

Political influence and firms' perception in the framework of transition risk: evidence from a survey of EU enterprises

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Abstract

Purpose – This study investigates how political influence and regulatory uncertainty affect firms' perceptions of environmental regulations as obstacles within the European Union (EU). It focuses on the role of transition risks in shaping business behavior amid well-defined environmental objectives.

Design/methodology/approach – The analysis draws on data from the 2019 World Bank Enterprise Survey, which includes a dedicated Green Economy module. The final dataset covers 4,366 enterprises across 10 EU countries. The study employs a logistic regression framework with Bayesian Model Averaging (BMA) for variable selection and robustness checks through instrumental variable (IV) estimation.

Findings – Results show that firms perceiving environmental regulations as obstacles are also more likely to report the use of political influence (e.g. informal payments or gifts). This relationship is particularly strong among large and manufacturing firms. Furthermore, regulatory uncertainty – particularly among small firms – is a significant driver of perceived regulatory burden. Firms complying with environmental policies through monitoring rather than strategic targets also report higher perceived obstacles.

Practical implications – The findings suggest that policy uncertainty and political dynamics play a critical role in shaping firms' compliance behavior. Policymakers should consider these dimensions when designing environmental regulations and supporting mechanisms to ensure policy effectiveness and credibility.

Originality/value – This paper contributes to the literature by examining the intersection of political influence, regulatory uncertainty, and environmental compliance in a high-income regional context. It highlights that even in the EU, where climate goals are clearly established, transition risks remain a substantial concern for enterprises.

Keywords Environmental policy, Political influence, Transition risk

Paper type Research article

1. Introduction

The EU Climate and Energy Framework outlines a pathway for reducing greenhouse gas emissions by at least 55% from 1990 levels, promoting more sustainable production and consumption. These targets are to be achieved by strengthening policies across energy, climate, transport, and environmental taxation. The effectiveness of such frameworks plays a critical role in shaping ecological outcomes (Ivanova, 2011).

JEL Classification — Q50, Q58, D73

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Enterprises are central to this transition but face growing challenges due to both physical climate risks and *transition risks*—uncertainties related to climate policies, technological shifts, and evolving consumer preferences (NGFS, 2020; Semieniuk *et al.*, 2021). Transition risks affect firms through rising compliance costs, competitiveness shifts driven by low-carbon innovation, and changing demand patterns—particularly for high-carbon sectors. These risks increase operational costs and investment uncertainty. Anticipation of regulatory changes can heighten uncertainty, affecting business confidence (Helm *et al.*, 2003). Despite the EU’s clear environmental ambitions, firms may exert political influence or engage in lobbying to ease regulatory burdens (Green *et al.*, 2022; Palmer *et al.*, 2022), potentially distorting environmental policymaking (Damania, 2002).

Political influence is particularly relevant in the shift to sustainable systems like the bioeconomy. Alongside market and technological barriers, lobbying and institutional quality significantly affect policy implementation (Palmer *et al.*, 2022; Barra and Falcone, 2023). As major stakeholders, businesses must align with and support credible environmental regulations to ensure policy success (Grey, 2018).

This study investigates how firms’ perceptions of their political influence affect their views on environmental regulations as barriers. While political connections may reduce perceived burdens, transition risks—particularly policy uncertainty—may heighten the perception that environmental regulations obstruct business operations. The European Union provides an ideal setting for this analysis, as it combines ambitious environmental goals with significant transition risks, highlighting the tangible challenges enterprises face even in a clear regulatory environment.

This paper explores two key research questions: To what extent does political influence shape firms’ perceptions of environmental regulations as obstacles? Does transition risk contribute to these perceptions?

To test these hypotheses, the analysis leverages a dataset of EU enterprises from the 2019 World Bank Enterprise Survey. This survey includes a dedicated Green Economy module, which collects information on firms’ implementation of environmental measures and the obstacles they face in tackling climate change and complying with EU-level objectives. We analyze whether political influence—via informal payments, gifts, or political ties—correlates with how firms perceive regulatory burdens, and whether policy uncertainty plays a significant role. The paper proceeds as follows: Section 2 reviews literature on political influence, environmental regulation, and policy uncertainty. Section 3 outlines the data. Section 4 describes the methodology. Section 5 presents and discusses the findings. Section 6 concludes with policy implications.

Our results reveal a significant link between firms’ use of political influence and their perception of environmental regulations as burdensome—particularly in heavily regulated sectors like manufacturing. Even in the EU’s structured regulatory setting, policy uncertainty remains a critical concern. These findings offer new insights into the intersection of political economy and environmental governance, emphasizing the need to address firm-level perceptions to support effective and inclusive environmental policy.

