Corporate Philanthropy, Research Networks, and Collaborative Innovation †

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Using a unique dataset of corporate philanthropy, we find that direct giving activities are positively associated with higher levels and more influential, collaborative, and original innovation. In contrast, our results do not hold for corporate foundations' contributions. Our results suggest that much of what is ostensibly promoted as philanthropy actually reflects research-related networking activities. The effect of direct giving on innovation is more pronounced in more opaque firms and more innovative and competitive industries. These findings provide evidence of the distinct motives by which firms choose between direct giving and foundation giving. Our study suggests that firms can use direct philanthropy to expand firm-boundaries by developing innovation with research partners.

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> "If, instead, corporations were to analyze their prospects for social responsibility using the same frameworks that guide their core business choices, they would discover that CSR (corporate social responsibility) can be much more than a cost, a constraint, or a charitable deed–it can be a source of opportunity, innovation, and competitive advantage." – Porter and Kramer (2006)

Corporate giving, either through corporate-sponsored foundations (foundation giving) or through direct giving, is significant. According to the Committee Encouraging Corporate Philanthropy (2011), the median firm in the Fortune 100 gave $53 million in 2010. The GivingUSA Foundation (2011) finds that approximately 69% of corporate giving in 2010 was through direct giving programs. Both the recipient identity and the amount of foundation giving must be disclosed through mandatory IRS filings, whereas neither is disclosed through any official filings for direct giving. Moreover, it has been reported that firms were opposed to disclosing their direct giving activities (Bryant, 1998), which appears surprising given the typically positive publicity associated with philanthropy.

We argue that managers are hesitant to disclose their direct giving initiatives due to their desire to keep their strategies for corporate innovation proprietary.[1] Technological innovation serves as an important dimension of firm-level competitive strategies and plays an increasingly influential role in the knowledge economy era (Dierickx and Cool, 1989; McGrath et al., 1996). However, firms engaging in innovative projects are often subject to various risks, such as high failure rates, imitative activities of competitors, and accelerated product life cycles (Bhattacharya and Ritter, 1983; Cohen, Nelson, and Walsh, 2000; Hall and Lerner, 2010; Aggarwal and Hsu, 2014; Chen, Chen, and Chu, 2014). This study thus aims to empirically examine if firms use corporate philanthropic programs to promote innovation.

[1] The Giving USA Foundation (2011) notes that of large gifts by corporations or corporate-sponsored foundations, 32% of gifts went to higher education, 11% to other education organizations, and 11% to the health subsector, suggesting that a significant amount of corporate giving is associated with research partnerships. We present anecdotal evidence for the link between corporate philanthropy and innovation in the Appendix.

Regulators are aware of the large discrepancy in disclosure between corporate-sponsored foundations and direct giving, and have sought to improve the level of disclosure for charitable giving. In 1997, Representative Paul Gillmor and Senator Mike Oxley sought to require firms to disclose their charitable giving (this proposal was ultimately dropped). The comment letters were generally opposed to the legislation, often noting the role of giving in corporate *strategy*. As one example, the letter from Adolph Coors Company (1997) notes that, "in this specialized area, we believe the Gillmor requirements would have a devastating impact on these marketing and sales strategies, and the very worthy charitable endeavors they fund."

Philanthropic giving may affect innovation through two different mechanisms. The first, termed the "research networking" mechanism, posits that when firms establish connections with research organizations that expand the firms' scope of knowledge and opportunity set to explore, the associated funds are sometimes officially referred to as "philanthropic." Haley (1991), Smith (1994), Kahn (1997), and Lev, Petrovits, and Radhakrishnan (2010) all suggest that firms can use philanthropic programs to outsource research and development (R&D).[2] In addition, developing R&D activities outside of firm-boundaries may lead to highly successful projects and also to many unsuccessful projects (Mata and Woerter, 2013), which subjects managers to a high level of private risk and motivates them to promote some activities that are actually external R&D investments as "corporate philanthropy." Thus, managers have the incentive to innovate through an official corporate-giving program, likely entailing fewer organizational hurdles than proposing a new project. Lastly, non-profit research organizations could be wary of pursuing a

[2] Czarntizki and Hottenrott (2012) suggest that firms are able to utilize R&D collaborations to attenuate financing constraints. Chai and Shih (2013) examine public-private research partnerships; controlling for selection issues by examining firms just above and just below thresholds for funding cutoffs, they find very large increases in innovation for firms that receive government funding for their projects in collaboration with public research organizations.

project that directly and explicitly benefits a particular company but could more readily justify a project associated with philanthropic support (Porter and Kramer, 2002, 2006).[3]

The second mechanism, which we term the "advertising mechanism," helps firms facilitate innovation in the following ways: (1) researchers note that there is a consistently positive relation between firms' CSR ratings (corporate philanthropy is generally associated with CSR ratings) and the employment-attractiveness of these firms as well as general efforts to improve firm-reputation[4] – these workforce characteristics should benefit innovative firms to a greater extent; (2) corporate giving enables firms to improve their ability to interact positively with government regulators – a positive relationship with regulators is helpful for an innovation-intensive firm that needs government support or subsidies for innovative activities; (3) corporate giving functions as a form of insurance from activists, and thus provides security to shareholders and managers (Baron, 2001; Godfrey, 2005; Cespa and Cestone, 2007), increasing the likelihood that innovative firms are able to exploit their inventions; and (4) philanthropy functions as a form of advertising, and leads to higher product prices.[5]

Since both the research networking and advertising mechanisms suggest positive effects of corporate giving on innovation, we hypothesize that corporate charitable giving programs promote innovation.

