Received: 17 May 2022 | Revised: 26 April 2023 | Accepted: 7 May 2023

DOI: 10.1002/bse.3453

RESEARCH ARTICLE

Business Strategy and the Environment WILEY

The impact of sustainability-oriented dynamic capabilities on firm growth: Investigating the green supply chain management and green political capabilities

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Abstract

Building on the dynamic capabilities literature and natural-resource-based view, the paper examines whether firms can attain sales growth through a range of sustainability-oriented dynamic capabilities including (1) internal green supply chain management capabilities, (2) external green supply chain management capabilities and (3) green political capabilities. Based on a dataset of 277 public US firms between 2010 and 2020, a panel quantile model of firm growth showcases that while internal green supply chain capabilities and green political capabilities affect firms' growth performance positively, external green supply chain capabilities are associated with slower growth. Importantly, the results indicate that the positive growth effects of green political capabilities are short-lived, while those of internal green supply chain capabilities are long-lived. The study contributes to the sustainability-oriented dynamic capabilities literature by showing that different capabilities have different implications for firm growth depending on the firm's base performance and the time periods under consideration.

KEYWORDS

climate lobbying, firm growth, green growth, green political capabilities, green supply chain management capabilities

1 | INTRODUCTION

In pursuit of green growth, companies are taking a range of climate actions to reduce their environmental impact and comply with the growingly stringent environmental regulations while striving to maintain their economic competitiveness (Dangelico & Pontrandolfo, 2015; Du et al., 2019; Fernandes et al., 2021; Lartey et al., 2019). The natural-resource-based view (NRBV) of the firm highlights the importance of firms' sustainability-oriented dynamic capabilities (SODC) as the basis of firms' successful sustainability strategies that simultaneously promote economic and environmental performance (Dangelico et al., 2017; Hart, 1995; Huang & Li, 2017). This study contributes to the growing body of sustainability-oriented dynamic capabilities (SODC) literature (Coppola et al., 2023; Danso et al., 2019; Demirel & Kesidou, 2019) by investigating the impact of two specific types of SODC on firms' growth potential: (1) green supply chain management (GSCM) capabilities and (2) green political capabilities.

Abbreviations: CDP, Carbon Disclosure Project; GSCM, green supply chain management; NRBV, natural-resource-based-view; SODC, sustainability-oriented dynamic capabilities.

GSCM capabilities cover a broad range of areas across the supply chain, including eco-design, eco-innovation, environmental management, green procurement, customer cooperation with environmental concerns and investment recovery (Zhu et al., 2013). GSCM capabilities are expected to reduce firms' environmental impact by integrating environmental thinking into the different stages of supply chain management while simultaneously improving economic performance through reduced costs, increased efficiency and higher levels of innovation (Srivastava, 2007; Wong et al., 2020). Green political capabilities, on the other hand, are expected to empower firms to engage with policymakers to position themselves effectively within the existing environmental and anticipated policy landscapes as well as actively shaping the environmental legislation to their own advantage (Delmas et al., 2015; Green et al., 2022). As such, green political capabilities are also expected to boost firm performance.

The current paper focuses on firm growth as a specific dimension of performance that is less considered in the sustainability literature. Prior studies that examine how firms' sustainability actions and capabilities affect their growth performance report mixed findings, reflecting the highly complex nature of both sustainability and growth processes in firms (Cainelli et al., 2011; Colombelli et al., 2015; Demirel & Danisman, 2019; Ghisetti & Rennings, 2014; Jové-Llopis & Segarra-Blasco, 2018; Kunapatarawong & Martínez-Ros, 2016; Leoncini et al., 2017; Marin & Lotti, 2016). A robust strategy to disentangle these complexities would be to account for heterogeneity in the sustainability capabilities and growth profiles of firms as the literature highlights the persistent firm differences in both domains. Therefore, we aim to unpack the relationship between SODC and firm growth by focusing on two specific types of SODC (i.e., green supply chain management capabilities and green political capabilities) and by examining their effects across firms with different growth profiles.

Based on a sample of 277 US firms and using the panel quantile regression technique (Coad et al., 2016; Guarascio & Tamagni, 2019), the paper highlights the varying effects of GSCM and green political capabilities on firm growth. The results show that internal GSCM capabilities which boost firms' ability to address their environmental impact individually within firm boundaries (Zhu et al., 2013) affect firm growth positively in the long run. On the other hand, external GSCM capabilities which facilitate environmental collaborations with customers and suppliers (Marrucci et al., 2022; Singh et al., 2021; Zhu et al., 2013) have no significant impact on the growth of most firms and even negative growth effects for some cohorts of firms. Finally, the findings show that the green political capabilities exert a positive short-term growth effect on high-growth firms but this fades away relatively quickly.

This study offers two contributions to the literature. First, we contribute to the SODC literature by providing in-depth investigations of the GSCM and green political capabilities as well as their implications for firm growth (Capasso et al., 2019; Fernandes et al., 2021). The findings point to the different implications of different SODC on firm growth; these change over time and tend to vary across firms with differing growth profiles. Hence, we argue that a holistic analysis of firms' different SODC is essential to better understand the complex relationships between corporate sustainability actions and firm performance (Lartey et al., 2020). Second, by focusing on green political capabilities, we extend the range of SODC that has been covered in the NBRV literature. In doing so, we leverage the recent insights on the increasing relevance of corporate political activities in firm strategy for consideration in the field of sustainability (Dorobantu et al., 2017; Ridge et al., 2019).

The paper proceeds with the literature review (Section 2), data and methodology (Section 3), results (Section 4) and discussions and conclusions (Section 5) sections.

2 | LITERATURE REVIEW AND HYPOTHESES

The increasingly popular notion of green growth focuses on creating environmental and economic value simultaneously through new clean technologies, low-carbon initiatives and energy efficiency actions (Fernandes et al., 2021; Ren et al., 2022). Organization for Economic Cooperation and Development (OECD) defines green growth as "fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies" (OECD, 2011, p. 9). Studies have shown that by adopting sustainable practices, firms can improve environmental performance and become more competitive, hence setting a trajectory for the green growth (Ambec & Lanoie, 2008; Chan et al., 2013; Leal-Rodríguez et al., 2018; Porter & Van der Linde, 1995; Singh et al., 2021). Yet, a significant portion of the literature argues that the cost burdens associated with organizations' pollution abatement activities can hamper firm performance (Borel-Saladin & Turok, 2013; Horváthová, 2012). Hence, the debate over "whether it pays to be green" remains in economic empirical studies (Ambec & Lanoie, 2008; Dixon-Fowler et al., 2013; Kunapatarawong & Martínez-Ros, 2016). In this paper, we focus on firm growth as a specific dimension of firm performance to investigate the impact of firms' SODC on their growth performance.