2. Literature review

2.1 Environmental regulations and firms’ perception

<<Regulation is a dynamic force that shapes business performance>> (Kitching *et al.*, 2015). It affects firms directly by imposing compliance costs and altering market dynamics, and indirectly through its impact on stakeholders (Vershina *et al.*, 2014). Firms’ perceptions of regulatory burden can influence how these effects manifest.

The impact of environmental regulations on firm performance depends on internal factors, such as firm size and managerial attitudes and external factors, including policy design and uncertainty (Aragón-Correa *et al.*, 2020). Well-crafted regulations can spur innovation and competitiveness (Porter and van der Linde, 1995; Ramanathan *et al.*, 2017; Li *et al.*, 2024), and

more stringent environmental rules have been linked to growth in manufacturing firms (Ullah and Mazhar, 2024). However, overlapping regulations and bureaucratic inconsistencies can create uncertainty in business planning, confusion, and managerial resistance (Dahlmann *et al.*, 2008).

At the same time, environmental regulations may impose costs that crowd out investment and innovation (e.g. *compliance cost effect*) (Song *et al.*, 2021). Resource-constrained firms often respond by combining innovation with political influence to mitigate these burdens (Oliver and Holzinger, 2008).

2.2 Political influence and environmental regulation

Environmental regulations often have distributional consequences. Politicians may exploit this by allocating permits or granting regulatory favors, enabling firms to benefit through formal ties or corruption (Faccio, 2006; Mauro, 1995; Kopas *et al.*, 2022). Corruption, in turn, can weaken environmental standards and worsen degradation (Sinha *et al.*, 2019; Zakharov, 2019; Tacconi and Williams, 2020), though its effects may be tempered in politically stable environments (Fredriksson and Svensson, 2003).

Political connections can either deter or promote environmental action. While they may reduce compliance and delay green investments (Gullberg, 2008; Palmer *et al.*, 2022), institutional pressure can push politically connected firms toward better environmental performance (Nguyen *et al.*, 2022; Wu *et al.*, 2022), especially in high-quality institutional contexts.

Higher levels of corruption are generally associated with weaker institutions and laxer environmental policy (Pellegrini and Gerlagh, 2006; Dincer and Fredriksson, 2018). In the EU, however, perceived national corruption can enhance trust in supranational institutions, a phenomenon described by the compensation hypothesis (Sánchez-Cuenca, 2000; Bauhr and Charron, 2020).

EU policymaking, being technocratic and less influenced by national constituencies, often limits the power of EU-wide and national interest groups (Michalowitz, 2007). In this context, national interest groups are most effective when their demands are technical rather than political. They may influence EU policy either through alignment with national governments (the *national route*) or by engaging directly via EU-level associations (the *EU route*) (Callanan, 2011). Business groups typically have more resources and access (Dür and Mateo, 2012), but non-business groups often align more closely with EU values and can be more successful (Dür *et al.*, 2015; Berkhout *et al.*, 2017).

Political influence can reduce perceived regulatory burdens. However, in multi-level governance systems like the EU, firms may perceive national and EU political contexts differently, leading to mixed effects.

- H1. Political influence shapes firms' perceptions of environmental regulations and their impact on operations.

2.3 Environmental policy uncertainty and firms' behavior

Environmental policy uncertainty arises from both the content of regulations and their enforcement (Li *et al.*, 2022). Elevated uncertainty undermines business confidence and investment (Montes and Nogueira, 2021), and increases firms' incentives to engage in lobbying (Engau and Hoffmann, 2009). Studies show that climate policy uncertainty discourages firms from assuming environmental responsibilities and hampers green innovation (Huang *et al.*, 2023; Sun *et al.*, 2024). Similar effects are observed in other domains, such as trade, where policy uncertainty reduces firms' environmental performance (Song *et al.*, 2023).

Uncertainty particularly constrains long-term green investments, including R&D in high-emission industries (Hu *et al.*, 2023; Hoang, 2022), while clarity around climate policy

enhances financial system stability (Gaies, 2024; Kapetanakis *et al.*, 2025). Although sustainability-oriented investments may not always yield immediate returns, they are often driven by regulatory and political pressures (Mamalyga, 2017). Firms may also respond to uncertainty through lobbying, individually or collectively, to influence outcomes (Saha *et al.*, 2023).

Transition risk, uncertainty about evolving regulatory frameworks, increases compliance costs and reinforces the perception of environmental regulation as a barrier.

H2. Regulatory uncertainty (e.g. transition risk) influences firms' perceptions of environmental regulation.

