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Financial constraints, investments, and environmental strategies: An empirical analysis of judicial barriers

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Abstract

This work analyzes the relation between the judicial system and financial constraints, investigating whether inefficiency in enforcing credit rights can amplify companies' difficulties in collecting resources on the capital market, limiting their access to the funds needed to support investments and environmental sustainability. Considering the Italian manufacturing industry and according to the selected insolvency procedures, our results suggest that, if the time necessary to settle cases decreases by 20%, we can expect an increase in the financial debt ratio between 0.92% and 5.08% and a decrease in the trade credit ratio between 0.81% and 2.71%, as well as an increase in investments between 0.46% and 3.22%. These results are robust under a variety of tests and support the hypothesis that judicial inefficiency represents a barrier to environmental sustainability, preventing investments in key technologies able to support green strategies, as well as the key role of trade dynamics as alternative funding strategy for their business. The economic implications of our evidence could be far-reaching for the whole economy, not only reducing the competitiveness and financial stability of the national system but also triggering a cascade effect on the market and undermining environmental strategies.

KEYWORDS

days payable outstanding, environmental strategies, financial constraints, financial debt, judicial inefficiency, legal system, manufacturing industry, trade credit

1 | INTRODUCTION

The capital market is fundamental in supporting companies and their business by providing access to external financial resources. Nevertheless, not all the companies can easily obtain the necessary financial resources on the market (i.e., they are under financial constraints), which is why their business strategies have to be based on internal resources (Farre-Mensa & Ljungqvist, 2016; Ughetto, 2008) or trade credit (Carbo-Valverde et al., 2016; Danielson & Scott, 2004). According to the current literature, these difficulties are attributable to significant uncertainties in the expected outcomes (Carpenter & Petersen, 2002; Hall, 2002), which might be heightened by asymmetric information and moral hazard between parties (Myers & Majluf, 1984; Stiglitz & Weiss, 1981). What about the legal system and the uncertainty of credit rights? Is it admissible to hypothesize that judicial inefficiency in enforcing credit rights amplifies the companies' difficulties in accessing external financial resources, pushing them toward alternative funding strategies (i.e., trade credit)?

List of Abbreviations/Acronyms: CEPEJ, European Commission for the Efficiency of Justice; DPO, days payable outstanding; ECCBSO, European Committee of Central Balance Sheet Data Offices; FE, fixed effect; MAD, median absolute deviation; RE, random effect.

Moreover, can we reject the hypothesis that a poor legal system might limit their access to external financial resources and, in doing so, prevent the implementation of environmental strategies?

The relation between the environmental strategies of firms and their financial performance has been widely investigated in a large portion of the literature (e.g., Boakye et al., 2020; García-Sánchez & Martínez-Ferrero, 2019; Hang et al., 2019; Minutolo et al., 2019). These contributions suggest that sustainability projects and environmental strategies positively affect the financial performance of firms, increasing their attractiveness to relevant stakeholders (i.e., employees and managers), decreasing their operating costs and improving their profitability. However, the possibility of financing such investments by means of external resources is far from obvious since there might be significant uncertainty in the estimation and related time span of future cash flows (Zhang et al., 2021). Hence, access to external financial resources might be not only crucial to the financial structure of firms and their performance on the market, but it might also represent a barrier to environmental sustainability, preventing investments in key technologies able to support green strategies. In this work, we show how the judiciary represents an external exogenous variable able to amplify the difficulties encountered by firms in collecting external resources on the capital market, affecting their corporate structure and leading to the adoption of alternative funding strategies for their business (e.g., trade credit).

Recent empirical works have focused on understanding the role of trade credit in market structure and industrial dynamics (Barrot, 2016; Breza & Liberman, 2017), although the literature has paid little attention to the impact of courts' efficiency in enforcing credit rights on trade credit demand. Since Fazzari et al. (1988), scholars have rather focused on difficulties in collecting financial resources on the capital market, exploring in particular the methodological approaches to identifying companies that are under financial constraints and their main characteristics. In brief, the evidence gathered in these investigations suggests that the probability of being under financial constraints depends on a firm's age and size (Hadlock & Pierce, 2010; Schneider & Veugelers, 2010), as well as on its decision to be innovative (Hall et al., 2016; Hottenrott & Peters, 2012). The common key element is uncertainties in the expected outcomes, which can drive up the companies' risk of insolvency and, consequently, reduce their ability to pay back loans. These uncertainties likely represent the main barrier to accessing the financial market and to investing in key technologies able to support environmental strategies, and we expect courts' inefficiency to amplify them even more, increasing the companies' financial constraints (i.e., further limiting their access to external financial resources) and forcing them to pursue an alternative funding strategy (i.e., trade credit).

The present work tests the above predictions, looking at the Italian manufacturing industry between 2015 and 2019 (more than 100,000 observations) and analyzing the relation between judicial inefficiency and firms' dynamics. On the one hand, we highlight the negative relation between courts' performance and investments in key technologies able to support green strategies. On the other hand, we determine whether there exists a negative relation between the time needed to settle an insolvency case (i.e., mortgage foreclosure) and the levels of external financial resources obtained by companies (i.e., financial debt ratio and financial leverage), thereby confirming the hypothesis that institutional inefficiency can amplify financial constraints. Afterwards, we explore the relation between the same proxy of judicial inefficiency (i.e., time needed to settle an insolvency case) and companies' access to trade credit to fund their business (i.e., trade credit ratio), which would support the hypothesis of alternative strategies in situations of uncertainty, triggered by postponing the payment deadline (i.e., days payable outstanding). From the methodological point of view, these empirical investigations adopt, as their control variable, a financial constraint measure based on the companies' internal characteristics for what concerns their expected solvency (i.e., credit rating). Accordingly, we have the opportunity to ascertain whether the courts' performance in enforcing credit rights can amplify financial constraints, allowing us to discern the internal characteristics of the companies from the external legal system.

This work can contribute to the current literature in several ways. On the one hand, our results can stimulate the debate around improving court performance to support financial dynamics and environmental strategies, focusing on a rather under-investigated aspect, that is, the companies' access to the capital market. This is even more relevant if we consider that our case study concerns Italy, a country characterized by one of the most inefficient judicial systems in the European Union (European Commission for the Efficiency of Justice [CEPEJ], 2016) and by the necessity to improve its institutional system to support national economic growth (Esposito et al., 2014). Moreover, according to the World Bank and the European Committee of Central Balance Sheet Data Offices (ECCBSO), the Italian manufacturing industry is characterized by one of the highest levels of trade credit to fund working capital, and as a consequence, the level of days payable outstanding is also among the highest, making for a very interesting case study. On the other hand, taking the literature on financial constraints and trade credit into account, judicial inefficiency and its role have often been overlooked. In addition, considering the current Covid-19 pandemic and the liquidity problems affecting all Western countries and their manufacturing industries, this research can shed new light on institutional reforms that might be able to reduce the companies' financial constraints, hence supporting national recovery and investments in environmental strategies. Finally, by examining the impact of judicial efficiency on trade credit, we can add new evidence on alternative means to access external resources.

The paper is organized as follows. Section 2 presents an overview of the current literature on judicial efficiency and financial dynamics and proposes our main hypothesis. Section 3 discusses insolvency procedures in Italy, while Section 4 introduces the adopted measure of financial constraints. Section 5 sets out the empirical strategy pursued and the case study under investigation (i.e., the Italian manufacturing industry). Finally, Section 6 illustrates the results of the empirical analysis, while Section 7 offers some conclusions that may be of particular significance from the policy makers' point of view.

