



RESEARCH

SMEs performance in public procurement and the Italian Legality Rating

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Abstract This study investigates the impact of the Italian Legality Rating (LR) on small and medium enterprises (SMEs) in public procurement. The LR, issued by the Italian Competition Authority, evaluates firms based on fiscal transparency, anti-corruption practices, corporate responsibility, and sustainability. While larger firms are more likely to obtain higher LR scores, SMEs benefit significantly from holding the certification. Using firm-level data and a Regression Discontinuity Design, we find that the LR doubles SMEs' tender-winning probabilities, highlighting its role as a strong institutional signal. Our findings emphasize the LR's potential to enhance SMEs' competitiveness in public procurement.

Plain English Summary A government-backed legality certificate can almost double a small firm's chance of winning a public contract. We study Italy's Legality Rating, which verifies firms' compliance with stan-

dards concerning fiscal transparency, anti-corruption, workplace safety, corporate responsibility, and environmental practices. Using firm and public procurement data and comparing businesses around the €2 million eligibility threshold, we find that small and medium-sized enterprises are less likely than larger firms to obtain the rating, but benefit more when they do: their probability of winning a tender rises by about 1.2 percentage points from a baseline of around 1.6%. This suggests that credible public certification can be especially valuable for smaller firms, which generally have fewer established ways to signal their reliability. Thus, governments should make credible certification more accessible to smaller businesses and consider an alternative for firms below the revenue threshold, so that certification promotes fair competition rather than creating an additional barrier to public procurement.

Keywords SMEs · Legality Rating · Public procurement

JEL Classification D44 · H57 · K40

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1 Introduction

A key goal of institutions is to guarantee legality in the business sector. This is especially the case when businesses are contractualized by public entities as in the case of public procurement (Chiappinelli, 2022; Chiappinelli et al., 2019, 2024; Maréchal & Morand,

2022; Montiel et al., 2019). To guarantee legality and the spread of virtuous practices concerning safety regulations, sustainable standards, and fiscal transparency, governments may require the enterprises to hold certifications showing their compliance.

In Italy, one such certification is the Legality Rating (LR). The LR is an institutional tool elaborated by the Italian Competition Authority, and its aim is to rate the legality of Italian Enterprises in terms of fiscal transparency, adoption of anti-corruption practices, attention to corporate social responsibility, green practices, and safety regulations. Enterprises holding the LR can benefit from advantages in public tenders, such as improved evaluation scores and easier access to credit from public financial institutions (Iossa & Mattonai, 2023; Main, 2023; Manaresi et al., 2022). Although several voluntary certifications may act as signals, the LR is distinct in that it is a state-issued certification explicitly designed to affect firms' interactions with public institutions, particularly in public procurement and access to credit. By providing a credible signal of legal compliance and integrity, it is especially relevant in procurement settings, where asymmetric information about firms' reliability and regulatory compliance is a central concern.¹

To get the LR, firms apply voluntarily by filling out an online request, where they need to show their indicators of fiscal transparency, involvement in sustainable practices, anti-corruption, etc. Each firm that receives the LR also gets a score. The score of the LR ranges from a minimum of one star (*) to a maximum of three stars (***). To get the minimum score, the enterprise must comply with the basic requirements on fiscal discipline, transparency of the records, and compliance with the health and safety regulations. The score can then be increased by providing evidence of an organizational model to prevent corruption and/or sustainable and green standards.

There is a wide theoretical and empirical literature on firm certifications (Dranove & Jin, 2010; Farhi et al., 2013; Hui et al., 2023a, b). Such certifications can serve as indicators of a firm's quality, helping to address the

challenge of unverifiable quality, particularly for firms that have not previously secured contracts (Albano et al., 2017; Lewis & Sappington, 1991). However, these certifications may also add complexity to the procurement process. Even if legal frameworks do not formally disqualify bidders lacking specific certifications, procurement entities may effectively exclude them in practice, thus disadvantaging certain bidders and potentially diminishing the overall quality of procurement outcomes (Bosio et al., 2022).

Larger firms may find it more easily to obtain the LR and achieve higher scores compared to smaller firms, as they can typically signal their quality more effectively (Fikru, 2014; Goel & Nelson, 2020; Terlaak & King, 2006). However, the literature suggests that certifications may marginally benefit small firms (Ullah, 2022). Hence, whether the LR is beneficial to small enterprises or whether it further increases small business costs for getting public contracts is, so far, an unexplored topic.

In this paper, we aim to answer this question by investigating the effect of the LR on small and medium enterprises (SMEs). In detail, we try to understand whether SMEs perform worse in the LR with respect to larger firms, and we try to understand whether having or not the LR may increase the probability of SMEs winning public tenders.

We build a unique dataset merging firm-level information with data on the LR and public procurement awards. We first present descriptive evidence suggesting that SMEs are less likely to get the LR with respect to bigger enterprises. We then investigate the effect of the LR on the winning probability of public tenders. Again, we start with a descriptive analysis showing that SMEs are less likely to win public tenders, and that the LR has a positive effect on winning probabilities of both SMEs and non-SMEs.

We dig deeper into the relationship between LR and winning probabilities, trying to establish possible causal effects. Exploiting the fact that only firms with a revenue level of 2 million may apply for the LR, we employ a Regression Discontinuity Design (Calonico et al., 2014) to unravel the causal effect of the LR on public tenders' winning probabilities. We find a positive and significant effect of the LR among SMEs; this effect is smaller on the overall sample, but is still sizeable and significant. Specifically, SMEs holding the LR experience an increase in winning probabilities by 1,2 p.p., meaning that the probability of winning an auction almost doubles.

¹ Despite the fact that the LR aggregates multiple dimensions (including fiscal, governance, and compliance-related aspects), its primary institutional role is to provide a synthetic measure of firms' adherence to legal and administrative standards. It should therefore be interpreted as a state-backed signal of reliability and integrity, rather than as a broad measure of firm quality or a pure measure of latent legality.

Overall, our results suggest that the LR may be more difficult to acquire for SMEs when compared with larger firms. However, these tools become a strong signal for public institutions that are more likely to reward and select SMEs holding the LR. Our results suggest that SMEs are those who may benefit more from the LR, as it becomes a clear signal of legality. Things are less pronounced for bigger firms, where additional certifications may be used to show one's firm's compliance and ethics (Drempetic et al., 2020), possibly reducing the risk aversion that characterizes public buyers when dealing with less experienced and/or smaller suppliers.

