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Article

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Does corporate integrity affect firm efficiency?

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A B S T R A C T

This study investigates how corporate integrity influenced firm efficiency in the United States in 2001–2018. Based on a measure of corporate integrity computed by machine learning and a measure of firm efficiency generated by data envelopment analysis, the results of our multivariate regression suggest that greater corporate integrity is generally associated with higher firm efficiency. This finding indicates that in a more integral culture, firms can optimize the use of resources to generate revenues more efficiently. We identify corporate social responsibility engagement as a channel through which integrity positively impacts firm efficiency. Interestingly, hiring external CEOs does not seem to result in a significant change in firm efficiency in terms of corporate integrity, suggesting that importing culture into top management does not change the effect of corporate integrity on firm efficiency.

1. Introduction

Corporate integrity has become increasingly important in the business world owing to the growing demand for ethical and responsible business. Corporate integrity refers to a company's commitment to ethical practices, including transparency, accountability, and compliance with laws and regulations. Studies have consistently demonstrated the crucial role of integrity in companies' long-term viability and growth (Brenkert, 2004; Donker et al., 2008; Wei et al., 2020). Although a rapidly growing body of literature has focused on corporate social responsibility (CSR), little is known about the relationship between corporate culture of integrity and firm efficiency. An idea worth noting is that CSR and corporate integrity are related but not exchangeable concepts (Maak, 2008), that is, recent findings in the growing CSR literature might not comprehensively apply to corporate integrity. According to the classification of Brown (2006), corporate integrity has five dimensions: cultural, interpersonal, organizational, social, and natural. The previous literature has focused on the impact of the different aspects of corporate ethical operations and activities, which belong to the organizational and interpersonal dimensions (e.g., management misconduct), on firm performance but not on the effect of integrity foundation values (i.e., corporate culture). The following two notes have been emphasized: (i) ethical operations and activities are outcomes and not the foundation value of firms; and (ii) firm efficiency is different from firm performance, with firm efficiency showing the marginal performance output a firm can achieve with a given set of

resource inputs. The current study aims to investigate the impact of corporate integrity on firm efficiency by analyzing the extent to which a firm's integrity culture influences its capacity to efficiently allocate and manage resources in business operations.

One pervasive problem in corporate integrity studies is that they do not comprehensively measure integrity at the firm level for empirical analysis. Past and current studies have mainly relied on questionnaires and interviews to collect data (Chatman et al., 2014; Graham et al., 2022; Guiso et al., 2015; Kaptein & Avelino, 2005; Shu et al., 2018), including those on corporate and managerial misbehavior (Biggerstaff et al., 2015; Davidson et al., 2015; Liu, 2016; Pham & Tran, 2020) and CSR performance (CSR) (Binh et al., 2022; McGuire et al., 1988; Wan et al., 2020). However, these approaches have some inherent issues, such as small sample sizes. Another concern is that the application of a binary variable setting to proxy misbehavior as a presentation of corporate integrity may cause information loss because this approach classifies firms into two groups of extreme degrees of integrity and does not capture the time-variant elements of corporate integrity (e.g., Liu (2016); Wan et al. (2020). Li et al. (2021) addressed this limitation by using machine learning to measure corporate integrity from the transcript data of the question and answer (Q&A) sections of earnings conference calls. The measure of Li et al. (2021) has been well validated by multiple tests and thus opens new avenues for follow-up studies in the corporate culture literature.

In the current study, we aim to understand the role of corporate integrity in the formation of firm efficiency by using a measure of

Abbreviations: 2SLS/IV, two-stage least squares–instrumental variable; CSR, corporate social responsibility; CSR, corporate social responsibility performance; DEA, data envelopment analysis; DMU, decision-making unit; LASSO, least absolute shrinkage and selection operator; LDS, LASSO double selection; Q&A, question and answer; RIT, ratio of indirect effect to total effect; RID, ratio of indirect effect to direct effect.

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corporate integrity culture generated through machine learning (Li et al., 2021). To measure firm efficiency, we use the measure of Demerjian et al. (2012) generated from data envelopment analysis (DEA). Our sample comprises firms in the United States in the 2001–2018 period given the availability of data from Li et al. (2021) and Demerjian et al. (2012). Our multiple fixed effects regression results show that corporate integrity exerts a significant positive impact on firm efficiency, thereby suggesting the evident economic impact of an integral culture on the improvement of corporate outcomes. We further confirm the baseline findings using a wide range of econometric approaches, including two-stage least squares–instrumental variable (2SLS/IV) regression, two-step Heckman selection regression, least absolute shrinkage and selection operator (LASSO), entropy balancing, alternative model specifications, and variable measurements. Finally, we find that even when firms hire external CEOs, the effect of corporate integrity does not change significantly, implying the persistence of integrity within the firm.

The contributions of this study to the existing literature are significant. First, this study is the first comprehensive empirical work to investigate the direct relationship between firm-level integrity values and firm efficiency. Most prior studies have examined the indirect relationship from an output perspective (e.g., CSR outcomes and corporate misconduct). By contrast, we demonstrate a direct integrity–efficiency relationship using U.S. firm data, thus providing a reference for the linkage of the two factors from a corporate finance perspective. Integrity culture generally improves firm efficiency and marginal managerial-specific performance. Therefore, our findings emphasize the importance of firms' intrinsic cultural values in shaping corporate outcomes. Second, our findings address the mediating effect of CSR as a channel through which corporate integrity affects firm efficiency. Using a mediation analysis with the structural equation modeling approach proposed by Iacobucci et al. (2007) and Zhao et al. (2010), we show evidence of the partial mediation of CSR practices on the integrity–efficiency relationship, meaning that firms transform their integral culture into a practical contribution to society and are thus rewarded for doing good deeds. Empirically, 17.9% of the impact of integrity on firm efficiency is indirect via the CSR channel while the indirect impact of other unobserved channels seems relatively small (less than 2.7%). Third, our findings shed light on the significance of external CEO promotion in the integrity–efficiency relationship. We address the persistence of integrity within a firm and its impact on firm efficiency regardless of the presence of an external CEO alienated from the firm's culture. This novel finding adds to our understanding of the effects of external CEOs on firm outcomes from an ethical perspective.

The remainder of this paper is organized as follows: Section 2 discusses the hypothesis development. Section 3 presents the research methodology and data. Section 4 reports and discusses the empirical results. Finally, section 5 concludes the paper.

2. Hypothesis development

Previous studies have suggested that an ethical corporate culture drives better firm performance. Denison and Mishra (1995) demonstrate a positive relationship between corporate culture and financial performance. Specifically, companies with a strong culture of integrity, adaptability, and involvement tend to outperform their peers in profitability, sales growth, and return on assets. Wan et al. (2020) provided evidence that a strong corporate integrity culture is positively associated with CSR practices, suggesting that promoting an integrity culture can effectively enhance CSR in Chinese firms. For instance, effective corporate governance can enhance the relationship between corporate integrity and the quality of internal controls, suggesting that promoting corporate integrity can lead to stronger internal controls (Shu et al., 2018). Simons et al. (1999) indicated that CEO integrity can influence these factors, leading to the improved financial performance of firms. Chen et al. (2014) reported that the transparency and comparability of

financial information can attract more foreign direct investment. This finding suggests that companies with a high degree of corporate integrity, which makes them more likely to provide transparent and reliable financial information, may be more attractive to investors and may contribute to sustainable development.

Collectively, the findings from the literature highlight the impact of the different aspects of corporate ethical businesses on firm performance but not the effect of integrity foundation values (i.e., corporate culture). We note that ethical operations and activities are outputs (performance) while the foundation values of firms are inputs. We draw on the new stakeholder theory on organizational purpose (McGahan, 2023), which states that an organization's survival and performance depend on its business ethics toward stakeholders. If a firm always considers the benefits for all stakeholders, not just shareholders, in its business purpose (which is intrinsic and cultural), then this firm can be expected to have enhanced efficiency. Consequently, we propose the following hypothesis:

Hypothesis 1 (H1). Firm efficiency is positively associated with corporate integrity.