2 | THEORETICAL BACKGROUND: JUDICIAL EFFICIENCY AND FINANCIAL DYNAMICS

The current literature suggests that judicial efficiency in enforcing rights has a positive impact on the financial markets (e.g., Brown et al., 2017; Djankov et al., 2008; Ponticelli & Alencar, 2016). In particular, Laeven and Majnoni (2005) found that judicial efficiency is one of the main drivers of interest rate spreads, implying that improvements in judicial enforcement of contracts are critical to lowering the cost of financial intermediation for firms. In addition, Bae and Goyal (2009) showed that banks respond to poor enforceability of contracts by reducing loan amounts, shortening loan maturities, and increasing loan spreads. Haselmann and Wachtel (2010) collected similar results, concluding that, if banks operate in a well-functioning legal system, they lend relatively more to small-medium enterprises and provide more mortgages, whereas they tend to lend more to large enterprises and to the government if the legal system is unsound. Moro et al. (2018) added new evidence to these results, indicating that the more efficient the judicial enforcement system and the greater the protection of creditors, the lower the probability that firms are partially or totally denied credit. Djankov et al. (2007) assessed the enforcement of creditors' rights against defaulting debtors by constructing an aggregate index, with scores between zero (poor creditors' rights) and four (strong creditors' rights). According to their results, creditor protection through the legal system is associated with higher ratios of private credit to gross domestic product, which is relatively more significant in richer countries. In a recent article, Shah et al. (2017) investigated the relation between credit rights and judicial efficiency, as well as its influence on firms' corporate leverage. Their results point to the fact that improved efficiency in enforcing credit rights makes credit more readily available, due to greater loan supply.

Considering strategic behaviors and moral hazard, Jappelli et al. (2005) proposed a model based on opportunistic debtors and inefficient courts, showing that improvements in judicial efficiency could reduce credit constraints and increase lending, with an ambiguous effect on interest rates that depends on banking competition and on the type of judicial reform. In particular, the authors noted that poor judicial enforcement drives up opportunistic behaviors on the part of borrowers. This means that, anticipating that creditors will be unable to recover their loans easily and cheaply via the courts, borrowers are tempted to default, and lenders respond by reducing the availability of credit. Falavigna and Ippoliti (2018, 2020) gathered similar data on opportunistic behavior and came to the conclusion that the higher the judicial inefficiency in enforcing creditors' rights, the higher the risks taken by managers and/or stockholders, due to the perceived lower likelihood of creditors applying for a declaration of insolvency. Examining loan repayment delays in Italy, Schiantarelli et al. (2020) confirmed this evidence, demonstrating that a firm's decision to delay payments to banks depends on its financial health and that legal enforcement of collateral recovery can amplify this phenomenon. Finally, focusing on the enforcement of bankruptcy, Shah and Shah (2016) analyzed the relationship between national judicial efficiency and the cash holdings of corporations. They argued that efficient judicial systems are associated with higher levels of corporate cash holdings, supporting what they call the managerial-fear hypothesis. According to this hypothesis, managers believe that improvements in judicial efficiency can increase the probability of bankruptcy and loss of their jobs, and they respond to this fear by hoarding extra cash as a buffer against such negative outcomes.

Considering the relation between alternative funding strategies and judicial efficiency, the literature has highlighted the importance of informed lending (such as supplier credit) in weak enforcement environments, that is, where the expected financial constraints are greater. Indeed, according to Gopalan et al. (2016), suppliers not only have alternative ways to enforce their contracts but their expertise in liquidating the collateral (their product) may also prove important (Fabbri & Menichini, 2010). In addition, to the extent that such trade credit is costly (Petersen & Rajan, 1994), a decrease in enforcement costs will result in firms using less trade credit to finance their assets.

Thus, according to the literature illustrated so far, uncertainty in the enforcement of credit rights and opportunistic behaviors, which are ascribable to courts' inefficiency and/or current insolvency procedures, can reduce access to external financial resources, increasing companies' financial constraints. Indeed, both judicial inefficiency in enforcing banks' credit rights and the related debtors' exploitative behaviors may intensify uncertainty on the capital market and expected risks regarding the repayment of loans. Banks and other financial institutions may react to this greater uncertainty by reducing access to their financial resources, increasing companies' financial constraints. Therefore, the judicial system represents an institutional environment that can amplify the difficulties encountered by companies in collecting the necessary financial resources, causing them to adopt alternative financial strategies to fund their business, such as, for example, the substitution and/or integration of financial debt with trade credit (Danielson & Scott, 2004; De Blasio, 2005; Yang, 2011). Obviously, trade credits might support firms' survivorship but not their environmental strategies and the required investments.

In view of all of the above, in order to validate the proposed interpretation of the selected case study (i.e., the Italian judicial system and its manufacturing industry), assuming that external financial resources are fundamental to invest in environmental sustainability, we aim to empirically test the following hypotheses:

> **H1.** Judicial inefficiency in enforcing credit rights can amplify the companies' financial constraints, reducing their access to external financial resources and capital market services, as well as investments in environmental strategies.

> **H2.** Judicial inefficiency in enforcing credit rights can drive companies to increase trade credit to financially support their business and to survive on the market.

If the proposed hypotheses are confirmed, the economic implications could be far-reaching for the whole economy, reducing both the competitiveness and the financial stability of the national system, triggering a cascade effect on the market and undermining the environmental strategies of companies.

3 | THE ITALIAN JUDICIAL SYSTEM AND INSOLVENCY PROCEDURES

The Italian Ministry of Justice is in charge of administering civil and criminal justice, which is divided into two main tiers and one lowest level. At the lowest level are the so-called *Justices of the Peace* (i.e., *Giudici di Pace*), with specific civil and criminal competences. At a higher level, the first tier includes first instance courts (i.e., *Tribunali Ordinari*), while the second tier comprises second instance courts (i.e., *Corte di Appello)*, which are responsible for appeals against first instance judgments. In the period considered (i.e., between 2015 and 2019), there were 140 first instance courts and 26 second instance courts. The first and the second instance courts are grouped according to their judicial geography to form 26 judicial districts (i.e., *Distretto di Corte di Appello*). Finally, there is also a court of last resort (i.e. *Corte Suprema di Cassazione*), with seat in Rome and acting as the highest appellate court in all civil and criminal cases.

According to the Italian law, there are two formal procedures to settle an insolvency case (Falavigna & Ippoliti, 2020; Rodano et al., 2016). The creditors can either initiate a process of mortgage foreclosure (i.e., *esecuzione forzata*), which can target the debtors' movables or real estate, or apply to certify the debtor's insolvency (i.e., *istanza di fallimento*), and after this preliminary step, the court will enforce their credit rights through a bankruptcy procedure (i.e., *fallimento*). Alternatively, the debtor can apply for an arrangement with creditors through the mediation of the court (i.e., *concordato preventivo*). In this case, the creditors cannot expect to fully recover the amounts due, but the defaulting debtor may be expected to cooperate.

Under the Italian law, all creditors can engage in a mortgage foreclosure procedure, that is to say, all secured and unsecured credits can be enforced by courts through mortgage foreclosure of debtors' assets (i.e., movable and/or real estate). The main difference between secured and unsecured credits revolves around the assets involved in the insolvency procedure. In the former situation, there is a specific asset that represents the collateral in case of insolvency with respect to that specific secured credit, which cannot be involved by other creditors in other insolvency procedures (i.e., there is an exclusive right to use that asset as collateral for a single secured credit). In the latter situation, there are no specific guarantees for unsecured credits, that is, all the remaining debtors' assets that do not represent a collateral for a secured credit can be involved in the insolvency procedure to collect the due amounts of money. In both cases, there is a specific judicial procedure aimed at certifying the insolvency status of the debtor (e.g., an unpaid invoice), and an order of payment is then issued by the same court (i.e., *Decreto Ingiuntivo di Pagamento*). After 40 days, if there are no oppositions by the debtor and/or the due payment is not made, the aforementioned order is enforceable and the foreclosure procedure can start. At this point, the payment of secured credits is facilitated by the current procedure, since a foreclosure order is not necessary (i.e., *Atto di Pignoramento*), simplifying the bailiff's work and reducing the time needed to collect the due amount of money, since the object of the foreclosure has already been identified (i.e., the collateral). The alternative approach to foreclosure is bankruptcy, which is largely a debtor-protective process and prevents creditors from seizing and selling the debtor's assets piecemeal, giving time to liquidate the debtor in an orderly fashion or, more commonly, sell the business as a going concern or reorganize its capital structure. Note that only the biggest companies can be involved in bankruptcy procedures. Indeed, according to current regulations, creditors can initiate bankruptcy procedures if, and only if, the debtors meet at least one of the following criteria: assets higher than 300,000.00 Euro, gross revenues higher than 200,000.00 Euro, or total debts higher than 500,000.00 Euro. On the other hand, all insolvent debtors can be involved in mortgage foreclosure procedures.