2.1 | Theoretical background: Sustainability-oriented dynamic capabilities (SODC)

The natural-resource-based view (NRBV) of the firm builds on the resource-based view and dynamic capabilities literature (Barney et al., 2011; Teece et al., 1997) to emphasize that firms' sustainability-oriented dynamic capabilities (SODC) are crucial for them to mitigate the environmental impact of their activities while simultaneously ensuring the survival and success of the firm (Qiu et al., 2019). SODC are defined as firms' capabilities in integrating and rearranging their existing resources to address environmental challenges effectively (Buzzao & Rizzi, 2020; Dangelico et al., 2017).

An increasing number of researchers have started focusing on better understanding sustainability-oriented capabilities as a means to empowering firms' green transition and green growth (Demirel &

Kesidou, 2019; Dzhengiz & Niesten, 2020; Singh et al., 2021). Existing studies point to a range of SODC that reside in firms, often classified under the broad categories of sensing (i.e., market monitoring and technology scanning), seizing (i.e., strategic planning) and reconfiguring (i.e., organizational restructuring) for sustainability (Khan et al., 2020). Johnson (2017) presents a list of SODC that includes internal capabilities such as environmental management and an ability to continuously learn in sustainability matters as well as external capabilities such as networking and collaboration within the local, industrial and supply chain communities. Demirel and Kesidou (2019) examine internal SODC such as environmental self-regulation, environmental technology and environmental market sensing capabilities; while an extensive list of internal and external SODC are reported by Kabongo and Boiral (2017) to include environmental innovation, environmental constraint management, green marketing, interconnectedness, networking, green human resource management and higher order learning capabilities. Seles et al. (2022) identify three broad categories of SODC to cover (1) the relationship with external stakeholders (e.g., collaboration capabilities), (2) management of people (e.g., sustainability leadership and sustainable business model innovation capabilities) and (3) structure, product and process (e.g., eco-innovation and dynamic remanufacturing capabilities). A detailed list of conceptualizations around SODC can be found in a recent systematic review of the literature by Buzzao and Rizzi (2020).

The literature that investigates the impact of SODC on firm performance is growing with most studies examining the implications for environmental performance and relatively few on economic performance (Dangelico et al., 2017; Demirel & Kesidou, 2019; Khan & Wisner, 2019; Rehman et al., 2022; Schrettle et al., 2014). In this paper, we focus on two specific SODC, (1) green supply chain management (GSCM) capabilities and (2) green political capabilities, to investigate their impact on firm growth.

2.2 | Green supply chain management (GSCM) capabilities and firm growth

Operations management literature emphasizes the important role of supply chain management capabilities in elevating firms' ability to identify, use and assimilate internal and external information and resources to address various opportunities and challenges in their markets (Daddi et al., 2021; Hong et al., 2018). In addition to acting as a core competency to drive firm efficiency and innovation, supply chain management capabilities can improve firms' resilience in the face of supply chain shocks (Lee & Rha, 2016; Yu et al., 2019). Overall, studies report that firm performance is positively influenced by supply chain management capabilities that help firms achieve efficiency improvements, cost reductions, improved product quality, customer satisfaction and regulatory compliance (Eslami et al., 2021).

Green supply chain management (GSCM) literature combines the abovementioned operations management literature with insights from environmental management to investigate the range and nature of GSCM capabilities (Marrucci et al., 2022; Singh et al., 2021). A broad definition used for GSCM is "… integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life" (Srivastava, 2007, p. 54–55). GSCM capabilities ensure an efficient and effective flow of information, materials and other resources, with a focus on minimizing waste and increasing ecological efficiency throughout the supply chain (Siems et al., 2021). As the system-wide nature of the climate crisis becomes more evident, firms are increasingly taking actions that improve sustainability not just within the firm but beyond the immediate firm boundaries and across their broader supply chains (Amir et al., 2022; Kong et al., 2021).

The empirical literature investigating the impact of GSCM capabilities on firm performance presents mixed findings (Paulraj et al., 2015; Wolf, 2013). Chowdhury and Quaddus (2021) argue that GSCM capabilities enable the speedy reconfiguration of a firm's supply chain, allowing the firm to actively grow its share in green markets. Similarly, Borazon et al. (2022) and Kong et al. (2021) demonstrate that GSCM capabilities increase economic performance by boosting innovation, while Daddi et al. (2021) show that stronger GSCM capabilities lead to greater market competitiveness through internationalization. On the other hand, Hong et al. (2018) and Esfahbodi et al. (2016) do not find sufficient evidence for a positive relationship between GSCM capabilities and firm performance. Similarly, Laari et al. (2018) demonstrate that there are no positive performance effects of GSCM capabilities despite their positive impact on firms' overall environmental performance.

One potential explanation for these mixed findings is the literature's tendency to overlook the dichotomy of *internal* and *external* GSCM practices and the plausible differences in their performance effects. "Internal GSCM practices are defined as practices that can be implemented and managed independently by individual manufacturers. External GSCM practices typically require some level of cooperation with external stakeholders or partners such as suppliers and customers" (Zhu et al., 2013, p. 107). Internal GSCM capabilities relate to firms' environmental activities such as eco-design, eco-innovation and environmental management that can be implemented by an individual organization alone (Zhu et al., 2013). On the other hand, external GSCM relates to activities such as green procurement, customer cooperation with environmental concerns and investment recovery, where the organization cooperates with supply chain partners for improved environmental outcomes (Fang & Zhang, 2018; Zhu et al., 2013).

The literature emphasizes the central role that internal GSCM capabilities play in managing the firm's environmental impact within its boundaries and across the supply chain without causing disconnection and fragmentation in the supply chain (Yang et al., 2013). Internal GSCM capabilities are seen as a precondition for firms to build external GSCM capabilities (Wong et al., 2020). To our knowledge, the GSCM literature puts little emphasis on the potentially different effects of internal and external GSCM capabilities on firm performance. Exceptions include Khan and Wisner (2019) who find that internal GSCM capabilities positively impact firm performance while external GSCM capabilities do not have a positive impact on firm performance and Dangelico et al. (2017) who report that neither internal nor external GSCM capabilities have a direct influence on firm performance despite boosting environmental performance.