[3] In one recent study of research organizations pursuing industry partnerships, D'Este and Perkmann (2011) provide a discussion of the reasons that academics engage with industry (and the relative importance of research-related motives and of commercialization). Additionally, Francis, Hasan, and Wu (2014) note the role of academics on firms' board of directors, and how their presence is associated with higher levels of innovation.
[4] See Turban and Greening (1997), Albinger and Freeman (2000), Werbel and Wortman (2000), Backhaus, Stone, and Heiner (2002), and Peterson (2004).
[5] For advertising, see Schwartz (1968), Fry, Keim, and Meiners (1982), Navarro (1988), and Boatsman and Gupta (1996). For CSR leading to higher product prices, see Goett, Hudson, and Train (2000), Roe, Teisl, Levy, and Russell (2001), Loureiro and Hine (2002), Loureiro (2003), Loureiro and Lotade (2005), Eichholtz, Kok, and Quigley (2013); the ability to set higher prices would be especially relevant for newly innovative products.

Unlike the research networking mechanism, the advertising mechanism does not depend on direct giving per se, and can occur through either firms' direct giving or their foundations. Different motivations and real effects between direct giving and foundation giving may lead to different innovation performance. We propose that the research networking mechanism mainly relies on direct giving and not foundation giving, due to the managerial flexibility, direct access, and lack of disclosure associated with direct giving. Moreover, we argue that firms are able to explore unique technology fields using research partnerships with non-profit organizations, given their own limited pool of expertise and human capital (e.g., Jaffe, 1989; Henderson, Jaffe, Trajtenberg, 1998; Cohen, Nelson, and Walsh, 2002). Thus, these activities may lead to more original inventions that result from combining diverse technologies (Jaffe, Trajtenberg, Henderson, 1993; Fleming, Mingo, and Chen, 2007; Singh, 2008).

In contrast to direct giving, foundation giving suffers from a number of limitations that prevent it from being used as a mechanism to support corporate innovation. First, foundations must disclose how much is given to each recipient on IRS form 990-PF. Second, foundation directors have a fiduciary duty to the foundation itself, rather than the sponsoring corporation (although the firm appoints the directors to the foundation and thus effectively controls the foundation's board). Moreover, foundations have generally faced restrictions on "venture-capital"-related activities. Lastly, direct giving is more efficient and effective than foundation giving in terms of forging research networks and collaborations because the latter channel requires more disclosure and involves more layers of administration. Consequently, we hypothesize that direct giving is more effective in promoting innovation than foundation giving because it drives more collaborative and original innovations.

To examine the proposed hypotheses, we construct a dataset consisting of the financial, philanthropic, and innovation data of all U.S. public firms between 1989 and 2004. We combine our innovation data with a sample of direct giving and foundation giving beginning in 1989. Our sample separates direct giving from foundation giving and is composed of IRS disclosures for corporate-sponsored foundations and surveys for direct giving from Petrovits (2006), the Taft Group's Corporate Giving Directory, the Chronicle of Philanthropy, the Foundation Center, and the National Center for Charitable Statistics (NCCS).[6] Our patent data is from the NBER patent dataset, and our financial data is from Compustat.

We find that direct giving is significantly associated with more and better innovations, suggesting a positive relation between direct giving and the quantity and quality of innovation. We find that an increase in direct giving from the twenty-fifth to the seventy-fifth percentile is associated with a 17.2% increase in the quantity of patents, an 18.6% increase in patent citations, and a 3.5% increase in patent influence. Conversely, we do not find any significant relation between foundation giving and measures for innovation.

The intriguing contrast between our results with direct giving compared to foundation giving suggests that the research networking mechanism, and not the advertising mechanism, spurs innovation and explains why firms have increased their direct giving much faster than their foundation giving in most recent decades. The advertising mechanism is not supported because innovation should otherwise also positively associate with foundation giving, as that would also help attract both high-quality human capital and pro-innovation customers, as well as provide insurance against governments and activists.

[6] For our sample of direct giving, The Chronicle of Philanthropy notes that some of the firms decline to respond due to company policy not to publicly release data that has not already been made public. We recognize the potential for selection issues in the disclosure of direct giving data, and report the results from Heckman selection models to mitigate this bias in Section II B.

We find a significantly positive relation between direct giving and both collaborative innovation and originality, suggesting that firms with more direct giving learn more from non-profit organizations and have broader networks for innovation. An increase in direct giving from the twenty-fifth to the seventy-fifth percentile leads to a 38.3% increase in collaborative innovation and a 7.7% increase in originality. Conversely, we find no relation between foundation giving and these measures. We thus empirically justify the networking channel for the influence of corporate giving on innovation: Much of what is disclosed as direct giving enables firms to explore new technologies and expand their expertise by leveraging the capability of non-profit organizations. We further examine several supplementary tests and cross-sectional analyses. These analyses provide empirical support for a causal interpretation of our findings.