The current procedures prescribe that judicial competence for insolvency cases depends on the location of either the registered office or the main production facility of the insolvent business. Therefore, the creditor will apply for a declaration of insolvency or mortgage foreclosure to the competent court of first instance, taking the location of the debtor's registered office or production facility into account, and then, if necessary, present an appeal against this judgment to the competent court of second instance.

Considering the Italian justice system between 2015 and 2019, Table 1 presents legal times in the current insolvency procedures. The readers can easily understand which role judicial inefficiency plays in making it harder for companies to access external financial resources,

TABLE 1 Average time needed to settle an insolvency case according to judicial procedure

Judicial district of second instance	Mortgage foreclosure (movable)	Mortgage foreclosure (real estate)	Bankruptcy
North	167	1227	2334
Center	274	1704	2909
South	336	2257	3679
Islands	316	2573	4627

Note: Considering the Italian justice system between 2015 and 2019, Table 1 presents legal times in the current insolvency procedures; judicial delay at first instance level expressed in days.

since the external legal system is actually able to amplify uncertainties and risks. Indeed, extraordinary judicial delays in enforcing credit rights might discourage banks and other financial institutions from supplying companies with the resources needed to support their business and their investments in environmental sustainability projects, consequently increasing their financial constraints. According to Table 1, for instance, to enforce a bankruptcy procedure in the South of Italy, a company may have to wait for up to 10 years, while in the North of Italy, the waiting time is up to 6 years. Hence, we can expect greater difficulties in accessing financial resources in the South of Italy, which would lead companies located in that area to adopt alternative strategies (e.g., funding their business via trade credit and delaying payments). This also highlights the existing efficiency gap between the North and the South of Italy, with the former geographical macro area being the leading benchmark in enforcing credit rights.

4 | MEASURING FINANCIAL CONSTRAINTS

Although there is no consensus on how to determine whether companies are under financial constraints, according to Carreira and Silva (2010), this investigation should be based on proxies such as (a) dividend payout ratio, (b) firm self-evaluation, (c) cash stocks, (d) degree of leverage, (e) age and size, (f) institutional affiliation, and (g) credit ratings. Some scholars have proposed ad hoc indexes based on these proxies and other key balance sheet information, for example, the Kaplan and Zingales index, the Hadlock and Pierce index, and the Whited and Wu index (Farre-Mensa & Ljungqvist, 2016). Other researchers have instead opted for cash flow-based indicators such as, for example, working capital (Hottenrott et al., 2016), changes in cash holdings, cash flow and debt issues (Lööf & Nabavi, 2016), the use of external equity finance (Brown et al., 2012), and cash inflows from fixed asset sales (Borisova & Brown, 2013). In yet other cases, consideration has been given to whether companies have paid low or no dividends (Fazzari et al., 1988) and to the general perception regarding the external supply of credit assessed through surveys (Coad et al., 2016; Neicu et al., 2016). Finally, the literature has also focused on credit rating, examining both its absence (e.g., Adam, 2009; Almeida et al., 2004) and its estimation (e.g., Czarnitzki, 2006; Czarnitzki & Hottenrott, 2011; Peters et al., 2017). The former approach highlights the expected constraints due to information asymmetries between parties in the capital market and the very high prices to be paid to gather the necessary financial resources. On the other hand, the latter approach emphasizes the solvency of companies, stratifying access to external resources accordingly.

In this work, we adopt credit rating as a measure of our companies' financial constraints, since it represents a valuable piece of information used by banks and other financial institutions to assess the financial health of companies and then, based on this evaluation, decide whether to supply the necessary financial resources (Czarnitzki & Kraft, 2007; Falavigna & Ippoliti, 2021a). Accordingly, for every observation, a credit rating score is computed by means of the artificial neural networks methodology, following the assessment system of Standard & Poor's and classifying companies into eight classes: AAA (i.e., very high capacity to repay debts), AA (i.e., high capacity to repay debts), A (i.e., sound capacity to repay debts, which might be affected by adverse circumstances), BBB (i.e., adequate capacity of repayment, which might worsen), BB (i.e., predominantly speculative debt), B (i.e., high default risk), CCC (i.e., very high default risk), and D (i.e., failed enterprise). In detail, following Falavigna (2012), the present study estimates the scores by means of a neural networks algorithm on the basis of key information extracted from the companies' financial statements: total receivables due from shareholders, total tangible assets, total current assets, total shareholders' funds, total provisions for risks and charges, total payables, total value of production, total production costs, and total financial charges.

We expect financial constraints to depend on the companies' financial health and expected solvency, represented by the credit rating scores. Hence, we expect a company classified in rating class D to have the severest financial constraints, while they should be much weaker in the case of a company in rating class AAA. Nevertheless, according to the theory proposed here, the expected levels of financial constraints can be amplified by judicial inefficiency in enforcing credit rights. In other words, assuming two companies in the same credit rating class, we expect a company located in a district with higher judicial inefficiency to have more limited access to external financial resources, since the banks would be taking greater risks in lending due to credit rights uncertainties.

5 | EMPIRICAL STRATEGY AND DATA

Analyzing the Italian manufacturing industry between 2015 and 2019 (more than 100,000 observations), we test the proposed hypothesis by merging two main sources of information: data on insolvency procedures at the first instance level (source: Italian Ministry of Justice) and financial information on manufacturing companies (source: AIDA—Bureau van Dijk's database). Our analysis considers all the manufacturing companies located in the North of Italy, which is the Italian geographical macro area with the best-performing judicial system and the highest concentration of firms. Hence, by focusing on this area, we have the opportunity to test our hypothesis in the country's most dynamic and competitive environment, collecting evidence that ought to be even more robust. Lastly, we look at the *median absolute deviation* (*MAD*) to detect and then drop the outliers (Leys et al., 2013).

In particular, considering the *i*th active company at time *t*, we study several fixed effect (FE) regression models (panel data, FEs) having the following forms:

$$FIN\_D_{i,t} = \beta_0 + \beta_1 MS_{i,t-1} + \beta_2 TNA_{i,t-1} + \beta_3 AGE_{i,t} + \sum_{z=1}^{8} \gamma_z CR_{i,z,t-1} + \\ + \beta_4 JUD_{i,t-1} + \beta_5 LIQ_{i,t-1} + u_{i,t} + \varepsilon_{i,t}, \quad \text{(A)}$$

$$TRA\_C_{i,t} = \beta_0 + \beta_1 MS_{i,t-1} + \beta_2 TNA_{i,t-1} + \beta_3 AGE_{i,t} + \sum_{z=1}^{8} \gamma_z CR_{i,z,t-1} + \\ + \beta_4 JUD_{i,t-1} + \beta_5 LIQ_{i,t-1} + u_{i,t} + \varepsilon_{i,t}, \quad (B)$$

$$FIN\_L_{i,t} = \beta_0 + \beta_1 MS_{i,t-1} + \beta_2 TNA_{i,t-1} + \beta_3 AGE_{i,t} + \sum_{z=1}^{8} \gamma_z CR_{i,z,t-1} + \\ + \beta_4 JUD_{i,t-1} + \beta_5 LIQ_{i,t-1} + u_{i,t} + \varepsilon_{i,t}, \quad (C)$$

$$DPO\_V_{i,t} = \beta_0 + \beta_1 MS_{i,t-1} + \beta_2 TNA_{i,t-1} + \beta_3 AGE_{i,t} + \sum_{z=1}^{8} \gamma_z CR_{i,z,t-1} + \\ + \beta_4 JUD_{i,t-1} + \beta_5 LIQ_{i,t-1} + u_{i,t} + \varepsilon_{i,t}. \quad (D)$$

Although the decision to adopt FE regression models is confirmed by the Hausman test, we propose random effect (RE) regression models as robust test to verify the collected results. Indeed, the variables that proxy for judicial efficiency (i.e., mortgage foreclosure) have a very slow year-to-year variation. These are key variables with positive but very small "within" relative to "between" firm variance, and by using firm FEs, the coefficients on the judicial efficiency variables might potentially be biased.