Our results contribute to three strands of the literature.

First, we relate to the literature investigating the effects of the LR introduction on procurement outcomes and firm behavior (Becchetti et al., 2024; DeBenedetto et al., 2024; Rosa & Bernini, 2021). Iossa and Latour (2025) investigate the effects of the Legality Rating, showing that a higher rating is associated with better procurement performance. Specifically, the authors find that higher legality scores are positively associated with lower time delays and extra costs. DeBenedetto et al. (2024) find a positive relationship between Legality Rating and firms' production efficiency, suggesting that the LR may help promote productivity and legality of the business sector. Our paper is closely related to Pizzo (2024), who studies the effect of the Legality Rating on firms' access to public procurement and contract execution efficiency using a matching-based approach, showing that the LR increases both participation and efficiency in public procurement. The author finds that most of the results are driven by firms holding a high LR score. We complement this work along three dimensions. First, we focus on procurement success conditional on participation, thereby isolating the role of the LR among firms already active in procurement markets. Second, we exploit the €2 million revenue eligibility threshold in a regression discontinuity design, which allows us to mitigate selection on unobservables and leverage quasi-exogenous variation in certification. Third, while Pizzo (2024) emphasizes heterogeneity across LR scores, we focus on firm size, providing a comprehensive picture of SMEs by showing that they are less likely to obtain the LR but benefit more from it once certified. Taken together, the two papers provide complementary evi-

dence on different margins of procurement outcomes, using distinct identification strategies.

We add to the literature investigating the effects of certifications on firms performance (Auriol & Schilizzi, 2015; Goedhuys & Sleuwaegen, 2013; Marinovic et al., 2018). Martí and Quas (2018) find that government certification helps SMEs secure bank financing by signaling credibility and reliability to lenders. The certification reduces information asymmetry, making banks more likely to lend to certified SMEs. Calza and Goedhuys (2021) show that domestic standards certification promotes growth in Vietnamese small firms by enhancing productivity and market access. Certification improves firms' credibility, aiding their competitive standing. Our results contribute to this literature by showing that certifications designed by the institutions may be particularly beneficial to SMEs, although they may be harder to get.

Last, we contribute to the literature studying SMEs participation in public procurement (De Silva et al., 2012; Nakabayashi, 2013; Nemec, 2024; Shagbazian et al., 2026). Hoekman and Taş (2020) analyze how procurement policies impact SMEs participation in public purchasing, finding that tailored policies, such as simplified procedures and set-asides, significantly increase SMEs engagement in public contracts. Hoekman and Taş (2024) examine the role of discretion in European public procurement processes, finding that allowing discretionary decision-making can improve procurement outcomes by fostering flexibility and efficiency. However, they also note risks of favoritism and reduced transparency, suggesting that discretion must be carefully managed to balance efficiency with accountability.

Cappelletti and Giuffrida (2024) analyzes set-aside programs in government procurement, finding that while these increase competition by attracting targeted firms, they often lead to cost overruns and delays. The authors highlight inefficiencies due to adverse selection and moral hazard. We add to this literature by showing the effects of institutional certifications on public procurement performance.

The paper develops as follows: Section 2 depicts the data; Section 3 shows the empirical strategy; in Section 4, we present the results and the robustness tests; and Section 5 offers a brief discussion of the results and concludes.

2 Data

2.1 The Legality Rating

The first dataset we use comes from the Italian Competition Authority (AGCM) and includes firm-level data on Legality Rating (LR). The LR is an indicator that reflects a company's adherence to high legal standards and its commitment to responsible business management. It was introduced with Article 5-ter of the Decree Law 1/2012. Companies that apply for it receive a score ranging from one to three stars. A base score of one star is awarded if the company meets all the requirements outlined in Article 2 of the Regulation on Legality Ratings, adopted by resolution no. 28361 on July 28, 2020. Although the criteria underlying the Legality Rating are publicly observable, its informational content does not derive from the opacity of the rules, but from the credible verification of firms' compliance with legally defined requirements. Obtaining the LR requires demonstrating the absence of legally verified violations (e.g., criminal records, breaches of labor safety regulations), which rely on administrative data and external verification rather than self-reported information. The LR should not be interpreted as a signal whose value depends on hidden or unexpected information. Its informational role derives instead from third-party verification and standardization. Contracting authorities may know the formal criteria for obtaining the rating, but still face costs in verifying whether each bidder satisfies them at the time of the tender. The LR reduces these verification costs by transforming dispersed legal and administrative information into a simple, standardized, state-backed signal. The relevant comparison is therefore not between public and hidden criteria, but between an uncertified firm whose compliance would have to be assessed by the buyer and a certified firm whose compliance has already been verified by AGCM. This channel is particularly relevant for SMEs, which typically have weaker reputational signals, fewer alternative certifications, and shorter procurement track records.

A potential limitation of the Legality Rating is that, once it becomes a target, firms may strategically seek to satisfy the requirements for certification. This concern is particularly relevant for voluntary certification schemes. In our setting, however, the institutional design of the LR limits the scope for short-run manipulation, as the rating is largely based on externally ver-

ified legal and administrative records rather than self-reported inputs. Still, the LR should not be interpreted as a perfect measure of firms' latent legality. If the certification loses informational content, its value as a signal to contracting authorities may be attenuated. Conversely, if firms with stronger internal organization or better compliance systems are more likely to obtain the rating, simple comparisons between rated and unrated firms may overstate its effect. For this reason, our empirical analysis combines rich controls, fixed effects, an RDD around the eligibility threshold, and within-firm estimates. At the same time, firms' behavioral responses to the LR are not necessarily a source of bias for our research question. If firms improve their compliance practices in order to obtain the certification, this is part of the policy mechanism: the LR may operate both by certifying pre-existing reliability and by encouraging compliance-enhancing behavior.

