different market conditions, we create a dependent variable, denoted *Resource Efficiency x Market Condition*. This variable represents whether investments are realized in down, steady or growing market conditions. On the basis of this classification, we have created a variable *RE1j* that takes the value of 1, if the

firm is investing in resource efficiency when the market performance is down; 2, if the firm is investing in resource efficiency when the market performance is steady; 3, if the firm is investing in resource efficiency when the market performance is growing; and 0, if a firm is not investing in resource efficiency.

We assume that firms choose one of the mutually exclusive alternatives characterized by our categorical variable. This variable reflects four distinct unordered alternatives: Resource Efficiency Investment when market performance is down (alternative $j = 1$), Resource Efficiency Investment when market performance is steady ($j = 2$), Resource Efficiency Investment when market performance is down (alternative $j = 3$) and No Resource Efficiency Investment ($j = 0$). A multinomial logit model was used to evaluate the impact of the firm's characteristics on resource efficiency investments.

In the multinomial logit model, the probability that the firm i belongs to the category of investors determined by different market situation j, $\forall\ j = 0, 1, 2,3,$ is defined by:

$$Prob(RE_i = j) = \frac{Exp(x_i\beta_j)}{\sum_{k=0}^{2} Exp(x_i\beta_k)} = \frac{Exp(x_i\beta_j)}{1 + \sum_{k=0}^{2} Exp(x_i\beta_k)} \quad (1)$$

where X_i represents the vector of variables for firm i (cost leadership, ES, R&D, vertical integration, regulation, quality/differentiation strategy, QS, holding, export, profit, size, sector activity); $\beta_1 - \beta_{12}$are slope coefficients to be estimated.

Multinomial logit models are valid under the Independence of Irrelevant Alternatives (IIA) assumption that states that the characteristics of one particular choice alternative do not impact the relative probabilities of choosing other alternatives. We perform both the Haussmann and Small-Hsiao tests to test the validity of the IIA assumption. The results of the tests confirm the independence of irrelevant alternatives in all categories.

Results

The descriptive statistics indicate that 3,295 firms representing 56% of the firms in our sample (5,877 firms) invest in resource efficiency strategies divided into 46.70% in energy efficiency, and 44.22% in material efficiency. Out of our sample of 3,295 firms, only 9.87% (580 firms) invest in resource efficiency in down market conditions, as compared to 25.98% (1527 firms), in steady market conditions and 20.21% (1188) in growing market conditions.

The results of the logit regression and multinomial regressions are presented in Table 2. In the first column, we present the logit results; the second column shows the results of the determinants of resource efficiency investments when the market is down as compared to no investment; the third column shows the determinants of resource efficiency investment when the market is growing compared to the no investment situation.

In column 1, we observe that the variable representing market conditions is negative and significant, indicating that firms are less likely to invest in resource efficiency when market conditions are worse. The marginal effects indicate that constrained market conditions decrease by 5 points a firm's probability of investing in resource efficiency. This confirms hypothesis H1b but contradicts hypothesis H1a.

Furthermore, as expected, firms showing high values for the variables representing cost leadership strategy, investments in environmental standards, R&D and vertical integration are more likely to invest in resource efficiency strategies. This confirms our hypotheses H2a, H3 and H4. However, the quality/differentiation strategy variable is non-significant and H2b is therefore not confirmed. This non-significant finding indicates that quality/differentiation oriented firms are not driving the adoption of resource efficiency strategies.

Turning to the control variables, we find that larger firms, with higher shares of exports, that have adopted quality standards, are also more likely to invest in resource efficiency strategies. This confirms previous studies (e.g., Darnall and Edwards, 2006; Schleich, 2009; Pekovic and Galia, 2009; Porter and Van Der Linde, 1995; Conrad, 1997; Malueg, 1989; Van Raaij and Verhallen, 1983). The results, regarding the negative and significant coefficient of our variable representing regulation, might indicate that changes in regulation might be a barrier to the adoption of innovative resource efficiency strategies (Delmas, 2002a,b). It is possible that such regulatory changes increased the environmental uncertainty and made resource efficiency strategies less attractive.