Our paper contributes to the economics literature by providing empirical support for the economic value of corporate philanthropy, albeit from a new perspective. Corporate philanthropy is often regarded as wasteful due to agency problems (e.g., Kitzmueller and Shimshack, 2012).[7] As discussed earlier, some papers propose that corporate philanthropy serves the rational and strategic purpose of improving relations with governments and social activists, promoting brand-awareness, and helping position a firm's products. We propose a new explanation: Many activities officially disclosed as philanthropic appear to actually promote innovation by facilitating networking and collaborations with non-profit research-oriented organizations.

[7] Some researchers argue that corporate giving should not result in better operating performance, due to its associated agency problems and incentive issues (Friedman, 1970; Galaskiewicz, 1997; Jensen, 2002; Werbel and Carter, 2002; Brown, Helland, and Smith, 2006; Hong, Kubik, and Scheinkman, 2012; Cheng, Hong, and Shue, 2013; Masulis and Reza, 2014). However, Kim, Park, and Wier (2012) present evidence that CSR firms are less likely to take part in earnings management or GAAP violations (CSR is frequently associated with philanthropy); their evidence is consistent with managers of CSR firms behaving in a trustworthy and socially responsible manner.

Our use of patent data points to a new direction for the research on corporate philanthropy. Prior studies connect corporate giving to input variables including advertising expenditure (Navarro, 1988), capital investment (Graff Zivin and Small, 2005), and R&D (Lev, Petrovits, and Radhakrishnan, 2010) or output variables including return on assets, Tobin's Q (Wang, Choi, and Li, 2008), and sales growth (Lev, Petrovits, and Radhakrishnan, 2010). However, to the best of our knowledge, no prior study has examined the effect of corporate philanthropy on patent performance. The patent data have been commonly used in the economics and management literature because firm-level patent records contain detailed information about the contents, scopes, applications, and references of all registered inventions. Unlike R&D and capital expenditure, patent data enable us to construct *various* measures to capture firms' innovation activities in different dimensions, such as patent influence, collaborative innovation, and patent originality. Moreover, patent-based measures provide information other than conventional financial ratios, enabling us to assess firm performance from a new perspective.

Lastly, our study also adds to the literature on the strategies by which firms allocate financial resources to create innovation. In addition to in-house R&D efforts (which can also be affected by ownership and governance factors such as hedge fund ownership (Wang and Zhao, 2014)), firms can acquire other firms with innovation (Sevilir and Tian, 2012; Phillips and Zhdanov, 2013; Bena and Li, 2014; Bernstein, 2014), or spur innovation by forming strategic alliances with specialized and innovative firms (Gomes-Casseres, Hagedoorn, and Jaffe, 2006; Robinson, 2008; Robinson and Stuart, 2007a, 2007b; Seru, 2014).[8] Although previous studies

[8] There are other ways that firms are likely to foster innovation externally, as well. Mowery, Oxley, and Silverman (1996), Stuart (2000), and Gomes-Casseres, Hagedoorn, and Jaffe (2006) discuss the alliances that firms might form, and the incomplete contracting issues arising in such arrangements. Establishing a subsidiary to focus on a particular project and allows innovative employees to share more profits is another approach, but it suffers from escalating costs of innovation (Gilson, 2010). Acquisitions are another potential strategy; however, they do not actually spur later innovations because the inventors at target firms become less productive after the acquisition,

have extensively examined the efficiency and efficacy of innovating through in-house R&D and M&A activities, whether and how firms promote innovation by providing financial resources to non-profit organizations remains under-examined, and the literature on the subject lacks empirical evidence. Since some non-profit organizations such as government-sponsored institutions, universities, and hospitals are known as incubators and harbingers of cutting-edge technologies that are valuable to the private sector (e.g., Nelson, 1986; Jaffe, 1989; Cockburn and Henderson, 1998), it is crucial for mangers to establish and maintain connections with these innovation hubs.

I. DATA

A. Data Sources and Empirical Measures

Our data on corporate giving is from a number of sources. Petrovits (2006) provides us with her sample of both direct giving and foundation giving up to 2000. Her sample is derived from the Taft Group's Corporate Giving Directory, which includes firms that give at least $200,000 annually to charities through either direct or foundation giving. This sample is limited to firms with at least three consecutive years of data that are also included on Compustat, and the data also includes the corporate foundation's employer identification number (EIN). Through a request to The Foundation Center, we also collect the EINs of corporate-foundations created from 1999 to 2010. Using the EINs, we collect an updated sample of foundation outlays from the National Center for Charitable Statistics (NCCS), which extracts data from each foundation's

possibly due to lower incentives and organizational burdens (Seru, 2014). Finally, we stress that the most fundamental, novel, and revolutionary innovations are typically from universities (Jaffe, 1989), which generally have both contracting and cultural reasons to prefer the type of collaboration that we suggest in our paper (Porter and Kramer, 2002, 2006).

990-PF filing. We also supplement Petrovits's sample with a larger sample of direct giving data that begins in 1999 and ends in 2010 from The Chronicle of Philanthropy; it is the result of annual surveys completed by the top 300 firms in the Fortune 500.[9] 117 of these firms completed the most recent survey, and The Chronicle matches the foundation 990-PF data for an additional 63 firms. Our sample can thus be treated as a combination of a large sample of firms' direct giving and a complete sample of their foundation giving.

