Creative Corporate Culture and Innovation

Abstract: We identify creative companies by means of a textual analysis that hinges on the competing values framework. We show that a creative corporate culture is an important driver of innovation, as measured by the number of patents as well as the patents' importance as captured by patents' citations and market values. A portfolio of creative companies earns significantly positive annual four-factor alphas. We quantify potential biases that could be induced by the omission of relevant variables by formally examining coefficient movements after inclusion of controls.

1. Introduction

Innovation refers to the introduction of new goods, new methods of production, the establishment of new markets or new forms of supply, and plays a key role in boosting economic growth (Aghion, Van Reenen and Zingales 2013). This is why understanding the determinants of firms' ability to innovate is important for academics and policymakers alike. Corporate culture can potentially catalyse firms' innovation processes since it can boost employees' motivation with a positive effect on stock returns (Edmans, 2011) and firms' working environments (Price, 2007). The belief that corporate culture relates to the ability to innovate is also widely held among listed firms: 85% of S&P 500 companies have a section on their websites dedicated to corporate culture, and 80% of those firms advertise innovation as a corporate value (Guiso, Sapienza and Zingales 2014). Intel, for example, states that "passion for innovation helps us maintain our role as a technology leader", and 3M refers to W. McKnight, its iconic chairman (who led the firm from 1949 to 1966), as "a business philosopher, since he created a corporate culture that encourages employee initiative and innovation". There is a growing academic literature on corporate culture addressing issues such as the link between firm performance and the employees' perception of corporate values (Guiso et al., 2014), or the role played by corporate culture in moderating the probability of CEO turnover (Fiordelisi and Ricci, 2014). Studies in the field of management have also examined how a creative environment within an organization

could be developed, e.g. by fostering diversity (Kauppila, Bizzi, and Obstfeld, 2018), team work (Aggarwal and Woolley, 2018), or by the collaborative promotion of technology standards (Vakili, K., 2016). This literature suggests that companies cherishing a creative corporate culture should indeed have a superior ability to innovate (Anderson, Potočnik and Zhou 2014), but, somewhat surprisingly, few empirical papers do analyse the relationship between innovation and corporate culture. One reason may be that the concept of corporate culture is somewhat nebulous, and raises numerous measurement issues in empirical research (see the review paper by Zingales, 2015). Our paper aims to fill this gap by answering the following research questions: Do creative companies generate greater innovative output? Does a creative corporate culture increase firm value?

We show that creative companies add more value by investing in innovative projects relative to their peers that are less oriented toward innovation. We document two important results: first, creative companies generate higher innovative output. Second, we outline that a creative corporate culture is positively associated to firm value. While these results are economically meaningful and highly statistically significant, a contemporaneous correlation between corporate culture, unobservable characteristics of innovative companies, and the production of innovative output may hinder a proper interpretation of the estimated coefficients. We therefore formally examine the effect of omitted variable bias on our coefficients following the approach proposed by Oster (2019). More specifically, we examine how the coefficients and R-squared changes after the inclusion of control variables in order to quantify the potential effect of omitted variables. Our analysis points out that omitted variables are very unlikely to cancel-out or to have a severe effect, which is why we conclude that creativity has a positive effect on the ability of companies to generate valuable innovation.

We measure corporate culture by assessing corporate financial statements and assume that words and language (named "vocabulary") used by members of listed firms in their official documents reveal some information on the culture they adhere to (Levinson, 2003). By using the competing values' framework (CVF) (Cameron, De Graff, Quinn and Thakor, 2006; Quinn and Rohrbaugh, 1983) to define four cultural dimensions (Create, Collaborate, Compete, and Control), we identify a vocabulary for the cultural dimension Create by means of the Harvard Psychological dictionary. We then apply textual analysis (Stone, Dunphy, Smith and Ogilvie, 1966) on the 128,489 10-K reports available in the SEC's Edgar database to estimate a firm specific score for the corporate cultural dimension Create of the CVF. We use this score to generate three indicator variables that identify creative companies.

We approximate firms' innovative output by their patenting activity (Hirshleifer, et al. 2012, Bloom et al. 3013 and Kogan et al. 2017), which is the number of patents granted in each year of our sample from the U.S. Patents and Trademarks Office. The patent count proxies for innovation success in an imperfect manner because patents differ substantially in importance. Patent citations are better able to capture the technological and economic significance of patents (Trajtenberg, 1990; Hall, Jaffe, and Trajtenberg, 2005). However, the patent citations unavoidably suffer from problems of truncation for patents granted in years closer to our final sample year, because less time is available to accumulate citations. To address this issue, we use the citation count calculated by Kogan et al. (2017) which accounts for truncation by dividing the number of citations of each patent by the average number of citations received by all the patents granted in the same year. Specifically, we use the database at company level of Kogan et al. (2017)[1] and we merge it with our corporate culture scores to examine the effect

1 We thank Leonid Kogan, Dimitris Papanikolaou, Amit Seru, and Noah Stoffman for making available these data at the link: https://iu.app.box.com/v/patents

of creativity on the number, the citations and the value of patents granted to listed companies. The final database that we will use in this analysis comprises the intersection of the Edgar database, Compustat, CRSP and the Kogan et al. (2017) patenting data at company level, and consists of 25,373 observations for the period 1995 to 2010, the end year of Kogan et al. (2017) patenting data.

The paper proceeds as follows: we describe our measures for corporate culture in section two, and our sample in section three. Section four outlines the relation between corporate culture and innovative output. Section five analyses the association between corporate culture, firm value, and the investment in R&D. Section six examines the risk-adjusted abnormal returns of creative companies. Section seven reports some robustness checks and we conclude in section eight.

2. Theoretical Framework

Corporate culture comprises "a set of norms and values that are widely shared and strongly held throughout the organization" (O'Reilly and Chatman, 1996). Consistent with Deal and Kennedy (1982), Peters and Waterman, (1982), Wilkins and Ouchi (1983) and Schein (1992), the above definition implies that corporate culture can influence economic outcomes, such as an organization's effectiveness and value creation. As we focus on the role of corporate culture in affecting firms' innovation ability, we need to define the culture dimensions in a precise way. We follow Cameron et al. (2006) who draw on Quinn and Rohrbaugh (1983) and we use their competing values framework (CVF) that distinguishes among four culture dimensions: control, competition, collaboration, and creation, that are also used in e.g. Hartnell et al., 2011; Ostroff et al., 2003; Schneider et al., 2013. The CVF defines corporate culture as internally or externally oriented. An internally oriented firm can have a collaboration-

oriented culture (termed “clan culture type” in the CVF), which has an employee focus that aims at developing competencies and strengthening the organizational culture. The intuition is that this cultural dimension engenders employee attitudes that are strengthened by fostering cooperation and the participation of employees in corporate decisions. The “clan culture type” clarifies and reinforces organizational values, norms, and expectations, develops employees’ skills and cross-functional work groups, and implements programmes that enhance employee retention. Companies promoting this culture can be more successful as they can succeed in retaining human resources. An internally oriented culture can also be control-oriented (often called a “hierarchy culture”). This type of corporate culture is structured on clear but rigid mechanisms. The goal of a control-oriented firm is to create value-augmenting efficiency and enhancing the effectiveness of internal processes (e.g. improving systems and technology) by standardized procedures and hinging on rule reinforcement and uniformity.