Regarding the determinants of resource efficiency investments when the market is down, compared to the no investment situation (the second column of Table 2), we observe that cost leadership strategy, environmental standards and internal R&D are significant predictors of investments in resource efficiency strategies. This confirms hypotheses H5a, H5c, and H5d. Similarly, the variable representing vertical integration is positively related to investments in resource efficiency strategies, and this confirms our hypothesis H5e. Overall firms with cost leadership strategy, internal R&D, environmental standards and that are vertically integrated are 24% more likely to adopt resource efficiency strategies when they perceive down market conditions. The variable quality/differentiation strategy is non-significant and therefore not a predictor of the adoption of resource efficiency strategies.

Turning to the control variables, larger firms, and firms belonging to a holding are more likely to invest in resource efficiency strategies, indicating some potential economies of scale associated with the adoption of such strategies. Furthermore, export negatively influences a firm's probability of investing in resource efficiency when the market is going down.

Table 2
The Determinants of the adoption of energy and resource efficiency strategies

Variables	(1) Resource efficiency strategies	(2) Resource efficiency × Market down (reference no investment)	(3) Resource efficiency × Market grow (reference no investment)
	Logit model	Multinomial model	
Market conditions	−0.19***		
	(0.04)		
Cost reduction	0.33***	0.44***	0.28***
	(0.05)	(0.08)	(0.07)
Quality/diff strategy	0.08	0.05	0.22***
	(0.06)	(0.09)	(0.08)
Env standard	0.50***	0.55***	0.39***
	(0.07)	(0.11)	(0.09)
R&D	1.89***	1.40***	2.00***
	(0.07)	(0.11)	(0.10)
Vertical integration	0.23***	0.43***	−0.02
	(0.10)	(0.16)	(0.13)
Regulation	−0.10***	0.02	−0.02
	(0.04)	(0.06)	(0.05)
Qual standard	0.41***	0.11	0.82***
	(0.08)	(0.13)	(0.12)
Holding	0.25***	0.38***	0.18
	(0.09)	(0.14)	(0.12)
Export	0.29*	−1.00***	0.66***
	(0.15)	(0.25)	(0.18)
Profit	0.00***	−0.00	0.00***
	(0.00)	(0.00)	(0.00)
Size	0.00***	0.00**	0.00*
	(0.00)	(0.00)	(0.00)
Agrifood	0.03	0.24	−0.66***
	(0.13)	(0.18)	(0.19)
Consumption goods	0.29**	0.20	0.46***
	(0.14)	(0.21)	(0.18)
Cars and equipment	−0.37***	−0.06	−0.36***
	(0.11)	(0.16)	(0.13)
Energy	0.61***	−0.60	0.74***
	(0.27)	(0.48)	(0.30)
Construction	0.86***	−0.85***	1.36***
	(0.16)	(0.35)	(0.19)
Commercial	0.37***	0.38**	−0.17
	(0.13)	(0.18)	(0.18)
Transport	0.92***	−0.19	1.41***
	(0.14)	(0.26)	(0.17)
Financial and real estate	1.91***	−14.24	2.58***
	(0.24)	(624.11)	(0.29)
Services for firms	−0.01	−0.65***	0.30**
	(0.12)	(0.20)	(0.15)
Services for individuals	0.63***	−0.12	0.76***
	(0.19)	(0.31)	(0.26)
Constant	−2.78***	−4.66***	−4.95***
	(0.31)	(0.48)	(0.41)
Pseudo R2	0.21	0.15	
Correctly classified	73.80%	82.92%	78.83%
Observations	5,877	5,877	5,877

(*), (**), (***) indicate parameter significance at the 10, 5 and 1 per cent level, respectively.

The third column (Table 2) represents the results related to the determinants of resource efficiency investment when the market is growing, comparing to a no investment situation. export, cost leadership, quality standards, environmental standards, R&D and size are significant, as in the results of the logit estimates (first column). This is not surprising, since these investments represent a larger share of the overall investments. Additionally, profit positively influences a firm's probability of investing in resource efficiency when the market is growing compared to the no investment situation. Vertical integration is non-significant which is consistent with our argumentation that favored vertical integration in downturn market conditions. The variable regulation is also non-significant, indicating that regulation is not a barrier for managers perceiving growing market conditions. Interestingly, the variable representing quality/differentiation strategy is positive and significant. This indicates that such firms are more likely to invest in resource efficiency strategies in perceived growing marking conditions although to a slightly lesser extent than cost reduction oriented firms.