Previous studies have suggested that firms with a stronger integrity culture generally engage more in CSR activities (Wan et al., 2020) and that good CSR can result in improved cost efficiency (Binh et al., 2022) and output efficiency (Benlemlih & Bitar, 2018). Similarly, by investigating the relationship between internal CSR and firm efficiency using an international sample of firms from 47 countries, Setyowati et al. (2024) found that good CSR practices enhance firm efficiency; this finding supports the value-creating function of CSR. This conjecture is supported by stakeholder theory, in which firms act on the benefits of stakeholders and generally have better stakeholder relationships, reduced risks and costs, and better reputation; are more resilient during uncertain times; and are thus able to operate more efficiently. Thus, we expect CSR to serve as a channel through which corporate integrity improves firm efficiency. The following hypothesis is formulated:

Hypothesis 2 (H2). CSR mediates the impact of corporate integrity on firm efficiency.

3. Data and methodology

3.1. Firm efficiency measurement

Firm efficiency is computed using the DEA, as proposed by Demerjian et al. (2012). DEA is employed to evaluate the relative effectiveness of different decision-making units (DMUs), which are individual firms in firm-level studies. Firms are considered DMUs that convert certain inputs (e.g., labor and capital) into outputs (e.g., revenue and income). The DEA efficiency ratio is defined by dividing the inputs by the outputs. Regarding the financial reports published by firms, we defined seven inputs (including net property, plant, and equipment (PP&E); net operating leases; net R&D; purchased goodwill; other intangible assets; cost of inventory; and selling, general, and administrative expenses) and one output (included revenue). As these inputs are subject to managerial discretion, they all contribute to revenue creation and are affected by managerial abilities. To calculate the efficiency score, each input and output are assigned weights. DEA efficiency is determined by comparing the ratio of firm outputs to firm inputs. This procedure considers all possible combinations of inputs and incorporates a sufficient number of observations to construct a comprehensive efficiency frontier.

The DEA methodology has two key advantages, as argued by Demerjian et al. (2012). First, DEA provides an ordinal ranking of relative efficiency, allowing firms to optimize across various outputs and inputs. It compares each firm against the most efficient outcome. Second, the DEA efficiency measurement is widely used. For example, if two firms have the same output but have different mixes of inputs, both are considered efficient. In the summary statistics, we estimate firm

efficiency by industry group (owing to a sufficiently large number of observations), with the expectation that firms in the same industry will have similar technologies and business structures for converting inputs into outputs. We use the firm efficiency measure provided by Demerjian et al. (2012) as the proxy for firm efficiency and refer to it as EFFICIENCY. The higher the value of EFFICIENCY, the more efficient the firm is.

As a robustness check, we use the measure of marginal managerial performance (MASCORE) by Demerjian et al. (2012). Specifically, the authors parse EFFICIENCY into firm-specific efficiency and manager-specific efficiency (MASCORE) by using a regression framework with EFFICIENCY as the outcome variable, including firm- and industry-level input variables and year-fixed effects. The six firm characteristics that affect firm efficiency are firm size, market share, cash availability, life cycle, operational complexity, and foreign operations (Demerjian et al., 2012). A Tobit regression by industry, including year fixed effects, is also applied to estimate managerial ability. The residual from this model represents firm efficiency that cannot be explained by these factors and is attributed to managerial ability (MASCORE).

3.2. Corporate integrity culture measurement

We adopt a novel measure of corporate integrity by Li et al. (2021) that is computed using textual analysis and semi-supervised machine learning. Li et al. (2021) used the word embedding model, one of the most recent machine learning techniques, on text data from the Q&A sections of earnings conference call transcripts of U.S. firms to determine the value of integrity culture and four other dimensions: innovation, quality, respect, and teamwork.

The corporate integrity measure is developed using the following steps. In the first step, Li et al. (2021) used the word-to-vector (word2vec) approach to select the frequently mentioned values from the websites of S&P 500 firms. In particular, the cultural value of integrity is mentioned approximately 70% of the time. The seed words, which provide units of meaning integrity, are also established. Specifically, the authors check all other words that can be clustered with integrity for each firm and their frequency across firms. They then select the words most commonly associated with integrity. The eight seed words for the cultural value of integrity are *accountability*, *ethics*, *fairness*, *honesty*, *integrity*, *responsibility*, *transparency*, and *trust*. During the stage of training the word2vec model by using 209,480 earnings call transcripts from Thomson Reuters' Street Events database for the 2001–2018 period, the cultural value of integrity is defined using a coherent set of seed words, such as the phrase “do the right thing.” The word embedding model is applied by training a neural network model to learn the meanings of all words and phrases within the earnings call transcripts by analyzing their respective contexts. Subsequently, the authors construct a “culture dictionary” for integrity. By computing the average of the vectors of the seed words and the cosine similarity between each unique word in the earnings call transcripts, the authors identify the top 500 words most closely associated with the seed words.

The integrity score for a firm is calculated by dividing the weighted count of the number of words associated with the cultural value of integrity by the total number of words in the document. The weight is $tf - idf$, where tf (i.e., term frequency) indicates the word frequency in the document and idf (i.e., inverse document frequency) represents the inverse frequency of documents containing the word in the corpus. The authors validate their proposed measures using a wide range of tests, alternative data and measurements, and empirical evidence on the relationship between corporate integrity and multiple corporate behaviors and policies. In the current study, we use the integrity scores of U.S. firms provided by Li et al. (2021) as a measure of corporate integrity. For the sensitivity test, we calculate the three-year rolling average of INTEGRITY as an alternative measure of corporate integrity because culture may exert time-variant effects on economic behaviors.

3.3. Measure of CSR performance

We measure CSRP by using the total number of CSR strengths minus the total number of CSR concerns in three dimensions from the MSCI ESG KLD database: environment, community contribution, and corporate governance. After calculating the scores of the three dimensions, we sum them to obtain the final corporate CSRP score. CSRP represents how a firm transforms its commitments to sustainable development into real practices. We use CSRP to estimate the mediating effect of CSR on the integrity–efficiency relationship.

3.4. Empirical strategy

3.4.1. The empirical model

We use the following empirical model to estimate the impact of corporate integrity on firm efficiency (H1):

$$EFFICIENCY_{it} = \alpha + \beta \times INTEGRITY_{it} + \sum CONTROL + \gamma_i + \delta_t + \varepsilon_{it} \quad (1)$$

where $EFFICIENCY_{it}$ is the measure of efficiency of firm i during year t ; $INTEGRITY_{it}$ is the proxy of cultural value of integrity of firm i during year t ; $\sum CONTROL$ stands for the vector of control variables; γ_i and δ_t are the industry and year fixed effects for controlling for unobservable confounding factors in the industry and time dimensions, respectively; and ε_{it} is the error term of the model. The control variables are firm size, financial leverage, corporate investment, fixed assets ratio, sales growth, and market-to-book ratio (Cheng et al., 2018; Margaritis & Psillaki, 2007). All the firm-level control variables are lagged by one period. Table 1 describes the variables used in this study.

Following the literature (Cheng et al., 2018; Lin et al., 2009; Margaritis & Psillaki, 2007), we expect firm size to be positively associated with firm efficiency. The association between firm size and efficiency is well-grounded in resource-based theory: as larger firms tend to have more resources, established markets, and efficient process management, they are expected to be more efficient than their counterparts. Similarly, efficient firms generally have higher growth and valuation; therefore, we control for the sales growth ratio and market-to-book ratio in the baseline model.

Financial leverage has a complex relationship with firm efficiency. While several studies have indicated a positive relationship between firm performance, efficiency, and financial leverage (Han et al., 2024; Khanna & Tice, 2005; Setyowati et al., 2024), pecking order theory suggests that efficient firms can generate more internal capital and thus rely less on debt financing. From a different perspective, Margaritis and Psillaki (2007, 2010) showed an inverted U-shaped relationship between firm efficiency and capital structure.