This review shows that while political influence can lead to more favorable regulatory outcomes, uncertainty, particularly in developing contexts, negatively affects firms' environmental performance. This study advances the literature by jointly examining the effects of political influence and regulatory uncertainty on firms' perceptions of environmental policy. Unlike prior research focused mainly on emerging economies, it analyzes EU enterprises, showing that transition risk persists even within established regulatory environments. By incorporating firm size and sectoral heterogeneity, the study highlights how these dynamics shape perceived regulatory burdens.

3. Materials and methods

3.1 Data

The primary data source for this study is the World Bank Enterprise Survey Datasets (World Bank, 2019a). For this study, a subset of European Union (EU) countries was selected: Croatia, Cyprus, Estonia, Italy, Lithuania, Poland, Portugal, Romania, the Slovak Republic, and Slovenia. These were the only EU countries surveyed during the 2019 wave. The selected sample thus focuses on Southern and Eastern European countries and could not be extended to other EU Member States due to data availability constraints. The data are stratified by sector of activity, in line with each country's Gross National Income. The final sample includes firms from EU countries only, covering the manufacturing sector, retail services, and other service activities (World Bank, 2019b). After merging and cleaning the data, the final dataset comprises 4,366 companies of varying sizes (small, medium, large) and sectors (manufacturing and non-manufacturing). More information on the dataset can be found in the Online Appendix.

3.1.1 Dependent variable. As a dependent variable, the question was: "To what degree is each of the following an obstacle to the current operations of this establishment?" Respondents were asked to rank each obstacle from least to most impactful. This question also included an item on environmental regulations. The answers followed a five-level Likert scale, with a score of 0 if the respondent did not think environmental regulations were an obstacle, and 5 if they were a significant obstacle. Due to the skewness in the distribution of this item, the Likert scale was transformed into a dichotomous variable: it takes a value of 0 if the company does not perceive environmental regulation as an obstacle, and 1 otherwise. Table A1 of the Online Appendix shows the distribution of the answers.

3.1.2 Main explanatory variables. The explanatory variable capturing the dimension of corruption was derived from the question: "It is often said that firms make gifts or informal payments to public officials to gain advantages in drafting laws, decrees, regulations, or other binding government decisions. Using the scale in the show card, please tell me to what extent have the following practices had a direct impact on this establishment?" The interviewer shows a card with a scale from 1 to 5, and respondents rank each answer from least impactful to most impactful for day-to-day operations. The item used was: "Payments, gifts, or exchange of favors with national government officials to affect the content of government decrees." For the same reason as the dependent variable, this Likert scale scores 0 if respondents think there is no impact, and 5 if payments/informal gifts exert a significant impact. The variable used for the

analysis takes a value of 0 if the company does not think informal gifts/payments impact the day-to-day operations of the establishment, and 1 otherwise (see [Table A1 in the Online Appendix](#) for the distribution of the answers).

The variable on political connection was selected following [Song et al. \(2022\)](#) from the question: “*Has the owner, CEO, top manager, or any of the board members of this firm ever been elected or appointed to a political position in this country?*” This variable takes the value of 0 if no manager is elected or appointed to a political position and 1 otherwise (see [Table A1](#)). A significant coefficient for one or both variables would prove [H1](#). If the coefficients show a positive sign, political influence is associated with the perception of environmental policy as an obstacle. Firms that think informal payments and gifts impact business operations, or politically connected firms, also tend to view environmental regulations as an obstacle. A negative sign would imply that political influence might be effective in reducing the perception of environmental regulations as an obstacle. This would suggest that political influence effectively mitigates the adverse consequences of tighter environmental regulations on firms.

To capture the dimension of uncertainty influencing the perception of environmental regulation, respondents were asked: “What is the main reason no measure was adopted?” when inquiring whether they had adopted any measures to improve energy efficiency. Among the items listed were reasons such as lack of funding, high operational or technical risk, and prioritization of investments. Two items specifically asked if no measures were adopted due to uncertainty over price or regulations. Firms might perceive environmental regulation as an obstacle due to an uncertain regulatory framework (e.g. transition risk). Thus, uncertainty over the regulatory framework may be another factor influencing the perception of environmental regulation.

3.1.3 Control variables. Besides the main explanatory variables, the analysis includes two sets of control variables. The first set aims to profile the enterprise in terms of its compliance (or lack thereof) with environmental standards, exposure to physical risk, adoption of measures related to environmental compliance, and environmental management ([Table A2 of the Online Appendix](#)). Specifically, the set of questions labeled as *Targets* asks respondents whether the establishment has implemented any targets or strategic objectives for energy consumption, emissions, or environmental management in general. Positive and significant coefficients for any of these items would indicate that the establishment sets its own environmental targets. Setting targets to comply with environmental regulations suggests that the enterprise considers environmental issues among its strategic objectives, which should reduce the perception of regulations as an obstacle to day-to-day operations. In contrast, the *Obligations* set includes questions about whether the establishment is subject to monitoring or taxes on emissions or energy consumption. These obligations may come from stakeholders and could influence the enterprise’s operations. Positive and significant coefficients for these items would suggest that the establishment is subject to environmental monitoring or obligations. Compliance through obligations (e.g. monitoring CO2 emissions, energy consumption, being subject to energy taxes) signals that the enterprise is bound to comply with regulations. Ideally, firms that comply more through obligations rather than targets are more likely to perceive environmental regulations as an obstacle.

