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An empirical investigation of corporate culture and productivity using textual analysis approach

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Abstract
We investigate the impact of corporate culture on firm productivity using textual analysis of earnings calls. Employing the Ackerberg-Caves-Frazer (2015) control-function approach and a shift-share instrument exploiting regional social capital, we find a robust positive causal effect. However, this effect is not uniform: productivity gains are driven specifically by innovation and quality. Validation against Glassdoor reviews confirms that innovation measures reflect "lived" culture, while teamwork may represent strategic signalling. The findings suggest that specific cultural attributes, rather than generalized culture, are key drivers of productivity.

Keywords: corporate culture, earnings calls, productivity
JEL Classification Codes: M14, M20, O40

1. Introduction

Although corporate culture is widely regarded as a crucial driver of business value (Graham et al., 2022), financial performance (O'Reilly et al., 2014; Chatman et al., 2014), and organizational effectiveness (Denison, 1990), the investigation of the relationship between corporate culture and productivity remains underexplored (Cherian et al., 2021). The challenge of exploring this relationship stems from limitations in defining and quantifying corporate culture, especially in empirical studies (Martin, 1992; Alvesson, 1993). The reliance on interviews, surveys, and qualitative assessments has historically limited the scope of research to smaller samples or specific settings (e.g., Guiso et al., 2015; Graham et al., 2022).

This study aims to fill this gap by treating corporate culture as a production input and

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analyzing how variations in cultural dimensions affect firm productivity. We utilize the textual analysis data from Li et al. (2021), which quantifies the five dimensions of culture (innovation, integrity, quality, respect, and teamwork) from earnings call transcripts. To ensure rigorous identification, we employ the Ackerberg, Caves, and Frazer (2015) control-function approach to estimate total factor productivity (TFP), correcting for simultaneity bias. Furthermore, to address potential endogeneity where struggling firms might strategically emphasize culture, we implement a shift-share instrumental variable strategy that exploits exogenous variation in regional social capital.

Our results show that corporate culture contributes positively to firm productivity, aligning with the view that a "better" culture enhances performance. However, we find that this effect is not uniform across all dimensions. The productivity gains are driven primarily by innovation and quality, which exhibit robust positive effects. We validate these findings by comparing our text-based measures with employee reviews from Glassdoor, confirming that the innovation dimension in earnings calls reflects the "lived" culture of the firm rather than merely strategic communication. These findings suggest that for managers aiming to improve productivity, fostering specific cultural attributes related to innovation and quality is particularly consequential.

2. Data and empirical methodology

2.1. Data and productivity measurement

We combine corporate culture data from Li et al. (2021) with firm-level financial data from Compustat. Our final sample comprises 38,991 firm-year observations for 5,057 U.S. firms from 2003 to 2019. Detailed sample selection steps and variable definitions are provided in the Appendix.

To address simultaneity bias in production functions, we estimate total factor productivity (TFP) using the control-function approach of Ackerberg, Caves, and Frazer (2015). This method improves upon standard OLS and Levinsohn and Petrin (2003) by correcting for functional dependence between labor and unobserved productivity. We assume a Cobb-Douglas production function:

$$ln\ Y_{it} = \beta_K \ln(K_{it}) + \beta_L \ln(L_{it}) + \omega_{it} + \varepsilon_{it} \quad (1)$$

where Y_{it} is sales, L_{it} is the number of employees, and K_{it} is net PP&E. We use the cost of goods sold as proxy for the unobserved productivity component ω_{it}. The resulting estimated residual $\hat{\omega}_{it}$ serves as our TFP measure.

2.2. Identification strategy

We relate TFP in year t to corporate culture in year t-1. Culture scores are derived from earnings call transcripts using the machine learning approach of Li et al. (2021), quantifying the five

dimensions defined by Guiso et al. (2015): innovation, integrity, quality, respect, and teamwork.