Corporate investment, usually proxied by the ratio of capital expenditure to total assets, is positively associated with firm efficiency, as the Cobb–Douglas production function suggests. Increased capital investment implies an increase in the capital (K) in the production function. If we hold all other factors (e.g., labor and technology) constant, then an increase in capital leads to an increase in the total firm output and, hence, an increase in firm efficiency.

The standard Cobb–Douglas production function suggests a positive association between firm efficiency and asset tangibility, proxied by the ratio of PP&E to total assets. Intuitively, tangible assets such as machinery and infrastructure can directly contribute to the production process, improving a firm's ability to generate revenue and profits by increasing the input of capital in the form of tangible assets. The efficient use of tangible assets ensures that the firm maximizes its output relative to its inputs, thereby enhancing overall efficiency. However, intangible assets have emerged in recent decades as a more efficient and resilient source of value creation than tangible assets (Crouzet et al., 2022; Hoang & Tran, 2022; Nakamura, 2010). Thus, the impact of asset tangibility on firm efficiency may be reversed.

Table 1
Variable definitions.

Variable name	Description	Data source
EFFICIENCY	Firm efficiency measure constructed using data envelopment analysis (Demerjian et al., 2012)	Demerjian et al. (2012)
MASCORE	Managerial ability measure proposed by Demerjian et al. (2012)	Demerjian et al. (2012)
INTEGRITY	Text-based corporate integrity measure constructed using machine learning and firm reports by Li et al. (2021)	Li et al. (2021)
INTEGRITY_MA3	Three-year rolling (from t-2 to t) average of INTEGRITY	
IND_AVERAGE	The cross-sectional industry average of INTEGRITY, excluding the focal firm.	
INTEGRITY_CHECK	Indicator variable that equals one if the corporate integrity measure is available, zero if missing.	
SIZE	Natural logarithm of total assets of the firm	Compustat
LEVERAGE	Long-term debt to total assets ratio of the firm	Compustat
INVESTMENT	Capital expenditures scaled by lagged total assets of the firm	Compustat
PPE	Net property, plant and equipment (PPE) scaled by total assets	Compustat
SALESGR	Growth in total sales of the firm	Compustat
MTB	Market-to-book value ratio of the firm	Compustat
EXTERNALCEO	Dummy variable that equals one if the CEO was hired from outside of the firm, zero if otherwise	Bloomberg
LOCAL CORRUPTION	The natural logarithm of the total corruption convictions of local government's officials during the year.	US department of justice website – Public integrity section
BIG4	Dummy variable that equals one if the firm's auditor firm is one of the big four auditor firm, zero otherwise.	Compustat
CSR	The sum of the differences between the number of strengths minus the number of concerns regarding environment, community contribution, and corporate governance of firms.	MSCI ESG KLD database
ENERGY	Dummy variable that equals one if the firm belongs to the energy sector. Sector classification follows the global industry classification standards (GICS).	MSCI
MATERIALS	Dummy variable that equals one if the firm belongs to the materials sector. Sector classification follows the global industry classification standards (GICS).	MSCI
INDUSTRIALS	Dummy variable that equals one if the firm belongs to the industrials sector. Sector classification follows the global industry classification standards (GICS).	MSCI
CONSUMERDIS	Dummy variable that equals one if the firm belongs to the consumer discretionary sector. Sector classification follows the global industry classification standards (GICS).	MSCI
CONSUMERSTA	Dummy variable that equals one if the firm belongs to the consumer staples sector. Sector	MSCI

Table 1 (continued)

Variable name	Description	Data source
HEALTHCARE	classification follows the global industry classification standards (GICS). Dummy variable that equals one if the firm belongs to the health care sector. Sector classification follows the global industry classification standards (GICS).	MSCI
INFOTECH	Dummy variable that equals one if the firm belongs to the information technology sector. Sector classification follows the global industry classification standards (GICS).	MSCI
COMM	Dummy variable that equals one if the firm belongs to the communication sector. Sector classification follows the global industry classification standards (GICS).	MSCI
UTILITIES	Dummy variable that equals one if the firm belongs to the utilities sector. Sector classification follows the global industry classification standards (GICS).	MSCI
REALESTATE	Dummy variable that equals one if the firm belongs to the real estate sector. Sector classification follows the global industry classification standards (GICS).	MSCI
GDPGR	GDP growth rate of the country	World bank open database
INFLATION	Inflation rate of the country	World bank open database
EPU	Annual economic policy uncertainty index of the US	Baker et al. (2016)

3.4.2. Econometric tests

We perform multiple fixed effects regression to estimate Model (1) and account for unobserved confounding factors at the industry level and in the time dimension. We cluster standard errors by firm to alleviate serial correlation and heteroskedasticity issues. For robustness check, we run different regression specifications with (i) additional macroeconomic control variables (GDP growth, inflation, and policy uncertainty), (ii) different variable measurements, and (iii) 2SLS/IV regressor to alleviate endogeneity concerns.

Another issue in the research design is the sample selection problem. Sample selection bias occurs when the process of selecting a sample for analysis is related to the outcome variable, leading to distorted or biased parameter estimates. As the construction of the INTEGRITY variable requires data from the Q&A sections of the earnings call transcripts of listed firms, the data are available only for a small subset of firms in the population. Moreover, the inclusion of INTEGRITY in our model causes most of the missing values and significantly reduces the final sample size. The outcome variable integrity is difficult to observe for firms whose earnings call transcripts are not available or whose earnings conferences do not attract much attention from market participants. To address this inherent sample selection problem, we employ a two-step Heckman selection estimator to estimate our baseline model as a sensitivity test. The Heckman selection model involves a two-step estimation. The first (selection) equation models the probability that an observation has the value of INTEGRITY. The second (outcome) equation models the relationship between EFFICIENCY and INTEGRITY while correcting the selection bias by incorporating the probability of selection in the selection equation.

Furthermore, we conduct an alternative selection technique called LASSO double selection (LDS) to account for the potential omitted

variable bias prevalent in the finance literature. LDS is an extension of LASSO, which is a machine learning technique for variable selection and regularization to prevent overfitting in regression models. LASSO is applied to the linear regression models to address the issue of multicollinearity and feature selection. It adds a penalty term to the objective function of the ordinary least squares estimator, which includes the sum of the absolute values of the coefficients multiplied by a tuning parameter. This technique encourages sparse solutions, meaning that it tends to push the coefficients of less important variables to exactly zero. In this estimation, we include all control variables, financial statement items, and general corporate information such as location, year of incorporation, and industry classification. If the LDS estimation results support the findings of the baseline regression, then we can safely confirm the inference from the baseline model.

In testing H2, we use a structural equation modeling approach (Iacobucci et al. (2007); Zhao et al., 2010) to estimate the mediating effect of CSR on the integrity–efficiency relationship. We argue that integrity culture motivates CSR, which in turn, enhances firm efficiency. The structural equation models are shown in Diagram 1. We use two approaches for this mediation analysis: the method of Iacobucci et al. (2007) using Sobel's z-test and the method of Zhao et al. (2010) using the Monte Carlo z-test. This analysis involves three variables: the dependent variable (EFFICIENCY), expected mediating variable (CSR), and independent variable (INTEGRITY).

In the approach of Iacobucci et al. (2007), if either or both of the INTEGRITY→CSR and INTEGRITY→CSR coefficients are statistically insignificant, then no evidence proves the mediating effect of CSR on the newfound relationship. If the aforementioned coefficients are both significantly different from zero, then a mediating effect exists, and two outcomes are possible. First, if the Sobel z-stat's p-value is less than 10% and the INTEGRITY→CSR coefficient is insignificant, then CSR has complete mediation, that is, the impact of INTEGRITY on EFFICIENCY is transmitted completely through the CSR channel. Second, if the INTEGRITY→CSR coefficient is significantly different from zero, then the mediating effect of CSR is partial, indicating that CSR is one of the channels through which integrity positively impacts firm efficiency.