Exposure to physical risk is related to the adaptation side of climate change. Firms that have experienced asset deterioration due to climate change are more likely to believe that environmental regulations are necessary to mitigate these effects. Managers who are appointed to address climate change or environmental issues signal that these concerns are already integrated into the enterprise’s decision-making. Thus, this set of questions is expected to have a negative correlation with the perception of environmental regulations as an obstacle ([Table A2 in the Online Appendix](#)).

Further control variables relate to firms’ characteristics, such as size (e.g. number of employees), sector, and funding sources for day-to-day operations ([Table A2 in the Online Appendix](#)). The variable for funding sources takes a value of 0 if most day-to-day operations

are funded through the enterprise's own resources, capturing the firm's exposure to external debt. Other controls in this block address whether the enterprise holds an international certification or has implemented a set of Key Performance Indicators (KPIs). Two questions ask if the establishment has a manager appointed for environmental and climate change issues and whether this manager's performance is evaluated against compliance with environmental standards.

Another set of controls pertains to innovation and innovative capabilities, measured through patents, the introduction of (product and process) innovations, and the amount of R&D expenditure (Table A2 of the Online Appendix). A significant body of research connects a firm's propensity to innovate with compliance to environmental regulations through innovation (e.g. Porter Hypothesis) (Barbieri et al., 2016).

The final set of controls relates to the institutional context, specifically the quality of government and environmental governance at the national level (Table A3 of the Online Appendix). To capture the first aspect, the European Quality of Governmental Institutions Index (EQI) was included to measure the overall quality of institutions. The 2017 version of the index, as computed by Charron et al. (2019), is based on a survey of all 28 EU countries and an estimation of various indicators. The EQI is built on a framework that defines the quality of government as "a multi-dimensional concept consisting of high impartiality and quality of public service delivery, along with low corruption" (Charron et al., 2019). Since no EQI data were available for 2019, the data from 2017 were used. A higher index value indicates higher institutional quality. The EQI index was computed at the country level to standardize the sample. To capture environmental stringency, the Environmental Performance Index (EPI), computed by Yale University, was included. The EPI ranks countries based on 24 performance indicators across 10 dimensions: air quality, water and sanitation, heavy metals, biodiversity and habitat, forests, fisheries, climate and energy, air pollution, water resources, and agriculture. A higher EPI score indicates better environmental performance in these areas. The final control for the institutional framework is based on a question from the survey asking, "From the perspective of this establishment, for the next three years, which one of the following areas of public spending should be the highest priority?" The items related to Environment and Energy were selected as relevant policy areas for this analysis. A positive and significant coefficient for one or both of these variables would suggest that companies perceiving environmental regulation as an obstacle also believe that more public spending should be directed toward these areas.

3.2 Econometric model

Equation (1) shows the baseline model for the i enterprise:

$$\begin{aligned} Envreg_i = & \beta_0 + \beta_1 Payments/Gifts_i + \beta_2 Polconnection_i + \beta_4 Obstacles_i + \beta_5 Targerts_i \\ & + \beta_6 Obligations_i + \beta_7 Institutions_i + \beta_5 Controls_i + \alpha_i + \varepsilon_i \end{aligned} \quad (1)$$

$Envreg$ is the dependent variable, taking value 0 if the enterprise does not perceive environmental regulation as an obstacle, and 1 otherwise. $Payments/Gifts$ is the variable constructed to capture the perception of corruption, taking value 1 if the company perceives informal gifts/payments to an official may somehow influence day-to-day operations. $Polconnection$ takes value 1 if the CEO/manager/board component has been elected or appointed to a political position. A significance of one or both coefficients variable would prove H1. $Obstacles$ is the variable taken from the question "What is the main reason no measure was adopted?". On the other hand, positive and significant coefficient between the items of this question related to uncertainty (over regulatory framework or prices) would prove H2. Considering the nature of the dependent variable, the empirical strategy is carried out in a logistic framework with country fixed-effect.