We propose a specific dependent variable for each model:

- *FIN_D* (Model A), which is a financial debt ratio equal to the total amount of a company's debts to banks and other financial institutions over total assets (log transformation), representing an index of external resources gathered on the capital market;
- *TRA_C* (Model B), which is a trade credit ratio equal to the total amount of a company's debts to suppliers of goods and/or services over total assets (log transformation), representing an index of external resources gathered from suppliers and through the company's business activities (i.e., delaying payments);
- *FIN_L* (Model C), which is a financial leverage index equal to the total amount of financial debts over the company's equity (log transformation);
- *DPO_V* (Model D), which is the total amount of days payable outstanding, used as proxy for supplier payment times, extracted from accounting information (log transformation).

Based on the above theoretical background and our hypothesis, we expect judicial inefficiency in enforcing credit rights to amplify the companies' financial constraints, reducing their financial debt ratio and, consequently, their dependency on external resources collected on the capital market (i.e., *FIN_D*). Thus, institutional inefficiency drives companies to rely more heavily on trade credit (i.e., *TRA_C*), that is to say, to adopt alternative funding strategies. The financial leverage index (i.e., *FIN_L*) and the days payable outstanding (i.e., *DPO_V*) can confirm the results of the previous models, pointing to a link between financial constraints and the legal system. Therefore, we expect that the higher the judicial inefficiency, the lower the financial leverage index and, consequently, the higher the DPO value (since access to external financial resources by companies is more limited). Note that we assume that external financial resources are fundamental to invest in green strategies and environmental sustainability, that is to say, with no access to the capital market, there are no investments in these strategies.

Coherently with the aforementioned literature, we adopt the following control variables:

- *MS*, which is an index representing a company's market share with respect to its industrial sector at time $t-1$ (log transformation) and is equal to the company's total amount of sales over the industry's total amount of sales, based on the NACE classification (three-digit code);
- *TNA*, which is equal to total net fixed assets at time $t-1$ (log transformation) and represents the size of our observation;
- *AGE*, which is a continuous variable indicating the seniority of the observation at time *t*, expressed in years (log transformation);
- *CR*, which is a matrix of eight dummy variables equal to 1 according to the expected credit rating at time $t-1$;
- *JUD*, which is the time needed to settle an insolvency case through mortgage foreclosure (movable and real estate) in the *j*th first instance district (where the company is located) at time $t-1$, expressed in days (log transformation)[1];
- *LIQ*, which is an index equal to financial and operating activities divided by debts at time $t-1$ (log transformation), representing the liquidity of the observation.[2]

Excluding seniority, all the independent variables are lagged by 1 year since banks and other financial institutions grant access to financial resources according to the most recent information available, extracted from the latest official financial statements (i.e., referring to the previous year). Table A1 presents detailed information about the estimation of these variables.

Finally, in the robust test (i.e. RE regression model), we consider the following environmental characteristics to account for social and cultural heterogeneity among our observations (i.e., FEs introduced in the model):

- *INDU*, which is a matrix of 24 dummy variables equal to 1 if the productivity sector (two-digit code) belongs to the selected NACE sector, 0 otherwise;
- *REGION*, which is a matrix of eight dummy variables equal to 1 if the observation is located in that administrative regional area (i.e., Valle d'Aosta, Piedmont, Liguria, Lombardy, Veneto, Emilia Romagna, Trentino Alto Adige, and Friuli Venetia Giulia), 0 otherwise.

Table 2 shows some descriptive statistics of the dependent and independent variables (pooled sample of observations), while, focusing on industrial sectors (NACE codes—two digits) and credit ratings, Table 3 reports some additional descriptive statistics on the financial health of the Italian manufacturing industry (pooled sample of observations). In detail, taking all industrial sectors into account, the table displays the percentage of firms based on their estimated credit rating.

TABLE 2 Descriptive statistics of dependent and independent variables

Variable	Explanation	Obs.	Mean	SD	Min	Max
FIN_D	Financial debt ratio[a]	138,940	−1.852	1.353	−9.831	2.197
TRA_C	Trade credit ratio[a]	184,302	−1.300	0.758	−8.894	4.303
FIN_L	Financial leverage[a]	135,458	−0.201	1.922	−8.977	8.103
DPO_V	Days payable outstanding[a]	138,389	2.164	1.830	−3.411	12.658
MS	Market share[a]	184,544	−9.238	1.417	−17.553	0.000
TNA	Total net fixed assets[a]	184,544	5.199	1.752	0.000	9.962
AGE	Seniority (years)[a]	184,544	2.632	0.989	0.000	5.004
CR	D	184,544	0.029	0.168	0.000	1.000
	CCC	184,544	0.011	0.105	0.000	1.000
	B	184,544	0.268	0.443	0.000	1.000
	BB	184,544	0.100	0.300	0.000	1.000
	BBB	184,544	0.170	0.375	0.000	1.000
	A	184,544	0.125	0.331	0.000	1.000
	AA	184,544	0.213	0.410	0.000	1.000
	AAA	184,544	0.084	0.277	0.000	1.000
JUD	Mortgage foreclosure—real estate (days)[a]	184,428	7.173	0.239	6.129	7.724
	Mortgage foreclosure—movable (days)[a]	184,428	5.124	0.397	4.220	6.730
LIQ	Liquidity index[a]	184,544	0.188	0.784	−7.261	8.059

Note: Considering the Italian manufacturing industry between 2015 and 2019 (pooled sample of observations), Table 2 shows some descriptive statistics of the dependent and independent variables.
[a]Logarithmic transformation.

TABLE 3 Distribution of observations according to industrial sector and credit rating

D	CCC	B	BB	BBB	A	AA	AAA	Total firms	NACE code	Description
3.98%	2.34%	30.06%	10.09%	18.76%	11.11%	17.45%	6.21%	9814	10	Manufacturing of food products
4.21%	2.01%	21.88%	11.13%	24.27%	10.68%	17.22%	8.61%	1545	11	Manufacturing of beverages
9.09%	9.09%	18.18%	0.00%	18.18%	9.09%	0.00%	36.36%	11	12	Manufacturing of tobacco products
2.65%	1.32%	25.56%	10.33%	16.30%	13.04%	22.18%	8.62%	6068	13	Manufacturing of textiles
4.80%	2.02%	28.16%	11.22%	18.66%	10.92%	16.96%	7.28%	6045	14	Manufacturing of wearing apparel
3.13%	1.87%	27.63%	10.18%	17.92%	11.32%	19.85%	8.10%	3420	15	Manufacturing of leather and related products
2.71%	1.00%	27.23%	10.61%	18.20%	13.60%	17.61%	9.03%	5978	16	Manufacturing of wood and of products of wood and cork
1.51%	0.65%	29.19%	10.21%	18.15%	13.34%	20.52%	6.43%	2782	17	Manufacturing of paper and paper products
3.44%	1.19%	29.08%	11.77%	16.32%	12.22%	19.37%	6.61%	6397	18	Printing and reproduction of recorded media
1.30%	1.30%	21.43%	3.25%	14.94%	14.94%	29.87%	12.99%	154	19	Manufacturing of coke and refined petroleum products
2.34%	1.12%	22.68%	7.94%	17.04%	13.32%	23.54%	12.00%	4999	20	Manufacturing of chemicals and chemical products
1.13%	3.95%	20.34%	2.82%	10.17%	14.69%	34.46%	12.43%	177	21	Manufacturing of basic pharmaceutical products and pharmaceutical preparations
2.11%	0.71%	27.58%	9.75%	16.33%	13.09%	22.22%	8.22%	9922	22	Manufacturing of rubber and plastic products

(Continues)

TABLE 3 (Continued)