The data we collect are reasonably representative. For example, our philanthropy data in the same year is approximately $2.4 billion given directly and $2.3 billion given through corporate-sponsored foundations in 2008. In the same year, the IRS reports approximately $11.6 billion (about 1.2% of net income) in charitable contributions from approximately 835,000 firms (including foreign or non-public ones) filing a corporate income tax return in 2008. Given that we do not have the detailed information of all recipients, donation amounts, and final purposes of all giving, we assume that there is little variation in the use of philanthropic donations across sample firms. To mitigate the concern about inference biases due to firm-level variations in philanthropy, we conduct propensity score matching, two-stage least squares regressions, and Heckman selection regressions to address omitted variables and selection issues.

We retrieve the patent records of these companies from the updated NBER patent dataset developed by Hall, Jaffe, and Trajtenberg (2005a), which consists of detailed information such as patent inventors, patent assignees (i.e., firms), technology categories, the number of citations received by each patent until the end of 2006, filing dates and issue dates, and Compustat-matched identifiers (CUSIP and GVKEY) of all patents approved by the U.S. Patent and

[9] We thank Noelle Barton at The Chronicle of Philanthropy for providing us with this data.

Trademark Office (USPTO) from 1976 to 2006.[10] These details help us to construct various innovation measures to reflect these firms' innovation activities along multiple dimensions.

We construct three common measures of firms' innovation output. The first is "patent counts," the number of successful patent applications filed by the focal firm in a sample year. This measure is a simple yet intuitive proxy for firm-level innovation from a quantitative perspective (e.g., Scherer, 1965; Griliches, 1981). The second is "patent citations," (sometimes also referred to as "citation-weighted patent counts" in the literature). It is defined as the number of citations received by all successful patent applications filed by the focal firms in a sample year.[11] The third is "patent influence," defined as the log-linearized citations per patent, to reflect the influence (based on citations received) of the successful patent-applications for each firm-year (Lerner, Sørensen, and Strömberg, 2011). These three measures have been widely used in the economics literature. Some researchers argue that patent citations better reflect the impact of a firm's innovation and its associated economic values (e.g., Trajtenberg, 1990; Harhoff, Narin, Scherer and Vopel, 1999; Fleming and Sorenson, 2004; Hall, Jaffe, and Trajtenberg, 2005b; Pandit, Wasley, and Zach, 2011; Belenzon and Schankerman, 2013). The patent citations measure that we use is the adjusted cumulative citations available from the NBER dataset, which corrects for the vintage bias due to the citation lag and excludes self-citations.

Two additional issues about our innovation measures are worth noting. First, we scale patent counts, citations, collaborative innovation, and originality by the annual sales (in million dollars) of the focal firm. Sales reflect the scale of operational activities as well as the status of

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[10] The original dataset developed by Hall, Jaffe, and Trajtenberg (2005a) is at http://www.nber.org/patents/. An updated version is now available at https://sites.google.com/site/patentdataproject/Home/downloads.
[11] Since old patents inherently receive more citations than new patents, Hall, Jaffe, and Trajtenberg (2005a) estimate the citation-lag distribution (i.e., the fraction of lifetime citations) and then multiply raw patent citations with estimated future citations to obtain adjusted patent citations.

cash flows, and are regarded as an appropriate scaling factor for patents and R&D in the literature (e.g., Scherer, 1965; Lev and Sougiannis, 1996). Second, we construct all innovation-related variables by application year in order to precisely capture each firm's innovation activities in each year (Hall, Jaffe, and Trajtenberg, 2005a). In doing so, we choose to drop innovation measures in 2005 and 2006 because the NBER database contains all patents granted by the end of 2006, and it takes an average of two to three years for a patent application to be subsequently approved since the 1990s (Hall, Jaffe, and Trajtenberg, 2005a and 2005b).

The final step of our data construction is to collect financial and accounting data of selected firms from Compustat. Our main regressions use 615 firm-year observations over the 1989-2004 period, consisting of 102 distinct firms with *non-missing* direct giving data, foundation giving data, and financial and accounting data for our main tests. Nevertheless, in robustness analysis, we implement a Heckman selection model that allows us to make statistical inferences based on a larger yet less restrictive sample (almost 4,000 firm-year observations with non-missing direct giving or foundation giving), in which we obtain consistent evidence. Other studies set direct giving equal to zero if it is not disclosed. Doing so may not be appropriate for tests of this nature, since it could mix firms that do not disclose direct giving data with firms that do not give anything directly. Consequently, in our main tests, we choose to use sample firm-year observations with non-missing direct giving data.

B. Summary Statistics

Table I provides the sample statistics of the variables that we study in this paper. Our summary statistics show that a significant amount of corporate philanthropy occurs through direct giving rather than foundation giving. For example, firms donate a mean (median) $19.2 ($10.8) million directly and $9.8 ($4.3) million through their foundations. The means of direct and foundation giving correspond to 1% and 0.5% of firm sales, respectively; the medians of direct and foundation giving correspond to 0.5% and 0.3% of firm sales, respectively. An average firm with annual sales of $1 million dollars in our sample generates 0.012 patent counts and 0.173 patent citations. Our mean patent influence measure is 1.54, reflecting a mean of 9.2 citations per patent. In addition, this typical firm with one million dollars in sales cites 0.005 patents of non-profit organizations, and produces a score of 0.245 for originality.