3.2.1 Bayesian model averaging. The high number of covariates (29) allows for using a model averaging technique to pick out the most suitable model for the analysis. Model averaging, carried out in a Bayesian framework, will deal with the uncertainty of the model related to variable selection. For the sake of this work model averaging is used to select among the numerous variables which one could better describe the relationship subject of analysis. Bayesian averaging overcomes the most common pitfalls related to standard hypothesis testing (Raftery, 1995). BMA results highly depend on the hyperparameters used for the estimation. In this empirical framework [1] the prior is set to $\frac{1^K}{K}$ for all the models where K is the total number of variables included in the analysis. The choice of this prior is considered weak (Box and Tiao, 2011) as it does not provide any more information giving equal likelihood to all the models. Furthermore, setting equal prior impact the posterior probability only slightly giving more significance to the likelihood function. Those characteristic makes it suitable to allow data-driven inference. For the priors of the parameters, the BMA estimation used in this work employs BIC approximation which is roughly equal to the unit information prior (UIP) (Amini and Parameter, 2011). More details on BMA applied in this work can be found in the Online Appendix.

When examining the relationship between environmental regulation, corruption, and policy uncertainty, the risk of endogeneity must be carefully considered. Endogeneity may arise due to reverse causality—where, for instance, corruption influences the stringency of environmental regulations, or stricter regulations incentivize corrupt practices. Additionally, omitted variable bias may occur if unobserved factors such as institutional quality or economic development affect both the explanatory and dependent variables. Measurement error, particularly in indices of corruption and policy uncertainty, can further exacerbate endogeneity concerns. For this reason, the final step of the analysis involves an IV probit [2] on the final model as a robustness check. The estimation of the IV follows the two-step approach as described by Newey (1987). The IV also addresses endogeneity non-random measurement error (Rassen *et al.*, 2009).

4. Results and discussion

4.1 Correlations and model averaging

Table A5 in the Online Appendix presents the correlations among all variables used in the estimation. Before estimation, the model specified in Equation (1) underwent a model averaging process. All covariates were included in the model averaging estimation. Table 1 displays the Bayesian Model Averaging (BMA) results for the complete set of covariates. Based on this process, nine variables were retained from the initial set of 30. Notably, the political connection variable was excluded from the final model. The sole remaining variable from the *Obligations* category was CO2 monitoring. Other retained controls include size, sector, and financial exposure.

4.2 Baseline model

Table 2 presents the main results of estimating Equation (1) after model averaging. As corruption may influence uncertainty, the two variables of interest are analyzed separately. Column 1 includes *Payments/Gifts*, while Column 2 includes *Obstacles*. Country fixed effects were incorporated to control for country-specific factors. Tables 3 and 4 provide results for specifications by firm size and sector for the two explanatory variables.

The findings indicate that enterprises perceiving environmental regulations as an obstacle are also more likely to believe that payments and informal gifts to legislators influence their operations. This holds across all specifications. Regarding the uncertainty dimension, there is a positive and significant relationship between uncertainty about prices or regulations and the perception of environmental regulations as an obstacle, particularly among small enterprises (Tables 3 and 4).

Table 1. Results of BMA model averaging

		Dependent variable Environmental regulations			
		p! = 0	EV	SD	Model 1
Intercept		100	0.76727	0.165014	7.673e-01
Payments/gifts		100	1.94173	0.109447	1.942e+00
Political connection		0	0	0	
EPI		100	0.06094	0.006643	6.094e-02
EQI		100	0.34271	0.073718	3.43 E+02
Obstacles		100			
	No obstacle		-0.18625	0.145554	-1.862e-01
	Not a priority related to other investments		-0.36050	0.145063	-3.605e-01
	Not profitable		0.15472	0.214808	1.547e-01
	Operational and/or technical risk		-0.09691	0.274144	-9.691e-02
	Uncertainty about future prices		0.60742	0.269182	6.074e-01
	Uncertainty about regulations		0.51383	0.255548	5.138e-01
Energy target		0	0.000	0.000	
Climate objectives		0	0.000	0.000	
CO2 targets		0	0.000	0.000	
Climate responsible		0	0.000	0.000	
Energy consumption		0	0.000	0.000	
Energy taxes		0	0.000	0.000	
Energy standards		0	0.000	0.000	
CO2 monitoring		100	0.49410	0.128383	4.941e-01
Pollution control		0	0	0	
Public expenditures (environment)		100	0.43728	0.109830	4.373e-01
Public expenditures (energy)		0	0.000	0.000	
Water management		0	0.000	0.000	
Waste recycling and reduction		0	0.000	0.000	
Lock-in		0	0.000	0.000	
Physical risk		0	0.000	0.000	
Sector		100			
	Non-manufacturing		-0.37809	0.071063	-3.781e-01
Size		100			
	Medium		-0.24547	0.096402	-2.455e-01
	Small		-0.42529	0.093585	-4.253e-01
Certification		0	0.000	0.000	
KPI		0	0.000	0.000	
Innovation		0	0.000	0.000	
Patent		0	0.000	0.000	
R&D		0	0.000	0.000	
Financial exposure		100	0.35214	0.071385	3.521e-01
nVar			8		
BIC			-3.157e+04		
Post Prob			1		

Source(s): Authors' own work

In terms of compliance, firms monitoring CO₂ exhibit a positive and significant association with perceiving environmental regulations as an obstacle. Furthermore, enterprises advocating for increased public expenditure in environmental policy are more likely to perceive regulations in this area as obstacles.