This score can increase by one "+" for each additional requirement met under Article 3 of the Regulation. Accumulating three "+" results in an additional star, up to a maximum of three stars. Firms can request the Legality Rating on a voluntary basis and, in addition to the basic requirements listed in the Regulation, companies must meet the following requirements to apply for the LR:

- be registered office located in Italy;
- have minimum revenues of 2 million Euros in the year preceding the year of request;
- be registered in the Business Register or in the Economic and Administrative Index (in Italian REA or Repertorio delle notizie Economiche e Amministrative) for at least two years before the application date.

For each firm that receives the Legality Rating (LR), the AGCM provides a dataset linking the rating outcome and the decision date with the firm's name and fiscal identifier. We use this dataset for the period 2013–2022. The LR remains valid for two years from issuance, and firms may request a renewal upon expiration. Moreover, there is no monetary cost for companies to obtain the LR. According to the AGCM, the main advantage of obtaining an LR is reputational (Garante & della Concorrenza e del Mercato, 2022). However, it is important to note that the LR does not attest to technical or organizational prerequisites; therefore, contracting

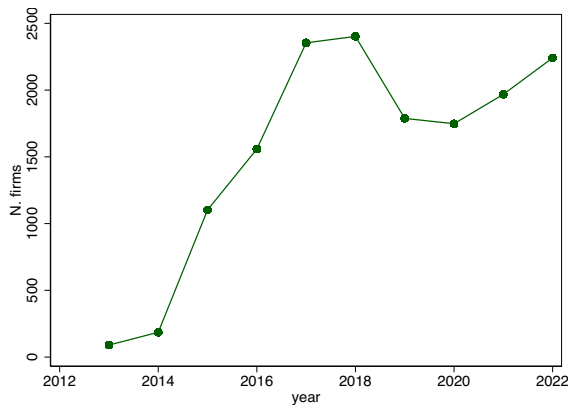


Fig. 1 New firms with Legality Rating in Italy

authorities cannot use it to exclude firms from tendering processes.²

Figure 1 shows the number of firms obtaining the LR for the first time. In total, almost 16,000 Italian companies have obtained the LR over the years 2013–2022. We do not observe unsuccessful applications for the LR. This limitation prevents us from separately estimating the application and approval stages. The control group therefore includes both firms that never applied for the LR and firms that may have applied but did not obtain it. The most relevant concern is positive selection into certification: firms receiving the LR may have stronger internal organization, better compliance systems, or more ambitious procurement strategies. In simple comparisons, this would likely bias the association between LR and procurement success upward. For this reason, our empirical analysis does not rely only on cross-sectional comparisons. We complement rich controls and fixed effects with an RDD around the EUR 2 million eligibility threshold and with within-firm estimates that absorb time-invariant firm characteristics. Still, our estimates should be interpreted as the effect of obtaining the LR among firms that become certified, rather than the effect of applying for the LR. Consistently, rating revocations are extremely rare (30 cases out of more than 16,000), suggesting limited ex-post non-compliance.

² In Resolution 101 of February 7, 2018, the Italian Anti-Corruption Authority declared that a tender requiring the LR among the technical and organizational prerequisites for bidders was non-compliant with the law.

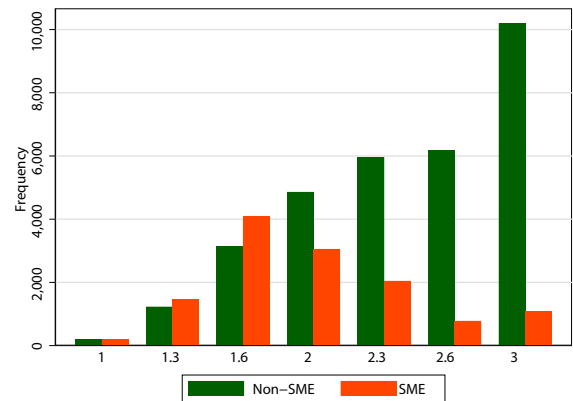


Fig. 2 Rating score distribution

2.2 Firm characteristics

The second dataset used is AIDA (Analisi Informatizzata delle Aziende Italiane or the Italian company information and business intelligence) from the Bureau van Dijk, which provides detailed firm-level balance sheets and firm characteristics on the universe of Italian corporations and limited liability companies for the years 2013–2022 (covering around 2 million firms per year). First, we define Small and Medium Enterprises (SMEs) as enterprises with less than 50 employees and revenues below 5 million Euros.³

We match firms by their Fiscal Code with the LR dataset to identify firms with LR by year. Figure 2 illustrates the distribution of the LR by firm size (SMEs vs. non-SMEs—only for firms with LR) and reveals that, while non-SMEs tend to have high or very high scores, SMEs usually have lower scores.

2.3 Italian procurement data

The third dataset is publicly provided by the Italian Anti-Corruption Authority and covers contract-level data on participating and winning firms in Italian public procurement tenders above 40,000 Euros. We use procurement data for the years 2013–2022. The dataset covers 34,290 unique tenders, and it includes the winner for 26,627 tenders. To match procurement data with firm data, we use the companies' fiscal code and the date of adjudication of the contract.

³ We employ two alternative definitions of SMEs: enterprises with less than 25 employees and enterprises with revenues below 5 million Euros.

Table 1 Descriptive statistics for SMEs and non-SMEs

Variable	SMEs			Non-SMEs		
	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Dummy for rating	0.07	0.255	521,256	0.152	0.359	718,158
Value of rating	1.869	0.475	36,484	2.354	0.554	108,835
Winning firm	0.016	0.124	521,256	0.015	0.122	718,158
Open auction	0.188	0.390	521,256	0.166	0.372	718,158
Restricted auction	0.389	0.488	521,256	0.251	0.434	718,158
Direct	0.301	0.459	521,256	0.467	0.499	718,158
Other type of auction	0.122	0.328	521,256	0.116	0.321	718,158
Age of the board	54.823	9.122	521,256	54.037	4.557	718,158
Share of women in the board	0.189	0.290	521,256	0.265	0.172	718,158
Employees	16.922	187.872	521,256	1382.146	7057.693	718,158
Revenues	3489.255	23,883.319	521,256	642,463.091	2,247,508.562	718,158
Profits	138.438	3044.122	521,256	16,303.262	440,153.071	718,158
Wages	527.154	610.395	521,256	58,890.925	246,390.383	718,158
Turnover per employee	7.872	10.315	521,256	9.707	13.441	718,158
Value added	63,748.878	52,751.892	521,256	118,835.652	84,164.159	718,158
Number of tenders (firm-year)	9.948	17.647	521,256	217.568	347.854	718,158
	Total number of SMEs 58661			Total number of non-SMEs 11013		