In this paper, we examine whether internal and external GSCM capabilities drive firm growth. We hypothesize that internal GSCM capabilities are likely to have a positive impact on firms' growth performance as the natural-resource-based view literature reports a strong positive relationship between firms' internal SODC and growth potential (Amui et al., 2017; Burger & Christen, 2011; Demirel & Kesidou, 2019). Yet, the literature that examines the customer and supplier collaborations presents less strong evidence to suggest that external GSCM capabilities can drive performance. Commonly cited reasons for the missing positive impact of external GSCM capabilities in firms are the high costs of implementation, difficulties in gaining buy-in from top management and complex partnership structures involved in supply chains (Dube & Gawande, 2016; Tseng et al., 2019). Therefore, we propose that

Hypothesis 1. Internal GSCM capabilities are positively associated with firm growth.

Hypothesis 2. External GSCM capabilities are not significantly associate with firm growth.

2.3 | Green political capabilities and firm growth

Firms' stakeholder engagements beyond their supply chains increasingly involve political behaviour, defined as "firm actions that have the objective or effect of shaping public policy or the policy preferences of other actors" (Green et al., 2022, p. 2041). Recent years have seen governments introduce significant decarbonization policies to achieve net-zero emissions, with significant implications as well as opportunities for firms (Zameer et al., 2021). As these policies take shape, firms engage with policymakers through political behaviour that takes the form of lobbying and public relations campaigns to influence the environmental agenda in their favour—an activity we will refer to as "climate lobbying" from here onwards. Brulle (2018) estimates that over $2 billion of lobbying expenditures was spent on climate change legislation in the US Congress from 2000 to 2016, constituting 3.9% of the total lobbying expenditures. Climate lobbying seeks rents through favourable climate regulations, carbon tax treatment and public procurements.

Even though the political economy literature tends to focus more on firms' climate lobbying activities that undermine environmental regulations (Catola & D'Alessandro, 2020), it is increasingly clear that climate lobbying is not always done to undermine environmental regulations. Several studies showcase that environmentally proactive firms are equally active in climate lobbying as their polluting counterparts (Damania, 2001). Grey (2018) suggests that firms make clean technology investments and then lobby for strong environmental protection to capture a high market share from their investment. Cai and Li (2020) also indicate that stricter environmental regulation confers a competitive advantage upon the clean firms, enabling them to capture a greater share of the market, while the extra cost burden of lobbying is often negligible. Delmas et al. (2015) reveal that both dirty and clean firms are active in climate lobbying, holding a range of positions from "strongly supporting anti-climate policies" to "supporting pro-climate policies" and weaker positions in between these two ends (Green et al., 2022).

Surprisingly, researchers have not sufficiently investigated how firms' green political engagements affect their performance. Hence, we turn to the broader lobbying literature to gain broader insights on this matter. One strand of the contemporary political economy literature focuses on lobbying as the mechanism by which firms change and influence the rules and laws in a firm's favour (Krammer & Jimenez, 2020). Corporates engage in lobbying by explaining their positions at public meetings, through discussions with policymakers, and by developing proposals for further design and development of legislation (Brulle, 2018). Prior researchers who examined how lobbying affects firm performance revealed mixed findings (Cao et al., 2018). On the one hand, lobbying across different fields and topics have been found to exert a positive impact on firm performance as firms that lobby gain a variety of benefits, such as information, access, influence and political legitimacy (Chen et al., 2015; Mathur et al., 2013). However, Yim et al. (2017), who reveal that lobbying has a significant and positive effect on firm growth, also note the caveat that the effect of lobbying is contingent on the political structure where the firm is placed. On the other hand, other studies challenge the positive association between lobbying and firm performance, stating that the effectiveness of lobbying is relatively uncertain (Eun & Lee, 2019). Hadani and Schuler (2013) find that firms' political investments in lobbying are negatively associated with market performance except for firms in regulated industries. Cao et al. (2018) argue that the negative association between lobbying activities and firm performance is largely driven by operationally complex firms. Finally, in the context of climate lobbying, Meng and Rode (2019) emphasize that policy design plays an important role in determining the returns to climate lobbying investments made by different types of firms.

In this paper, we argue that firms' green political capabilities are the source of their ability to proactively and effectively engage with policymakers through climate lobbying and gain competitive advantage. Green political capabilities allow organizations to manipulate the regulatory environment surrounding their activities and deploy environmental regulations in order to garner support for their positions (Zimmerman & Zeitz, 2002). Therefore, we propose that

Hypothesis 3. Green political capabilities embodied in climate lobbying are positively associated with firm growth.

3 | DATA AND METHODOLOGY

3.1 | Sample

In order to test the effects of green supply chain management and green political capabilities on firm growth, we use a sample of 277 US firms that jointly appear in the Carbon Disclosure Project (CDP) and COMPUSTAT databases between 2010 and 2020. The CDP is a not-for-profit organization that is supported by major institutional investors (Jung et al., 2016). It annually sends questionnaires to companies to collect information on greenhouse gas emissions and related issues (Li et al., 2018). The CDP questionnaire covers broad dimensions of a firm's activity regarding climate change including management, risks, opportunities and emissions. Each year, CDP receives responses from more than 3000 organizations in 60 countries (Jung et al., 2016). We adopt CDP data starting from the year 2010 as CDP extended its coverage to 4500 firms in 2010, with significantly more detailed questions. The response rates are also higher after 2010, with 65% of the firms answering the questionnaire (Ben-Amar & McIlkenny, 2015). COMPUSTAT North America database provides accounting and market information on all publicly traded firms in the United States. The COMPUSTAT and CDP databases are merged at the firm level to provide the sample used in this study. After eliminating observations with missing data, our final sample consists of 277 firms and 1285 firm-year observations from 2010 to 2020.[1]

3.2 | Variables

3.2.1 | Dependent variable: Firm growth

This study measures firm growth (*salesgrowth*) by taking differences in logarithm of sales (Coad, 2009). We focus on sales growth rather than employment growth as a more comparable measure of firm growth across firm size and industry (Coad et al., 2017; Kang et al., 2019).