In Panel B, we show that direct giving and foundation giving (both scaled by sales) have a weak relation; the correlation coefficient between foundation giving and direct giving is 19%, suggesting that these two forms of philanthropy can be treated as distinct activities (although, admittedly, they may be affected by common factors). Additionally, whereas direct giving is significantly and positively associated with all of the innovation measures, foundation giving is only significantly and positively correlated with collaborative innovation (17%) that will be defined in Section IV. Our findings that the correlation coefficients between direct giving and innovation are less significant than those between foundation giving and innovation provide preliminary support for our hypotheses.

II. RESULTS

A. Direct Giving, Foundation Giving, and Innovation Output

Panel A of Table II provides our main results from regressing patent counts and citations in year *t+1* on direct giving in year *t*, typical control variables in year *t*, and year and industry fixed effects. Our control variables include R&D expenses scaled by sales (RD), advertising expenses scaled by sales (Advertising), market-to-book ratio (MarketToBook), debt-to-market ratio (Leverage), logged sales (LogRevenue), and institutional ownership (InstiOwn).[12] Patent counts, patent citations, direct giving, R&D expenses, and advertising expenses are all scaled by annual sales in the same year. Our statistical inferences are based on t-statistics of regression coefficients using standard errors clustered by firms that are robust to heteroskedasticity across firms and autocorrelation within firms. We show that direct giving is significantly and positively associated with larger quantities of patents in the subsequent year. Based on the coefficients, an increase in direct giving from the twenty-fifth to the seventy-fifth percentile is associated with a 17.2% increase in patent counts, an 18.6% increase in patent citations, and a 3.5% increase in patent influence. These results support our first hypothesis that corporate charitable giving promotes innovation.[13]

In Panel B, we examine whether foundation giving is associated with innovation from regressing patent counts and citations in year *t+1* on foundation giving in year *t*, typical control variables in year *t*, and year and industry fixed effects.[14] Patent counts, patent citations, foundation giving, R&D expenses, and advertising expenses are all scaled by annual sales in the same year. To make the estimation results comparable to Panel A, we focus only on sample firms

[12] Aghion, Van Reenen, and Zingales (2013) and Sapra, Subramanian, and Subramanian (2013) propose the effects of institutional ownership and corporate governance on innovation, respectively. Atanassov, Nanda, and Seru (2007) and Ciftci and Cready (2011) document that firms' size and financing choice, respectively, affect their innovation performance. Year fixed effects are included to control for the effect of potential policy changes on innovation, such as bankruptcy codes, as discussed in Acharya and Subramanian (2009). Readers interested in more determinants of firm-level innovation are referred to a review article by Ederer and Manso (2011). In addition, the effect of direct giving on innovation is not eliminated by including the corporate governance index (G-index) of Gompers, Ishii, and Metrick (2003). We do not include the G-index in our main regressions because the existence of the G-index reduces our sample-size. We do not include firm fixed effects because the existence of firm fixed effects may underestimate the effect of corporate giving on innovation. Since corporate giving is relatively stable across time and a firm's innovation output could be highly correlated with its individual effect, any effect of corporate giving will be absorbed by firm fixed effects (e.g., Hall, Jaffe, and Trajtenberg, 2005b; Hall, Thoma, and Torrisi, 2007; Noel and Schankerman, 2013).

[13] The coefficients of R&D are insignificant in these regressions; this effect is driven by our focusing on firms in our direct giving sample. In fact, when we broaden our sample in the robustness check section, R&D loads as significantly positive, as expected.

[14] We conduct separate regressions for direct giving and foundation giving. Nevertheless, our results are reasonably robust to including both direct giving and foundation giving in the same regression.

that report direct giving to avoid selection issues in disclosure, although we obtain very similar results using a sample that includes all firms with foundation giving data. Consistent with our expectations, we do not find any evidence that foundation giving is associated with higher levels of innovation. Although firms have other reasons to engage in giving through foundations, the decision may not be primarily driven by desired innovation. Moreover, we discuss earlier that a number of issues – such as mandatory disclosure of foundations' activities and restrictions on the type of investment that foundations can pursue – limit the ability of foundations to pursue innovation opportunities on behalf of their sponsoring firms.[15]

The absence of a relation between foundation giving and innovation supports our second hypothesis that, compared to direct giving, foundation giving is not used as an effective tool in promoting innovation. This finding has a number of other implications. First, it helps explain why firms give less through their foundations compared to direct giving; foundation giving is not associated with increases in innovation. Our results suggest that to the extent that foundation giving *could* have an effect on innovation, we do not find any evidence of this relation. This is despite the view that foundation giving enables the firm to attract more highly-qualified employees and be partly protected from outside activists (i.e., the advertising mechanism). These benefits would enable it to more readily invest in innovation (Baron, 2001; Godfrey, 2005). Second, our results are not driven by some omitted variables – if both corporate giving and innovation are associated with improved future business prospects or sufficient financial resources, we would expect to see a relation with foundation giving as well.

B. Endogeneity Issues and Robustness

[15] Geographic proximity to research organizations could also be a driver of giving. However, this hypothesis would predict a relation with foundation giving as well, assuming foundations are located close to their sponsoring firms. On the other hand, since our direct giving data consists of larger firms, and these firms tend to be more geographically dispersed, geography-based tests would be misspecified.