Note: revenues, profits, wages, turnover per employee, and value-added are expressed in thousands of Euros

2.4 Descriptive statistics

We construct a firm-year panel including firms that have won at least one procurement contract and have a level of revenues of at least 50,000 euros per year. Each firm enters the panel in the year of its first observed contract and is then followed in subsequent years, allowing us to track its procurement performance over time. As a result, the analysis focuses on firms that are already active in public procurement markets. Accordingly, our estimates should be interpreted as capturing the effect of the Legality Rating on procurement success conditional on participation (i.e., the intensive margin), rather than its effect on firms' entry into procurement markets (i.e., the extensive margin). This implies that our results speak to the role of the LR in shaping competitive outcomes among participating firms, while leaving open the question of whether the LR affects access to procurement markets more broadly. We use our dataset in its long form, meaning that we use yearly data on firms that have won just one contract starting from the year in which they won the first procurement contract. Table 1 displays the summary statistics for SMEs and non-SMEs. The share of SMEs with LR is

less than half the share of non-SMEs with LR (0.07 vs. 0.15) and, consistent with Fig. 2, their average value of LR is lower (1.87 vs. 2.35). Moreover, SMEs display higher award rates in restricted auctions (0.39 vs. 0.25) and lower participation in direct tenders (0.30 vs. 0.47) than non-SMEs. There is also a striking difference in the number of procurement contracts that SMEs win in a year (10 contracts, on average), when compared with non-SMEs (218, on average). Finally, while both types of firms display a similar average age of the board, SMEs have a lower average share of women on the board.

3 Empirical framework

Our investigation aims to understand the effect of the Legality Rating (LR) on Small and Medium Enterprises (SMEs). Specifically, we try to understand whether SMEs have a lower probability of getting the LR, and we also study whether the LR may be an advantage for SMEs in public tenders. As explained above, we define SMEs as those enterprises with less than 50 employees

and revenues below 5 million Euros. In the robustness, we also test our results with alternative definitions.

We first investigate the relationship between firm size and the probability of getting the LR employing a linear probability model as in Eq. 1.

$$RatingDummy_{irts} = \beta_0 + \beta_1 SMEs_{irts} + \delta_r + \gamma_t + \theta_s + \epsilon_{irts} \quad (1)$$

Where *RatingDummy_{irts}* is a dummy variable taking a value equal to one if the firm has the LR and zero otherwise, *SMEs_{irts}* is our variable of interest, taking a value equal to one if the firm is a SMEs and zero otherwise, $\beta_2 X_i$ controls for firm-specific characteristics such as the share of females in the board and the average age of the board, δ_r , γ_t , θ_s control for regional, time and sector fixed effect, and ϵ_{irts} is the error term.

We then investigate the differences between SMEs and non-SMEs in the probability of winning a public tender, and how and if the LR may increase winning probabilities. For this purpose, we first run an equation similar to Eq. 1, where the dependent variable is winning probabilities, and the independent variable of interest is *RatingDummy_{irts}*.

Running a simple linear probability model does not properly address endogeneity concerns, though. We may find that the effect (if any) of the LR on winning probabilities of public tenders is driven by a spurious correlation between firm size and winning probabilities. In fact, larger companies may obtain the LR more easily and may also have a higher likelihood of being awarded procurement contracts even in the absence of the LR. Also, since application to the LR is voluntary, firms applying and not applying to the LR may differ in some unobserved characteristics even controlling for firm-level characteristics, auction features, and a rich set of fixed effects. To mitigate these concerns, we employ a Regression Discontinuity (RDD) approach. Specifically, we exploit the 2 million Euros revenue requirement to apply for the LR. The intuition behind our empirical strategy is to compare firms just above the threshold the year before obtaining the LR for the first time, with firms that had revenues just below the threshold and could not apply for the LR. Therefore, treated firms at time t are those with no LR in the preceding year (but who are eligible to get the LR since they have revenues above or equal 2 M) and, once they obtain LR, they are considered as treated. Untreated

firms, instead, are those with no LR at time t . To select the window, we estimate the optimal bandwidth following Calonico et al. (2014). We estimate the following equation in the RDD-refined sample:

$$y_{pit} = \beta_0 + \beta_1 RatingDummy_{it} + \delta_r + \gamma_t + \theta_s + \nu_c + \beta_2 X_i + \beta_3 Z_p + \epsilon_{pit} \quad (2)$$

where y_{pit} is the dummy for firm i winning procurement tender p in year t . We control for region, time, sector, and contracting authority fixed effects. Further, we include turnover per employee, value-added, number of females in the board, and average age of the board as firm-level controls ($\beta_2 X_i$), and we control whether auctions are restricted or open ($\beta_3 Z_p$).

4 Results

Table 2 shows the relationship between firm size and the probability of getting the Legality Rating (LR) over the years 2014–2022.⁴ Results suggest that Small and Medium Enterprises (SMEs) are less likely to get the LR (column 1).

In Table 3 we investigate the relationships between firm size and being awarded a tender. Column 1 of Table 3 reveals that SMEs are 0.5 p.p. less likely to be awarded a public procurement tender (30 % of the mean value). We further analyze the association between LR and winning a procurement tender in columns 2–4 of Table 3. Companies with the LR are 0.6 p.p. more likely to be awarded procurement contracts, with SMEs benefiting more than non-SMEs from the LR (see columns 3 and 4).

Results in Tables 2 and 3 are, however, mainly descriptive. Hence, as explained in the previous section, to better understand the effect of the LR on the probability of winning public procurement contracts, we employ a Regression Discontinuity Approach, leveraging the 2 million threshold required to apply for the LR.

Column 2 in Table 2 already shows that the threshold is a predictor of the LR. In detail, firms with Revenues above the 2 million threshold are 14 p.p. more likely to have an LR.

⁴ We remove the year 2013 from the analysis as companies with LR were too few.