To address endogeneity, specifically that declining productivity might drive cultural signaling, we employ a shift-share instrument (Borusyak et al., 2025). We construct the instrument by interacting the leave-one-out industry-year mean culture ($Shift_{it}$, defined by 2-digit SIC code) with the state-level Family Unity index ($Unity_s$) from the Social Capital Project:[1]

$$Z_{ist} = Shift_{jt} \times Unity_s \tag{2}$$

This instrument exploits exogenous variation in regional social capital. The logic is that firms in states with stronger family-based social norms ($Unity_s$) are more responsive to industry-wide cultural trends ($Shift_{it}$). Since firms draw managers and employees from their local environment, those located in high-Family Unity states— characterized by norms of trust and cooperation—are more likely to internalize and emphasize cultural values such as integrity, teamwork, and respect when industry-wide pressure increases. The exclusion restriction requires that, conditional on industry and year fixed effects, state-level family structure affects firm productivity only via corporate culture rather than through other production channels.

We estimate two-stage least squares (2SLS) panel regressions:

$$\widehat{\omega}_{it} = \alpha + \delta C_{i,t-1} + \eta_j + \theta_t + u_{it} \tag{3}$$

where $C_{i,t-1}$ is the instrumented culture measure, and η_j and θ_t represent industry and year fixed effects. Standard errors are clustered at the firm level.

3. Results and discussion

3.1. Baseline result

Table 1 reports benchmark panel regressions of firm-level TFP on lagged log culture measures. Each specification relates $\widehat{\omega}_{it}$ to one lagged culture variable or the composite culture index. Overall, the baseline correlations suggest that, after conditioning on firm and industry heterogeneity, culture is at best weakly related to TFP in the cross-section, motivating the use of instrumental-variable methods in the next subsection to address remaining endogeneity concerns.

[1] The Social Capital Project is a research initiative of the U.S. Congress Joint Economic Committee (2018) that constructs a Social Capital Index and subindices, including a Family Unity measure based on family-structure indicators. We use Family Unity as a proxy for local family-based social capital and relational norms that shape how firms internalize and communicate cultural values. We thank the referee for suggesting the use of regional variation to address endogeneity.

Table 1. Culture and total factor productivity: ols regressions

	(1) Integrity	(2) Teamwork	(3) Innovation	(4) Respect	(5) Quality	(6) Composite
log(Culture)	-0.001	0.027***	0.002	0.012	0.048***	0.025**
	(0.009)	(0.010)	(0.010)	(0.008)	(0.010)	(0.010)
Industry fixed effects	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Observations	38,991	38,991	38,991	38,991	38,991	38,991
Adj. R-squared	0.215	0.216	0.215	0.215	0.218	0.216

Note: This table reports panel regressions of firm-level total factor productivity (TFP) on lagged log culture measures. Each column uses one culture dimension (Integrity, Teamwork, Innovation, Respect, Quality) or the composite culture index as the main regressor. The dependent variable is TFP. All specifications include industry and firm fixed effects and standard errors are clustered at the firm level. Stars correspond to statistical significance level, with *, ** and *** representing 10%, 5% and 1% respectively.

3.2 Instrumental variable approach

Table 2 reports instrumental-variable 2SLS regressions. The first-stage diagnostics reveal heterogeneity in the strength of the instrument across cultural dimensions. The instrument is strong for innovation (F-stat = 20.89) and quality (F-stat = 13.84), and acceptable for teamwork (F-stat = 11.25). However, the instrument is weak for integrity and respect (F-stats < 10). Consequently, we focus our interpretation on the dimensions where identification is more robust.

We find a positive causal effect for the composite culture index (Column 6), indicating that corporate culture, in aggregate, enhances productivity.[2] However, decomposing this effect reveals that it is driven by specific attributes. For the well-identified dimensions (innovation, quality, and teamwork) we find a positive and statistically significant causal effect on TFP. While the OLS baseline (Table 1) showed weak or insignificant associations for innovation, the IV estimate reveals a substantial positive impact: a one standard deviation increase in culture score is associated with an approximate 8.3% increase in TFP.[3]

[2] The magnitude of the IV estimates is considerably larger than the OLS estimates. This increase is likely driven by two factors. First, textual measures of culture contain inherent measurement error, which biases OLS coefficients toward zero (attenuation bias). Second, OLS estimates may be downward biased by reverse causality: firms experiencing declining productivity may strategically emphasize cultural initiatives in earnings calls to reassure investors. By isolating variation in culture driven by regional social norms rather than firm-specific conditions, the IV estimates mitigate this endogeneity and recover the stronger positive relationship.