The approach of Zhao et al. (2010) is employed to determine which portion of CSR mediates the impact of integrity on firm efficiency. We calculate two ratios: the ratio of the indirect effect to the total effect (RIT) and the ratio of the indirect effect to the direct effect (RID). These two ratios explain how much of the effect is transmitted via the channel relative to the total effect.

3.5. Data and descriptive statistics

This study covers a sample of U.S. listed firms in 2001–2018. Firm efficiency data are taken from Demerjian et al. (2012). Firm-level integrity scores are obtained from Li et al. (2021). Corporate financial and other firm-level data are obtained from the Bloomberg and COMPUSTAT databases. Macroeconomic data are obtained from the World Bank database. After excluding financial firms and missing values, our final sample consists of 32,015 firm–year observations from 1487 U.S. listed firms in the 2001–2018 period. Continuous variables are winsorized at the first and last percentiles, as is common practice. Note that in the case of external CEO data, the number of observations drops significantly from 32,015 to 5921. Table 2 presents the descriptive statistics for the variables used in this study.

Fig. 1 illustrates the confidence interval of INTEGRITY by different deciles of firm size (i.e., deciles of the natural log of the book value of total assets). It shows that the firm efficiency–firm size relationship seems to follow a nonlinear pattern. That is, small firms generally have

Table 2
Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Firm-level variables					
EFFICIENCY	37,008	0.342	0.175	0.000	1.000
MASCORE	37,008	0.000	0.145	−0.304	0.686
INTEGRITY	32,658	0.536	0.442	0.000	14.839
INTEGRITY_MA3	24,074	0.519	0.338	0.000	8.788
SIZE	37,008	6.624	1.896	2.197	11.221
LEVERAGE	37,008	0.205	0.221	0.000	1.031
INVESTMENT	37,008	0.049	0.055	0.001	0.323
PPE	37,008	0.241	0.230	0.006	0.898
SALES	37,008	1.068	0.743	0.092	3.973
MTB	37,008	3.112	5.490	−19.639	33.557
EXTERNALCEO	6327	0.528	0.499	0.000	1.000
LOCAL CORRUPTION	37,008	6.414	0.938	3.045	7.324
BIG4	37,008	0.801	0.399	0.000	1.000
CSR	16,119	0.541	1.194	0.000	9.000
ENERGY	37,008	0.078	0.269	0.000	1.000
MATERIALS	37,008	0.060	0.238	0.000	1.000
INDUSTRIALS	37,008	0.172	0.377	0.000	1.000
CONSUMERDIS	37,008	0.185	0.388	0.000	1.000
CONSUMERSTA	37,008	0.048	0.214	0.000	1.000
HEALTHCARE	37,008	0.159	0.366	0.000	1.000
INFOTECH	37,008	0.246	0.431	0.000	1.000
COMM	37,008	0.045	0.207	0.000	1.000
UTILITIES	37,008	0.002	0.043	0.000	1.000
REALESTATE	37,008	0.001	0.034	0.000	1.000
Macro-level variables					
GDPGR	18	2.004	1.531	−2.675	4.350
INFLATION	18	1.928	0.702	0.400	3.250
EPU	18	121.342	30.202	67.136	157.977

This table reports the descriptive statistics of variables used in this study.

higher efficiency, but efficiency decreases when the firms grow to medium sizes and then improves again when firms become large.

4. Empirical results and discussion

4.1. Baseline and channel test results

Panel A of Table 3 reports the regression results for Model 1. Column 1 shows the estimation results of Model 1 with industry and year fixed effects. For the robustness check, Column 2 presents the results with macroeconomic variables and firm fixed effects while Column 3 shows the results with macroeconomic variables and no fixed effects.

Consistent with our proposition, we find positive and statistically significant coefficients of INTEGRITY for all regression specifications. The coefficient of INTEGRITY in our full model specification (Column 1, Table 3) is 0.007, which is significant at the 5% level.¹ By standardizing the regression coefficients, we obtain a coefficient of INTEGRITY of 0.016, which indicates that a one-standard-deviation increase in INTEGRITY is associated with a 0.016 standard deviation increase in EFFICIENCY. The empirical results suggest a positive and economically significant association between corporate integrity and firm efficiency. This finding supports H1, which states that corporate integrity enhances efficiency. By fostering an integral culture within the firm, the firm may build trust and reputation among stakeholders, encourage employee engagement and productivity, improve compliance, and reduce misconduct. Consequently, these values translate into higher firm performance (Binh et al., 2022; Li et al., 2021; McGuire et al., 1988; Tariq & Abbas, 2013). Unlike previous studies, we directly link integrity culture and firm efficiency, thus shedding light on the role of corporate integrity in corporate finance from an empirical perspective.

¹ The signs of the control variables in the baseline regression are generally in line with their expected signs as in previous studies and theories discussed in Section 3.4.1.

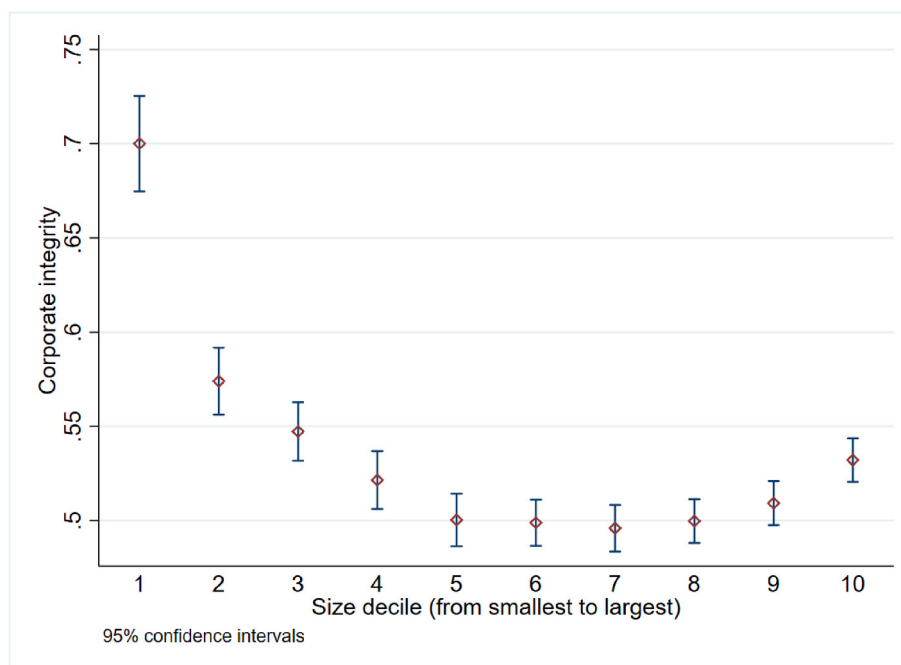


Fig. 1. Confidence interval plot of corporate integrity by firm size deciles.

Panel B of Table 3 reports the estimation results of the structural equation presented in Diagram 1 to evaluate the mediating effect of CSR on the integrity–efficiency relationship. We find that the three coefficients of INTEGRITY→CSR, CSR→EFFICIENCY, and INTEGRITY→EFFICIENCY and the Sobel z-stats are statistically significant at the 1% significance level. These results suggest that CSR practices have a mediating effect on the relationship between integrity and firm efficiency. RIT has a value of 0.179, suggesting that 17.9% of the total effect of corporate integrity on firm efficiency is transmitted through the CSR channel. Interestingly, RID has a value of 0.152, indicating that the indirect effect of INTEGRITY via the CSR channel is equivalent to 15.2% of the direct impact of INTEGRITY. As RIT is higher than RID, other factors may mediate the integrity–efficiency relationship. However, the proportion of the indirect effect explained by these unexplored channels seems relatively small, as the difference between RIT and RID is only 2.7%. These findings support H2.

In summary, the results of our empirical analysis suggest that corporate integrity has a significant positive impact on firm efficiency. As a firm’s integrity values motivate it to pursue CSR practices, the effect of integrity is partially transmitted through the CSR channel.