Table 2 Legality Rating predictors

	(1) Rating dummy	(2) Rating dummy	(3) Rating dummy
SME	−0.162*** (0.024)		−0.192*** (0.030)
Revenues $\geq 2M$		0.147*** (0.012)	0.037 (0.026)
Revenues $\geq 2M \times SME$			0.076*** (0.028)
Observations	1,155,627	1,155,627	1,155,627
R-squared	0.196	0.189	0.207
Firm-level controls	Yes	Yes	Yes
Region F.E.	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes
Sector F.E.	Yes	Yes	Yes
Mean Dep. Var.	0.125	0.125	0.125

Note: firm-level controls include value-added, wages, profits, the share of women in the board, the share under 40 in the board, and the age of the board. Standard errors in parentheses

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

Table 3 SMEs and public procurement

	(1) Winning firm	(2) Winning firm	(3) Winning firm—SMEs	(4) Winning firm—non-SMEs
SMEs	−0.005*** (0.001)			
Dummy for rating		0.006*** (0.001)	0.008*** (0.001)	0.003** (0.002)
Observations	1,155,338	1,155,338	486,089	666,181
R-squared	0.086	0.086	0.079	0.109
Firm-level controls	Yes	Yes	Yes	Yes
Auction controls	Yes	Yes	Yes	Yes
Contracting authority F.E.	Yes	Yes	Yes	Yes
Region F.E.	Yes	Yes	Yes	Yes
Publication year F.E.	Yes	Yes	Yes	Yes
Sector F.E.	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.0164	0.0164	0.0166	0.0163

Note: firm-level controls include turnover per employee, value-added, average age of the board, and share of women in the board. Auction controls include whether the auction is restricted or open. Robust standard errors clustered at sector level in parentheses

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

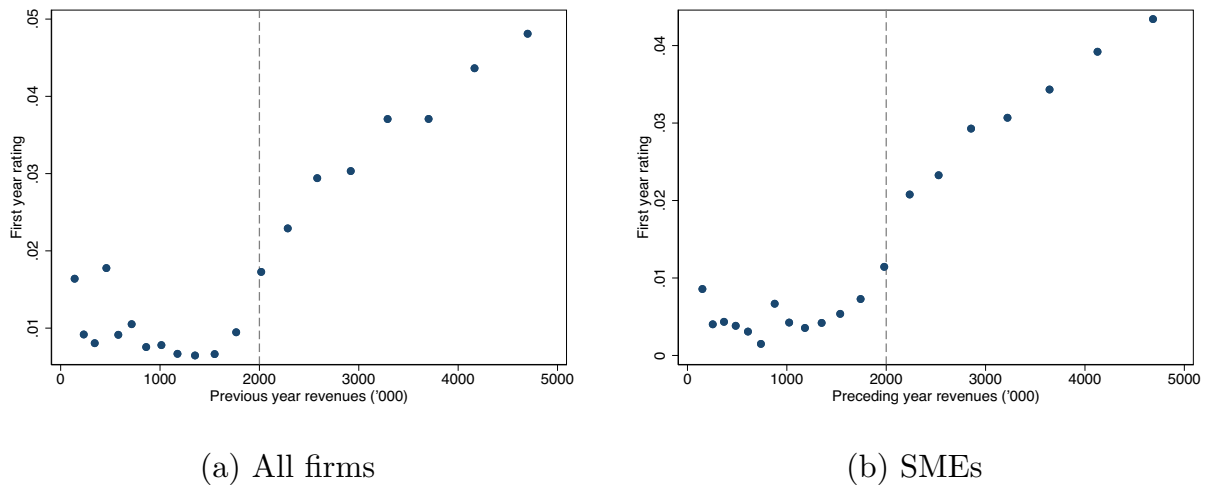


Fig. 3 New firms with LR and preceding year revenues

In line with this evidence, Fig. 3 shows the scatterplots of previous year revenues and the dummy for having obtained the LR for the first time for all firms (panel a) and SMEs (panel b). Although the rating is formally accessible only to firms above the 2 million threshold, a few observations appear below it. This likely reflects minor timing mismatches between the fiscal year of reported revenues and the year of the rating application, rather than a genuine exemption from the eligibility rule. Both panels nonetheless display a clear discontinuity at the threshold. Also, this evidence pushes us to include two different robustness checks: first, we treat these observations as errors, and we re-estimate our RDD when removing firms with the LR and the level of revenues lower than two million; second, we employ a fuzzy design to ensure causal interpretation of the results.

Before moving directly to the estimation, we run some analysis to check for possible manipulation around the threshold. We check the distribution of the previous year's revenues by showing the McCrary density test and the histogram around the discontinuity. Figure 4 shows that the distribution is continuous around the 2 million Euros threshold, suggesting that there is no manipulation. We find similar results when displaying the histograms of the revenues' distribution for both SMEs and non-SMEs in Fig. 5. Both distributions show no discontinuity around the threshold. Also

in Fig. 6, the scatterplots of different firm-level measures around the threshold do not display a discontinuity at the 2 million Euros threshold.

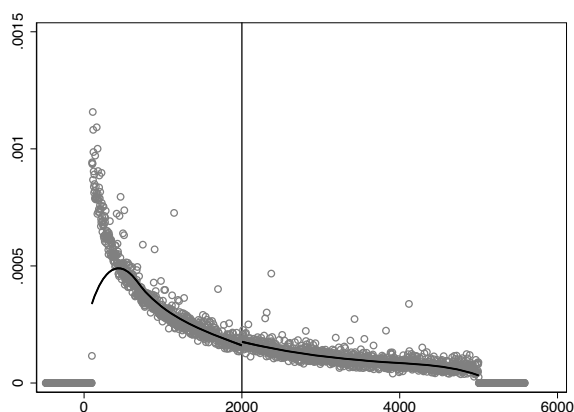
Table 4 shows the results of our Regression Discontinuity estimation.⁵ We find that the LR has a positive, but not significant, effect on winning probabilities in general (see column 1). However, when we focus on SMEs, the probability of being awarded a procurement contract almost doubles. Therefore, our results suggest that the LR does causally influence the probability of winning, but most of the effect depends on smaller firms, which may use this certification to signal their quality.