3.2.2 | Explanatory variables

The study uses several CDP survey questions as the proxies of GSCM and green political capabilities variables. First, internal GSCM (*igscm*) capabilities are measured with the survey question: "Do you classify any of your existing goods and/or services as low-carbon products or do they enable a third party to avoid GHG emissions?" If the answer is "Yes," we set the igscm variable equal to 1, and 0 otherwise. As an indicator of firms' external GSCM (*egscm*) capabilities, we use the CDP survey question "Do you engage with any of the elements of your value chain on GHG emissions and climate change strategies?" and set it to be equal to 1 if firms respond with a "yes," and 0 otherwise.

We use the CDP question "Do you engage in activities that could either directly or indirectly influence public policy on climate-related issues through any of the following?" as an indicator of the firm's green political capabilities (*gpc*). The variable is set to be equal to 1 if a firm responds, "Direct engagement with policy makers," and 0 if they respond with "No."

[1]Firms were excluded from the analysis if they did not respond to the CDP survey and/or it was not possible to obtain their financial information on COMPUSTAT.

3.2.3 | Control variables

In our estimations, we include control variables used in traditional firm growth studies including firm size and age. *Firm size* is controlled by including the logarithm of total *sale* of the current year (Grillitsch et al., 2019; Lee, 2018). *Firm age* was included given that literature finds younger firms have faster expected growth rates (Evans, 1987; Hart, 2000; Kim et al., 2016). We follow Lartey et al. (2021) to measure firm age using the natural logarithm of the time between a firm going public and the end of the fiscal year as the incorporation year variable is not available in the COMPUSTAT data. To capture the general innovation capabilities of firms which are associated with higher firm growth (Mudambi & Swift, 2011), we control for firms' *R&D intensity* variable computed as the ratio between R&D expenditure and turnover (Di Cintio et al., 2017). We also account for firms' broad level of resources as a possible determinant of firm growth through a variable titled *Slack* (Douglas & Judge, 1995), computed as the logarithmic value of the ratio of current assets to current liabilities (Bansal, 2005; Fu et al., 2020). Finally, we account for the broader environmental engagement and efforts of the firm by including a participation in emission trading schemes (*emit*) variable that is constructed based on the CDP question "Do you participate in any emissions trading schemes?" A dummy variable was accordingly introduced as 1 to refer to a company answering "Yes," 0 otherwise.

Our variables are described in Table 1. Descriptive statistics and Pearson correlation statistics are listed in Tables 2 and 3, respectively.

3.3 | Econometric method

In order to analyse the effect of SODC on firm growth, we estimate the equation based on Coad et al. (2016):

$$
\begin{aligned}
salegrowth_{i,t} = {} & \alpha_1 + \alpha_2 igscm_{i,t-1} + \alpha_3 egscm_{i,t-1} + \alpha_4 gpc_{i,t-1} + \alpha_5 emit_{i,t-1} \\
& + \alpha_6 logsale_{i,t-1} + \alpha_7 logfirmage_{i,t} + \alpha_8 logslack_{i,t} \\
& + \alpha_9 logR\&Dintensity_{i,t-1} + e_{i,t},
\end{aligned}
$$

where $igscm_{i,t-1}$, $egscm_{i,t-1}$, and $gpc_{i,t-1}$ are lagged independent variables for firm i at time $t-1$. Moreover, we include 2- and 3-year lags for these variables to capture longer term implications of explanatory variables.

Building on the work of Gibrat (1931), much research has gone into understanding the drivers of firm growth (Coad et al., 2016; Grillitsch et al., 2019), indicating the presence of a broad set of firm and industry specific factors that may influence growth (Audretsch et al., 2014; Sterk et al., 2021). An important realization in the field has been the need to carefully investigate the different growth dynamics of slow, medium and fast growth firms to gain a holistic understanding of the drivers of growth (Coad & Rao, 2008; Segarra & Teruel, 2014). We, therefore, apply the panel quantile regression estimation technique to capture the different firm growth dynamics along the firm growth distribution. Traditional least squares regression techniques provide summary point estimates that calculate the average

TABLE 1 Variables and measurement.

Variables	Measurement	Source
Sales growth	Sales growth from $t-1$ year to t year	Compustat
Internal GSCM capabilities	Dummy: 1 if the firm has low carbon products or these products enable a third party to avoid GHG emissions, 0 for NO	CDP 2010–2020
External GSCM capabilities	Dummy: 1 if the firm engages with value chain on climate-related issues, 0 for NO	CDP 2010–2020
Green political capabilities	Dummy: 1 if the firm undertakes direct engagement with policymakers, 0 for NO	CDP 2010–2020
Emission trading scheme	Dummy: 1 if the firm participates in any emissions trading schemes, 0 for NO	CDP 2010–2020
Sale	Sale amount to control firm size	Compustat
Slack	Ratio of current assets to current liabilities (Bansal, 2005)	Compustat
R&D intensity	R&D expenditure divided by sale (Fu et al., 2020)	Compustat
Firm age	The fiscal year minus listed year	Compustat

TABLE 2 Descriptive statistics.

Variable	Obs	Mean	Std. dev.	Min	Max
salgrowth	1285	0.019	0.169	−1.385	1.154
igscm ($t-1$)	1285	0.635	0.482	0	1
egscm ($t-1$)	1285	0.858	0.35	0	1
gpc ($t-1$)	1285	0.475	0.5	0	1
emit ($t-1$)	1285	0.289	0.454	0	1
logR&Dintensity ($t-1$)	1285	0.057	0.072	0	0.375
logsale ($t-1$)	1285	9.41	1.266	4.86	13.23
logfirmage	1285	3.416	0.861	0	4.949
logslack	1285	0.971	0.321	0.185	2.258

TABLE 3 Pearson correlation statistics.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) *salgrowth*	1.000								
(2) *igscm* ($t-1$)	−.106***	1.000							
(3) *egscm* ($t-1$)	−.057**	.158***	1.000						
(4) *gpc* ($t-1$)	−.097***	.300***	.297***	1.000					
(5) *emit* ($t-1$)	−.084***	.106***	.191***	.222***	1.000				
(6) *logR&Dintensity* ($t-1$)	.163***	−.131***	−.006	−.132***	−.004	1.000			
(7) *logsale* ($t-1$)	.040	.096***	.369***	.229***	.182***	−.162***	1.000		
(8) *logfirmage*	−.054*	.038	.107***	.085***	.053*	−.062**	.238***	1.000	
(9) *logslack*	.004	−.029	−.166***	−.171***	−.107***	.326***	−.359***	−.160***	1.000

*$p < 0.1$, **$p < 0.05$, and ***$p < 0.01$.

effect of the independent variables on the "average firm" (Coad & Rao, 2008). Mosteller and Tukey (1977) argued that the "mean" gives an incomplete picture of a single distribution, and therefore, the conventional regression curve gives a correspondingly incomplete picture for a set of distributions. Quantile regression techniques can, therefore, help us obtain the effects of all independent variables on the variation range and shape of the conditional distribution of the dependent variables (Kang & Liu, 2014). In particular, the standard least squares assumption of normally distributed errors does not hold for our database because growth rates follow an exponential rather than a Gaussian distribution (Coad & Rao, 2008). The nature of the growth rates distribution is illustrated in Figure 1.