Table 2. Results of probit estimation after model averaging

	Dependent variable Environmental regulations	
	(1)	(2)
Payment/Gifts	1.002*** (0.062)	
No Obstacle		-0.244*** (0.084)
Not a priority relative to other investments		-0.414*** (0.084)
Not profitable		0.170 (0.119)
Operational and/or technical risk		-0.208 (0.161)
Uncertainty about future prices		0.145 (0.151)
Uncertainty about regulation		0.174 (0.143)
CO2 monitoring	0.304*** (0.077)	0.329*** (0.076)
Public expenditure (environment)	0.236*** (0.066)	0.280*** (0.063)
Non-manufacturing	-0.128*** (0.045)	-0.090** (0.044)
Medium	-0.096 (0.058)	-0.091 (0.058)
Small	-0.277*** (0.057)	-0.246*** (0.056)
Financial exposure	0.151*** (0.044)	0.172*** (0.043)
Constant	-0.081 (0.084)	0.146 (0.112)
Country FE	Yes	Yes
Observations	4,366	4,366
Log Likelihood	-2371.933	-2478.715
Akaike Inf. Crit	4781.867	5005.430

Note(s): * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$
Source(s): Authors' own work

Other controls reveal that environmental regulations are more likely to be perceived as obstacles by large and manufacturing firms. Conversely, small enterprises and non-manufacturing firms exhibit negative associations with this perception (Table 2). Financial exposure is positively associated with the perception of environmental regulations as an obstacle, indicating that firms reliant on external debt are particularly sensitive to such challenges. For robustness check, Tables A6, A7 and A8 in the Online Appendix provide results for model specifications with different cutoffs for the dependent variables and using an ordered probit model.

Local regression results (Tables 3 and 4) confirm the robustness of signs and significance for relevant covariates, including CO₂ Monitoring, Financial Exposure, and Public Expenditure.

4.3 Robustness check: IV estimation

The final part of the analysis involves instrumental variable (IV) estimation. The IV for the *Payments/Gifts* variable is derived from the question: "It is said that establishments are

Table 3. Results of the probit estimation for sector and size (obstacle)

	Dependent variable Environmental regulations				
	Small	Medium	Large	Man	Non-man
No Obstacle	-0.296*** (0.112)	-0.226 (0.144)	-0.413* (0.215)	-0.360*** (0.116)	-0.110 (0.127)
Not a priority relative to other investments	-0.383*** (0.108)	-0.219 (0.147)	-0.605*** (0.223)	-0.477*** (0.117)	-0.328*** (0.124)
Not profitable	0.263 (0.163)	0.433** (0.195)	0.103 (0.294)	0.126 (0.167)	0.236 (0.173)
Operational and/or technical risk	0.036 (0.223)	0.265 (0.305)	-0.884*** (0.336)	-0.380* (0.215)	0.048 (0.246)
Uncertainty about future prices	0.471** (0.217)	0.217 (0.253)	0.010 (0.326)	0.318 (0.205)	-0.176 (0.242)
Uncertainty about regulation	0.353* (0.202)	0.262 (0.237)	-0.195 (0.324)	0.066 (0.194)	0.322 (0.216)
CO2 monitoring	0.683*** (0.173)	0.314** (0.122)	0.204* (0.110)	0.326*** (0.091)	0.349** (0.141)
Public expenditure (environment)	0.497*** (0.092)	0.371*** (0.106)	0.113 (0.125)	0.246*** (0.083)	0.331*** (0.100)
Non-manufacturing	-0.159*** (0.060)	-0.368*** (0.074)	-0.225** (0.089)		
Medium				-0.066 (0.073)	-0.159 (0.097)
Small				-0.280*** (0.075)	-0.251*** (0.089)
Financial exposure	0.343*** (0.062)	0.291*** (0.073)	0.273*** (0.084)	0.084 (0.059)	0.272*** (0.065)
Constant	0.316*** (0.108)	0.427*** (0.145)	0.842*** (0.218)	0.540*** (0.165)	-0.213 (0.156)
Country FE	Yes	Yes	Yes	Yes	Yes
Observations	1,942	1,368	1,056	2,431	1,935
Log Likelihood	-1238.456	-833.562	-608.719	-1317.849	-1141.567
Akaike Inf. Crit	2498.911	1689.123	1239.439	2681.697	2329.134

Note(s): * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source(s): Authors' own work

sometimes required to make gifts or informal payments to public officials to ‘get things done’ regarding customs, taxes, licenses, regulations, services, etc. On average, what percentage of total annual sales, or estimated total annual value, do establishments like this one pay in informal payments or gifts to public officials for this purpose?”