Our analysis reveals significant differences in investment behavior towards resource efficiency according to the market conditions. Our results yield a number of interesting findings that help us better understand the relationships between market conditions, firm strategy and organization.

Several versions of the model have been investigated to confirm the robustness of our results (Appendix 2). These include an independent estimation of each of the indicators of resource efficiency — namely, reduced energy and material — in four different market situations. The results of this investigation indicate very few significant differences between these two sets of strategies indicating that they follow the same logic.

Discussion and conclusion

Research indicates that resource efficiency strategies have the potential to lead to cost savings and that such strategies should therefore be more attractive in downturn economic conditions. We found on the contrary that fewer firms (10%) adopt resource efficiency strategies in perceived downturn market conditions as compared to steady or growing conditions (46%). Our goal was to uncover this apparent paradox and understand the set of characteristics of firms that adopt resource efficiency strategies in perceived downturn market conditions in order to provide recommendations to encourage more widespread adoption of such strategies.

Some scholars have argued that depressed market conditions reduce a firm's willingness to invest in innovation (e.g., Kanerva and Hollanders, 2009). However, while, on the whole, a firms' investment in innovation declines during a market downturn, a small but significant minority of firms is "swimming against the stream" and increasing their investments in innovative strategies (Filippetti and Archibugi, 2011). Such firms seek opportunities to invest *more* in constrained economic times, by developing strategies that are environmentally and economically oriented. Our results show the characteristics of such firms in the context of the adoption of resource efficiency strategies.

This paper broadens our understanding of the kind of firm-level resources and capabilities needed to develop models of frugal innovation that do more with less. In the context of resource efficiency strategies, our findings indicate that models of frugal innovation encompass a combination of various firm capabilities and strategies, which impact the likelihood of successful adoption of such innovations. We show that firms are more likely to invest in resource efficiency strategies in downturn market conditions if they are focusing their main strategy on cost leadership, if they have adopted environmental standards, if they have invested in R&D, if they are vertically integrated and of larger size. Firms with such characteristics are twice more likely than the average firm to invest in resource efficiency strategies in downturn conditions.

Our results indicate that investments in resource efficiency strategies are not conducted in isolation, but are part of a set of practices and strategies that potentially reinforce each other. Business models in downturn economic conditions are therefore significantly different from those in economically growing conditions, where resources are more readily available. This article builds on the literature analyzing the organizational factors that impact the adoption of sustainable strategies (Darnall and Edwards, 2006; Delmas and Toffel, 2008). It shows that firms adopt different sustainable strategies even when they are experiencing the same depressed economic conditions. The reason for these differences lies into differences in firms' organizational structures and resources (Aragon-Correa and Sharma, 2003). This research demonstrates the importance of opening the organizational black box to understand firm behavior in different economic conditions.

In addition, we broaden the context of application of the contingency theory. While scholars have used this approach in the context of general proactive strategies (Sharma et al., 2007), we were able to demonstrate its power in the context of much more focused resource efficiency strategies. This is significant because resource efficiency strategies, unlike more general proactive strategies, are expected to have a direct impact on cost savings and therefore somewhat less contingent on the organizational and economic context in which they are implemented. We reveal that resource efficiency strategies are not just "add-ons" that can be plugged into any organization, but rather developed jointly with other capabilities and in specific environmental conditions.

Our results have significant policy implications. Policymakers seeking to encourage corporations to reduce energy and resource use should infuse firms with a comprehensive set of strategies, rather than focusing solely on energy or resource efficiency. The United Nations Environmental Program (UNEP), as part of its resource efficiency program, is investing close to three billion dollars in demonstrating to public and private sector decision-makers that there is a case to be made for resource efficiency, and in supporting entrepreneurial innovations. UNEP recognizes that managers tend to consider resource efficiency investments as "environmental"; i.e., add-on interventions not related to core business and market competitiveness (UNEP, 2010, p. 621). Our research confirms the need to focus on the synergies between a firm's main strategy and its resource efficiency investments and is useful for managers who seek to improve their efficiency in order to improve their competitiveness. These managers should think about including resource efficiency as part of their core strategy and look for synergies with existing environmental and quality programs.