Our panel quantile regression procedure proceeds in two steps (Canay, 2011; Coad et al., 2016). The first step involves estimating the unobserved time-invariant effects u_i, which is done by using fixed-effect panel regression. The second step of Canay's estimator involves applying the well-known cross-sectional quantile regression estimator on a new dependent variable $\widehat{y_{i,t}}$ that has been created by transforming $y_{i,t}$ to remove the fixed effect: $\widehat{y_{i,t}} = y_{i,t} - u_i$ then regress $\widehat{y_{i,t}}$ on $x_{i,t}$. Therefore, panel quantile method with fixed effects is conducted and estimated in five quantiles (0.10, 0.25, 0.50, 0.75 and 0.90).

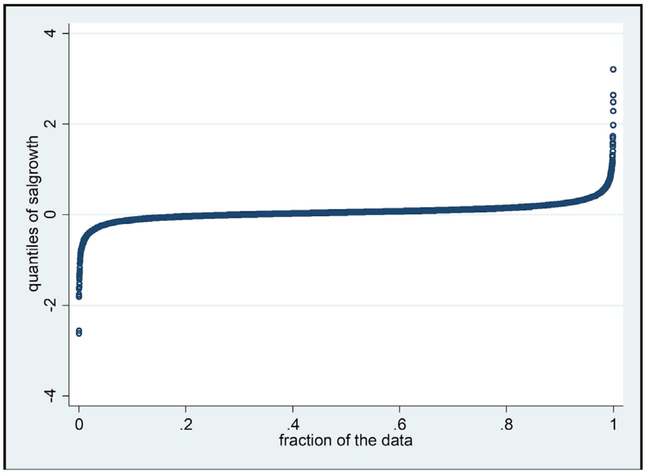

FIGURE 1 Quantile distributions of sales growth.

4 | RESULTS

Tables 4–6 present the results with 1-, 2- and 3-year lagged explanatory variables in our quantile regressions with the dependent variable "sales growth." In what follows, we report the detailed findings.

4.1 | Internal GSCM capabilities and firm growth

The results in Table 4 indicate that internal GSCM capabilities are positively associated with firm growth only at the 90th quantile (coefficient = 0.0187; $p < .1$). The findings are significantly different when we take into consideration the long-term effects of internal GSCM capabilities on firm growth (i.e., over 3 years), where internal sustainable GSCM capabilities are positively associated with sales growth of most quantiles in Table 6. Hence, our results suggest that internal GSCM capabilities do not immediately deliver economic

TABLE 4 Fixed-effects quantile regression estimates for sustainability-oriented dynamic capabilities—Sales growth (1-year lag).

Variables	(1) 10Q	(2) 25Q	(3) 50Q	(4) 75Q	(5) 90Q
igscm (*t* − 1)	−0.0018	0.0001	0.0051	0.0041	0.0187*
	(0.0160)	(0.0076)	(0.0039)	(0.0063)	(0.0109)
egscm (*t* − 1)	−0.0237	−0.0067	−0.0120***	−0.0054	−0.0437***
	(0.0276)	(0.0108)	(0.0046)	(0.0123)	(0.0142)
gpc (*t* − 1)	0.0154	0.0111	0.0111***	0.0104*	0.0257**
	(0.0170)	(0.0075)	(0.0041)	(0.0059)	(0.0113)
emit (*t* − 1)	−0.0382**	−0.0351***	−0.0277***	−0.0335***	−0.0431***
	(0.0172)	(0.0093)	(0.0048)	(0.0068)	(0.0126)
logR&Dintensity (*t* − 1)	1.4492***	1.4767***	1.5349***	1.5911***	1.4734***
	(0.0878)	(0.0614)	(0.0343)	(0.0311)	(0.0486)
logsale (*t* − 1)	0.3926***	0.3891***	0.3917***	0.3898***	0.3843***
	(0.0066)	(0.0034)	(0.0017)	(0.0027)	(0.0050)
logfirmage	−0.1938***	−0.1986***	−0.2061***	−0.2140***	−0.2263***
	(0.0108)	(0.0046)	(0.0023)	(0.0038)	(0.0052)
logslack	−0.0095	−0.0097	−0.0173**	−0.0264***	−0.0237
	(0.0276)	(0.0138)	(0.0068)	(0.0100)	(0.0185)
Constant	−3.1775***	−3.0719***	−3.0205***	−2.9244***	−2.7399***
	(0.0838)	(0.0380)	(0.0194)	(0.0329)	(0.0530)
Observations	1285	1285	1285	1285	1285
Company FE	Yes	Yes	Yes	Yes	Yes
Pseudo $R2$	.705	.764	.801	.807	.786

Abbreviations: *egscm*, external GSCM capabilities; *gpc*, green political capabilities; *igscm*, internal GSCM capabilities.
*$p < 0.1$, **$p < 0.05$, and ***$p < 0.01$.

TABLE 5 Fixed-effects quantile regression estimates for sustainability-oriented dynamic capabilities—Sales growth (2-year lag).