The CVF also outlines two externally oriented corporate cultures. The first is a competition-oriented culture (labelled “market culture type”) where firms focus on external effectiveness by aiming at enhancing competitiveness and accentuating the importance of fast response and customer focus. Customer and shareholder judgment is fundamental for competition-oriented firms. The second type is the creativity-oriented culture (termed “adhocracy”), which focuses on innovation in products and services. The firm encourages employees to share ideas, to develop a clear vision, and constantly change, e.g., allowing for freedom of thought and action among employees, such that rule breaking and reaching beyond barriers are common characteristics of the organisation's culture. This type of companies usually encourages radical new process breakthroughs and innovations, and develop new technologies that redefine entire industries.

<< INSERT FIGURE 1 >>

Figure 1 presents a stylised version of the CVF in panel A (Fiordelisi and Ricci. 2014). Panel B and C report respectively the words contained in the vocabulary of create and their yearly average frequency in our sample of l0Ks. We test the intuitive concept that a creativity-oriented corporate culture does indeed improve firms' ability to innovate. Specifically, we posit that *creativity-oriented corporations are able to obtain valuable output from their investment in R&D*. We also posit that the *innovative output produced by creative firms is more valuable than the innovative output produced by companies not oriented toward creativity*.

3. Data and Descriptive Statistics

We construct our sample by combining data obtained from four different databases: (1) accounting and financial variables from Compustat, (2) market information from CRSP, (3) 10-Ks from the SEC Edgar Database, used to calculate the corporate culture proxies, and (4) patent information from Kogan et al. (2017). Hence, the sample size, used to examine the innovative output of firms, is determined by the intersection of the above databases. Financial firms are excluded from the analysis. The resulting sample spans a time window from 1995 to 2010 (the end year of Kogan et al. 2017 database). Variables descriptions are given in table 1, and the summary statistics are reported in the first panel of table 2. The sample firms have on average a patent count of 7.3. As noted in Kogan et al. (2017) there is a large dispersion around the number of citations adjusted for truncation and the market value of patents granted to listed firms. Panel A of table 2 also shows that firms in our sample spend on average 5% of their assets in R&D.

<< INSERT TABLE 1 AND 2>>

Panel B of table 2 shows the difference in mean between companies identified as Creative by our text analysis and the other companies in our sample. Panel B of Table 2 shows that companies labelled as creative by our content analysis spend more in R&D and produce more patents. The patents granted to Creative companies receive more citations and are characterized by a higher market value.

3.1 Measuring Corporate Culture

To measure the cultural orientation of companies in the spirit of Cameron et al. (2006), we use textual analysis. We assume that the language used by employees (named "vocabulary") reveals some information on the corporate culture (Levinson, 2003). We argue that the characteristics of any firm are reflected in its official written documents and that our textual analysis is able to structurally examine the content of firms' official documents, such as 10-K reports (Antweiler and Murray, 2004; Hoberg and Hanley, 2010; Hoberg and Phillips, 2010; Li, 2008; Loughran and McDonald, 2011; Tetlock, 2007; Tetlock et al., 2008). To estimate the prevalence of our cultural dimension Create, defined in Figure 1, we identify a large set of key words that is selected by means of a two-step process: first, we start with the synonyms suggested by Cameron et al. (2006) to describe each cultural dimension. Second, the words selected in the first step are looked up in the Harvard-IV Dictionary in order to identify additional synonyms. Loughran and McDonald (2011) point out that the use of the Harvard dictionary in textual analysis significantly decreases the impact of a researcher's subjectivity in terms of word selection. As an example, words such as "Dream, begin, elaborate" are associated with "Create", which suggests a creativity-oriented culture. We calculate the prominence and the frequency with which our synonyms are reported in each annual 10-K. We also follow Loughran and McDonald (2011) and present additional results obtained by adjusting the simple frequencies for word commonality. Specifically, to

identify creative companies, we focus on the vocabulary of the cultural dimension Create (see Appendix). We then generate three different indicator variables identifying creative companies: (i) *Creative,* (ii) *Creative weighted* and (iii) *Creative log-adjusted and weighted*. The first measure (*Creative*) is constructed using simple frequencies. We calculate the frequency of the words contained in the vocabulary set of Create for each company-year. We then calculate the average of the second, third, and fourth lag for each company. The variable (*Creative*) takes the value of one if the average frequency of a specific company is above the industry median (we use Fama and French 48 industry classification[2]). We do not consider the first lag in the average frequency as it takes approximately two years for a patent to be granted. The second measure (*Creative weighted*) is constructed by adjusting the frequency of words in the vocabulary set of Create for commonality. Specifically, we multiply the frequency of each word by the natural logarithm of the total number of 10Ks in our sample divided by the number of 10ks with at least one occurrence of that word. We then sum the resulting adjusted frequencies of all the words contained in the bag of words of Create to generate an adjusted score for the cultural dimension Create for each company-year (Appendix, Panels A and B). The indicator variable (*Creative weighted*) takes the value of one in a specific year if the average of the second, third, and fourth lag of the adjusted score of a specific company is above the industry median. To build our third measure (*Creative log-adjusted and weighted*) we focus on words appearing at least once in each 10K. We divide the natural logarithm of the number of times a specific word appears in a 10K by the natural logarithm of the total number of words in the 10K. We then adjust the resulting log-frequency by word commonality to obtain a log-adjusted score for the dimension Create. If a word does not appear in one 10K we set the log-frequency for

[2] We use Fama and French classification for consistency throughout the paper. Using Standard Industry Classification (SIC) does not affect our estimates.

that word to zero. We then sum the log frequencies adjusted for commonality of all the words contained in the vocabulary for Create to obtain a log-adjusted score for each company-year. The indicator variable *Creative log-adjusted and weighted* takes the value of one in a specific year if the average of the second, third, and fourth lag of the log-adjusted score of a specific company is above the industry median.

3.2 Validating our culture measures

To gain further insights into the corporate culture measures, we rank the components of the S&P500 using the frequency, the adjusted frequency, and the log-adjusted and weighted frequency of the words in the vocabulary set of Create (see Panel C of Table 2). We then report the names of the first ten companies for each score in 2000, 2005, and 2010. Panel C of table 2 has a twofold objective: first, it helps us to examine the characteristics of companies that report very high scores in our text analysis. Second, this approach enable us to show that our corporate culture scores are persistent but move over time. Focusing on the components of the S&P500 also enables us to make an informal validation of our measures by examining the characteristics and features of companies in the top positions of our cultural scores. In the first column, we report the rank based on the simple frequency of words contained in the vocabulary set of Create. Microsoft appears among the first of ten companies in two out of three rankings (in 2000 and 2010). In 2000, Microsoft unquestionably fitted the core values of our cultural dimension Create, the focus of the company was growth and autonomy by means of innovation. In the late 90s Microsoft was, in fact, growing at an unprecedented speed and at the beginning of 2000, the company's stocks were trading at more than $58, the highest value in the company's history. Microsoft is also present among the top ten companies in the second column of panel C of table 2 where we report the ranking based on the frequencies of the words contained in the vocabulary set of Create

weighted by commonality. In addition to Microsoft, HP is present in two out of three rankings and a company like Du Pont which openly advertises science and innovation as core values is listed in all three rankings.