Our research is not without limitations. First, our analysis was based on French data; future research should explore similar questions in an international setting, as scholars have identified international institutional differences regarding the implementation of environmental strategies (Husted, 2005; Husted and Allen, 2006; Darnall et al., 2008; Delmas and Montiel, 2008; Delmas and Montes-Sancho, 2011). Second, our dependent variable represented investments in innovative resource efficiency strategies but did not measure actual efficiency gains. Although such strategies aim at efficiency gains, it would be interesting in the future to measure the effectiveness of such measures. Third, while our database included a

rich set of variables that allowed us to control for many organizational characteristics, its cross- sectional nature hampered us from conducting a dynamic analysis. Further research should examine whether the effects identified in this study persist over time, and should further investigate the precise nature of the dynamic interactions between the firm external environment, its main business strategy, resources and organization, and investments in resource efficiency.

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Appendix 1

Pearson correlation coefficients

	Resource efficiency	Resource efficiency × Market condition	Market condition	Cost leadership strategy	Env standards	R&D	Vertical integration	Regulation	Quality strategy	Qual standards	Holding	Export	Profit	Size
Resource efficiency	1.00	–	–	–	–	–	–	–	–	–	–	–	–	–
Resource efficiency × Market condition	−0.86*	1.00	–	–	–	–	–	–	–	–	–	–	–	–
Market condition	−0.14*	−0.26	1.00	–	–	–	–	–	–	–	–	–	–	–
Cost leadership strategy	0.16*	−0.14*	0.04*	1.00	–	–	–	–	–	–	–	–	–	–
Env standards	0.25*	−0.20*	−0.04*	0.16*	1.00	–	–	–	–	–	–	–	–	–
R&D	0.46*	−0.36*	−0.13*	0.16*	0.27*	1.00	–	–	–	–	–	–	–	–
Vertical integration	0.07*	−0.07*	0.02	0.06*	0.06*	0.09*	1.00	–	–	–	–	–	–	–
Regulation	0.01	0.00	−0.01	0.10*	0.05*	−0.01	0.03*	1.00	–	–	–	–	–	–
Qual/diff strategy	0.09*	−0.06*	−0.06*	0.16*	0.09	0.11*	−0.03*	0.12*	1.00	–	–	–	–	–
Qual standards	0.23*	−0.16*	−0.13*	0.11*	0.41*	0.27*	−0.15*	0.04*	0.13*	1.00	–	–	–	–
Holding	0.11*	−0.10*	0.00	0.12*	0.18*	0.12*	−0.01	−0.02	0.08*	0.18*	1.00	–	–	–
Export	0.20*	−0.14*	−0.09*	0.19*	0.31*	0.38*	0.07*	−0.01*	0.10*	0.27*	0.15*	1.00	–	–
Profit	0.09*	−0.02*	−0.09*	−0.00	0.09*	0.09*	−0.12*	0.04*	0.06*	0.06*	0.02	−0.01	1.00	–
Size	0.11*	−0.06*	−0.07*	0.07*	0.16*	0.10*	−0.13*	0.12*	0.06*	0.09*	0.05*	0.01	0.60*	1.00

*$p < 0.01$.

Appendix 2

The determinants of energy efficiency and energy resource efficiency strategies under different market conditions

Variables	(1) Energy efficiency investment vs no investment	(2) Energy efficiency × Market down vs no investment	(3) Energy efficiency × Market grow vs no investment	(4) Material efficiency investment vs no investment	(5) Material efficiency × Market down vs no investment	(6) Material efficiency × Market grow vs no investment
Market condition	−0.15***			−0.13***		
	(0.04)			(0.04)		
Cost leadership strategy	0.24***	0.33***	0.22***	0.20***	0.36***	0.10
	(0.05)	(0.090)	(0.071)	(0.05)	(0.091)	(0.071)
Quality/diff strat	0.12**	0.16	0.21**	0.21***	0.01	0.41***
	(0.06)	(0.104)	(0.083)	(0.06)	(0.100)	(0.087)
Env. standards	0.42***	0.41***	0.26***	0.65***	0.77***	0.58***
	(0.07)	(0.120)	(0.093)	(0.07)	(0.120)	(0.095)
R&D	1.66***	1.19***	1.72***	1.59***	1.22***	1.68***
	(0.07)	(0.123)	(0.103)	(0.07)	(0.123)	(0.105)
Vertical integration	0.13	0.65***	−0.30**	−0.26***	0.04	−0.53***
	(0.10)	(0.196)	(0.133)	(0.10)	(0.177)	(0.135)