D	CCC	B	BB	BBB	A	AA	AAA	Total firms	NACE code	Description
2.86%	1.36%	25.47%	10.25%	16.27%	11.80%	22.69%	9.32%	6774	23	Manufacturing of other non-metallic mineral products
1.67%	0.56%	26.97%	10.04%	18.53%	12.57%	19.75%	9.90%	2688	24	Manufacturing of basic metals
2.09%	0.62%	28.03%	10.39%	15.98%	12.53%	21.77%	8.61%	48,987	25	Manufacturing of fabricated metal products, except machinery and equipment
3.87%	1.18%	22.83%	8.68%	16.33%	12.76%	23.02%	11.33%	6534	26	Manufacturing of computer, electronic, and optical products
2.64%	1.38%	25.34%	9.23%	17.30%	12.88%	23.03%	8.21%	8421	27	Manufacturing of electrical equipment
2.57%	0.98%	25.07%	9.50%	16.91%	13.19%	23.29%	8.49%	26,112	28	Manufacturing of machinery and equipment
2.33%	1.14%	28.24%	9.71%	16.29%	13.09%	22.79%	6.41%	2277	29	Manufacturing of motor vehicles, trailers, and semitrailers
5.70%	2.66%	23.77%	11.34%	17.96%	11.56%	19.97%	7.05%	1843	30	Manufacturing of other transport equipment
3.39%	1.46%	27.82%	11.97%	19.21%	12.60%	17.24%	6.33%	7351	31	Manufacturing of furniture
3.90%	1.82%	24.48%	8.22%	16.59%	12.70%	22.63%	9.66%	6275	32	Other manufacturing
5.15%	0.82%	27.79%	9.02%	16.72%	11.25%	21.52%	7.72%	9970	33	Repair and maintenance of metal products, machines and equipment
2.89%	1.11%	26.83%	10.00%	16.95%	12.50%	21.33%	8.38%	184,544	Total	

Note: Considering the manufacturing industry between 2015 and 2019 (pooled sample of observations), Table 3 presents the percentage of firms based on their estimated credit rating, according to the industrial sectors (NACE codes—two digits).

5.1 | Judiciary, financial dynamics, and investments: Some empirical insights

Figure 1 highlights the relation between judicial inefficiency and the level of financial debts over total amount of debts in 2019 (Carmignani, 2004; Tsuruta, 2008), as well as the level of investments in tangible assets that could support environmental strategies. More precisely, we plot the judicial districts of second instance (i.e., *Distretti Giudiziari di Corte di Appello*), weighting the observations by the number of companies located in that district, and we look at the relation between the days needed to settle a bankruptcy case and the average (unconditional) level of these two dynamics. In both cases, we can observe a negative relation between judicial delay and these two key dynamics, that is, level of financial debts and investments.

Considering mortgage foreclosure and the other two insolvency procedures (real estate and movable), Table A2 further corroborates our preliminary evidence by providing some insights into the negative relation between judicial inefficiency and investments in tangible assets, which could support the environmental strategies adopted by companies. According to these insights, if judicial delay decreases, there is an increase in the probability of firms investing in key tangible assets, as well as in the amount of such investments. Indeed, if judicial efficiency decreases by 20%, we expect the level of investments in environmental strategies to increase between 0.46% (movable goods) and 3.22% (real estate).

Obviously, these results need to be investigated in greater depth to collect more robust evidence on this key issue. Thus, focusing on firms' access to external financial resources, our econometric models aim to verify the highlighted relation controlling for the selected external and internal variables.

Lastly, by looking at the graphs (Figure 1), we can better understand the need to investigate the North of Italy to collect robust results. Indeed, the weighted dot of our scatter plot represents the number of companies located in that judicial district, and the most significant concentration of these companies is in the North of Italy (i.e., the most industrialized and developed area), where judicial inefficiency is at its lowest level (i.e., upper-right quadrant). The proposed analysis aims to investigate this specific quadrant, confirming the suggested hypothesis within the most competitive area of the national market.

6 | RESULTS

Tables 4 and 5 present the results of our analysis, adopting an FE regression model (panel sample, with FEs) and robust standard errors. In detail, Table 4 displays the results of Model A (i.e., with financial debt ratio as dependent variable) and the results of Model B (i.e., with trade credit ratio as dependent variable). Then, Table 5 illustrates the results of Model C (i.e., with financial leverage as dependent variable)

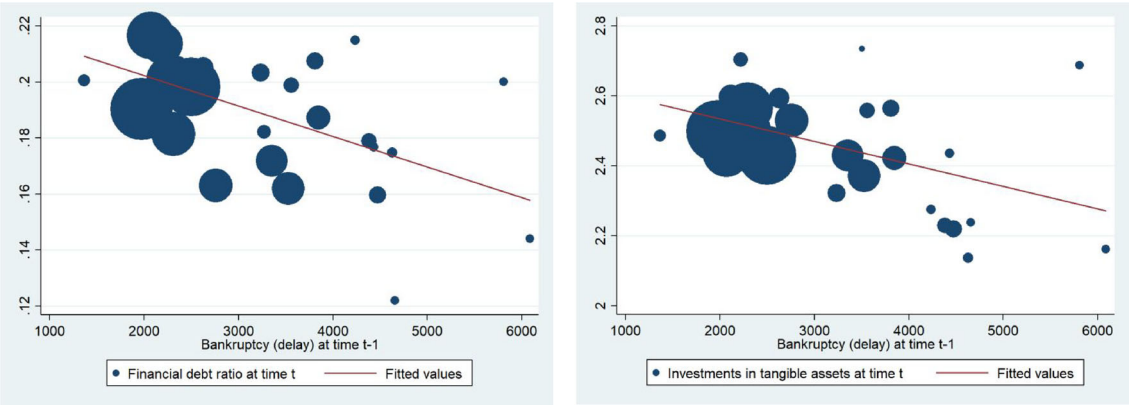

FIGURE 1 Financial debt ratio, investments in tangible assets, and judicial inefficiency in settling bankruptcy cases. *Note*: Considering the Italian manufacturing industry in 2019, the figure highlights the relation between judicial inefficiency and the level of financial debts over total amount of debts, as well as investments in tangible assets (log transformation). We plot the judicial districts of second instance (i.e., *Distretti Giudiziari di Corte di Appello*), weighting the observations by the number of companies located in that district, and we look at the relation between the days needed to settle a bankruptcy case and the average (unconditional) level of these two dynamics [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 4 Analysis of financial debt ratio (Model A) and trade credit ratio (Model B)

Variables	(Model A) Financial debt ratio$_t$[a]		(Model B) Trade credit ratio$_t$[a]	
CCC_{t-1}	0.0499 (0.0371)	0.0520 (0.0370)	0.0303 (0.0261)	0.0285 (0.0261)
B_{t-1}	0.0700** (0.0321)	0.0772** (0.0320)	0.0160 (0.0223)	0.0120 (0.0222)
BB_{t-1}	0.0648** (0.0317)	0.0687** (0.0316)	0.0274 (0.0219)	0.0248 (0.0219)
BBB_{t-1}	0.0271 (0.0319)	0.0257 (0.0318)	0.0168 (0.0218)	0.0167 (0.0218)
A_{t-1}	−0.0800** (0.0328)	−0.0854*** (0.0327)	−0.0183 (0.0219)	−0.0166 (0.0218)
AA_{t-1}	−0.255*** (0.0343)	−0.265*** (0.0343)	−0.0724*** (0.0222)	−0.0681*** (0.0222)
AAA_{t-1}	−0.525*** (0.0445)	−0.540*** (0.0445)	−0.150*** (0.0246)	−0.143*** (0.0246)
Seniority (years)$_t$[a]	−0.0748*** (0.0200)	−0.199*** (0.0173)	−0.00615 (0.00910)	0.0566*** (0.00823)
Liquidity index$_{t-1}$[a]	−0.0733*** (0.0106)	−0.0815*** (0.0106)	−0.0900*** (0.00893)	−0.0864*** (0.00894)
Market share$_{t-1}$[a]	−0.0112 (0.00980)	0.00271 (0.00967)	0.00708 (0.00576)	0.000163 (0.00576)
Total net fixed assets$_{t-1}$[a]	0.116*** (0.00629)	0.113*** (0.00630)	−0.0634*** (0.00306)	−0.0620*** (0.00306)
Mortgage foreclosure—real estate (days)$_{t-1}$[a]	−0.222*** (0.0155)		0.123*** (0.00685)	
Mortgage foreclosure—movable (days)$_{t-1}$[a]		−0.0412*** (0.00637)		0.0364*** (0.00304)
Constant	−0.731*** (0.142)	−1.608*** (0.129)	−1.728*** (0.0795)	−1.287*** (0.0738)
R^2 (overall)	.204	.165	.268	.197
Observations	133,318	133,318	174,840	174,840
Number of firms	44,091	44,091	58,082	58,082

Note: Analysis of the Italian manufacturing industry in the North of Italy between 2015 and 2019. Panel data with fixed effects (FEs). Robust standard errors are in parentheses.
[a]Logarithmic transformation.
*$p < .1$.
**$p < .05$.
***$p < .01$.

and the results of Model D (i.e., with days payable outstanding as dependent variable). Tables A3 and A4 show the results of the robust test, adopting a RE regression model (panel sample, REs) and robust standard errors.