The rankings presented in panel C show that our corporate culture measures move quite slowly over time, some companies are in the top positions in all the rankings and the majority of companies appear more than once in panel C of table 2. This evidence suggests that our corporate culture measures are significantly persistent over time, and firm fixed effects might cancel out a very relevant portion of the variability of our cultural variables. This finding is in line with Cronqvist et al. (2009), who attempt to capture corporate culture using firm fixed effects. However, our measures represent a step ahead compared to simple fixed effects as they also enable us to capture the slow variation of corporate culture over time and to identify creative companies. We examine formally the persistency of our measures of corporate culture by estimating the portion of the variance of our variables explained by firm fixed effects and the F-test resulting from a regression model with only firm fixed effects and a constant. The results reported in panel D of table 2 clearly show that our measures are very persistent and firm fixed effects explain a large portion of the variation of our corporate culture scores. While the persistence of corporate culture is largely expected and in line with the existing literature, it creates identification issues in regression models with firm fixed effects. Therefore, we avoid to augment our regression models with firm fixed effects and use State×Industry fixed effects to capture any persistent feature of companies operating in a specific industry (Fama and French 48 classification) in a specific state. We also include State×Year fixed effects in all our regression models to control for the effect of policies at State level that may simultaneously correlate with our cultural variables and with our outcome variables. Finally, to investigate the potential bias induced by the omission of relevant variables from our regression models we use the

methodology proposed by Oster (2019)[3] and examine the movement of our coefficients and R-Squared after inclusion of control variables. Specifically, below each regression model we present an estimate (δ) capturing how important the omitted factors could be in relation to our control variables to eliminate the observed effect. As an example, in our analysis a $\delta = 2$ would suggest that the unobservables would need to be twice as important as the observables to produce an effect of creativity on innovation equal to zero. For each regression model we also present an estimate ($\beta^{omitted}$) of the effect of creativity on innovation, under the very conservative assumption that unobservables are as important as the control variables used in our regression models ($\delta = 1$). In all this test, we follow Oster (2019) and we assume that the theoretical R-squared of a regression model which would also include the relevant variables potentially omitted from our models would be the minimum between 1.3 times the estimated R-squared and 1.

3.3 Other Variables

We argue that a firm's innovation ability is affected by its corporate culture. To test this hypothesis, we control for firm size (the natural logarithm of total assets), capital intensity (the net property, plant and equipment by number of employees), the amount of cash held, accounting performance (ROA), and sales growth. Moreover, since a higher innovative output is likely to be associated with larger stock returns (Hirshleifer et al., 2013), we control for the buy-and-hold return over the year.

4. Corporate Culture and Patenting Activity

[3] We thank Emily Oster for making publicly available the Stata command psacalc to implement the methodology proposed in Oster (2019).

We hypothesize that a Create-oriented corporate culture is positively associated with a firm's propensity to undertake innovative projects. Specifically, we argue that a creative corporate culture is positively associated with a firm's patenting activities. Model (1) of table 3 reports the results of a relation between the patent count and creative firms, in Model (2) and (3) we repeat the analysis replacing our measure *Creative* with *Creative weighted* and *Creative log-adjusted and weighted* respectively. We find consistently strong evidence that creativity is positively associated with the firms' innovation activity, as in this type of culture employees are stimulated to be creative and take risks. They are expected to thrive in a change-oriented environment. This result is consistent across different specifications. Our cultural variables are positive and statistically significant ($p<0.01$) in the first three models presented in table 3. The coefficients on our cultural variables ranges between 0.18 and 0.29. The results reported in table 3 suggest that the weighting words frequency on commonality has a minor effect on the coefficients of our cultural variables. Table 3 shows that using log-transformation of our words counts and weighting the words on commonality has a larger effect on our estimates. Albeit still highly statistically significant ($p<0.01$), the coefficient of our variable *Creative log-adjusted and weighted* in column 3 of table 3 is sensibly smaller than the coefficients reported in columns 1 and 2 measuring 0.18. Below each regression model we also report an estimate of the potential effect of unobservable on the coefficients of main interest (*Creative* in model (1), *Creative weighted* in model (2) and *Creative log-adjusted and weighted* in model (3)). All the estimates of δ are very large and substantially above 1 (the cut-off suggested in Oster (2019) as a critical value). This evidence suggests that omitted variables are very unlikely to eliminate the effect of creativity on the number of patents granted to listed firms. The large size of δ in all models is consistent with our estimates of $\beta^{omitted}$ that

are all very close to the coefficients reported in the first three lines of table 3, suggesting that adjusting for omitted variable has a relatively small effect on our coefficients.

In the last three models of table 3, we use as dependent variable the number of patent citations adjusted for truncation and scaled on book assets as calculated by Kogan et al. (2017). The results of these models confirm our earlier findings: patents granted to creative firms receive on average more citations than the patents granted to their peer companies that are not labelled as a creative firm. Coefficients are slightly larger compared to the coefficients reported in the first three columns of table ranging from 0.24 to 0.37. The smallest effect of creativity on the number of citations is estimated in model (6) where we use the log transformation to calculate the frequency of words in the vocabulary of Create, and we weight the frequencies on words' commonality. Consistently with the evidence reported in the first three columns the estimates of δ and $\beta^{omitted}$ suggest that omitted variables are very unlikely to drive our results.

<< INSERT TABLE 3>>

The coefficients reported in table 3 suggest that creative firms generate more patents and their patents receive more citations compared to companies that are not labelled as creative. This result is consistent across different weighting schemes. The coefficients estimated on our cultural variables remain positive and statistically significant ($p<0.01$) in all our specifications. This result suggests that creative companies innovate more and generate innovation of higher quality respect to their peers.

5. Corporate Culture, Investment in Innovation and Firm Value

We now turn our focus to R&D expenditure and on the market value of patents granted to creative companies as calculated by Kogan et al. (2017). We posit that *creative firms*

invest more in innovative projects and are better able to generate more valuable patents from their investments. To test this hypothesis, we regress the R&D expenditure and market value of patents scaled on total assets on a set of dummy variables identifying creative companies. Consistent with our hypothesis, the evidence suggests that creative firms invest more in innovative projects. Our cultural variables are positive and statistically significant ($p<0.01$) in the first three models of table 4 indicating that creative companies own patents of higher value compared to their peers. Below each regression model we also report estimates of the potential distortion created by omitting relevant variables in our regression models. The estimates of δ and $\beta^{omitted}$ suggest that omitted variables are very unlikely to eliminate the effect of creativity on the market value of patents and on the investment in R&D. While this empirical evidence supports our general hypothesis that creative companies generate more value from their investment in R&D, it may be that our results are driven by risk. Creative companies may in fact take more risk by investing more in R&D and even though they generate more valuable patents from their investment the potential gain arising from their innovation outputs may disappear when we control for risk. To examine this possibility in the next section we form different portfolios of creative companies and estimate whether these portfolios earn risk-adjusted abnormal returns.