4.2. Robustness tests

We conduct several robustness tests to validate the baseline findings. First, we adopt alternative variable measurements, namely, the marginal managerial performance measure provided by Demerjian et al. (2012), asset turnover ratio (ATURNOVER), and revenue per employee (REV_EMP), as the alternative dependent variables. Second, we use the natural logarithm of the firm’s environmental, social, and governance scores (ESG SCORE) and the three-year moving average of INTEGRITY (from year $t - 2$ to year t) (INTEGRITY_MA3) as alternative measures of the firm’s corporate integrity culture. Third, we exclude the period of the Global Financial Crisis (2008–2010) because decreased demand in the economy during the crisis may heavily affect firm efficiency.

Furthermore, we apply the entropy balancing procedure to reweight the sample and establish causality (Hainmueller, 2012). Entropy balancing is a statistical method used to adjust for covariate imbalances in observational studies. It aims to create balanced treatment (i.e., higher-integrity firms) and control (lower-integrity firms) groups by

reweighting the observations based on their covariate distributions. Entropy balancing is considered a robust balancing method in experimental and empirical studies (Josey et al., 2021; Källberg & Waernbaum, 2023-a; Zhao & Percival, 2017). As INTEGRITY is a continuous variable, we apply the entropy balancing technique for continuous treatment (Tübbicke, 2022). Finally, noting that EFFICIENCY is in the [0,1] range, we fit our model to a Tobit regression with a lower limit of 0 and an upper limit of 1 to check the robustness of the baseline findings using a censored estimation process. The estimation results of the sensitivity tests are reported in Columns 1–6 in Table 4.

Table 4 presents the estimation results. In general, we document empirical results that are similar to the baseline results, meaning that our main findings hold for alternative model specifications, variable measurements, sampling, and reweighting choices. Additionally, the results of the first robustness test (Column 1, Table 4) suggest that managers in high-integrity firms generally perform better than their counterparts. Further analysis shows that this effect does not vary across economic sectors (see Appendix A1).²

4.3. Instrumental variable approach

We employ the 2SLS/IV estimator to validate the causality of the integrity–efficiency relationship. We construct an instrument that captures the cross-sectional industry average of corporate integrity, excluding the current firm; we refer to it as IND_AVERAGE. As the

² We generate 10 dummy variables representing 10 nonfinancial sectors following the GICS sector classification (MSCI) and alternatively interact them with the main explanatory variable in the baseline model (INTEGRITY). We then re-estimate the model. The 10 sectors are energy, materials, industrials, consumer discretionary, consumer staples, healthcare, information technology, communication, utilities, and real estate. If the effect is stronger or weaker in one particular sector, we would expect the coefficient of the interaction term to be statistically significant. We do not use subsample analysis because of the absence of a direct comparison between sectors and the results may suffer from small sample bias in some sectors. The regression results suggest that the effect of INTEGRITY does not significantly differ across different sectors. The absence of a clear variation in the impact across sectors suggests the robustness of the baseline finding.

Table 3
Baseline and channel test results.

Panel A. Baseline results			
Variables	(1)	(2)	(3)
	EFFICIENCY	EFFICIENCY	EFFICIENCY
INTEGRITY	0.007** (0.003)	0.008*** (0.003)	0.018*** (0.003)
SIZE	0.053*** (0.001)	0.054*** (0.001)	0.051*** (0.002)
LEVERAGE	-0.056*** (0.009)	-0.051*** (0.009)	-0.067*** (0.010)
INVESTMENT	0.214*** (0.039)	0.199*** (0.039)	0.381*** (0.040)
PPE	-0.094*** (0.013)	-0.091*** (0.013)	-0.158*** (0.012)
SALESGR	0.048*** (0.004)	0.047*** (0.004)	0.023*** (0.003)
MTB	0.002*** (0.000)	0.002*** (0.000)	0.003*** (0.000)
GDPGR	-0.008 (0.029)	-0.006*** (0.000)	-0.006*** (0.001)
INFLATION	0.001 (0.032)	-0.025*** (0.001)	-0.026*** (0.001)
EPU	-0.001 (0.002)	-0.000*** (0.000)	-0.000*** (0.000)
Constant	-0.046*** (0.011)	0.043*** (0.011)	0.093*** (0.011)
Industry FE	Yes	Yes	No
Year FE	Yes	No	No
SE clustered by	Firm	Firm	Firm
Observations	32,015	32,015	32,015
Adjusted R-squared	0.411	0.396	0.280

This table reports the baseline regression results. There are three regression specifications used in this table: The full model specification (column 1), the model specification without the year fixed effect (column 2), and the model specification without fixed effects (column 3). Variable definitions are in Table 1. Standard errors are clustered by firm. Robust standard errors in parentheses. ***, **, and * denote significance level at 1%, 5%, and 10%, respectively.

Panel B. The estimation results of the Corporate social responsibility channel			
Estimates	Delta	Sobel	Monte Carlo
Indirect effect	0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)
Sobel z-stat's p-value	0.000	0.000	0.000
<u>Iacobucci et al. (2007)'s approach</u>			
Step 1: INTEGRITY→CSR	0.036***		
Step 2: CSR→EFFICIENCY	0.211***		
Step 3: INTEGRITY→EFFICIENCY	0.050***		
<u>Zhao et al. (2010)'s approach</u>			
RIT	0.179		
RID	0.152		

This table reports the corporate social responsibility channel estimation results using a structural equation modeling approach. RIT stands for the ration of the indirect to total effect. RID stands for the ratio of indirect to direct effect following Zhao et al. (2010)'s approach. Numbers parentheses are standard errors. ***, **, and * denote significance level at 1%, 5%, and 10%, respectively.

computation of IND_AVERAGE does not involve the current firm's INTEGRITY, IND_AVERAGE is exogenous to the firm's outcomes and does not have an impact on the current firm's efficiency. Moreover, it should correlate with INTEGRITY as it demonstrates common ethical standards and trends in the industry. Therefore, the instrument satisfies the exclusion criteria. Table 5 presents the results of the 2SLS/IV regression analysis.

In the first-stage regression, we find that IND_AVERAGE is

significantly associated with INTEGRITY, as expected. Moreover, the instrument passes diagnostic tests, including under-identification and weak identification tests. In the second-stage regression, the coefficient of the instrumented INTEGRITY variable is positive and significant at the 1% level and resides in the Anderson–Rubin confidence interval ([0.131, 0.232]), suggesting that the coefficient of INTEGRITY statistically differs from zero. The 2SLS/IV regression results elaborate our causal inferences regarding the integrity–efficiency relationship.

4.4. Dealing with the omitted variable bias

Omitted variable bias is a serious problem in multivariate regression models because of limited data availability for analysis. Regarding corporate culture and firm efficiency, we acknowledge that the data may not always be sufficient for tight control of potential confounding factors in the model. Therefore, conventional econometric models may not capture all factors that may distort the estimate of the integrity variable, even when fixed effects are included. To address this problem, we employ LASSO to enhance the prediction accuracy and interpretability of the empirical results. We use the double-selection LASSO linear regression of Urminsky et al. (2016), which proposes a double-LASSO variable selection process to identify potential control variables to be included in the model. The dataset for selection includes all financial variables and general information on firms from the COMPUSTAT database. We specify the dependent variable (EFFICIENCY) and explanatory variable (INTEGRITY) and leave the coefficient selection to the estimator. Table 6 reports the results of the double-selection LASSO regression.

The regression results in Table 6 indicate that 315 controls are selected from the 388 variables in our data. The Wald chi-squared statistic has a value of 5.61 (p-value <0.05). The coefficient of the variable of interest, INTEGRITY, is 0.008 (p-value <0.05), which falls within the confidence interval of the estimate (i.e., from 0.001 to 0.015). The size of INTEGRITY in this LASSO regression is similar to that in the baseline regression in Table 3 (i.e., 0.007), further bolstering our confidence in the robustness of the baseline results.