[3] We also explore industry heterogeneity by splitting the sample into high-technology and non-technology firms, following Kile and Phillips (2009). We find that the positive causal effect of innovation and quality on productivity is concentrated in the high-tech subsample (significant at the 5% level), consistent with the intuition that adaptive cultures are most valuable in sectors characterized by rapid technological change. For brevity, we do not report

This pattern is consistent with prior evidence that stronger cultures are associated with better firm outcomes (e.g., Guiso et al., 2015; Graham et al., 2022). However, we remark that culture in our setting is measured from earnings calls, reflecting how management present cultural attributes to capital markets rather than on employees' internal perceptions.

When we add log (total assets) to control for firm size (Table 3), only innovation and quality remain statistically significant. A natural interpretation is that these two dimensions are more tightly connected to productivity in ways that are not simply a function of firm size: innovation-oriented cultures support new products, processes, and technologies, while quality-oriented cultures reduce defects and waste, all of which map into higher efficiency (e.g., Xie et al., 2021; Aboramadan, 2020). Consistent with this interpretation, a split-sample analysis shows that the positive causal effect of innovation on productivity is concentrated in high-technology industries (see footnote 3).

Table 2. Culture and total factor productivity: instrumental-variable regressions

	(1)	(2)	(3)	(4)	(5)	(6)
	Integrity	**Teamwork**	**Innovation**	**Respect**	**Quality**	**Composite**
log(Culture)	-2.297	0.488**	0.481**	0.830*	0.646**	0.571**
	(2.308)	(0.237)	(0.201)	(0.473)	(0.260)	(0.229)
First Stage Coeff.	-0.004	0.018***	0.011***	0.009**	0.016***	0.003***
	(0.004)	(0.005)	(0.002)	(0.004)	(0.004)	(0.001)
Industry fixed effects	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Observations	37,550	37,550	37,550	37,550	37,550	37,550
R-squared	0.0070	0.0919	0.0786	0.0358	0.0839	0.0915
Kleibergen-Paap F-stat	1.261	11.25	20.89	4.757	13.84	21.36

Note: This table reports two-stage least squares (2SLS) regressions of firm-level total productivity (TFP) on lagged log culture measures. Each column uses one culture dimension (Integrity, Teamwork, Innovation, Respect, Quality) or the composite culture index as the endogenous regressor. Lagged log culture is instrumented with a shift-share variable constructed as the interaction between a leave-one-out industry-year mean of the culture score and the state-level Family Unity index from the Social Capital Project. The dependent variable is TFP. All specifications include industry and firm fixed effects, and standard errors are clustered at the firm level. The table reports the second-stage coefficient on log(culture), the corresponding standard error, and first-stage statistics (coefficient on the instrument and first-stage F-statistics). Stars correspond to statistical significance levels, with *, **, and *** representing 10%, 5%, and 1%, respectively.

By contrast, teamwork (and respect and integrity, which have low F-stat) are more closely linked to the firm's broader governance and disclosure environment, such as ethical compliance

the detailed estimates here, but they are available upon request.

and reporting practices, which tend to be more developed in larger, complex organizations (Graham et al., 2022; Altamuro et al., 2022; Liu, 2023). After controlling for firm size, much of the variation has been accounted for.

Table 3. Culture, firm size, and total factor productivity: instrumental-variable regressions

	(1) Integrity	(2) Teamwork	(3) Innovation	(4) Respect	(5) Quality	(6) Composite
log(Culture)	-1.095	0.576	0.391**	1.531	0.654**	0.635*
	(0.849)	(0.400)	(0.188)	(1.767)	(0.330)	(0.337)
log(Total Assets)	-0.036**	0.011	-0.016***	0.063	0.001	0.009
	(0.015)	(0.020)	(0.003)	(0.092)	(0.010)	(0.014)
First Stage Coeff.	-0.007*	0.011**	0.011***	0.004	0.013***	0.002***
	(0.004)	(0.005)	(0.002)	(0.004)	(0.004)	(0.001)
Industry fixed effects	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Observations	37,550	37,550	37,550	37,550	37,550	37,550
R-squared	0.0333	0.0736	0.1060	0.0103	0.0825	0.0791
Kleibergen-Paap F-stat	3.257	5.135	20.50	0.894	9.313	11.53

Note: This table extends the instrumental-variable specifications in Table 2 by adding log(Total Assets) as a control for firm size. The dependent variable is firm-level TFP. Each column uses one culture dimension (Integrity, Teamwork, Innovation, Respect, Quality) or the composite culture index as the endogenous regressor. Lagged log culture is instrumented with a shift-share variable constructed as the interaction between a leave-one-out industry-year mean of the culture score and the state-level Family Unity index from the Social Capital Project. All specifications include industry and firm fixed effects, and standard errors are clustered at the firm level. The table reports second-stage coefficients on log(culture) and log(Total Assets), their standard errors, and first-stage statistics. Stars correspond to statistical significance levels, with *, **, and *** representing 10%, 5%, and 1%, respectively.