According to the Wald chi-square statistics, all the models are statistically significant (i.e., at least one of the regression coefficients is not equal to zero). The overall R^2 is quite interesting, ranging between .14 (Model A—financial debt ratio) and .38 (Model C—financial leverage).

TABLE 5 Analysis of financial leverage (Model C) and days payable outstanding (Model D)

Variables	(Model C) Financial leverage$_t$[a]		(Model D) DPO value$_t$[a]	
CCC_{t-1}	0.272*** (0.0666)	0.274*** (0.0666)	−0.0673 (0.0617)	−0.0687 (0.0617)
B_{t-1}	0.330*** (0.0523)	0.341*** (0.0523)	−0.0728 (0.0510)	−0.0774 (0.0510)
BB_{t-1}	0.144*** (0.0514)	0.150*** (0.0514)	−0.106** (0.0508)	−0.109** (0.0508)
BBB_{t-1}	−0.0962* (0.0514)	−0.0997* (0.0513)	−0.122** (0.0509)	−0.122** (0.0509)
A_{t-1}	−0.358*** (0.0521)	−0.368*** (0.0521)	−0.117** (0.0514)	−0.115** (0.0514)
AA_{t-1}	−0.632*** (0.0535)	−0.650*** (0.0534)	−0.104** (0.0524)	−0.0993* (0.0524)
AAA_{t-1}	−0.916*** (0.0623)	−0.942*** (0.0623)	−0.101* (0.0588)	−0.0938 (0.0588)
Seniority (years)$_t$[a]	−0.267*** (0.0253)	−0.482*** (0.0221)	0.269*** (0.0286)	0.338*** (0.0250)
Liquidity index$_{t-1}$[a]	−0.145*** (0.0131)	−0.160*** (0.0131)	0.160*** (0.0175)	0.164*** (0.0175)
Market share$_{t-1}$[a]	−0.0494*** (0.0123)	−0.0259** (0.0121)	−0.0985*** (0.0145)	−0.106*** (0.0144)
Total net fixed assets$_{t-1}$[a]	0.108*** (0.00778)	0.102*** (0.00781)	0.00289 (0.00862)	0.00454 (0.00862)
Mortgage foreclosure—real estate (days)$_{t-1}$[a]	−0.373*** (0.0188)		0.127*** (0.0223)	
Mortgage foreclosure—movable (days)$_{t-1}$[a]		−0.0580*** (0.00778)		0.0362*** (0.00979)
Constant	2.347*** (0.178)	0.837*** (0.164)	−0.317 (0.212)	0.129 (0.189)
R^2 (overall)	.409	.321	.002	.001
Observations	130,104	130,104	132,751	132,751
Number of firms	43,212	43,212	45,901	45,901

Note: Analysis of the Italian manufacturing industry in the North of Italy between 2015 and 2019. Panel data with fixed effects (FEs). Robust standard errors are in parentheses.
[a]Logarithmic transformation.
*$p < .1$.
**$p < .05$.
***$p < .01$.

TABLE 6 Expected impact of reducing judicial delay by 20% according to the different insolvency procedures

Dependent variable	Mortgage foreclosure	FE model	RE model
Financial debt ratio	Real estate	5.08%	4.24%
	Movable	0.92%	0.91%
Trade credit ratio	Real estate	−2.71%	−5.19%
	Movable	−0.81%	−1.55%
Financial leverage	Real estate	8.68%	6.23%
	Movable	1.30%	1.22%
Days payable outstanding	Real estate	−2.79%	−5.21%
	Movable	−0.80%	−1.56%

Note: Considering the coefficients of the analysis (Tables 4 and 5 for the FE models and Tables A3 and A4 for the RE models), and assuming that the time necessary to settle a case decreases by 20%, this table presents the expected impact according to the different insolvency procedures. All coefficients are statistically significant with p value < .01.

Based on the above results, we cannot reject our first hypothesis, that is, judicial inefficiency is an exogenous variable able to affect companies' access to external financial resources, amplifying their difficulties in gathering the resources needed on the capital market to support investments in environmental sustainability. Indeed, the greater the judicial inefficiency in insolvency procedures, the lower the financial debt ratio, which is confirmed by lower financial leverage. In addition, we cannot reject our second hypothesis since the greater the judicial inefficiency in insolvency procedures, the higher the trade credit ratio, which is confirmed by a higher DPO value. In other words, we cannot reject the hypothesis that institutional inefficiency in enforcing credit rights can increase the expected risk of insolvency, reducing access to the credit market and forcing managers to adopt alternative funding strategies to ensure the survival of their businesses (i.e., trade credit).

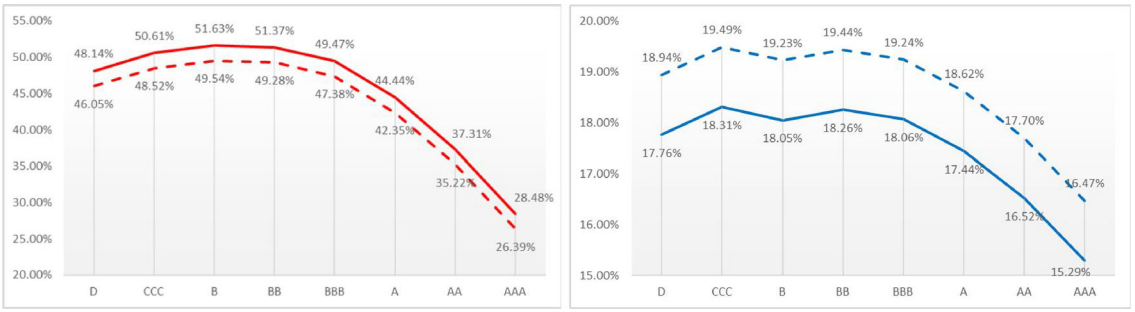

FIGURE 2 Firms' dynamics under financial constraints. *Note*: Considering the observations located in the North of Italy and mortgage foreclosure (real estate) as insolvency procedure, the figure shows the dynamics of companies with respect to their credit rating, adopting the coefficients of Table 4 (continuous red line: financial debt ratio; continuous blue line: trade credit ratio). The dashed lines refer to the expected impact of a 10% increase in judicial inefficiency for that insolvency procedure [Colour figure can be viewed at wileyonlinelibrary.com]

These results are rather robust, since we can observe coherent statistically significant relations across both case matters (i.e., real estate and movable assets). Moreover, adopting RE models, our hypothesis is once again confirmed (see Tables A3 and A4). Lastly, our results are coherent with the literature on the judiciary and firms' access to the capital market (Haselmann & Wachtel, 2010; Moro et al., 2018) and barriers to investments in environmental strategies (García-Quevedo et al., 2020), as well as current evidence on the Italian manufacturing industry (Falavigna & Ippoliti, 2020, 2021b).

Focusing on the judicial procedures, we expect to detect the highest impact in relation to mortgage foreclosure (real estate). Indeed, taking the coefficients of Table 4 into consideration, if the time necessary to settle a case using this procedure decreases by 20%, we expect the financial debt ratio to increase by 5.08%. Moving on to the other case matter (movable assets) and assuming the same 20% decrease in judicial delay, we expect an increase equal to 0.92%. At the same time, if the time necessary to settle a case decreases once again by 20%, we expect the trade credit ratio to drop by 2.71% (real estate) and 0.81% (movable), confirming that the legal system shapes business and corporate strategies, affecting investments in environmental sustainability projects. Table 5 further supports these dynamics. On the one hand, if the time necessary to settle a case decreases by 20%, we expect the financial leverage to increase by 8.68% (real estate) and 1.30% (movable). Lastly, assuming the same judicial performance improvement, we expect the DPO to decrease by 2.79% (real estate) and 0.80% (movable). Table 6 summarizes these results and draws a comparison with the robust test.