First, in Table III, we implement propensity score matching to construct a sample that contains direct giving firms and matched firms with similar characteristics including return on assets (ROA), cash holdings, and the Entrenchment Index from Bebchuk, Cohen, and Ferrell (2009).[16] Examining the effect of direct giving on innovation in such a sample mitigates the omitted variables because sample firms share similar profitability, cash balances, and governance. Given the smaller sample of firms with data for the Entrenchment Index, we first conduct the propensity score matching without the Entrenchment Index. As reported in Panel A, the characteristics of treated group are indifferent from those of matched firms with the exception of advertising expense, which is understandable given that these firms are generally more concerned with their reputation. This difference is not expected to affect our inferences because advertising expense does not promote innovation, as we report in Table II. Panel B shows regression results that direct giving remains positively and significantly associated with each of our five innovation measures, consistent with our baseline results. Similar results are provided in Panels C and D when we include the Entrenchment Index in matching. As a result, our baseline findings cannot be simply attributed to omitted variables related to profitability, cash, or corporate governance.

Second, since measures of innovation output are persistent, we include lagged innovation measures and obtain consistent results in Table IV. In this table, we conduct Granger (1969) causality tests for whether direct giving causes higher levels of innovation output (patent counts and patent citations) – or whether those innovation measures Granger-cause direct giving. This

[16] In our propensity score matching tests, we match our direct-giving firm-years with industry peers that are not in our direct-giving sample, and control for corporate governance (institutional ownership and Bebchuk, Cohen, and Ferrell's (2009) Entrenchment Index), profitability (ROA), and cash balance. We also require the matched firm's size to be in line with our direct-giving firm, to prevent confounding the results, and thus require revenue of the matched firm to be between 25% and 175% of the direct-giving firm. Our results are robust to omitting this constraint. If we cannot find an appropriate matched firm to a direct-giving firm, we drop that direct-giving firm. More details are provided in the table note of Table III.

set-up is empirically relevant because, if our earlier test results are driven by reverse causality, we would observe significantly positive coefficients on innovation predicting future levels of direct or foundation giving. We find that the direct giving coefficients remain positive, albeit with weaker statistical significance. In contrast, we do not find any evidence of innovation predicting direct giving. As a result, our finding is not subject to reverse causality issues.

Third, we attempt to address endogeneity with two-stage least squares regressions. Motivated by Lev and Sougiannis (1996), we use the industry average of direct giving as an instrument for the firm's level of direct giving. The intuition is that firms learned from their competitors in utilizing direct giving to establish research networks with non-profit organizations, or that firms are under competition for philanthropy due to its associated publicity. We provide the results in Table V. In the first-stage results, we show that industry giving is positively and significantly associated with the firm's level of direct giving. In the second-stage results, we find that the coefficients of the instrumented direct giving remain statistically significant. In addition, these coefficients are larger than their counterparts in Table II, suggesting even greater economic importance for direct giving on innovation after addressing endogeneity.

Lastly, given that firms voluntarily disclose their amount of direct giving to our sample database (although their philanthropic activities are not generally disclosed in regulatory filings), another issue to consider is whether restricting our sample to firms that disclose their level of direct giving introduces a sample-selection bias in our results. We address this issue with a Heckman (1979) two-stage sample-selection model using all firms with non-missing foundation or direct giving data (and set missing direct giving as zero). In the first stage, we model the probability of disclosing direct giving, with a probit specification. Specifically, we regress a dummy variable that equals one if direct giving is non-missing and zero if direct giving is missing on all control variables (except R&D) and fixed effects we have considered in our baseline results shown in Table II Panel A.[17] We then regress our innovation output measures that we use in Table II Panel A against the independent variables used in that table, as well as the inverse Mills ratio. Using the inverse Mills ratio controls for potentially endogenous sample-selection issues. Table VI shows that our baseline results are robust to the selection issue – direct giving is significantly associated with innovation output measures. Moreover, the coefficients of direct giving are close to those reported in Table II Panel A.

Our findings are also robust to additional tests. First, in Table A.I of the Internet Appendix, we control for direct giving and foundation giving in the same specifications. Comparing these results to Table II, we show that the results are little changed; direct giving remains positive and significant (and of similar magnitude), whereas foundation giving is insignificantly associated with innovation.

Second, one concern with our results is whether we have controlled adequately for the lag between giving and innovation. Although Hausman, Hall, and Griliches (1984) and Hall, Griliches, and Hausman (1986) present evidence that the lag between funding an innovation and filing for associated patents is typically less than one year, it is possible for giving-induced innovation to be associated with a longer time-period between initial funding and subsequent innovation. We conduct further tests using accumulated innovation measures in the subsequent three years (*t+1* to *t+3*). As shown in Table A.II of the Internet Appendix, we find similar results

[17] We recognize that the validity of the Heckman selection model mainly depends on the specification of the selection equation. In principle, all variables that potentially affect selection should be considered. Although it is impossible to exhaust all potential determinants of direct giving, our best strategy is to include all control variables (except R&D) and fixed effects in the selection equation because they are all potentially relevant for explaining direct giving. In addition, we do not attempt to propose instrumental variables because it is not necessary to design instrumental variables in Heckman selection model for statistical inference (see Chapter 4 of Guo and Fraser, 2014).

with greater economic magnitude than the corresponding coefficients in Table II, suggesting that the influence of direct giving lasts longer than one year.