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6. Risk-Adjusted returns of Creative Companies

In this section we examine whether a portfolio of creative firms outperforms different benchmarks after controlling for risk. Given the results reported in the previous tables is natural to expect that creative companies earn higher returns compared to other companies. Our results suggest in fact that creative companies own patents that are considered more valuable by investors. It is however unclear whether or not creative

companies outperform their competitors after controlling for risk. In this section, we estimate risk-adjusted returns generated by creative companies. We use our cultural indicator variables to create portfolios of companies culturally oriented toward creativity each January for all the years in our sample. We then calculated the return of equally-weighted and value-weighted portfolios of companies labeled as creative according to each one of our measures: *Creative, Creative weighted* and *Creative log-adjusted and weighted*. We use the risk-free rate or the Fama and French 48 industry index available on Kennet French website as benchmark. We then follow Edmans (2011) and employ a four-factor model to adjust for risk, specifically from Kennet French website we use: the excess return on the market (MKT) calculated as the value weighted return on all NYSE, AMEX and NASDAQ minus the risk free rate (Treasury bill rate from Ibboston Associates) in addition to the HML (high minus low), the SMB (small minus big) and a momentum portfolio (MOM). The coefficient of main interest is α which captures the abnormal risk-adjusted returns from each portfolio.

Panel A of table 5 presents the results from a portfolio constructed using our variable *Creative*, for the 1995–2010 period. α is positive and significant in our estimations presented in the first three columns. Specifically, our portfolio generates a positive alpha when we use the risk-free rate as a benchmark regardless of the weighting scheme used to calculate the returns. When we use the industry matched benchmark and we weight the components of our portfolio based on value (column 4) alpha becomes statistically indistinguishable than zero. This evidence may suggest that small creative companies are particularly able to create additional value with their investment in R&D. Similar evidence is also reported in Panels B and C where we use our indicator variables *Creative weighted* and *Creative log-adjusted and weighted* to create our portfolios. We conclude that Creative companies produce more valuable innovation and earn risk-adjusted abnormal return.

<< INSERT TABLE 5 >>

7. Robustness Tests

In this section we present some robustness checks to our main estimates. Specifically, we examine whether our results are driven by specific words that are particularly frequent in the 10Ks of the companies in our sample. Second, we test whether our results depend on the specific cut-off (the median) used in the paper to classify creative companies. These tests are reported in table 6. Specifically, in the first two panels we re-estimate our main regression models using our variable *Creative* calculated excluding the three more frequent words in the vocabulary. Specifically, in Panel A we exclude the words: develop* new* and chang* to identify creative companies. In panel B we repeat the analysis but we exclude the 5 more frequent words, specifically in addition to the first three most frequent words we also exclude the words research* and init*. While the coefficients reported in panel A and B are generally smaller compared to the coefficients reported in tables 3 and 4, the effect of our variable *Creative* on our dependent variables is still positive and statistically significant ($p<0.01$) in all our models. This result reinforces our evidence showing that the words used in our vocabulary are useful to capture corporate culture and also reinsures that our main results are not driven by specific words in our vocabulary.

<< INSERT TABLE 6 >>

In Panel C, we repeat the analysis but we compare companies in the first tercile of a ranking based on the simple frequencies of the words contained in our vocabulary of Create with companies in the bottom tercile of the ranking. As expected, the coefficients are generally greater than the coefficients presented in tables 3 and 4. This result again reinforces our evidence that the words in our vocabulary, selected to capture the cultural dimension create in the CVF, indeed generate a good proxy for a

corporate culture oriented toward creativity.

8. Conclusion

The majority of firms listed in S&P 500 mention that their innovative capacity largely hinges on their corporate culture. We show that a creativity-oriented corporate culture is associated with success in innovation activities (as measured by the number of patents, the patent citation, and the market value of patents), which in turn leads to higher risk-adjusted returns of creative companies. We examine potential distortions in our parameters generated by the omission of relevant variables from our regression models by examining coefficients and R-squared movement after the introduction of control variables. The results from this tests suggest that omitted variables are very unlikely to drive our results. This positive association with firm value explains why firms are strongly focused on advertising creativity among their corporate values.

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Figure 1 : Competing values framework (CVF)

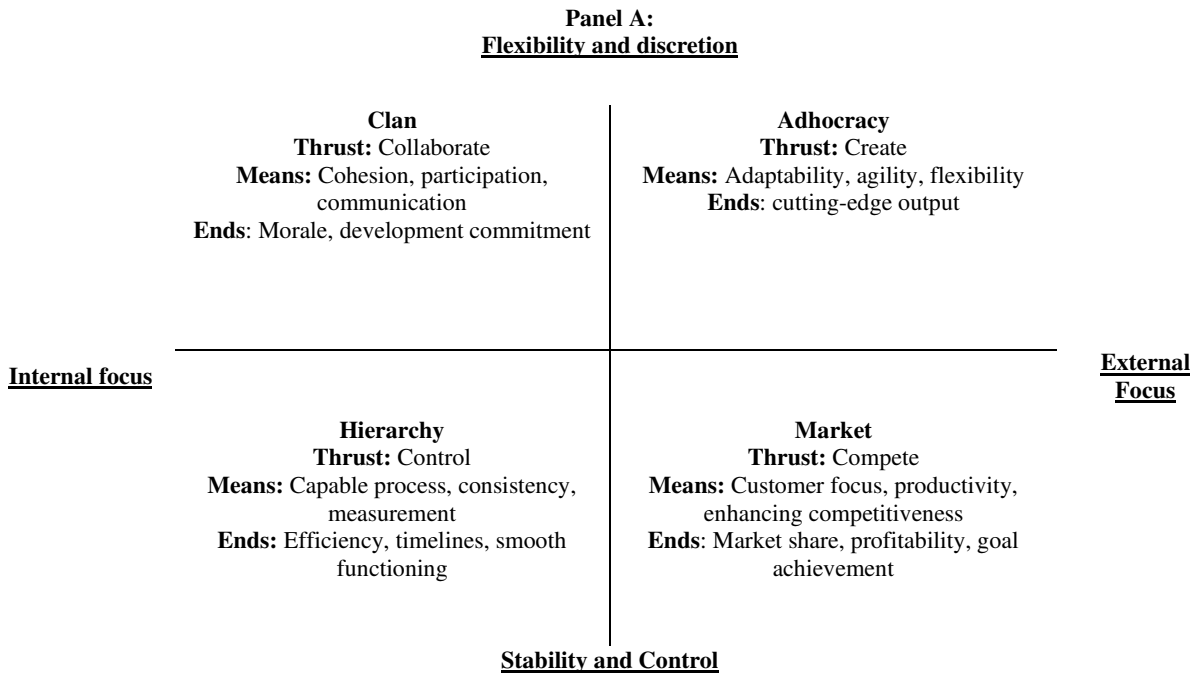

Table 1: Variable Description
This table reports the variable description and data sources.