(*continued on next page*)

(*continued*)

Variables	(1) Energy efficiency investment vs no investment	(2) Energy efficiency × Market down vs no investment	(3) Energy efficiency × Market grow vs no investment	(4) Material efficiency investment vs no investment	(5) Material efficiency × Market down vs no investment	(6) Material efficiency × Market grow vs no investment
Regulation	−0.16***	−0.06	−0.06	−0.06	−0.01	0.09*
	(0.04)	(0.066)	(0.052)	(0.04)	(0.066)	(0.053)
Qual. standards	0.44***	0.19	0.90***	0.57***	0.36**	0.80***
	(0.08)	(0.142)	(0.123)	(0.08)	(0.146)	(0.127)
Holding	0.08	0.09	0.03	0.10	0.13	0.08
	(0.09)	(0.153)	(0.119)	(0.09)	(0.157)	(0.124)
Export	0.54***	−0.72***	0.84***	0.46***	−0.87***	0.73***
	(0.14)	(0.257)	(0.182)	(0.14)	(0.259)	(0.182)
Profit	0.00	−0.00***	0.00	0.00***	−0.00***	0.00***
	(0.00)	(0.000)	(0.000)	(0.00)	(0.000)	(0.000)
Size	0.00***	0.00***	0.00***	−0.00	0.00	−0.00***
	(0.00)	(0.000)	(0.000)	(0.00)	(0.000)	(0.000)
Agrifood	−0.06	0.20	−0.80***	−0.08	0.08	−0.74***
	(0.12)	(0.183)	(0.203)	(0.12)	(0.192)	(0.193)
Consumption goods	0.13	0.04	0.45**	0.56***	0.56**	0.66***
	(0.14)	(0.227)	(0.177)	(0.14)	(0.221)	(0.179)
Cars and equipment	−0.46***	−0.11	−0.41***	−0.36***	0.02	−0.39***
	(0.10)	(0.168)	(0.134)	(0.10)	(0.168)	(0.134)
Energy	1.16***	−0.05	1.36***	−0.39*	−1.53***	−0.76**
	(0.25)	(0.481)	(0.288)	(0.21)	(0.542)	(0.294)
Construction	1.27**	−0.45	1.75***	0.25*	−1.89***	0.71***
	(0.16)	(0.347)	(0.189)	(0.15)	(0.476)	(0.185)
Commercial	0.22*	0.39**	−0.36*	0.27***	0.36*	−0.23
	(0.12)	(0.191)	(0.196)	(0.12)	(0.197)	(0.188)
Transport	1.11***	−0.21	1.61***	0.02	−0.69**	0.30
	(0.14)	(0.286)	(0.175)	(0.14)	(0.295)	(0.189)
Financial and real estate	1.97***	−14.41	2.58***	0.18	−14.37	0.57*
	(0.23)	(708.765)	(0.281)	(0.24)	(478.115)	(0.304)
Services for firms	−0.34***	−1.39***	0.02	−0.05	−0.48**	0.09
	(0.12)	(0.258)	(0.153)	(0.12)	(0.211)	(0.153)
Services for individuals	0.92***	0.17	1.05***	0.28	−0.42	0.32
	(0.19)	(0.322)	(0.260)	(0.19)	(0.383)	(0.277)
Constant	−2.68***	−4.85***	−4.63***	−2.97***	−4.32***	−5.04***
	(0.30)	(0.531)	(0.414)	(0.31)	(0.516)	(0.429)
R2	0.19	0.14	0.18	0.14		
Correctly classified	71.70%	87.09%	80.14%	71.87%	87.71%	80.94%
Observations	5,877	5,877	5,877	5,877	5,877	5,877

(*), (**), (***) indicate parameter significance at the 10, 5 and 1 per cent level, respectively.

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Biographies

Magali A. Delmas is a professor at the UCLA Anderson School of Management and the Institute of the Environment and Sustainability. E-mail: delmas@ucla.edu

Sanja Pekovic is a researcher at the University of Paris-Dauphine. E-mail: sanja.pekovic@dauphine.fr