This variable captures the reported average payment amount, which might not directly relate to the respondent’s perception of these payments’ effects. Previous research (De Rosa et al., 2010; Ashyrow and Akuffo, 2020) suggests that firms may engage in such practices due to industry norms rather than their specific regulatory experiences. Experiences of the other firms in the same sector can influence their attitude toward corruption, especially bribes.

The IV for the *Obstacle* variable stems from the question: “In fiscal year [insert last complete fiscal year], for the main market in which this establishment sold its main product, how many competitors did this establishment’s main product face?” Respondents provided a count of competitors, with an option to select “Too many to count.” For analysis, “Too many to count” was coded as 10,000, higher than the maximum reported value of 5,000 [3]. Higher market competition may be correlated with general uncertainty, including regulatory uncertainty, but it is assumed to satisfy the exclusion restriction by affecting firms’ perceptions of environmental regulations only indirectly through this channel. Specifically,

Table 4. Results of the probit estimation for sector and size (payments/gifts)

	Dependent variable Environmental regulations				
	Small	Medium	Large	Man	Non-man
Payments/Gifts	1.194*** (0.081)	1.261*** (0.108)	0.838*** (0.114)	1.017*** (0.084)	0.998*** (0.093)
CO2 monitoring	0.661*** (0.179)	0.301** (0.124)	0.179* (0.108)	0.277*** (0.092)	0.361** (0.143)
Public expenditure (environment)	0.413*** (0.098)	0.285** (0.112)	0.019 (0.128)	0.176*** (0.086)	0.325*** (0.103)
Non-manufacturing	-0.168*** (0.062)	-0.336*** (0.076)	-0.215** (0.090)		
Medium				-0.067 (0.074)	-0.160 (0.098)
Small				-0.309*** (0.075)	-0.274*** (0.090)
Financial exposure	0.217*** (0.065)	0.255*** (0.075)	0.258*** (0.085)	0.043 (0.060)	0.277*** (0.066)
Constant	-0.114** (0.056)	0.082 (0.065)	0.280*** (0.076)	0.247* (0.127)	-0.406*** (0.112)
Country FE	Yes	Yes	Yes	Yes	Yes
Observations	1,942	1,368	1,056	2,431	1,935
Log Likelihood	-1143.441	-765.196	-590.074	-1260.944	-1095.392
Akaike Inf. Crit	2298.882	1542.392	1192.148	2557.888	2226.783

Note(s): * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Source(s): Authors' own work

competition should not have a direct causal effect on the endogenous variable, perceived regulatory obstacles, except through its impact on regulatory uncertainty. In other words, conditional on regulatory uncertainty, competition is exogenous to firms' perceptions of environmental regulation stringency and does not influence outcomes via alternative pathways such as lobbying power or compliance costs. This justifies the validity of competition as an instrumental variable under the assumption that the instrument affects the dependent variable solely through the endogenous regressor. Diagnostic tests for the IV approach are presented in [Tables A9 and A10 in the Online Appendix](#). Results from the two-stage least squares estimation are shown in [Tables 5 and 6](#), confirming the robustness of the primary findings even after instrumenting the variables.

4.4 Discussion

The results provide support for [H1](#): firms that believe informal payments or gifts influence daily operations are more likely to perceive environmental regulations as obstacles. This association is particularly strong among large and manufacturing firms, which are typically subject to more stringent EU regulations (e.g. ETS, Non-Financial Reporting Directive). While political influence is often assumed to reduce perceived regulatory burdens, this result may suggest that influence is directed more toward market advantages than regulatory leniency. Alternatively, firms may perceive political influence as more effective at the national level than at the EU level, where institutions are perceived as more robust. Furthermore, through influencing national governments, national interest groups can exert their influence towards EU institutions (e.g. *national route*).