A potential explanation for these results might be related to the fact that it is easier to collect the due amounts of money through real estate assets and their related judicial procedures, since movable assets might be of lower value than real estate assets. What about financial constraints and firm dynamics?

Considering mortgage foreclosure (real estate) as insolvency procedure and simulating a 10% increase in judicial inefficiency for that insolvency procedure, Figure 2 shows the dynamics of companies with respect to their credit rating. In detail, adopting the coefficients of Table 4, the graphs (continuous red and blue lines) suggest an inverted U-shape for what concerns the financial health of our observations. These results are not surprising since debt levels represent a key piece of information to estimate the solvency of companies, which is used to evaluate (ex ante) their access to external financial resources. The dashed lines in the two graphs of Figure 2 refer to the expected impact of a 10% increase in judicial inefficiency, confirming the hypothesis that judicial inefficiency shape business strategies. Indeed, if the time needed to settle a mortgage foreclosure case (real estate) goes up, we can observe that the financial debt ratio decreases by 2.09% (red dashed line), while the credit debt ratio increases by 1.18% (blue dashed line). Based on the collected results and coherently with the suggested hypothesis, judicial inefficiency can amplify financial constraints, reducing access to external financial resources and, as a consequence, driving companies to rely more on trade credit.

Turning to the control variables and focusing on corporate governance (Model A and Model C), we can gain additional interesting insights that are coherent with the *financial growth cycle theory* (Berger & Udell, 1998). According to our evidence and looking at "seniority," mature firms display lower access to the capital market, which might be due to their more limited need to make investments and further develop their business. The variable "market share" corroborates this interpretation, although the coefficients are statistically significant only in the case of Model C (i.e., considering leverage). Then, taking internal liquidity into account, we can confirm the *pecking order theory*, which suggests that firms prefer internal capital to finance their business (Myers & Majluf, 1984). Finally, as for the proposed proxy of firm size (i.e., total net fixed assets), keeping the other variables constant, our results indicate that bigger firms have greater access to the capital market, in line with the current literature on the determinants of *financial constraints* (Carreira & Silva, 2010).

7 | CONCLUSIONS

Recent academic contributions have highlighted the positive relation between environmental management practice and financial

performance (e.g., Aslam et al., 2021; Feng et al., 2018; Lee et al., 2016; Xie et al., 2019). On the other hand, the current literature also emphasizes the expected negative impact of judicial inefficiency on market dynamics, hindering economic growth (Hayo & Voigt, 2013), entrepreneurship (Fu et al., 2020; Lichand & Soares, 2014), and investments (Giacomelli & Menon, 2017). Furthermore, the inefficiency of legal systems has an expected negative impact on financial dynamics, such as financing and asset maturity (Gopalan et al., 2016) and access to external financial resources (Haselmann & Wachtel, 2010; Moro et al., 2018), which are fundamental to facilitate investments in environmental strategies (Zhang et al., 2021). This work aims to illuminate these financial dynamics, focusing on the impact of delay in enforcing insolvency procedures and suggesting the hypothesis that judicial inefficiency can amplify financial constraints, causing companies to adopt alternative funding strategies to survive on the market, consequently reducing their opportunities to implement environmental strategies. In view of our evidence, if the time necessary to settle an insolvency case decreases, we can observe an increase in the financial debt ratio, increasing the chances to invest in environmental sustainability, as well as a decrease in the trade credit ratio. These results are robust under a variety of tests, and they support the hypothesis of a negative relation between the courts' inefficiency in enforcing credit rights and the companies' access to the financial market and its resources, as well as the key role of trade dynamics in helping companies under financial constraints in a legal system with poor enforcement. Hence, we can expect lower investments in sustainability projects and environmental strategies in districts with higher levels of judicial inefficiency; that is to say, judicial inefficiency can represent a key barrier to sustainability and environmental management practice.

Policy makers ought to be aware of these dynamics, so as to evaluate opportunities to review the current insolvency procedures, thereby boosting judicial efficiency (Fossen, 2014; Rodano et al., 2016; Vig, 2013). The proposed approach is coherent with the evaluations of the Italian judicial system provided by international institutions, such as the International Monetary Fund (Esposito et al., 2014; Jassaud & Kang, 2015) and the Organization for Economic Co-operation and Development (Palumbo et al., 2013), which stress the need to enhance the efficiency and effectiveness of civil procedures to ensure the smooth processing of cases in court. This necessity becomes even more pressing if we consider the current pandemic period and the potential collapse of the national market. Indeed, these companies need liquidity to survive this crisis, but banks and other financial institutions need certainty in credit rights enforcement. If the judicial system can improve its current performance, the Italian manufacturing industry will have greater opportunities to move on after the pandemic and be once again competitive on the EU and global markets.

Even though its results are quite interesting, our work has clear limits and there are ample opportunities for future improvements. On the one hand, we do not have detailed information (collected, for instance, through ad hoc surveys) about the companies' access to the financial market and their difficulties in collecting external resources. Moreover, we do not have information about environmental, social, and governance transparency, as well as its disclosure to support such strategies (Nakao et al., 2007; Yu et al., 2018). Obviously, this key information might confirm our expectations. On the other hand, this case study focuses on the Italian market and its manufacturing industry, that is, a specific socioeconomic environment in which the companies operate. Accordingly, in order to generalize our findings, specific comparative analyses might be implemented, so as to ascertain the presence of differences among countries (Garcia & Orsato, 2020). Lastly, there might be several omitted variables due to data availability, and we acknowledge that our results should be interpreted with caution.

Regardless of these limits, the present investigation contributes to shedding new light on a key barrier that might prevent investments in environmental sustainability, that is, the external legal system and its inefficiency in enforcing credit rights, thereby hopefully steering research interest in this direction.

CONFLICT OF INTEREST

None.

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ENDNOTES

[1] Note that three case matters are considered in order to observe the impact of judicial inefficiency on access to external financial resources: mortgage foreclosure (i.e., both movable and real estate) and bankruptcy.

[2] Note that we consider short-term credits and debts to estimate this index, that is, maturing within 1 year.

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APPENDIX A

TABLE A1 Description of variables

Variable	Definition	Explanation
FIN_D	Financial debt ratio$_t$[a]	$\frac{\text{Total financial debts}_t}{\text{Total assets}_t}$
TRA_C	Trade credit ratio$_t$[a]	$\frac{\text{Total commercial debts}_t}{\text{Total assets}_t}$
FIN_L	Financial leverage$_t$[a]	$\frac{\text{Total financial debts}_t}{\text{Total equity}_t}$
DPO_V	Days payable outstanding$_t$[a]	$360\ \frac{\text{Total commercial debts}_t - \text{advances to supplier}_t}{\text{Total purchase}_t}$
MS	Market share$_{t-1}$[a]	$\frac{\text{Total company's sales}_{t-1}}{\text{Total industry's sales}_{t-1}}$
TNA	Total net fixed assets$_{t-1}$[a]	Total amount of net fixed assets at time $t-1$
AGE	Seniority (years)$_t$[a]	$\text{Year}_t - \text{Year}_{\text{founding}}$
CR	Rating class$_{t-1}$ D	8.99% < Expected bankruptcy risk$_{t-1}$
	Rating class$_{t-1}$ CCC	3.43% < Expected bankruptcy risk$_{t-1}$ ≤ 8.99%
	Rating class$_{t-1}$ B	1.51% < Expected bankruptcy risk$_{t-1}$ ≤ 3.43%
	Rating class$_{t-1}$ BB	0.61% < Expected bankruptcy risk$_{t-1}$ ≤ 1.51%
	Rating class$_{t-1}$ BBB	0.21% < Expected bankruptcy risk$_{t-1}$ ≤ 0.61%
	Rating class$_{t-1}$ A	0.06% < Expected bankruptcy risk$_{t-1}$ ≤ 0.21%
	Rating class$_{t-1}$ AA	0.02% < Expected bankruptcy risk$_{t-1}$ ≤ 0.06%
	Rating class$_{t-1}$ AAA	Expected bankruptcy risk$_{t-1}$ ≤ 0.02%
JUD	Mortgage foreclosure—real estate (days)$_{t-1}$[a]	Time necessary to settle a case of mortgage foreclosure (real estate) at time $t-1$
	Mortgage foreclosure—movable (days)$_{t-1}$[a]	Time necessary to settle a case of mortgage foreclosure (movable) at time $t-1$
LIQ	Liquidity index$_{t-1}$[a]	$\frac{\text{Total financial credits (less than 1 year)}_{t-1} + \text{cash}_{t-1}}{\text{Total financial debts (less than 1 year)}_{t-1}}$

Note: The table presents detailed information about the estimation of dependent and independent variables.
[a]Logarithmic transformation.