4.5. Heckman selection estimation

Earnings call transcript data are not always available for all listed firms in the United States; the same is true in our sample. The lack of data leads to missing values for the INTEGRITY variable in some firms, and these values are non-random. The binary choice of information disclosure during the Q&A sessions of earnings calls is not observable, we can only model it as a function of the potential drivers of corporate integrity disclosure:

$$INTEGRITY_{check} = f\left(\sum_{j=1}^n X_j\right)$$

where $INTEGRITY_{check}$ is a binary selection indicator that equals 1 if such data are disclosed and 0 otherwise and X_j is the j th determinant of the aforementioned binary choice. We model binary choice as a function of three factors: firm size, audit quality, and the local institutional quality of the state in which the firm's headquarters is located. Intuitively, firm size is a common factor driving market attention because larger firms generally have more attentive Q&A sessions at earnings call conferences. Larger firms typically have more shareholders, media coverage, corporate governance mechanisms, and analysts. Hence, they face more pressure to disclose. The confidence interval plot shown in Fig. 2 confirms this pattern.

Table 4
Robustness test.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	MASCORE	ATURNOVER	REV_EMP	EFFICIENCY	EFFICIENCY	EFFICIENCY	EFFICIENCY	EFFICIENCY	
INTEGRITY	0.006** (0.002)	0.130*** (0.024)	13.136* (6.944)				0.007*** (0.003)	0.007** (0.003)	0.007*** (0.002)
ESG SCORE				0.023** (0.009)					
INTEGRITY_MA3					0.014*** (0.005)				
Constant	−0.155*** (0.010)	3.252*** (0.101)	16.231 (38.237)	0.244 (0.177)	−0.072*** (0.013)	−0.071*** (0.011)	−0.045*** (0.011)	0.023 (0.307)	
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
SE clustered by	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	
Entropy balancing	No	No	No	No	No	No	Yes	No	
Observations	32,015	32,015	31,370	10,575	23,629	25,678	32,015	32,015	
Adj. R-squared	0.249	0.521	0.601	0.506	0.445	0.425	0.418		

This table reports the robustness test results using different model specifications and variable measurements. Standard errors are clustered by firm. Variable definitions are in Table 1. Robust standard errors in parentheses. ***, **, and * denote significance level at 1%, 5%, and 10%, respectively.

Table 5
IV/2SLS regression.

VARIABLES	(1)	(2)
	First-stage	Second stage
	INTEGRITY	EFFICIENCY
IND_AVERAGE (excluding focal firm)	0.295*** (0.019)	
INTERGRITY		0.179*** (0.026)
SIZE	−0.025*** (0.003)	0.055*** (0.002)
LEVERAGE	0.057*** (0.020)	−0.078*** (0.010)
INVESTMENT	−0.368*** (0.081)	0.443*** (0.043)
PPE	−0.047** (0.023)	−0.144*** (0.012)
SALESGR	−0.008 (0.006)	0.024*** (0.003)
MTB	0.001 (0.001)	0.003*** (0.000)
GDPGR	−0.002 (0.002)	−0.005*** (0.001)
INFLATION	0.003 (0.004)	−0.027*** (0.001)
EPU	0.000 (0.000)	−0.000*** (0.000)
Constant	0.557*** (0.030)	−0.023 (0.023)
Under-identification test statistic	234.803***	
Weak identification test statistic	228.921***	
Anderson-rubin confidence interval	[0.131, 0.232]	
SE clustered by		Firm
Observations		30,816
Adjusted R-squared		0.117

This table reports the Two-Stage Least Square estimation results. The instrumented variable is INTEGRITY. The instrumental variable is cross-sectional the industry average of INTEGRITY after excluding the focal firm (IND_AVERAGE). Variable definitions are in Table 1. Standard errors are clustered by firm. Robust standard errors in parentheses. ***, **, and * denote significance level at 1%, 5%, and 10%, respectively.

Disclosure quality, proxied by a dummy variable indicating whether a firm's auditor is a Big Four audit firm, is another determinant of corporate disclosure choice. In general, firms with higher audit quality have higher disclosure quality. Fig. 3 shows that the missing INTEGRITY

Table 6
Lasso double selection model.

VARIABLES	(1)
	EFFICIENCY
INTEGRITY	0.008** (0.004)
Industry FE	Yes
Year FE	Yes
Confidence interval	[0.001, 0.015]
Number of controls	388
Number of selected controls	315
Wald chi-sq statistic	5.61**
Observations	16,274

This table reports the Double-selection Least Absolute Shrinkage and Selection Operator (Double-selection Lasso) regression results. Variable definitions are in Table 1. Standard errors are clustered by firm. Robust standard errors in parentheses. ***, **, and * denote significance level at 1%, 5%, and 10%, respectively.

observations fall into the category of firms with low audit quality (BIG4 = 0); however, the same is not the case for their counterparts (BIG4 = 1).

Local institutional quality is likely to drive corporate information disclosure. States with more corrupt governments may hinder corporate disclosure of financial and nonfinancial information (Hoang, 2022; Hoang et al., 2024; Xu et al., 2019). We proxy local institutions using the natural logarithm of the total corruption convictions of local government officials during the year. More corruption convictions mean that the state government is more corrupt and that the quality of local institutions is lower than that of their counterparts. We plot the difference in Fig. 4, and the argument is well supported by the data.

Table 7 reports the two-step Heckman selection regression results. The two-step approach involves estimating the probability of selection in the first stage and using it to adjust the second-stage regression for unbiased parameter estimates. The first-step probit regression introduces a correction term, lambda (λ), to account for sample selection bias in econometric analysis. Lambda captures the relationship between the unobserved factors affecting the selection process and outcome variable. By including lambda in the second-stage regression equation, the model corrects for the potential endogeneity caused by non-random sample inclusion. In Column 1 of Table 7, the coefficient of INTEGRITY is 0.006 with p-value <0.05. This result further corroborates our baseline finding after correcting for potential sample selection biases.

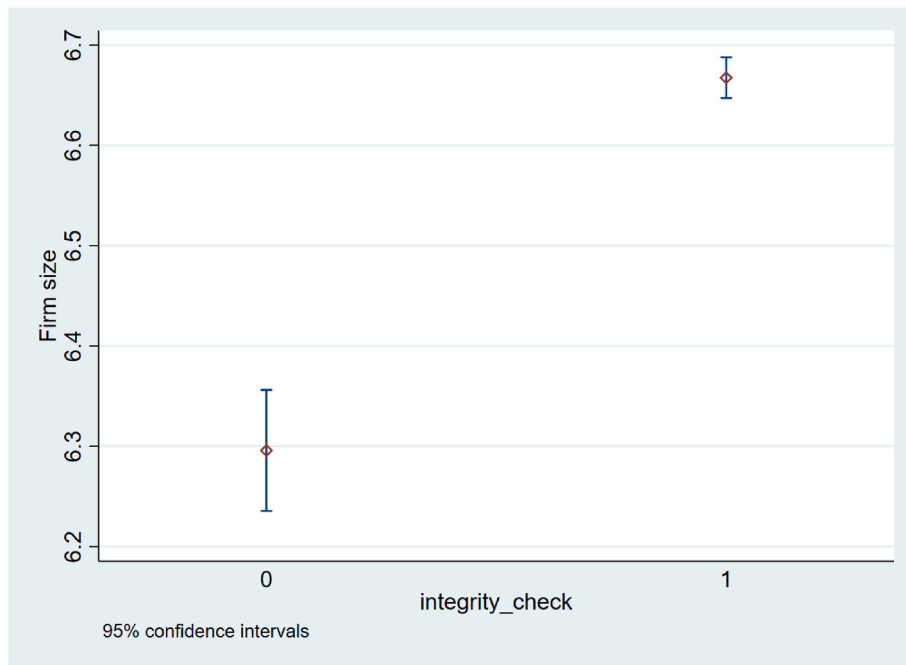


Fig. 2. Confidence interval plot of firm size by observation of integrity.
 Note: Integrity_check variable has the value of one when the integrity data of the firm is observable from the earnings call transcripts, zero otherwise.