[H2](#) is also supported: firms, especially smaller ones, exposed to greater policy or regulatory uncertainty are more likely to perceive environmental regulations as obstructive. The IV

Table 5. Results of the 2SLS procedure (payments/gifts)

	OLS Payments/Gifts		2-SLS Environmental regulations	
Medium	0.0158	(0.351)	-0.126*	(0.027)
Small	0.0284	(0.085)	-0.259***	(0.000)
Non-manufacturing	-0.00322	(0.805)	-0.195***	(0.000)
Public Expenditures (Environment)	0.135***	(0.000)	0.236***	(0.000)
Financial Exposure	0.0827***	(0.000)	0.207***	(0.000)
CO2 Monitoring	-0.00368	(0.862)	0.317***	(0.000)
Average amount paid Payments/Gifts	-0.0287***	(0.000)	1.155***	(0.000)
Constant	0.235***	(0.000)	0.144***	(0.000)
Country FE	Yes		Yes	
Observations	4,366		4,366	
R ²	0.14			
F	85.10			
df_m	8		8	
df_r	4,357			

Note(s): *p*-values in parentheses * *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

Source(s): Authors' own work

Table 6. Results of the 2SLS procedure (obstacle)

	OLS Uncertainty		2-SLS Environmental regulations	
Medium	0.0128	(0.085)	-0.328*	(0.027)
Small	0.00790	(0.273)	-0.387**	(0.005)
Non-manufacturing	-0.000502	(0.929)	-0.201*	(0.048)
Public expenditures (environment)	0.00113	(0.147)	0.104	(0.503)
Financial exposure	-0.0126	(0.175)	0.317**	(0.001)
CO2 monitoring	-0.0126	(0.453)	0.531***	(0.004)
Competition	0.00294***	(0.000)		
Uncertainty			16.67***	(0.000)
Constant	0.102***	(0.000)	-0.561***	(0.006)
Country FE	Yes		Yes	
Observations	3,294		3,294	
R ²	0.01			
F	2.875			
df_m	8		8	
df_r	3,195			

Note(s): *p*-values in parentheses * *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

Source(s): Authors' own work

estimates confirm the robustness of both H1 and H2, with consistent signs and statistical significance, strengthening the causal interpretation.

An additional finding shows that firms viewing environmental regulations as burdensome are also more likely to advocate for increased public spending in this area. This could reflect either a desire for more policy attention to environmental challenges or a call for compensatory subsidies to ease compliance costs. Future research could explore this further, especially in light of growing EU green investment programs.

Overall, the results underscore the importance of political influence and transition risk in shaping firms' perceptions of environmental regulation. While the cross-sectional nature of

5. Conclusions

This study examines how political influence and transition risk shape firms' perceptions of environmental regulations within the EU's environmental policy framework. The findings reveal that firms viewing environmental regulations as obstacles are also more likely to perceive political influence—particularly corruption—as a factor affecting their day-to-day operations. This association is especially strong among large and manufacturing firms, which face greater regulatory burdens.

Moreover, transition risk, defined by uncertainty in climate policy and pricing, emerges as a significant concern, particularly for small firms. These effects persist even when using instrumental variable techniques, indicating that policy uncertainty is not merely country-specific but reflects broader systemic issues across the EU. In response, policymakers should address transition risk through coordinated, forward-looking strategies. This includes mapping interconnections between climate risk and other systemic risks (e.g. economic, financial, technological), enhancing stakeholder cooperation, and addressing the unequal distribution of costs and benefits of the low-carbon transition (Collins *et al.*, 2021). Strengthening continuity in environmental policy by building on successful mitigation efforts and documenting best practices for instance, through an EU-wide databank could reduce regulatory uncertainty. Equally important is scenario planning for failures and recovery, improving institutional resilience (Collins *et al.*, 2021).

An additional insight is that firms perceiving environmental regulations as burdensome are also more likely to support increased environmental spending. This may reflect either the need for greater support in complying with regulations or a call for compensatory subsidies to alleviate regulatory costs.

While the results underscore a robust link between political influence, policy uncertainty, and firms' regulatory perceptions, some limitations remain. These include typical survey data challenges, sampling, coverage, nonresponse, and measurement errors (Stern *et al.*, 2014), and a geographically limited sample focused on selected Southern and Eastern EU countries. Future research should extend this analysis to other EU regions and institutional contexts to assess the generalizability of these findings.

Ultimately, this study highlights the importance of institutional quality and regulatory credibility in ensuring that environmental regulations are perceived not as obstacles but as enablers of sustainable transition.

Data availability

Data will be made available upon reasonable request.

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Notes

1. BMA estimation for generalized linear model has been performed with the *BMA* package from R <https://cran.r-project.org/web/packages/BMA/BMA.pdf>
2. The IV estimation in a logistic setting has been computed using the *ivprobit* package from Stata. For more information, see <https://www.stata.com/manuals/rivprobit.pdf>
3. In the analysis the variable has been used in its logarithmic form.

Supplementary material

The supplementary material for this article can be found online

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