Dependent Variables	Description	Database
$patents$	The number of patents granted to a company in a specific year (variable fNpats in Kogan et al. 2017 firm innovation database)	Kogan et al. 2017 firm_innovation
$patents\ citations$	The number of citations received by patents granted to a company in a specific year adjusted for truncation and scaled by book assets (variable Tcw in Kogan et al. 2017 firm_innovation database)	Kogan et al 2017. firm_innovation
$patents\ market\ value$	The total market value of the patents granted to a company in a specific year scaled by book assets (variable Tsm in Kogan et al. 2017 firm_innovation database)	Kogan et al. 2017 firm_innovation
$\frac{\text{R\&D}}{\text{Total Assets}}$	R&D expenditure scaled by book assets	Compustat
Cultural Variables	**Description**	**Database**
$Creative$	An indicator variable taking the value of one in a specific year if the average of the second, third, and fourth lag of the frequency of words contained in the bag of words for Create of a specific company is above the industry median (Fama and French 48 Industry classification).	Edgar
$Creative\ weighted$	An indicator variable taking the value of one in a specific year if the average of the second, third, and fourth lag of the score of a specific company for Create adjusted for words commonality is above the industry median (Fama and French 48 Industry classification).	Edgar
$Creative\ log-adjusted\ and\ weighted$	An indicator variable taking the value of one in a specific year if the average of the second, third, and fourth lag of the log-score of a specific company for Create adjusted for word commonality is above the industry median (Fama and French 48 Industry classification).	Edgar
Control Variables	**Description**	**Database**
ln ($Total\ Asset$)	Natural logarithm of total asset	Compustat
$\frac{PPE}{Employees}$	Net property plant and equipment per employee	Compustat
ROA	Net income before taxes on total assets	Compustat
$\frac{Cash}{Total\ assets}$	Ratio of cash to total assets	Compustat
$Sales\ return$	The value of total sales divided by the value of total sales in the previous year	Compustat
$Stock\ Return$	The buy and hold return over the fiscal year	CRSP

Table 2
Panel A: Descriptive Statistics

This table reports the summary statistics of all variables.

Dependent Variables	Mean	Median	Standard Deviation	5th pctile	95th pctile
$patents\ count$	7.2745	0.0000	27.8518	0.0000	32.0000
$patents\ citations$	16.4469	0.0000	62.3106	0.0000	75.6769
$patents\ market\ value$	100.9474	0.0000	490.3900	0.0000	337.7100
$\frac{\text{R\&D}}{\text{Total Assetts}}$	0.0554	0.0009	0.1134	0.0000	0.2682
Cultural Variables	**Mean**	**Median**	**Standard Deviation**	**5th pctile**	**95th pctile**
$Creative$	0.4987	0.0000	0.5000	0.0000	1.0000
$Creative\ weighted$	0.5003	1.0000	0.5000	0.0000	1.0000
$Creative\ log-adjusted\ and\ weighted$	0.4998	0.0000	0.5000	0.0000	1.0000
Control Variables	**Mean**	**Median**	**Standard Deviation**	**5th pctile**	**95th pctile**
$Total\ Assets$	2378.6850	346.9460	6178.1260	20.4920	13054.0000
$\frac{PPE}{Employees}$	5.9638	5.8492	1.9147	3.0200	9.4769
ROA	193.5304	34.8581	602.3508	5.5129	956.3391
$\frac{Cash}{Total\ assets}$	-0.0295	0.0330	0.2302	-0.4755	0.1553
$Sales\ return$	0.1281	0.0728	0.1492	0.0031	0.4531
$Stock\ Return$	1.1287	1.0724	0.4036	0.6721	1.7018

Table 2 Panel B: Differences in mean for our dependent variables based on our variable creative

Dependent Variables	Mean Creative Companies	Mean Control Sample	Standard Deviation Creative Companies	Standard Deviation Control Sample	Difference in mean
patents count	8.9038	5.6539	30.7681	24.5042	3.2500***
patents citations	20.5519	12.3636	69.9992	53.2687	8.1883***
patents market value	115.4601	86.5111	525.2156	452.6595	28.9489***
R&D	0.0798	0.0312	0.1353	0.0791	0.0486***

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

Table 2 Panel C: Companies rankings based on cultural scores

Frequency	**Frequency Adjusted for word commonality**	**Log frequency Adjusted for word commonality**
	2000	
Microsoft	Mattel	Adobe Systems
Exxon Mobil	Primary Pdc	Walt Disney
Primary Pdc	Du Pont De Nemours	Kla-Tencor
Dow Jones & Co	Steel Excel	Mattel
Du Pont De Nemours	Eastman Kodak	Symbol Technologies
Knight-Ridder	Pharmacia	Hp
New York Times Co	Hp	Medimmune
Lilly (Eli) & Co	Microsoft	Broadvision
Veritas Software	Dow Jones & Co	Perkinelmer
Avon Products	Lilly (Eli) & Co	Texaco
	2005	
Tegna Inc	Eastman Kodak	Hp
Newmont Mining	Adobe Systems	Sun Microsystems
Knight-Ridder Inc	Applied Biosystems	Lockheed Martin
Tribune Media Co	Intl Business Machines	Electronic Arts
Applied Biosystems	Lilly (Eli) & Co	Viavi Solutions
New York Times Co	Hp	Raytheon
Dow Jones & Co	Pfizer	Boeing
Consolidated Edison	Du Pont De Nemours	Danaher
Twenty-First Century Fox	Bristol-Myers Squibb	Intuit
Ew Scripps	Sigma-Aldrich	Adobe Systems
	2010	
New York Times Co	Pioneer Natural Resources Co	Walt Disney
Tegna Inc	Flir Systems	Adobe Systems
Adobe Systems	Eastman Kodak	Eastman Kodak
Sigma-Aldrich	Micron Technology	Mattel
Pfizer	Adobe Systems	Intuit
Newmont Mining	Varian Medical Systems	Yahoo
Bristol-Myers Squibb Co	Viacom	Intuitive Surgical
Twenty-First Century Fox	Du Pont De Nemours	Boeing
Microsoft	Sigma-Aldrich	Bristol-Myers Squibb
Biogen	Bristol-Myers Squibb	Du Pont De Nemours

Table 2 Panel D - the persistency of our cultural scores

	Adjusted R-squared of a regression model with only firm fixed effects	Joint significance (F-test) of Firm Fixed effects
Frequency	0.76694	17.73871
Frequency Adjusted for word commonality	0.800533	21.41439
Log frequency Adjusted for word commonality	0.709793	13.44091

Table 3: Innovative output

This table relates the dependent variables, the number of patents granted to each firm and the patent citations received by the patents owned by each firm, to our cultural variables. The cultural variables are constructed by means of textual analysis on companies' 10-Ks. Variable definitions are reported in table 1. Industry Classification is based on Fama and French 48 Industry scheme (Fama and French 1997). All regression models are augmented with State×Industry and State×Year Fixed Effects. δ and $\beta^{omitted}$ are estimated following the procedure proposed by Oster (2019). We assume a theoretical value for the R^2 of a regression model including unobservable of min($1.3R^2$,1) . δ captures how important unobservables would need to be compared to the observed control variables in order to produce an effect of our cultural variables equal to zero. $\beta^{omitted}$ also shows the effect of our cultural variables under the additional assumption of $\delta = 1$. All variables are winsorized at 1% level. Standard errors are reported in parentheses and are clustered at industry by state level.