Variables	(1) 10Q	(2) 25Q	(3) 50Q	(4) 75Q	(5) 90Q
igscm (*t* − 2)	0.0062	0.0017	0.0008	−0.0039	0.0125
	(0.0197)	(0.0081)	(0.0055)	(0.0073)	(0.0126)
egscm (*t* − 2)	−0.0245	−0.0207**	−0.0218***	−0.0220	−0.0467**
	(0.0312)	(0.0091)	(0.0063)	(0.0152)	(0.0182)
gpc (*t* − 2)	0.0047	−0.0002	0.0060	0.0095	0.0236*
	(0.0197)	(0.0076)	(0.0054)	(0.0078)	(0.0143)
emit (*t* − 2)	−0.0355*	−0.0233**	−0.0132**	−0.0191**	−0.0381**
	(0.0187)	(0.0107)	(0.0055)	(0.0079)	(0.0159)
logR&Dintensity (*t* − 2)	1.9669***	1.8936***	1.9880***	2.0250***	1.8729***
	(0.1423)	(0.0475)	(0.0498)	(0.0454)	(0.0551)
logsale (*t* − 1)	0.4514***	0.4467***	0.4439***	0.4410***	0.4366***
	(0.0071)	(0.0030)	(0.0022)	(0.0032)	(0.0060)
logfirmage	−0.1726***	−0.1795***	−0.1886***	−0.2005***	−0.2044***
	(0.0113)	(0.0052)	(0.0032)	(0.0051)	(0.0086)
logslack	−0.0090	−0.0110	−0.0212**	−0.0202	−0.0113
	(0.0413)	(0.0105)	(0.0105)	(0.0159)	(0.0159)
Constant	−3.8486***	−3.7059***	−3.5984***	−3.4793***	−3.3435***
	(0.0955)	(0.0349)	(0.0265)	(0.0415)	(0.0650)
Observations	1058	1058	1058	1058	1058
Company FE	Yes	Yes	Yes	Yes	Yes
Pseudo *R2*	.720	.781	.815	.822	.804

*p < 0.1, **p < 0.05, and ***p < 0.01.

results and it takes time for these capabilities to generate growth returns for the company. As such, Hypothesis 1 is partially supported.

4.2 | External GSCM capabilities and firm growth

The impact of external GSCM capabilities on firms' sales growth is insignificant in some quantiles and significantly negative in other quantiles as reported in Table 4. In addition, from Tables 4 to 6, we can observe that the effect of external GSCM capabilities on sales growth remains significantly negative for most quantiles over time. Despite the great emphasis in the literature on the requirement for firms to develop SODC specifically to engage with their external supply chain partners, our findings suggest there are significant performance-related penalties associated with these relational capabilities.

4.3 | Green political capabilities and firm growth

The green political capabilities variable exerts a strong positive impact on firm growth at middle and upper growth quantiles in Table 4 where explanatory variables are 1-year lagged. In other words, green political capabilities appear to deliver more growth returns for firms in the upper quantiles of the growth distribution. A plausible explanation is that when high-growth firms engage in climate policy lobbying, they are more likely to gauge the attention of policymakers and benefit from these activities economically. Interestingly, the results in Tables 5 and 6 indicate that the positive link between green political capabilities and sales growth weakens year by year, revealing the short-term rather than a long-term impact of this variable.

The short-term effect of green political capabilities can be explained by the relatively short political cycles and the continuously changing policy agendas. Firms appear to receive immediate growth benefits from developing green political capabilities; however, the long-term viability of these benefits requires continuous investment and upgrading of these capabilities.

4.4 | Endogeneity analysis and robustness checks

The nature of climate actions at the firm level is likely to be affected by endogeneity between SODC and firm growth. In other words, although SODC may lead to growth, firms that enjoy growth (or even firms that anticipate that they will grow) may be better able to commit resources to build their SODC. Problems of endogeneity may be alleviated by allowing for time lags between variables and by controlling for the potentially confounding effects of time-invariant effects. In

TABLE 6 Fixed-effects quantile regression estimates for sustainability-oriented dynamic capabilities—Sales growth (3-year lag).

Variables	(1) 10Q	(2) 25Q	(3) 50Q	(4) 75Q	(5) 90Q
igscm (*t* − 3)	0.0238	0.0442***	0.0436***	0.0453***	0.0739***
	(0.0197)	(0.0085)	(0.0044)	(0.0070)	(0.0135)
egscm (*t* − 3)	−0.0468**	−0.0344***	−0.0331***	−0.0200***	−0.0064
	(0.0214)	(0.0118)	(0.0043)	(0.0077)	(0.0267)
gpc (*t* − 3)	−0.0126	−0.0133	−0.0030	0.0142**	−0.0157
	(0.0209)	(0.0088)	(0.0046)	(0.0071)	(0.0151)
emit (*t* − 3)	0.0158	0.0034	−0.0014	−0.0103	−0.0102
	(0.0228)	(0.0100)	(0.0043)	(0.0081)	(0.0145)
logR&Dintensity (*t* − 3)	1.2238***	1.2872***	1.3431***	1.4732***	1.4814***
	(0.1384)	(0.0645)	(0.0493)	(0.0558)	(0.0635)
logsale (*t* − 1)	0.5679***	0.5656***	0.5598***	0.5552***	0.5543***
	(0.0088)	(0.0037)	(0.0018)	(0.0031)	(0.0066)
logfirmage	−0.2874***	−0.3040***	−0.3067***	−0.3146***	−0.3295***
	(0.0128)	(0.0053)	(0.0021)	(0.0057)	(0.0091)
logslack	0.0242	−0.0038	−0.0120	−0.0186	−0.0236
	(0.0363)	(0.0150)	(0.0088)	(0.0115)	(0.0190)
Constant	−4.5258***	−4.3784***	−4.2709***	−4.1733***	−4.0679***
	(0.0997)	(0.0426)	(0.0210)	(0.0392)	(0.0732)
Observations	859	859	859	859	859
Company FE	Yes	Yes	Yes	Yes	Yes
Pseudo *R2*	.793	.843	.869	.875	.861

*p < 0.1, **p < 0.05, and ***p < 0.01.

this study, we lagged 2 and 3 years for variables to address reverse causality in quantile regression.

Panel quantile regressions generate robust estimates, especially for misspecification errors associated with nonnormality and the existence of outliers (Gerged, 2021; Lin et al., 2021). We also have done a robustness check by applying employment growth as dependent variable. Tables 7–9 show that the results are roughly similar.

5 | DISCUSSIONS AND CONCLUSIONS

This study explores the implications of different sustainability-oriented dynamic capabilities (SODC) for firm growth in the context of 277 US public companies between the years 2010 and 2020. The natural-resource-based view (NRBV) literature leverages insights on dynamic capabilities to identify a range of SODC under different categories such as environmental management capabilities, environmental innovation capabilities, environmental self-regulation capabilities and environmental market sensing capabilities (Buzzao & Rizzi, 2020; Dangelico et al., 2017; Demirel & Kesidou, 2019). The impact of these SODC on firms' environmental performance is widely reported in studies; while only a small proportion of the literature examines the relationship between SODC and firms' economic performance.