TABLE A2 Analysis of the relation between investments in tangible assets and judicial inefficiency

Variables	(Model γ) Investments		(Model δ) Investments[a]	
Mortgage foreclosure—real estate (days)$_{t-1}$[a]	−0.167*** (0.0138)		−0.142*** (0.0205)	
Mortgage foreclosure—movable (days)$_{t-1}$[a]		−0.0973*** (0.00925)		−0.0204$^{\omega}$ (0.0132)
Constant	−0.385*** (0.0989)	−1.055*** (0.0519)	2.948*** (0.146)	2.059*** (0.0740)
Year (FE)	Yes	Yes	Yes	Yes
NACE code (FE)	Yes	Yes	Yes	Yes
Observations	318,091	318,091	72,859	72,859
R^2	-	-	.014	.014

Note: Analysis of the Italian manufacturing industry in Italy between 2015 and 2019. Pooled data with logistic regression (Model γ) and OLS regression (Model δ). Considering the dependent variable, Model γ adopts a dummy equal to 1 if the company invested in tangible assets between time t and $t-1$, while Model δ adopts the absolute value of such investments in tangible assets between time t and $t-1$. Robust standard errors are in parentheses.
[a]Logarithmic transformation.
*$p < .1$.
**$p < .05$.
***$p < .01$.
$^{\omega}p < .15$.

TABLE A3 Robust test—Analysis of financial debt ratio (Model A) and trade credit ratio (Model B)

Variables	(Model A) Financial debt ratio$_t$[a]		(Model B) Trade credit ratio$_t$[a]	
CCC_{t-1}	0.102*** (0.0354)	0.103*** (0.0355)	0.0177 (0.0240)	0.0137 (0.0242)
B_{t-1}	0.131*** (0.0307)	0.137*** (0.0308)	−0.0104 (0.0205)	−0.0203 (0.0206)
BB_{t-1}	0.150*** (0.0305)	0.154*** (0.0305)	−0.00562 (0.0203)	−0.0127 (0.0204)
BBB_{t-1}	0.0561* (0.0306)	0.0553* (0.0306)	−0.0244 (0.0201)	−0.0264 (0.0203)
A_{t-1}	−0.163*** (0.0312)	−0.166*** (0.0313)	−0.0877*** (0.0202)	−0.0882*** (0.0204)
AA_{t-1}	−0.550*** (0.0321)	−0.555*** (0.0322)	−0.205*** (0.0205)	−0.203*** (0.0206)
AAA_{t-1}	−1.144*** (0.0402)	−1.150*** (0.0403)	−0.439*** (0.0224)	−0.433*** (0.0226)
Seniority (years)$_t$[a]	0.0112* (0.00602)	−0.00385 (0.00602)	−0.122*** (0.00282)	−0.103*** (0.00285)
Liquidity index$_{t-1}$[a]	−0.185*** (0.00804)	−0.190*** (0.00805)	−0.202*** (0.00653)	−0.197*** (0.00657)
Market share$_{t-1}$[a]	−0.118*** (0.00475)	−0.118*** (0.00474)	0.121*** (0.00284)	0.119*** (0.00286)
Total net fixed assets$_{t-1}$[a]	0.137*** (0.00375)	0.135*** (0.00375)	−0.120*** (0.00193)	−0.117*** (0.00194)
Mortgage foreclosure—real estate (days)$_{t-1}$[a]	−0.186*** (0.0120)		0.239*** (0.00546)	
Mortgage foreclosure—movable (days)$_{t-1}$[a]		−0.0407*** (0.00616)		0.0701*** (0.00292)
Constant	−2.653*** (0.175)	−3.654*** (0.160)	−0.613*** (0.0749)	0.588*** (0.0688)
NACE code (FE)	Yes	Yes	Yes	Yes
Region (FE)	Yes	Yes	Yes	Yes
R^2 (overall)	.270	.271	.359	.357
Observations	133,318	133,318	174,840	174,840
Number of firms	44,091	44,091	58,082	58,082

Note: Analysis of the Italian manufacturing industry in the North of Italy between 2015 and 2019. Panel data with random effects (REs). Robust standard errors are in parentheses.

[a]Logarithmic transformation.

*$p < .1$.

**$p < .05$.

***$p < .01$.

TABLE A4 Robust test—Analysis of financial leverage (Model C) and days payable outstanding (Model D)

Variables	(Model C) Financial leverage$_t$[a]		(Model D) DPO value$_t$[a]	
CCC_{t-1}	0.442*** (0.0669)	0.442*** (0.0670)	−0.0429 (0.0582)	−0.0457 (0.0582)
B_{t-1}	0.679*** (0.0550)	0.686*** (0.0551)	0.00310 (0.0487)	−0.00733 (0.0487)
BB_{t-1}	0.356*** (0.0543)	0.358*** (0.0544)	−0.0766 (0.0485)	−0.0842* (0.0486)
BBB_{t-1}	−0.151*** (0.0543)	−0.156*** (0.0544)	−0.180*** (0.0485)	−0.182*** (0.0486)
A_{t-1}	−0.723*** (0.0549)	−0.730*** (0.0550)	−0.276*** (0.0488)	−0.277*** (0.0489)
AA_{t-1}	−1.416*** (0.0559)	−1.427*** (0.0560)	−0.352*** (0.0492)	−0.351*** (0.0492)
AAA_{t-1}	−2.212*** (0.0628)	−2.226*** (0.0630)	−0.380*** (0.0536)	−0.377*** (0.0537)
Seniority (years)$_t$[a]	−0.0853*** (0.00730)	−0.104*** (0.00730)	−0.0107 (0.00827)	0.00505 (0.00824)
Liquidity index$_{t-1}$[a]	−0.352*** (0.0105)	−0.360*** (0.0105)	0.236*** (0.0118)	0.241*** (0.0118)
Market share$_{t-1}$[a]	−0.0935*** (0.00578)	−0.0942*** (0.00577)	−0.335*** (0.00695)	−0.334*** (0.00696)
Total net fixed assets$_{t-1}$[a]	0.0964*** (0.00451)	0.0930*** (0.00451)	0.0182*** (0.00491)	0.0208*** (0.00491)
Mortgage foreclosure—real estate (days)$_{t-1}$[a]	−0.271*** (0.0143)		0.240*** (0.0174)	
Mortgage foreclosure—movable (days)$_{t-1}$[a]		−0.0545*** (0.00762)		0.0706*** (0.00927)
Constant	0.703*** (0.207)	−0.787*** (0.189)	−2.141*** (0.216)	−0.916*** (0.188)
NACE code (FE)	Yes	Yes	Yes	Yes
Region (FE)	Yes	Yes	Yes	Yes
R^2 (overall)	.520	.519	.110	.110
Observations	130,104	130,104	132,751	132,751
Number of firms	43,212	43,212	45,901	45,901

Note: Analysis of the Italian manufacturing industry in the North of Italy between 2015 and 2019. Panel data with random effects (REs). Robust standard errors are in parentheses.

[a]Logarithmic transformation.

*$p < .1$.

**$p < .05$.

***$p < .01$.