3.3 Culture data validation

To ensure our earnings-call measures reflect actual employee experiences or than just investor communication, we cross-validate them with the MIT Sloan Culture 500 scores derived from Glassdoor reviews. We identify a sample of firms with overlapping coverage in both datasets.[4] Table 4 reports the correlations between our measures and the Culture 500 scores, which are

[4] The MIT Culture 500 scores firms on nine dimensions based on employee reviews. We isolate the three dimensions (integrity, collaboration, and innovation) that align with our variables. We hand-collected data for the top and bottom 20 firms in these categories and matched them to our sample, yielding 106 unique firms where both Culture 500 scores and our earnings-call measures are available. The data for individual firms can be accessed from https://sloanreview.mit.edu/culture500/. We thank the referee for suggesting this validation exercise.

measured as frequency (how often a cultural theme is mentioned in employee reviews) and intensity (how positively it is discussed). We find a positive and statistically significant correlation for innovation, particularly with the intensity score, suggesting that executive communication regarding innovation aligns with employee perceptions. Conversely, the correlation for collaboration is negative. This divergence likely reflects different constructs: our variables measure culture as communicated to capital markets, where larger, complex firms may emphasize collaboration rhetorically (consistent with Table 3), whereas Glassdoor captures culture as experienced by employees. Overall, the two measures are related but distinct.

Table 4. Comparison of Earnings-Call Culture Measures with MIT Culture 500 Scores

	Mean	Correlation	Std Dev	5th pct	50th pct	95th pct
Integrity	2.24		0.74	1.69	2.05	2.86
Frequency	-0.18	0.0140	0.61	-0.60	-0.35	0.10
Intensity	-0.50	-0.1601	0.82	-1.10	-0.80	0.10
Teamwork	2.23		1.12	1.45	1.87	2.87
Frequency	0.56	-0.0026	0.51	0.20	0.50	0.90
Intensity	1.38	-0.3376***	0.61	1.00	1.40	1.90
Innovation	7.19		3.77	4.80	6.62	8.09
Frequency	-0.53	0.1608*	0.89	-1.30	-0.65	0.00
Intensity	0.93	0.2848***	0.93	0.00	0.95	1.80

Note: This table compares our earnings-call-based culture measures with MIT Sloan Management Review Culture 500 scores for 106 firms identified as being in the top or bottom 20 on Integrity, Collaboration (Teamwork), and Innovation in the Culture 500 data. For each dimension, the first row reports summary statistics for the earnings-call measures; the Frequency and Intensity rows report summary statistics for the corresponding Glassdoor NLP measures. The Correlation column reports the Pearson correlation between the earnings-call measure and the Culture 500 score for that dimension. Mean, standard deviation, and percentiles are reported across firms. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

4. Conclusion

This study provides causal evidence that corporate culture drives firm productivity, utilizing a shift-share instrument and Ackerberg-Caves-Frazer (2015) TFP estimation to address endogeneity. We find that productivity gains are concentrated in innovation and quality, dimensions that map directly to operational efficiency and are validated by employee sentiment. Conversely, dimensions like teamwork appear more closely linked to strategic signaling. For practitioners, this implies that productivity improvements stem not from generalized cultural initiatives, but from targeted investments in innovation- and quality-oriented norms.

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Appendix

Appendix 1. Financial and production data

Firm-level financial data are obtained from Compustat for U.S.-domiciled firms from 2003 to 2019. We exclude financial firms (SIC 6000-6999) and regulated utilities (SIC 4900-4999). We retain firm-year observations with positive values for sales (SALE), net property, plant, and equipment (PPENT), number of employees (EMP), cost of goods sold (COGS), and total assets (AT). To ensure data quality, we drop observations with inconsistent fiscal-year reporting or missing industry classifications.