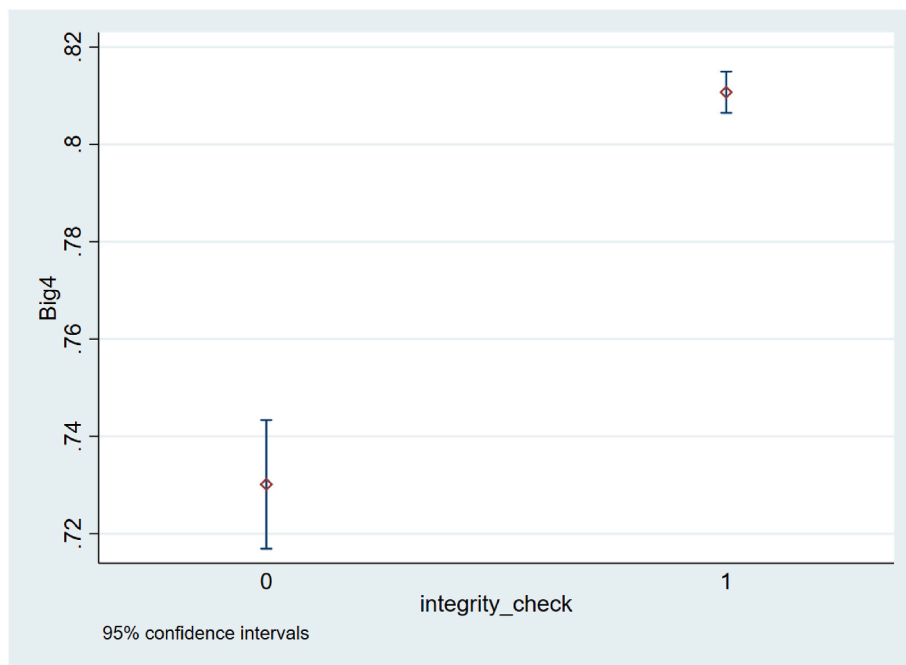


Fig. 3. Confidence interval plot of Big4 Auditor by observation of integrity.
 Note: Integrity_check variable has the value of one when the integrity data of the firm is observable from the earnings call transcripts, zero otherwise.

In summary, most robustness test results show a similar effect size for INTEGRITY on EFFICIENCY (Fig. 5). This empirical similarity suggests that our baseline findings remain robust after applying different regression approaches.

4.6. Do external CEOs matter to the integrity–efficiency relationship?

According to Ertimur et al. (2018), about 40% of CEOs in public firms were externally hired in 1992–2014; one may argue whether

externally hired CEOs deter the positive effect of corporate integrity on firm efficiency. However, integrity as a cultural dimension of firms is often deeply rooted and resistant to short-term changes, such as outsider succession (Fiordelisi & Ricci, 2014). Therefore, whether an external CEO who brings in fresh perspectives and new practices affects the integrity–efficiency relationship is still questionable.

To test whether hiring external CEOs matters to the integrity–efficiency relationship, we augment Model 1 with the interaction term between INTEGRITY and an indicator variable that equals 1 if the

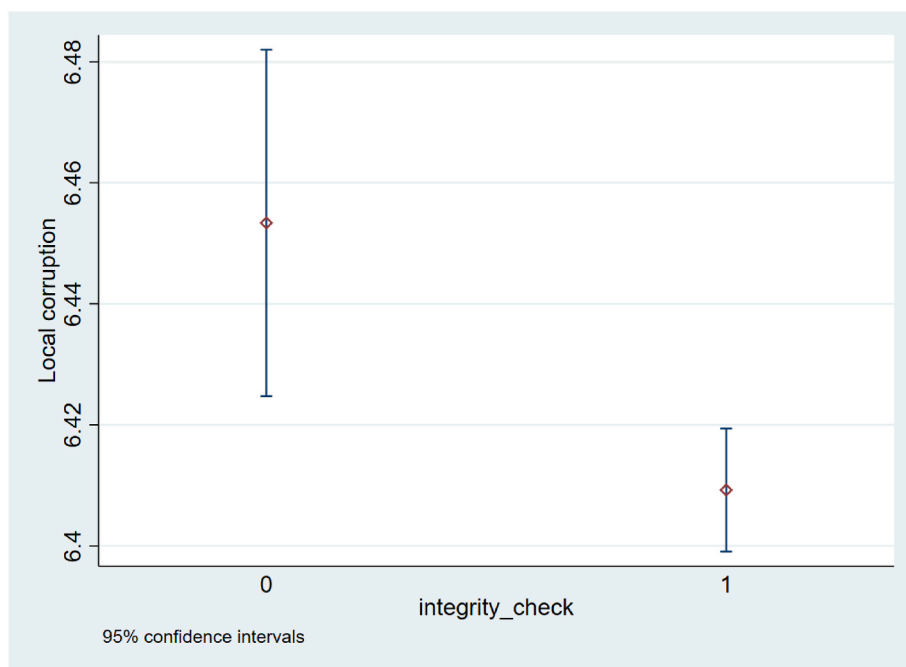


Fig. 4. Confidence interval plot of local corruption by observation of integrity. Note: Integrity_check variable has the value of one when the integrity data of the firm is observable from the earnings call transcripts, zero otherwise.

Table 7 Two-step Heckman selection estimation.

VARIABLES	(1) EFFICIENCY	(2) INTEGRITY_CHECK	(3) /mills
INTERGRITY	0.006** (0.003)		
SIZE	0.057*** (0.001)	0.035*** (0.005)	
LEVERAGE	-0.055*** (0.006)		
INVESTMENT	0.219*** (0.033)		
PPE	-0.095*** (0.011)		
SALESGR	0.048*** (0.002)		
MTB	0.002*** (0.000)		
GDPGR	-0.008 (0.058)		
INFLATION	-0.001 (0.065)		
EPU	-0.001 (0.003)		
LOCAL CORRUPTION		-0.025*** (0.009)	
Big4		0.183*** (0.023)	
lambda			0.244*** (0.058)
Constant	-0.007 (0.469)	0.969*** (0.067)	
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Standard errors	Bootstrapping		
Observations	36,212	36,212	36,212
Wald chi-sq statistic p-value	0.000		

This table reports the Two-step Heckman selection regression results. Variable definitions are in Table 1. Standard errors are clustered by firm. Robust standard errors in parentheses. ***, **, and * denote significance level at 1%, 5%, and 10%, respectively.

firm has an external CEO and 0 otherwise (EXTERNALCEO). Then, we estimate the augmented Model 1. Noting that the number of observations in our sample drops sharply owing to the limited data on CEO hiring compared with the baseline regression, we employ a bootstrapping estimator of the augmented Model 1 as a robustness check. Table 8 presents the estimation results.

In Table 8, the coefficients of the interaction term EXTERNALCEO × INTEGRITY are positive but remain statistically insignificant, suggesting that external CEOs do not exert a significant impact on the integrity–efficiency relationship. This finding suggests that hiring external CEOs does not significantly alter the positive effect of integrity on firm efficiency. Intuitively, while external CEOs may bring new perspectives and expertise, integrity values remain a crucial driver of firm efficiency.

5. Conclusion

Our findings provide a new understanding of how corporate integrity influences corporate outputs and highlight the importance of maintaining a strong cultural emphasis on integrity in fostering sustainable and efficient business practices. Our findings suggest the importance of fostering a culture of integrity within an organization to positively influence firm efficiency. Notably, firms that prioritize ethical conduct practices are likely to experience improved operational efficiency. In addition, we provide a reference for the promotion policy of U.S. firms regarding the choices of internal versus external CEO candidates. The empirical findings provide a scholarly reference for organizational leadership that considers the alignment of integrity culture with operational efficacy and strategic decision-making in the contemporary corporate landscape.