	ln $(1 + patents\ count)$			ln $(1 + patents\ citations)$		
	(1)	(2)	(3)	(4)	(5)	(6)
$Creative$	0.2748***			0.3584***		
	(0.0320)			(0.0414)		
$Creative\ weighted$		0.2946***			0.3745***	
		(0.0325)			(0.0430)	
$Creative\ log-adjusted\ and\ weighted$			0.1836***			0.2476***
			(0.0299)			(0.0377)
ln $(Total\ Asset)$	0.3238***	0.3221***	0.3198***	0.3857***	0.3836***	0.3803***
	(0.0255)	(0.0252)	(0.0252)	(0.0287)	(0.0284)	(0.0283)
$\frac{PPE}{Employees}$	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
ROA	-0.3256***	-0.3260***	-0.3439***	-0.4180***	-0.4205***	-0.4398***
	(0.0549)	(0.0540)	(0.0554)	(0.0695)	(0.0685)	(0.0699)
$\frac{Cash}{Total\ assets}$	0.4021***	0.4034***	0.4661***	0.6277***	0.6335***	0.7082***
	(0.1010)	(0.0982)	(0.1005)	(0.1252)	(0.1223)	(0.1254)
$Sales\ return$	-0.0551***	-0.0539***	-0.0493***	-0.0311	-0.0292	-0.0237
	(0.0151)	(0.0153)	(0.0152)	(0.0201)	(0.0202)	(0.0203)
$Stock\ Return$	0.0117	0.0122*	0.0091	0.0124	0.0129	0.0089
	(0.0075)	(0.0073)	(0.0074)	(0.0093)	(0.0091)	(0.0093)
$Constant$	-1.1794***	-1.0759***	-1.0764***	-1.4773***	-1.3366***	-1.3508***
	(0.3993)	(0.4068)	(0.4163)	(0.4626)	(0.4707)	(0.4837)
$Industry\ FE \times State\ FE$	Y	Y	Y	Y	Y	Y
$State\ FE \times Year\ FE$	Y	Y	Y	Y	Y	Y
Adjusted R^2	0.450	0.452	0.444	0.437	0.439	0.431
R^2	0.4806	0.4823	0.4752	0.4688	0.4700	0.4631
δ	10.76	8.900	4.769	9.601	8.302	4.840
$\beta^{omitted}$	0.266	0.279	0.153	0.343	0.351	0.208
$Observations$	25,373	25,373	25,373	25,373	25,373	25,373
*** p<0.01, ** p<0.05, * p<0.1						

Table 4: Firm Value and R&D expenditure

This table relates the dependent variables, the market value of patents granted to each firm and the R&D expenditure, to our cultural variables. The cultural variables are constructed by means of textual analysis on companies' 10-Ks. Variable definitions are reported in table 1. Industry Classification is based on Fama and French 48 Industry scheme (Fama and French 1997). All regression models are augmented with State×Industry and State×Year Fixed Effects. δ and $\beta^{omitted}$ are estimated following the procedure proposed by Oster (2019). We assume a theoretical value for the R^2 of a regression model including unobservable of min($1.3R^2$,1) . δ captures how important unobservables would need to be compared to the observed control variables in order to produce an effect of our cultural variables equal to zero. $\beta^{omitted}$ also shows the effect of our cultural variables under the additional assumption of $\delta = 1$. All variables are winsorized at 1% level. Standard errors are reported in parentheses and are clustered at industry by state level.

	$\ln(1 + patents\ market\ value)$				$\frac{\text{R\&D}}{\text{Total Assetts}}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$Creative$	0.3695***			0.0252***		
	(0.0501)			(0.0033)		
$Creative\ weighted$		0.4143***			0.0210***	
		(0.0519)			(0.0029)	
$Creative\ log-adjusted\ and\ weighted$			0.2588***			0.0130***
			(0.0500)			(0.0022)
ln ($Total\ Asset$)	0.6226***	0.6201***	0.6170***	-0.0035***	-0.0037***	-0.0038***
	(0.0399)	(0.0395)	(0.0395)	(0.0006)	(0.0006)	(0.0007)
$\frac{PPE}{Employees}$	-0.0003***	-0.0003***	-0.0003***	-0.0000***	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
ROA	-0.3096***	-0.3063***	-0.3313***	-0.1167***	-0.1180***	-0.1193***
	(0.0763)	(0.0756)	(0.0780)	(0.0084)	(0.0084)	(0.0087)
$\frac{Cash}{Total\ assets}$	0.6906***	0.6845***	0.7724***	0.1095***	0.1122***	0.1167***
	(0.1473)	(0.1446)	(0.1508)	(0.0094)	(0.0095)	(0.0096)
$Sales\ return$	-0.0331	-0.0322	-0.0257	0.0064***	0.0067***	0.0070***
	(0.0256)	(0.0259)	(0.0261)	(0.0015)	(0.0015)	(0.0015)
$Stock\ Return$	0.0816***	0.0823***	0.0780***	-0.0009	-0.0009	-0.0011
	(0.0114)	(0.0113)	(0.0115)	(0.0007)	(0.0007)	(0.0007)
$Constant$	-2.6031***	-2.4746***	-2.4759***	0.0066	0.0196*	0.0198*
	(0.5558)	(0.5573)	(0.5602)	(0.0111)	(0.0109)	(0.0113)
$Industry\ FE \times Stat$	Y	Y	Y	Y	Y	Y
$State\ FE \times Year\ FE$	Y	Y	Y	Y	Y	Y
Adjusted R^2	0.484	0.486	0.481	0.599	0.594	0.587
R^2	0.5130	0.5150	0.5095	0.6212	0.6169	0.6105
δ	17.07	10.55	4.378	3.283	3.295	2.672
$\beta^{omitted}$	0.370	0.399	0.211	0.0191	0.0158	0.00863
$Observations$	25,373	25,373	25,373	25,352	25,352	25,352

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

Table 5: Risk-Adjusted returns of Creative Companies

Monthly regressions of returns to a portfolio of Creative firms identified using text analysis and three different methods: simple frequencies (Panel A), frequencies adjusted for words' commonality (Panel B) and log-adjusted frequencies weighted using words' commonality (Panel C). We use four factors (Carhart 1997), MKT, HML, SMB, and MOM. The dependent variable is the portfolio return less either the risk-free rate or the industry-matched portfolio return. In each panel we report results for equal-weighted and value-weighted returns. Newey –West standard errors with autocorrelation of order 1 are reported in parentheses. The sample period is January 1995–December 2010.

Panel A: Portfolio based on the measure *Creative*

	Equally Weighted		Value Weighted	
	Risk Free	Industry	Risk Free	Industry
	(1)	(2)	(3)	(4)
α	0.0059***	0.0018*	0.0028**	-0.0021
	(0.0018)	(0.0009)	(0.0014)	(0.0022)
β^{MKT}	1.0587***	0.0738***	1.0359***	-0.0037
	(0.0460)	(0.0204)	(0.0324)	(0.0516)
β^{HML}	0.0250	-0.0154	-0.2711***	-0.1509**
	(0.0688)	(0.0246)	(0.0522)	(0.0726)
β^{SMB}	0.9256***	0.0736*	0.0288	-0.8032***
	(0.0734)	(0.0415)	(0.0472)	(0.0666)
β^{MOM}	-0.2479***	0.0350	-0.1043**	0.1895***
	(0.0528)	(0.0239)	(0.0435)	(0.0616)
Observations	180	180	180	180

Panel B: Portfolio based on the measure *Creative weighted*

	Equally Weighted		Value Weighted	
	Risk Free	Industry	Risk Free	Industry
	(1)	(2)	(3)	(4)
α	0.0058***	0.0018**	0.0024**	-0.0025
	(0.0018)	(0.0009)	(0.0012)	(0.0022)
β^{MKT}	1.0579***	0.0735***	1.0172***	-0.0183
	(0.0442)	(0.0177)	(0.0303)	(0.0521)
β^{HML}	0.0350	-0.0054	-0.2321***	-0.1074
	(0.0686)	(0.0229)	(0.0499)	(0.0717)
β^{SMB}	0.9021***	0.0509	-0.0143	-0.8499***
	(0.0684)	(0.0395)	(0.0391)	(0.0680)
β^{MOM}	-0.2450***	0.0380*	-0.0771**	0.2252***
	(0.0514)	(0.0226)	(0.0369)	(0.0631)
Observations	180	180	180	180