In this paper, we evaluate the impact of (1) *green supply chain management* (*GSCM*) capabilities and (2) *green political* capabilities on the growth of firms. The findings showcase the varying implications of different SODC on firm growth along the full range of firm growth quantiles and the different time scales over which these last.

First, the results show that internal GSCM capabilities exert a positive effect on the growth of firms across all quantiles, albeit with a time lag. This aligns with the literature that emphasizes the necessity of in-house environmental management and environmental innovation capabilities for firms to simultaneously improve their environmental and economic performance (Colombelli et al., 2015; Demirel & Danisman, 2019; Jové-Llopis & Segarra-Blasco, 2018). Additionally, these findings indicate the performance benefits of firms that can tackle their direct (i.e., Scope 1) emissions that originate in the company and can be controlled by the company. The external GSCM capabilities, however, are found to have an insignificant effect on some of the firm-growth quantiles and even negative effects on others. This suggests a trade-off between the external GSCM activities of firms and their growth. Engaging with external organizations involves a costly and comprehensive approach to reduce the environmental impact of production that goes beyond the firm boundaries. Therefore, recouping performance benefits from efforts that surpass the firm boundaries can be challenging, resulting in losses for the firm

TABLE 7 Fixed-effects quantile regression estimates for sustainability-oriented dynamic capabilities—Employment growth (1-year lag).

Variables	(1) 10Q	(2) 25Q	(3) 50Q	(4) 75Q	(5) 90Q
igscm (*t* − 1)	−0.0163	−0.0120*	−0.0115***	−0.0087	−0.0265
	(0.0118)	(0.0071)	(0.0039)	(0.0058)	(0.0188)
egscm (*t* − 1)	−0.0035	0.0109	0.0096*	0.0076	0.0043
	(0.0144)	(0.0114)	(0.0057)	(0.0069)	(0.0147)
gpc (*t* − 1)	0.0257**	0.0081	0.0087**	0.0075	0.0140
	(0.0116)	(0.0068)	(0.0039)	(0.0058)	(0.0133)
emit (*t* − 1)	−0.0056	−0.0135**	−0.0181***	−0.0191***	−0.0425***
	(0.0120)	(0.0065)	(0.0039)	(0.0062)	(0.0127)
logR&Dintensity (*t* − 1)	0.3462***	0.2423***	0.2415***	0.2641***	0.0509
	(0.0559)	(0.0421)	(0.0283)	(0.0376)	(0.0550)
logemp (*t* − 1)	0.3482***	0.3393***	0.3353***	0.3337***	0.3279***
	(0.0055)	(0.0028)	(0.0016)	(0.0025)	(0.0043)
logfirmage	−0.0086	−0.0098**	−0.0103***	−0.0165***	−0.0244***
	(0.0072)	(0.0039)	(0.0022)	(0.0038)	(0.0077)
logslack	0.0361***	0.0363***	0.0351***	0.0352***	0.0433***
	(0.0052)	(0.0025)	(0.0021)	(0.0033)	(0.0073)
Constant	−1.3699***	−1.2714***	−1.2080***	−1.1407***	−1.0110***
	(0.0353)	(0.0205)	(0.0113)	(0.0181)	(0.0395)
Observations	1275	1275	1275	1275	1275
Company FE	Yes	Yes	Yes	Yes	Yes
Pseudo *R2*	.645	.732	.776	.759	.697

*$p < 0.1$, **$p < 0.05$, and ***$p < 0.01$.

in the short to medium term. This explains the reluctance of firms to address their Scopes 2 and 3 emissions (i.e., emissions where the firm is indirectly responsible due to activities up and down its supply chain). When dealing with Scopes 2 and 3 emissions, the required engagement and collaboration with supply chain partners comes at a cost that may be hard to recover (Patchell, 2018). Finally, the findings indicate that green political capabilities exert a positive short-term effect on firm growth, and this only applies to fast-growing firms. This finding is in tandem with prior literature that highlights the positive performance returns to firms' political capabilities (Yim et al., 2017), extending it to the case of green political capabilities. As highlighted by Grey (2018), firms' green political capabilities might be an important driver of competitive advantage when significant green investments are underway.

5.1 | Theoretical contributions

The study makes two theoretical contributions to the (1) NRBV literature on SODC (Capasso et al., 2019; Dangelico & Pontrandolfo, 2015; Demirel & Kesidou, 2019; Fernandes et al., 2021; Miroshnychenko et al., 2017) and (2) to the GSCM literature (Geng et al., 2017; Paulraj et al., 2015; Zhu et al., 2013). First, building on the political economy literature, we introduce green political capabilities as an important element of firms' SODC composition. The literature on environmental innovation and performance has long recognized the important influence of the regulatory environment in shaping firm decisions related to sustainability (Horbach, 2008; Porter & Van der Linde, 1995). However, firms' efforts and ability to shape their regulatory environment are rarely considered in sustainability studies despite the growing levels of engagement between industry and policymakers through lobbying and public relations campaigns (Brulle, 2018). By including green political capabilities as part of the SODC, we emphasize the need to better understand how firms actively manipulate their environmental policy landscape to gain advantage in relation to their climate change strategies.

Second, the study distinguishes between internal and external GSCM capabilities to show that these two SODC originating from the same domain have different implications for firm performance. Achieving the net-zero emissions are only feasible through integrating firms' internal and external supply chain management capabilities to address the environmental impact of production holistically (Zhu et al., 2013). While internal GSCM are shown to already return performance benefits to firms according to the results, it is important to understand the factors that inhibit external GSCM capabilities to improve firm performance. GSCM scholars have emphasized that the main challenges in implementing a holistic GSCM include gaining the support of senior management, poor supplier commitment, resistance

TABLE 8 Fixed-effects quantile regression estimates for sustainability-oriented dynamic capabilities—Employment growth (2-year lag).