4.1 Robustness checks

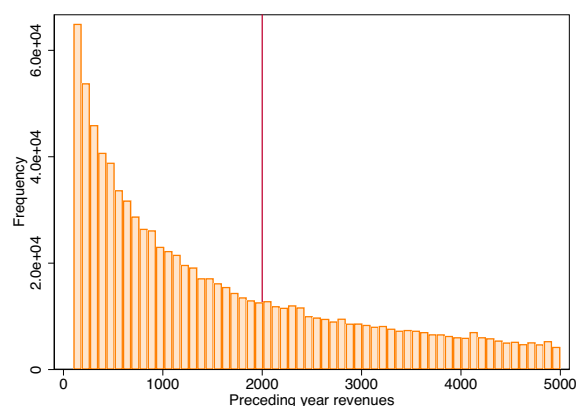
In this subsection, we run some robustness checks of our main results.

Firm fixed effects To address the concern that the results we find are driven by firm characteristics (i.e., firms meeting some specific requirements) instead of the LR per se, we complement the RDD with a within-firm specification including firm fixed effects. This

⁵ Given the level of the threshold, we report the estimates for the whole sample and for the SMEs. The RDD for bigger firms is much noisier and lacks clear significance since the average level of revenues for non-SMEs is around 6 million.



(a) McCrary Density test



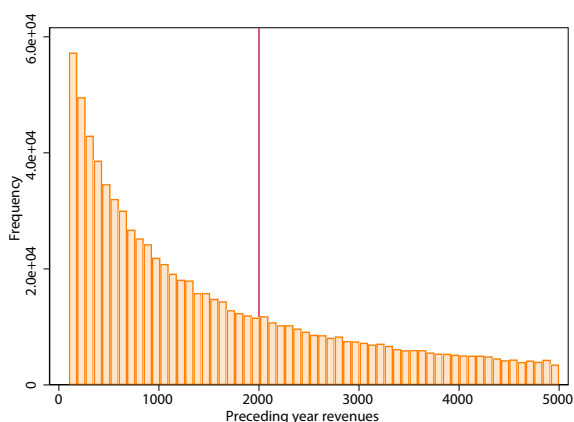
(b) Histogram

Fig. 4 Distribution of preceding year revenues around the 2 million Euros threshold

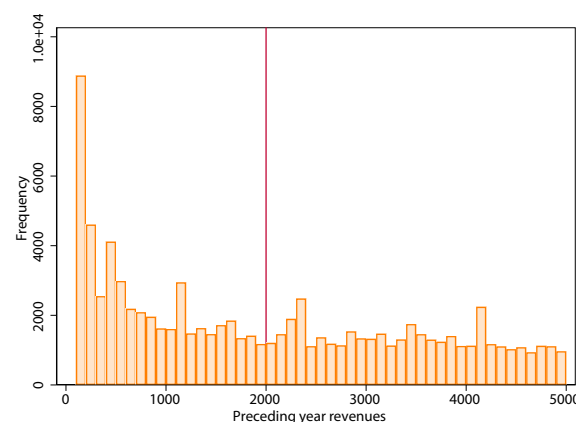
analysis exploits changes over time in firms' position relative to the EUR 2 million eligibility threshold and changes in LR status. The specification absorbs all time-invariant firm characteristics, including persistent differences in managerial quality, reputation, sectoral specialization, and procurement ability. The results, reported in Table 5, show that among SMEs crossing the EUR 2 million threshold is associated with a higher probability of obtaining the LR (column 4). Moreover, obtaining the LR is associated with a higher probability of winning procurement contracts within the same firm

for SMEs (column 3). These estimates do not replace the RDD and cannot rule out time-varying unobserved shocks. However, they show that the main pattern is not driven only by fixed differences between firms with LR and firms without LR.

Alternative definitions of SMEs As a first check of the validity of our main result, we perform additional regressions of equation 1 using two alternative definitions of SMEs. Table 6 shows the results when defining SMEs as those with employees below 25 (column 1)

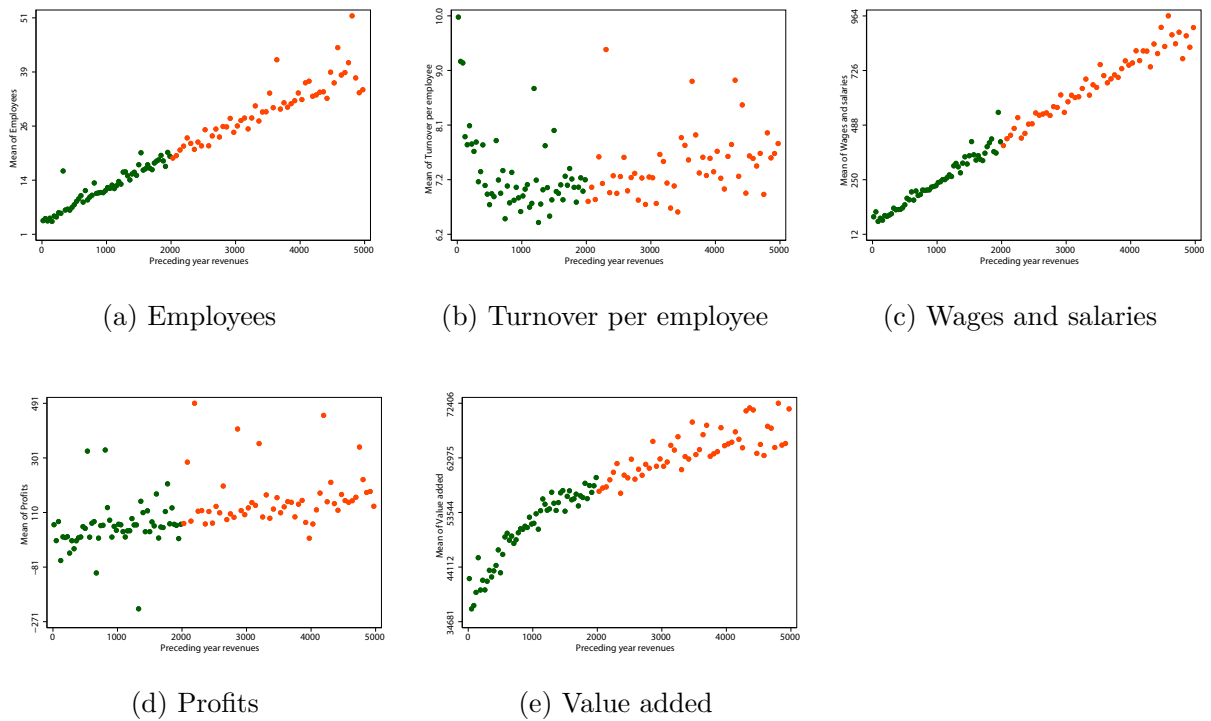


(a) SMEs



(b) Non-SMEs

Fig. 5 Distribution of preceding year revenues around the threshold: SMEs vs. non-SMEs