These findings have important implications for corporate management and investors. First, management should prioritize and promote ethical conduct and integrity throughout the organization as they directly and indirectly contribute to improved firm efficiency and performance. Strong corporate integrity fosters trust among shareholders, employees, customers, and the community, leading to positive operational output and reduced conflicts of interest. Second, investors may find it strategically advantageous to invest in the stocks of firms that demonstrate a strong culture of integrity. Firms that prioritize ethical

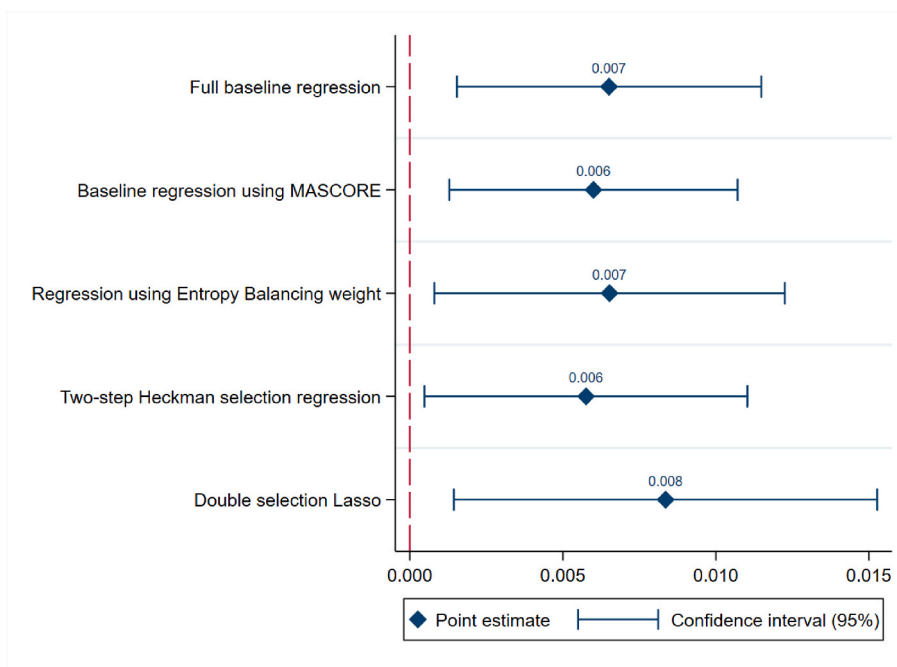


Fig. 5. Coefficient plot of baseline model and sensitivity test specifications.

Table 8

Do external CEOs matter to the integrity-efficiency relation?

Variables	(1)	(2)
	EFFICIENCY	EFFICIENCY
EXTERNALCEO × INTEGRITY	0.019 (0.015)	0.014 (0.012)
EXTERNALCEO	-0.014 (0.010)	-0.011 (0.007)
INTEGRITY	0.028*** (0.009)	0.033*** (0.007)
SIZE	0.077*** (0.003)	0.077*** (0.002)
LEVERAGE	-0.111*** (0.022)	-0.109*** (0.013)
INVESTMENT	0.244** (0.114)	0.250*** (0.069)
PPE	-0.089*** (0.029)	-0.089*** (0.015)
SALESGR	0.067*** (0.005)	0.069*** (0.003)
MTB	0.002*** (0.001)	0.002*** (0.000)
Constant	-0.235*** (0.041)	-0.235*** (0.058)
Industry FE	Yes	Yes
Year FE	Yes	Yes
SE	Clustered by firm	Bootstrapping, 10,000 reps
Observations	5921	5921
Adjusted R-squared	0.467	0.418

This table reports regression results of the external CEO test. Variable definitions are in Table 1. Standard errors are clustered by firm. Robust standard errors in parentheses. ***, **, and * denote significance level at 1%, 5%, and 10%, respectively.

behavior and transparency are likely to be efficient; thus, they can achieve better financial performance as reflected in stock returns.

Our study has two limitations. First, we do not have a direct measure

of corporate integrity. Therefore, the empirical analysis is subject to a certain degree of measurement error. Thus, we use a wide range of empirical tests to address potential econometric issues and ensure that our findings are valid and reliable. Future studies could delve into this dimension and obtain data to measure corporate integrity using more direct and diverse approaches. Second, our sample covers only a portion of public firms in the United States, thus limiting the generalization of the results to international firms in different cultural and institutional contexts. Investigating and expanding the topic to a wider range of firms in different contexts may provide a better understanding of the value creation function of integrity at the firm level.

CRedit authorship contribution statement

Giang Thi Minh Vu: Data curation, Writing – original draft, Writing – review & editing. **Minh-Huyen Dao:** Validation, Writing – original draft, Writing – review & editing. **Khanh Hoang:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing.

Data availability statement

The data used in this study are available from the sources identified in the paper.

Declaration of competing interest

None.

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Appendix

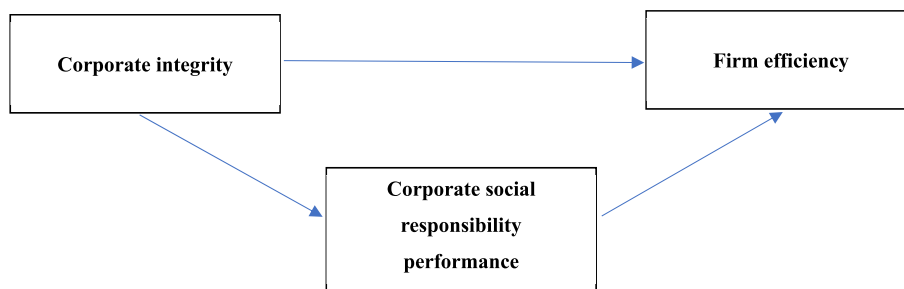


Diagram 1. The mediating effect of corporate social responsibility on the integrity–efficiency relationship.

Appendix A1. The impact of integrity on firm efficiency across sectors

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	EFFICIENCY	EFFICIENCY	EFFICIENCY	EFFICIENCY	EFFICIENCY	EFFICIENCY	EFFICIENCY	EFFICIENCY	EFFICIENCY	EFFICIENCY
INTEGRITY	0.006** (0.003)	0.006** (0.003)	0.005 (0.003)	0.007** (0.003)	0.007** (0.003)	0.008*** (0.003)	0.009*** (0.003)	0.006** (0.003)	0.007** (0.003)	0.007*** (0.003)
ENERGY	0.006 (0.012)									
ENERGY×INTEGRITY	0.006 (0.014)									
MATERIALS		-0.043*** (0.009)								
MATERIALS × INTEGRITY		0.014 (0.008)								
INDUSTRIALS			-0.034*** (0.006)							
INDUSTRIALS×INTEGRITY			0.007 (0.004)							
CONSUMERDIS				0.022** (0.009)						
CONSUMERDIS × INTEGRITY				-0.005 (0.006)						
CONSUMERSTA					0.012 (0.017)					
CONSUMERSTA × INTEGRITY					-0.001 (0.013)					
HEALTHCARE						0.003 (0.013)				
HEALTHCARE×INTEGRITY						-0.006 (0.007)				
INFOTECH							0.015* (0.009)			
INFOTECH×INTEGRITY							-0.008 (0.006)			
COMM								0.013 (0.020)		
COMM×INTEGRITY								0.021 (0.017)		
UTILITIES									-0.114*** (0.027)	
UTILITIES×INTEGRITY									0.003 (0.007)	
REALESTATE										0.078*** (0.013)
REALESTATE×INTEGRITY										-0.023 (0.080)
Constant	-0.046*** (0.011)	-0.043*** (0.011)	-0.040*** (0.011)	-0.049*** (0.011)	-0.046*** (0.011)	-0.046*** (0.011)	-0.050*** (0.011)	-0.046*** (0.011)	-0.046*** (0.011)	-0.046*** (0.011)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standard SE clustered by	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Observations	32,015	32,015	32,015	32,015	32,015	32,015	32,015	32,015	32,015	32,015
Adjusted R-squared	0.411	0.412	0.413	0.412	0.411	0.411	0.411	0.412	0.411	0.411

This table reports the regression results of the baseline model with the inclusion of sector dummy and the interaction term between the sector dummy and INTEGRITY. Standard errors are clustered by firm. Variable definitions are in Table 1. Robust standard errors in parentheses. ***, **, and * denote significance level at 1%, 5%, and 10%, respectively.

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