Variables	(1) 10Q	(2) 25Q	(3) 50Q	(4) 75Q	(5) 90Q
igscm (*t* − 2)	−0.0051	0.0057	0.0061*	0.0138*	0.0029
	(0.0127)	(0.0077)	(0.0036)	(0.0072)	(0.0171)
egscm (*t* − 2)	−0.0002	−0.0074	−0.0000	0.0024	0.0240
	(0.0162)	(0.0106)	(0.0044)	(0.0092)	(0.0209)
gpc (*t* − 2)	0.0259**	0.0168**	0.0228***	0.0201***	0.0018
	(0.0130)	(0.0078)	(0.0038)	(0.0068)	(0.0142)
emit (*t* − 2)	0.0045	0.0033	−0.0071*	−0.0097	−0.0086
	(0.0135)	(0.0078)	(0.0037)	(0.0070)	(0.0147)
logR&Dintensity (*t* − 2)	1.4634***	1.4207***	1.4099***	1.4729***	1.2503***
	(0.0598)	(0.0567)	(0.0315)	(0.0433)	(0.0899)
logemp (*t* − 1)	0.3615***	0.3549***	0.3494***	0.3458***	0.3389***
	(0.0060)	(0.0032)	(0.0015)	(0.0030)	(0.0057)
logfirmage	0.0321***	0.0216***	0.0205***	0.0126***	−0.0026
	(0.0083)	(0.0046)	(0.0022)	(0.0048)	(0.0095)
logslack	0.0478***	0.0401***	0.0461***	0.0436***	0.0462***
	(0.0035)	(0.0043)	(0.0010)	(0.0038)	(0.0102)
Constant	−1.6608***	−1.5243***	−1.4739***	−1.3997***	−1.2510***
	(0.0402)	(0.0234)	(0.0104)	(0.0233)	(0.0480)
Observations	1050	1050	1050	1050	1050
Company FE	Yes	Yes	Yes	Yes	Yes
Pseudo *R2*	.657	.739	.780	.763	.694

*$p < 0.1$, **$p < 0.05$, and ***$p < 0.01$.

to the implementation of advanced supply chain technologies and large costs (Dube & Gawande, 2016; Tseng et al., 2019). Efforts diverted to overcoming these challenges could help firms strengthen their external GSCM capabilities and consequently reap growth benefits from their efforts to reduce the environmental impact of their supply chains.

5.2 | Managerial implications

The findings have important implications for firms and managers who are looking for ways to grow firm capabilities to tackle climate change, comply with the increasingly stringent environmental regulations and eventually become net-zero emitters. Our findings indicate that actively engaging with policymakers to shape the environmental policy agenda and developing internal GSCM capabilities (such as eco-design, eco-innovation and environmental management) can be effective ways for firms to couple environmental and economic benefits. On the other hand, given the negative growth implications of external GSCM capabilities, firms may consider how best to approach their supply chains to ensure that their sustainability efforts jointly improve environmental and economic performance. The literature recommends commitment from top management, close and long-term engagements with suppliers and leveraging the potential of advanced technologies (e.g., big data analytics and blockchain technologies) to grow strong external GSCM that have a higher potential to drive economic and environmental benefits simultaneously.

5.3 | Limitations and future research

This study presents some limitations that can be addressed in future studies. First, the sample of firms used in this study is limited to firms that responded to the CDP questionnaire, potentially oversampling the environmentally proactive firms. Similarly, the COMPUSTAT database inherently leads to oversampling for large firms, not covering the case of SMEs that account for more than 90% percentage of economic activity (OECD, 2019). Second, we employ variables formed from the CDP questionnaire as proxies for independent variables. These self-reported statements are prone to social desirability bias, which occurs when businesses strive to portray a more positive picture than is actually true (Dahlmann & Roehrich, 2019). Additionally, many independent variables are set as binary variables instead of numerical values due to survey design, which might mask the more sophisticated effects of these factors on firm growth. Future studies could employ more representative samples and more precise estimates from secondary sources using measurements such as green patents (Ren et al., 2020). Additionally, firms' political connections and

TABLE 9 Fixed-effects quantile regression estimates for sustainability-oriented dynamic capabilities—Employment growth (3-year lag).

Variables	(1) 10Q	(2) 25Q	(3) 50Q	(4) 75Q	(5) 90Q
igscm (*t* − 3)	0.0376***	0.0394***	0.0366***	0.0449***	0.0663***
	(0.0066)	(0.0077)	(0.0038)	(0.0074)	(0.0172)
egscm (*t* − 3)	−0.0581***	−0.0438***	−0.0360***	−0.0209**	−0.0081
	(0.0210)	(0.0090)	(0.0042)	(0.0088)	(0.0206)
gpc (*t* − 3)	0.0390***	0.0271***	0.0381***	0.0311***	0.0237
	(0.0119)	(0.0075)	(0.0040)	(0.0072)	(0.0178)
emit (*t* − 3)	−0.0097	−0.0026	−0.0108***	−0.0129	−0.0181
	(0.0126)	(0.0076)	(0.0040)	(0.0079)	(0.0203)
logR&Dintensity (*t* − 3)	2.0393***	1.9182***	2.0005***	2.0780***	1.9703***
	(0.0479)	(0.0521)	(0.0492)	(0.0581)	(0.0848)
logemp (*t* − 1)	0.4738***	0.4710***	0.4651***	0.4625***	0.4537***
	(0.0034)	(0.0031)	(0.0016)	(0.0029)	(0.0084)
logfirmage	0.0366***	0.0307***	0.0342***	0.0317***	0.0153
	(0.0091)	(0.0044)	(0.0023)	(0.0043)	(0.0151)
logslack	0.0462***	0.0483***	0.0485***	0.0461***	0.0511***
	(0.0043)	(0.0038)	(0.0025)	(0.0044)	(0.0064)
Constant	−2.0829***	−2.0065***	−1.9713***	−1.9325***	−1.7982***
	(0.0463)	(0.0215)	(0.0118)	(0.0213)	(0.0672)
Observations	854	854	854	854	854
Company FE	Yes	Yes	Yes	Yes	Yes
Pseudo *R2*	.739	.807	.837	.824	.774

**p* < 0.1, ***p* < 0.05, and ****p* < 0.01.

policy engagement activities in the context of climate change legislations deserve close investigation as regulations are expected to tighten in this area and firms are likely to increase their environmental lobbying efforts (Faccio et al., 2006).

ACKNOWLEDGEMENTS

The authors are grateful to Alex Coad for advice on methods and to the attendees of DRUID Conference (2022) for helpful suggestions. All errors remain ours.

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How to cite this article: Yi, Y., & Demirel, P. (2023). The impact of sustainability-oriented dynamic capabilities on firm growth: Investigating the green supply chain management and green political capabilities. *Business Strategy and the Environment*, 1–16. https://doi.org/10.1002/bse.3453