For the production function estimation, output (Y) is measured as sales (SALE), capital (K) as net PP&E (PPENT), and labor (L) as the number of employees (EMP). We use the cost of goods sold (COGS) as the proxy input for unobserved productivity in the Ackerberg, Caves, and Frazer (2015) control-function estimation. All monetary variables are winsorized at the 1st and 99th percentiles to mitigate the impact of outliers.

Appendix 2. Corporate culture measures

Corporate culture scores are obtained from the Li et al. (2021) database, which utilizes machine learning to quantify culture from earnings call transcripts. The data scores each firm-year along the five dimensions defined by Guiso et al. (2015): innovation, integrity, quality, respect, and teamwork. The original database covers 209,480 earnings calls for 62,664 firms through 2018.

For our empirical analysis, we compute the natural logarithm of one plus the raw frequency score for each dimension:

$$Culture_{it} = \ln(1 + Score_{it}) \tag{4}$$

We also construct a composite culture index, defined as the equally weighted average of the five dimensional scores. Table A1 (Panel B) reports the correlations among these dimensions. While most existing work focuses on the composite score, we also analyze each dimension separately, consistent with Gorton et al. (2022), who emphasize the need to identify which elements of corporate culture are most closely related to productivity: "better understanding which elements of corporate culture drive productivity and the extent to which management practices and leadership influence, constrain, or contribute to the culture-productivity channel is a clear direction for future work" (p. 555).

Appendix 3. Instrumental variable: family unity

Our shift-share instrument relies on the state-level Family Unity index from the U.S. Congress Joint Economic Committee (2018)'s Social Capital Project. This index is a standardized composite of family-structure indicators, including: (i) the share of children living with two

married parents, (ii) the share of births to unmarried mothers, and (iii) measures of single parenthood and marital stability.

Higher values of the index indicate a greater prevalence of intact two-parent families and stronger local relational norms. We match the state-level index to firms based on their historical headquarters state in Compustat (STATE). This variable is interacted with the leave-one-out industry mean of culture to form the instrument Z_{ist} described in Section 2.2.

Appendix 4. Summary statistics

Panel A reports summary statistics for TFP, financial variables, culture scores, and Family Unity. Financial numbers are measured in USD million, while employees are measured in thousands. Corporate culture measures by Li et al. (2021) are extracted from US corporate earnings calls using textual analysis and measured in five dimensions defined by Guiso et al. (2015) (innovation, integrity, quality, respect, and teamwork). Composite corporate culture is the equally weighted score of the five corporate culture dimensions. Family Unity is the state-level index from the Social Capital Project. Panel B reports correlations between TFP, the five culture dimensions, the composite culture index, and Family Unity.

Table 5. Descriptive statistics

Variable	Mean	Std Dev	5th pct	50th pct	95th pct
Firm Financials					
TFP	2.23	0.28	1.87	2.22	2.63
Sale	4,452.72	15,467.43	18.41	791.98	17,820.00
Net PPE	1,859.45	7,968.01	1.52	140.66	8,652.00
Num Employees	12.82	38.35	0.08	2.49	56.00
Cost of Goods Sold	3,001.45	11,542.30	10.22	446.32	11,741.23
Total Assets	7,561.89	36,395.58	33.93	944.50	29,988.80
Culture					
Integrity	2.40	1.27	0.91	2.13	4.78
Teamwork	2.49	1.75	0.73	2.01	5.98
Innovation	4.52	2.58	1.57	3.94	9.54
Respect	3.07	2.16	0.82	2.51	7.28
Quality	2.47	1.50	0.78	2.12	5.34
Composite	14.95	5.72	7.59	13.93	25.59
Instrument					
Family Unity	0.04	0.63	-1.08	0.05	1.09

Table 6. Correlations of culture scores by dimension

	TFP	Integrity	Teamwork	Innovation	Respect	Quality	Composite
Integrity	0.0140						
Teamwork	-0.0212	0.3123					
Innovation	-0.0786	0.0961	0.3360				
Respect	-0.0197	0.3428	0.3015	0.2885			
Quality	0.0353	-0.0661	0.0958	0.2453	-0.0258		
Composite	-0.0371	0.4731	0.6661	0.7494	0.6699	0.3785	
Family Unity	0.0212	-0.0153	0.0741	0.0685	0.0312	0.0513	0.0755