Third, we examine the robustness of our analyses by expanding our sample to all firms that report either direct giving or foundation giving. We do so by setting to zero firm-years whose direct giving activities are missing from our proprietary sample. Doing so will generally weaken our main results (since a value of direct giving equal to zero may not be representative of the disclosed level of direct giving). In Table A.III of the Internet Appendix, we extend our main regressions to a sample of all firms with either non-zero direct giving or with corporate-sponsored foundations. In this table, we show that direct giving remains generally significant. Also of interest is that, in our broader sample, R&D expenditure is significantly positive in all regressions, as expected. This indicates that sample-selection issues drove its earlier insignificance.

We recognize that it is impossible for us to exclude all possible endogenous explanations, and we conduct further analyses in the following sections to further strengthen a causal interpretation of the effect of direct giving on innovation.

III. Exploring the Mechanisms

In this section, we examine how the effect of direct giving on innovation varies with industry- and firm-specific characteristics. Specifically, we inspect the effects of firm-level information asymmetries, industry-level innovativeness, and industry-level innovation competition on the direct giving-innovation relation. Firms with greater levels of information asymmetries are more likely to network with external parties, as these arrangements are less visible. Innovation competition can also interact with the influence of direct giving on innovation by affecting the pressure to innovate and the incentive to network with external parties. Moreover, firms in high-tech industries require more innovation capabilities and are thus more motivated to pursue research networks with non-profit organizations.

This section also helps strengthen the causal interpretation for the positive relation between direct giving and innovation output based on cross-sectional analyses. If both direct giving and innovation output were driven by an omitted variable, then the influence of this variable should be pronounced in all cross-sectional variation considered in this section. Since it is difficult to provide any potential factor that satisfies all these coincidences, a reasonable interpretation for our baseline results is that direct giving promotes innovation.

A. Effect of Information Asymmetries

We expect that firms with greater information asymmetries are also the kind of firms that would develop their innovations through the type of partnerships that can be less easily detected. Conversely, when a firm is more transparent to its investors and its competitors, it is more inclined to be the type of firm that is performing internal R&D.

To test this proposition, we use analyst dispersion as a proxy for information asymmetries, following from Krishnaswami and Subramaniam (1998). Analyst dispersion is defined as the standard deviation of forecasts for earnings per share (EPS) made in the three months before the announcement of actual annual EPS divided by the mean of these forecasts.[18] Both the standard deviation and the mean are obtained from the unadjusted I/B/E/S summary data set.

[18] We also construct analyst dispersion based on 6-month-ahead forecasts and obtain similar results.

We first regress our innovation output measures (counts, cites, and influence) on the interaction term between direct giving and analyst dispersion, analyst dispersion, direct giving, and all other control variables used in prior tables. As shown in Table VII, the positive relation between direct giving and innovation appears to be stronger among firms with higher levels of analyst dispersion for counts and cites. We find that the coefficients of the interaction term are positive for innovation output measures, suggesting that opaque firms have greater flexibility in exploiting what is ostensibly "direct giving" to learn more and better ideas. The interaction term is insignificantly positive for innovative influence, although the coefficient of direct giving remains positive and significant.

B. Effect of Innovation Competition

Since one of the most important incentives for firms to innovate is to avoid default and bankruptcy resulting from weak product lines (Eisdorfer and Hsu, 2011), we expect industry structure to explain firms' innovation choices. We suggest that the link between direct giving and innovation is more prominent in less concentrated industries for two reasons. First, firms in less innovation-concentrated industries face more severe technology-races, so most of their resources are used to ensure short-term survival rather than long-term profitability. These pressures encourage their giving activities to be focused on how these activities directly benefit the firm (as opposed to purely philanthropic giving). Second, fierce competition encourages firms to find diverse channels to develop unique innovations (e.g., Blundell, Griffith, and Van Reenen, 1999). As a result, we would expect that greater innovation competition leads to more innovation per dollar spent on direct giving.

To test this proposition, we first construct a Herfindahl index based on the ownership distribution of patents filed by firms in the same industry in the same year to measure innovation concentration in each industry every year,[19] which is a reverse indicator of innovation competition. We then regress all innovation measures on the interaction between the concentration index and direct giving, the concentration index, direct giving, and all other control variables. As reported in Table VIII, the coefficients on the interaction term are significantly negative, supporting our proposition. The negative coefficient suggests that, in more innovation-concentrated industries, firms generate fewer innovations per dollar of direct giving. This finding can be interpreted in two ways: firms in less competitive industries are more willing to commit direct giving to non-innovation purposes; or, market pressures encourage firms in more competitive industries to be more efficient in converting direct giving into innovation.

Table VIII supports our proposition that the direct giving-innovation relation is stronger in more competitive industries since firms face stronger pressures to develop innovations, for counts and cites (similar to the results for Table VII, although patent influence remains significantly associated with direct giving, the interaction term is not significantly negative). Our finding further confirms the strategic use of direct giving, as we would not expect a moderating effect from innovation competition if direct giving were not made for innovation purposes.