**Fig. 6** Scatterplots of firm-level measures**Table 4** Legality Rating and public procurement—RDD

	(1) All firms	(2) SMEs
Dummy for rating	0.006 (0.004)	0.012*** (0.005)
Observations	201,130	182,614
<i>R</i> -squared	0.205	0.111
Firm-level controls	Yes	Yes
Auction controls	Yes	Yes
Contracting authority F.E.	Yes	Yes
Region F.E.	Yes	Yes
Publication year F.E.	Yes	Yes
Sector F.E.	Yes	Yes
Mean Dep. Var.	0.0235	0.0161
Bandwidth	1208	1300

Note: firm-level controls include turnover per employee and value-added. Auction controls include whether the auction is restricted or open. Robust standard errors clustered at sector level in parentheses

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

Table 5 Legality Rating and public procurement—firm fixed effects

	(1) Non-SMEs Win	(2) Rating dummy	(3) SMEs Win	(4) Rating dummy
Dummy for rating	0.000 (0.002)		0.005*** (0.002)	
Revenues $\geq 2M$		0.001 (0.012)		0.005*** (0.002)
Observations	664,310	664,310	466,400	466,400
R-squared	0.132	0.187	0.168	0.229
Firm FE	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes
Region F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Sector F.E.	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.0163	0.0380	0.0167	0.0232

Note: the regressions include firm fixed effects. Columns 1 and 2 include the sample of non-SMEs, columns 3 and 4 include the sample of SMEs. Firm-level controls include turnover per employee and value-added. Auction controls include whether the auction is restricted or open. Robust standard errors clustered at sector level in parentheses

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

and SMEs as those with revenues below 5 million Euros (column 2). We find that the results are robust to both definitions, with coefficients very close to Table 4.

Winsorizing revenues We check the robustness of our results by winsorizing previous year revenues at 5 and 95% and at 10 and 90%. Tables 7 and 8 show the

results of our robustness checks. While the coefficient in Table 8 loses statistical significance and becomes much noisier (possibly due to the lower sample size), it still remains consistent with our main results. Furthermore, Table 7 shows that when winsorizing at 5 and 95 %. Results are similar to our main findings.

Table 6 Legality Rating and public procurement—RDD

	(1) SMEs below 25 employees Winning firm	(2) SMEs below 5M revenues Winning firm
Dummy for rating	0.017*** (0.006)	0.013** (0.006)
Observations	196,954	187,852
R-squared	0.109	0.112
Firm-level controls	Yes	Yes
Auction controls	Yes	Yes
Contracting authority F.E.	Yes	Yes
Region F.E.	Yes	Yes
Publication year F.E.	Yes	Yes
Sector F.E.	Yes	Yes
Mean Dep. Var.	0.0157	0.0149
Bandwidth	1465	1305

Note: firm-level controls include turnover per employee and value-added. Auction controls include whether the auction is restricted or open. Robust standard errors clustered at sector level in parentheses

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

Table 7 Legality Rating and public procurement—RDD winsorizing revenues at 5 and 95%

	(1) All Firms Winning firm	(2) SMEs Winning firm
Dummy for rating	0.011** (0.005)	0.014*** (0.005)
Observations	132,678	108,575
<i>R</i> -squared	0.239	0.146
Firm-level controls	Yes	Yes
Auction controls	Yes	Yes
Contracting authority F.E.	Yes	Yes
Region F.E.	Yes	Yes
Publication year F.E.	Yes	Yes
Sector F.E.	Yes	Yes
Mean Dep. Var.	0.0252	0.0169
Bandwidth	709.3	695.1

Note: firm-level controls include turnover per employee and value-added. Auction controls include whether the auction is restricted or open. Robust standard errors clustered at sector level in parentheses

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

Excluding below-threshold rated firms Since Fig. 3 shows that there are some firms with LR, but with revenues lower than 2 million, we check the robustness of our results when eliminating these observations from our sample. Also in this case, the results are in line with our main analysis (Table 9).

Fuzzy design In our main analysis, we focus on firms that have won at least one procurement contract. We also focus our regression discontinuity identification on firms that take the Legality Rating for the first time, and that show a level of revenues just above the threshold the year before the assignment of the Legal-

Table 8 Legality Rating and public procurement—RDD winsorizing revenues at 10 and 90%

	(1) All firms Winning firm	(2) SMEs Winning firm
Dummy for rating	0.006 (0.008)	0.010 (0.008)
Observations	72,753	62,953
<i>R</i> -squared	0.305	0.177
Firm-level controls	Yes	Yes
Auction controls	Yes	Yes
Contracting authority F.E.	Yes	Yes
Region F.E.	Yes	Yes
Publication year F.E.	Yes	Yes
Sector F.E.	Yes	Yes
Mean Dep. Var.	0.0307	0.0192
Bandwidth	375.7	406.6

Note: firm-level controls include turnover per employee and value-added. Auction controls include whether the auction is restricted or open. Robust standard errors clustered at sector level in parentheses

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

Table 9 Legality Rating and public procurement—RDD excluding below-threshold rated firms

	(1) All Firms Winning firm	(2) SMEs Winning firm
Dummy for rating	0.007 (0.005)	0.008*** (0.001)
Observations	72,753	62,953
R-squared	0.305	0.177
Firm-level controls	Yes	Yes
Auction controls	Yes	Yes
Contracting authority F.E.	Yes	Yes
Region F.E.	Yes	Yes
Publication year F.E.	Yes	Yes
Sector F.E.	Yes	Yes
Mean Dep. Var.	0.0241	0.0165
Bandwidth	940.7	667.04

Note: firm-level controls include turnover per employee, share of females in the board, age of the board, and value-added. Auction controls include whether the auction is restricted or open. Robust standard errors clustered at sector level in parentheses

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

ity Rating. This should lower possible selection concerns. However, since firms apply to the LR on a voluntary basis, we are not fully able to eliminate selection issues. As an example, firms applying to the LR may differ on some unobserved characteristics with respect to firms that do not get the LR. To try to lower these concerns, we also employ a Fuzzy Regression Discontinuity Design, where in the first stage we estimate the probability of getting the Legality Rating, given the revenue threshold.