Table 5 (cont.) Panel C: Portfolio based on the measure *Creative log adjusted and weighted*

	Equally Weighted		Value Weighted	
	Risk Free	Industry	Risk Free	Industry
	(1)	(2)	(3)	(4)
α	0.0061***	0.0020***	0.0033**	-0.0017
	(0.0018)	(0.0008)	(0.0014)	(0.0021)
β^{MKT}	1.0620***	0.0772***	1.0442***	0.0111
	(0.0467)	(0.0155)	(0.0331)	(0.0446)
β^{HML}	0.0475	0.0077	-0.2951***	-0.1083
	(0.0710)	(0.0210)	(0.0563)	(0.0751)
β^{SMB}	0.8996***	0.0475	0.0274	-0.8601***
	(0.0705)	(0.0294)	(0.0485)	(0.0698)
β^{MOM}	-0.2662***	0.0164	-0.1145**	0.1659***
	(0.0553)	(0.0171)	(0.0487)	(0.0600)
Observations	180	180	180	180

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

Table 6: Robustness Checks

This table relates the dependent variables, the number of patents granted to each firm, the patent citations received, the market value of the patents owned by each firm, and the R&D expenditure, to our cultural variables. The cultural variables are constructed by means of textual analysis on companies' 10-Ks. Variable definitions are reported in table 1. Industry Classification is based on Fama and French 48 Industry scheme (Fama and French 1997). All regression models are augmented with State×Industry and State×Year Fixed Effects. δ and $\beta^{omitted}$ are estimated following the procedure proposed by Oster (2019). We assume a theoretical value for the R^2 of a regression model including unobservable of $\min(1.3R^2,1)$. δ captures how important unobservables would need to be compared to the observed control variables in order to produce an effect of our cultural variables equal to zero. $\beta^{omitted}$ also shows the effect of our cultural variables under the additional assumption of $\delta = 1$. All variables are winsorized at 1% level. Standard errors are reported in parentheses and are clustered at industry by state level.

Panel A: Excluding the top three words in the vocabulary of Create

	$\ln(1+patents\ count)$	$\ln(1+patents\ citations)$	$\ln(1+patents\ market\ value)$	$\frac{R\&D}{Total\ Assetts}$
	(1)	(2)	(3)	(4)
$Creative$	0.2687***	0.3363***	0.3630***	0.0175***
	(0.0321)	(0.0418)	(0.0488)	(0.0026)
$\ln(Total\ Asset)$	0.3230***	0.3848***	0.6215***	-0.0036***
	(0.0252)	(0.0284)	(0.0395)	(0.0006)
$\frac{PPE}{Employees}$	-0.0002***	-0.0002***	-0.0003***	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
ROA	-0.3216***	-0.4162***	-0.3038***	-0.1181***
	(0.0547)	(0.0692)	(0.0765)	(0.0084)
$\frac{Cash}{Total\ assets}$	0.4289***	0.6678***	0.7259***	0.1147***
	(0.1003)	(0.1252)	(0.1489)	(0.0095)
$Sales\ return$	-0.0571***	-0.0329	-0.0359	0.0066***
	(0.0153)	(0.0204)	(0.0265)	(0.0015)
$Stock\ Return$	0.0116	0.0122	0.0815***	-0.0009
	(0.0076)	(0.0094)	(0.0115)	(0.0007)
$Constant$	-1.1730***	-1.4548***	-2.5962***	0.0144
	(0.4132)	(0.4787)	(0.5521)	(0.0113)
$Industry\ FE \times Stat$	Y	Y	Y	Y
$State\ FE \times Year\ FE$	Y	Y	Y	Y
Adjusted R^2	0.450	0.436	0.484	0.591
R^2	0.4804	0.4677	0.5129	0.6138
δ	8.989	8.246	11.15	2.693
$\beta^{omitted}$	0.253	0.313	0.349	0.0118
$Observations$	25,373	25,373	25,373	25,352

Table 6 (cont.) Panel B: Excluding the top five words in the vocabulary of Create

	$\ln(1+patents\ count)$	$\ln(1+patents\ citations)$	$\ln(1+patents\ market\ value)$	$\frac{\text{R\&D}}{\text{Total Assetts}}$
	(1)	(2)	(3)	(4)
$Creative$	0.1883***	0.2330***	0.2482***	0.0063***
	(0.0306)	(0.0380)	(0.0491)	(0.0018)
$\ln(Total\ Asset)$	0.3232***	0.3850***	0.6218***	-0.0035***
	(0.0252)	(0.0284)	(0.0395)	(0.0006)
$\frac{PPE}{Employees}$	-0.0002***	-0.0002***	-0.0003***	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
ROA	-0.3629***	-0.4683***	-0.3605***	-0.1215***
	(0.0540)	(0.0692)	(0.0768)	(0.0086)
$\frac{Cash}{Total\ assets}$	0.4916***	0.7469***	0.8119***	0.1200***
	(0.1004)	(0.1265)	(0.1514)	(0.0097)
$Sales\ return$	-0.0468***	-0.0200	-0.0219	0.0073***
	(0.0152)	(0.0203)	(0.0262)	(0.0015)
$Stock\ Return$	0.0116	0.0121	0.0814***	-0.0009
	(0.0075)	(0.0094)	(0.0115)	(0.0007)
$Constant$	-1.1182***	-1.3830***	-2.5150***	0.0249**
	(0.4086)	(0.4726)	(0.5509)	(0.0118)
$Industry\ FE \times Stat$	Y	Y	Y	Y
$State\ FE \times Year\ FE$	Y	Y	Y	Y
Adjusted R^2	0.445	0.431	0.480	0.584
R^2	0.4756	0.4627	0.5093	0.6074
δ	10.52	9.443	10.85	2.259
$\beta^{omitted}$	0.177	0.217	0.234	0.00364
$Observations$	25,373	25,373	25,373	25,352

Table 6 (cont.) Panel C: Comparing companies in the top tercile of Create with companies in the bottom tercile of the yearly industry rank of Create.

	$\ln(1+patents\ count)$	$\ln(1+patents\ citations)$	$\ln(1+patents\ market\ value)$	$\frac{\text{R\&D}}{\text{Total Assetts}}$
	(1)	(2)	(3)	(4)
$Creative$	0.3659***	0.4791***	0.4952***	0.0343***
	(0.0439)	(0.0586)	(0.0694)	(0.0043)
$\ln(Total\ Asset)$	0.3146***	0.3722***	0.6064***	-0.0040***
	(0.0261)	(0.0296)	(0.0411)	(0.0007)
$\frac{PPE}{Employees}$	-0.0002***	-0.0002***	-0.0003***	-0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
ROA	-0.3453***	-0.4438***	-0.3346***	-0.1119***
	(0.0609)	(0.0762)	(0.0865)	(0.0084)
$\frac{Cash}{Total\ assets}$	0.3409***	0.5296***	0.6133***	0.1067***
	(0.1023)	(0.1287)	(0.1444)	(0.0101)
$Sales\ return$	-0.0553***	-0.0366	-0.0387	0.0067***
	(0.0198)	(0.0250)	(0.0320)	(0.0017)
$Stock\ Return$	0.0152*	0.0175	0.0947***	-0.0004
	(0.0087)	(0.0111)	(0.0123)	(0.0009)
$Constant$	-1.2133***	-1.5371***	-2.6767***	0.0029
	(0.3949)	(0.4624)	(0.5620)	(0.0117)
$Industry\ FE \times Stat$	Y	Y	Y	Y
$State\ FE \times Year\ FE$	Y	Y	Y	Y
Adjusted R^2	0.449	0.437	0.487	0.595
R^2	0.4920	0.4813	0.5271	0.6265
δ	9.176	8.325	13.39	2.791
$\beta^{omitted}$	0.360	0.467	0.504	0.0257
$Observations$	17,426	17,426	17,426	17,410

Appendix:

Panel A. Bag of words for Create

Create	adapt*, begin*, chang*, creat*, develop*, discontin*, dream*, elabor*, entrepre*, envis*, experim*, fantas*, freedom*, futuri*, idea*, imagin*, init*, innovat*, intellect*, inventive*, learn*, new*, origin*, pioneer* , radic*, research*, start*, thought*, trend*, ventur*, vision*

Panel B: Average yearly word frequency by words roots

Year	1996	1997	1998	1999	2000	2001	2002	2003
develop*	0.1939	0.2705	0.3032	0.3441	0.3445	0.3420	0.3267	0.3730
new*	0.3095	0.0724	0.2556	0.3019	0.3105	0.3053	0.3026	0.0320
chang*	0.1529	0.1062	0.1409	0.1696	0.1877	0.1975	0.2150	0.1295
research*	0.0661	0.0913	0.0955	0.1066	0.1069	0.1079	0.1063	0.1276
init*	0.0342	0.0417	0.0496	0.0587	0.0577	0.0610	0.0743	0.0970
begin*	0.0348	0.0377	0.0436	0.0437	0.0430	0.0456	0.0544	0.0643
origin*	0.0312	0.0331	0.0323	0.0329	0.0332	0.0348	0.0352	0.0416
ventur*	0.0379	0.0430	0.0411	0.0367	0.0380	0.0383	0.0349	0.0362
discontin*	0.0286	0.0300	0.0279	0.0227	0.0249	0.0269	0.0350	0.0436
creat*	0.0173	0.0241	0.0266	0.0291	0.0322	0.0307	0.0310	0.0385
trend*	0.0181	0.0214	0.0193	0.0194	0.0200	0.0215	0.0248	0.0304
intellect*	0.0040	0.0069	0.0104	0.0128	0.0166	0.0196	0.0227	0.0321
start*	0.0109	0.0132	0.0127	0.0140	0.0149	0.0142	0.0135	0.0127
innovat*	0.0067	0.0093	0.0094	0.0107	0.0117	0.0112	0.0109	0.0129
imagin*	0.0051	0.0119	0.0127	0.0147	0.0118	0.0094	0.0085	0.0079
vision*	0.0015	0.0063	0.0058	0.0084	0.0071	0.0064	0.0046	0.0068
adapt*	0.0020	0.0055	0.0065	0.0053	0.0055	0.0049	0.0050	0.0051
learn*	0.0014	0.0020	0.0034	0.0032	0.0043	0.0058	0.0054	0.0049
pioneer*	0.0034	0.0042	0.0026	0.0017	0.0017	0.0018	0.0025	0.0025
idea*	0.0012	0.0011	0.0018	0.0024	0.0029	0.0030	0.0028	0.0026
experim*	0.0007	0.0014	0.0016	0.0015	0.0014	0.0015	0.0016	0.0016
freedom*	0.0005	0.0004	0.0005	0.0005	0.0006	0.0006	0.0006	0.0010
entrepre*	0.0003	0.0002	0.0004	0.0006	0.0006	0.0006	0.0006	0.0006
dream*	0.0001	0.0002	0.0002	0.0002	0.0004	0.0002	0.0003	0.0003
elabor*	0.0000	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0025
thought*	0.0002	0.0002	0.0002	0.0005	0.0002	0.0003	0.0003	0.0003
envis*	0.0001	0.0002	0.0001	0.0001	0.0002	0.0003	0.0002	0.0003
radic*	0.0002	0.0001	0.0003	0.0003	0.0002	0.0001	0.0003	0.0002
fantas*	0.0000	0.0000	0.0001	0.0001	0.0002	0.0002	0.0001	0.0003
inventive*	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
futuri*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
develop*	0.3550	0.2987	0.2943	0.2974	0.2886	0.3313	0.2579	0.3122
new*	0.0836	0.2746	0.2786	0.2695	0.2634	0.0243	0.2563	0.2362
chang*	0.1553	0.2537	0.2909	0.2761	0.2815	0.1410	0.2890	0.1624
research*	0.1184	0.0992	0.0928	0.0936	0.0900	0.1006	0.0737	0.1010
init*	0.0842	0.0667	0.0656	0.0703	0.0684	0.0824	0.0658	0.0593
begin*	0.0593	0.0616	0.0628	0.0650	0.0756	0.0848	0.0539	0.0459
origin*	0.0430	0.0363	0.0350	0.0348	0.0323	0.0368	0.0299	0.0343
ventur*	0.0337	0.0307	0.0301	0.0269	0.0278	0.0322	0.0276	0.0383
discontin*	0.0424	0.0367	0.0368	0.0364	0.0352	0.0390	0.0281	0.0300
creat*	0.0389	0.0353	0.0309	0.0283	0.0268	0.0314	0.0253	0.0287
trend*	0.0343	0.0299	0.0310	0.0302	0.0299	0.0368	0.0305	0.0219
intellect*	0.0345	0.0285	0.0314	0.0325	0.0325	0.0390	0.0318	0.0157
start*	0.0130	0.0114	0.0120	0.0123	0.0123	0.0144	0.0113	0.0133
innovat*	0.0145	0.0121	0.0126	0.0127	0.0127	0.0157	0.0123	0.0103
imagin*	0.0094	0.0081	0.0066	0.0062	0.0067	0.0076	0.0055	0.0103
vision*	0.0076	0.0041	0.0043	0.0050	0.0038	0.0033	0.0028	0.0059
adapt*	0.0051	0.0038	0.0041	0.0036	0.0035	0.0046	0.0033	0.0050
learn*	0.0071	0.0036	0.0034	0.0032	0.0035	0.0048	0.0042	0.0038
pioneer*	0.0017	0.0014	0.0014	0.0013	0.0014	0.0016	0.0011	0.0025
idea*	0.0023	0.0017	0.0015	0.0013	0.0012	0.0016	0.0014	0.0022
experim*	0.0016	0.0014	0.0013	0.0013	0.0013	0.0014	0.0009	0.0014
freedom*	0.0011	0.0007	0.0004	0.0005	0.0004	0.0006	0.0004	0.0006
entrepre*	0.0005	0.0003	0.0003	0.0003	0.0003	0.0004	0.0003	0.0005
dream*	0.0002	0.0002	0.0002	0.0008	0.0006	0.0006	0.0004	0.0002
elabor*	0.0010	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0004
thought*	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	0.0003	0.0003

Appendix 2, panel B continued								
envis*	0.0002	0.0002	0.0002	0.0001	0.0001	0.0002	0.0002	0.0002
radic*	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002
fantas*	0.0001	0.0000	0.0001	0.0001	0.0000	0.0001	0.0000	0.0001
inventive*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
futuri*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000