The results in Tables 10 and 11 indicate a positive and significant effect of the Legality Rating on winning a public procurement contract in the overall sample. However, when we restrict the sample, we find that the results appear to be driven by SMEs. Although the results in Table 11 are noisy, due to the smaller number of observations, we find that the point estimates for SMEs are positive, sizable, and close to significant thresholds.

Table 10 Legality Rating and public procurement—fuzzy RDD

	(1) First stage (LR)	(2) Treatment effect (Win)
Conventional	0.0129*** (0.0014)	0.4775** (0.2077)
Bias-corrected	0.0128*** (0.0014)	0.3973* (0.2077)
Robust	0.0128*** (0.0016)	0.3973* (0.2185)
Observations	1,183,089	1,183,089
Effective observations (left/right)	292,123/399,448	292,123/399,448
Number of clusters	1049/1058	1049/1058
Bandwidth (h)	18,470.64	18,470.64

Note: Fuzzy Regression Discontinuity estimates with covariate adjustment using a triangular kernel and local linear polynomial ($p = 1$). Robust standard errors clustered at the sector level. Covariates include *Rendimentodipendenti*, *VA*, *restricted*, and *open*

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

Table 11 Legality Rating and public procurement—fuzzy RDD (SMEs)

	(1) First stage (LR)	(2) Treatment effect (Win)
Conventional	0.0027** (0.0011)	0.8206 (0.6374)
Bias-corrected	0.0020* (0.0011)	0.5420 (0.6374)
Robust	0.0020 (0.0026)	0.5420 (1.1036)
Observations	496,017	496,017
Effective observations (left/right)	168,131/86,632	168,131/86,632
Number of clusters	1027/909	1027/909
Bandwidth (h)	1454.30	1454.30

Note: Fuzzy Regression Discontinuity estimates with covariate adjustment using a triangular kernel and local linear polynomial ($p = 1$). Robust standard errors clustered at the sector level. Covariates include *Rendimentodipendenti*, *VA*, *restricted*, and *open*

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

Overall, these results appear to confirm our previous analysis: the LR affects the winning probabilities of SMEs.⁶

5 Discussion and conclusion

Certifications are increasingly used by governments and institutions to guarantee firms' compliance. In the last decade, the Italian Competition Authority (AGCM) introduced the Legality Rating (LR), a certification that evaluates firms' compliance with safety regulations, fiscal transparency, anti-corruption practices, and sustainable and green standards. Firms holding the Legality Rating "have the right to access benefits when they request public or bank funding and when they partici-

pate in public procurement tenders" (Garante & della Concorrenza e del Mercato, 2022).

Ethical and legal certifications are usually less costly for bigger firms (Drempetic et al., 2020), hence in this paper we investigate the effect of the LR on SMEs. First, we find a negative correlation between firm size and the LR, meaning that SMEs are less likely to get the LR and that they are less likely to get a higher score if compared with bigger firms. Descriptively, we also find that SMEs are less likely to win public tenders and that holding the LR may increase winning probabilities.

We exploit the fact that only firms with a level of 2 million in revenues can request the LR to delve deeper into possible causal relationships between the LR and public tender-winning probabilities. Employing a Regression Discontinuity Design (RDD), we show that SMEs holding the LR are 1.2 percentage points more likely to win public tenders. The same holds for the whole sample, but with a much smaller magnitude. Our results are robust to a specification with firm fixed-effects, alternative definitions of SMEs, alternative empirical strategies, and different levels of winsorization.

We interpret our results in light of the literature showing that certifications are signals that reduce information asymmetries (Asseyer & Weksler, 2024; Etilé & Teyssier, 2016; Terlaak & King, 2006). The LR may be viewed by the authorities as a clear signal of compliance and legality; as a result, SMEs holding the Legality

⁶ Note that our fuzzy RDD estimates identify a Local Average Treatment Effect for firms whose decision to obtain the LR is affected by eligibility. These firms are located around the €2 million threshold and are likely to be marginal applicants with limited prior reputation in procurement markets. In this context, the LR may provide a particularly salient signal of reliability and compliance, leading to sizeable effects on procurement outcomes. This is especially relevant given the low baseline probability of winning a contract (around 1.6%), which implies that even small absolute changes correspond to large proportional effects. Accordingly, our estimates should be interpreted as local to firms close to the threshold and to first-time LR recipients, and may not generalize to firms with more established procurement histories.

Rating may be particularly advantaged by holding this certification. The same applies to a lesser extent to bigger firms, as information asymmetries are particularly higher for small enterprises (Martí & Quas, 2018).

Our findings add a tile to the current debate about SMEs participation in public procurement and institutional certifications (Hoekman & Taş, 2020; Hoekman & Taş, 2024; Pizzo, 2024) by showing that certifications such as the LR are more difficult to achieve for SMEs. However, SMEs are also those who benefit more from this kind of certification, at least when looking at public procurement winning probabilities. Further research is needed to understand whether the effects of the LR may then improve overall efficiency. As a policy implication of our study, the government might perhaps create an alternative certification for very small firms (e.g., those with revenues below 2 million Euros), not to be further penalized in the public procurement process by the introduction of tools as the LR. Cappelletti et al. (2024) show that winning public procurement may help firms survival. Is the LR a way in which only the most productive and virtuous firms are helped to survive?

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Data availability The firm-level financial information from the AIDA Bureau van Dijk database is subject to third-party licensing restrictions and therefore cannot be shared directly. However, the authors are fully committed to transparency and replicability: we are happy to share all code (do-files and scripts) and detailed documentation needed to reconstruct the sample and replicate all empirical results, conditional on researchers having access to the same AIDA license and to the publicly available Legality Rating and procurement data.

Declarations

Ethics approval and consent to participate Not applicable.

Competing interests The authors declare no competing interests.

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