C. Industry innovativeness

We also examine our baseline results by focusing on which industry-groups are driving the results by adding the interaction terms of direct giving and an indicator variable for each industry group to the regressions. The main presumption is that firms in high-tech industries require more innovation capabilities and are thus more motivated to pursue research networks with non-profit organizations. For presentational clarity, we do not display the additional explanatory variables that we use (RD, Advertising, MarketToBook, Leverage, LogRevenue, and

[19] For example, if there are three firms (A, B, and C) in industry *j* and they receive 0, 1, and 3 patents, respectively, in year *t*, industry *j*'s innovation concentration index in year *t* is 0.625 = $[(0/4)^2 + (1/4)^2 + (3/4)^2]$.

InstiOwn) in Table IX. Among 12 Fama-French industry groups, we consider 10 non-financial and non-utility industries. We find that the effect of direct giving on our innovation output measures is largely driven by the business equipment (i.e., information technology) industry for patent counts and citations, and the health-care industry for all three of our innovation measures. Since the information technology and health-care industries are known to be innovation-intensive sectors, the stronger direct giving-innovation relation in these two industries supports our proposition.

IV. DIRECT GIVING, COLLABORATIVE INNOVATION, AND ORIGINALITY

One reason that firms would innovate through collaborative partnerships is if their direct giving facilitates real options in their supporting organizations' innovations, by enabling the firms to access different areas of expertise (Chesbrough, 2003). In this section, we study the networking channel by examining whether direct giving positively associates with two proxies that reflect the intensity and breadth of networking activities. The first variable, "collaborative innovation," directly captures the extent to which a sample firm generates innovation by learning from non-profit organizations. A firm's collaborative innovation in a sample year is defined as the number of citations that (1) are made by the patents filed by the firm in that year, and (2) cite prior patents owned by non-profit organizations with COD numbers from 6 to 15 (including universities, research institutions, governments, or hospitals).[20] A higher value of collaborative

[20] Jaffe, Trajtenberg, and Henderson (1993), Mowery, Oxley, and Silverman (1996), Sorenson and Fleming (2004), and Gomes-Casseres, Hagedoorn, and Jaffe (2006) have used the citation flows to measure the knowledge diffusion due to geographic and social proximity and strategic alliances. In addition, the survey of Jaffe, Trajtenberg, Fogart (2000) provides direct evidence that citations reflect knowledge flows. In the NBER patent dataset, each approved patent is required to provide a list of citations of prior patents upon which it is developed, and this list is based on self-reporting or being requested by USPTO patent examiners. Using the citation data, we can closely track the path of knowledge flows.

innovation indicates a stronger collaborative relationship effect because the sample firms use more knowledge from their non-profit partners to develop their own inventions.

The second variable, “originality,” measures the breadth of firms’ expertise and also reflects the magnitude of networking activities and associated benefits. The originality score of a patent is defined as one minus the Herfindahl index of the technology class distribution of all patents that have been cited by that patent (see Trajtenberg, Henderson, and Jaffe, 1997). If a patent has cited prior patents in a broader range, it is regarded as more “original” as it does not follow the trajectory of existing patents and combines more diverse technologies; thus, it receives a higher originality score (between zero and one). For a firm filing more than one patent in a sample year, its originality score is defined as the sum of each patent’s originality score. A higher value of originality indicates that a firm is able to create inventions based on knowledge from different resources; conditional on fixed financial resources and human capital, the firm that is able to use more different technologies is more likely to learn more from other organizations, such as non-profit research-oriented ones.

In Panel A of Table X, we regress collaborative innovation and originality in year *t+1* on direct giving in year *t*, typical control variables in year *t*, and year and industry fixed effects. Panel A shows a significant relation between direct giving and both collaborative innovation and originality. In Panel B of Table X, we consider three-year accumulated innovation measures and obtain consistent results. These findings suggest that firms can utilize direct giving programs to learn more from non-profit research institutes as reflected in greater collaborative innovation, and that such efforts result in innovation with higher originality, consistent with our second hypothesis.

The quantity of one-year collaborative innovation increases by 38.3% when direct giving increases from the twenty-fifth to the seventy-fifth percentile. This suggests that not only is direct giving associated with increased innovation as reported in Table II, but that the increase is most concentrated in the type of innovation where firms are likely to collaborate with outside research-oriented, non-profit partners.

Similarly, we find that direct giving is positively associated with future originality of sample firms' patent portfolios. In terms of economic magnitude, an increase in direct giving from the twenty-fifth to the seventy-fifth percentile leads an increase of 7.7% in originality in the next year. This estimate of economic significance further corroborates our argument that the positive effect of direct giving on subsequent innovation output can be attributed to the expanded scope of the focal firm's innovative activities following direct giving.

Conversely, panels C and D of Table X show no association between foundation giving and collaborative innovation or originality. This confirms our earlier findings that foundation giving is not associated with innovation output because foundation giving does not help firms gain access to non-profit organizations' knowledge in developing new competitive advantages and expanding the range of creative activities.

V. CONCLUSION

This paper uses a unique dataset to examine the association between corporate philanthropy and innovation, and exploits the differences between direct giving and foundation giving. Our evidence consistently shows that direct giving – and not foundation giving – is associated with an increased number of patents and associated citations. Moreover, using patent-based innovation measures, we show the significant effect of direct giving on collaborative innovation and originality. This association supports our proposition that intangible investment activities developed in collaboration with outside research organizations are frequently disclosed as direct giving. In contrast, the insignificant relation between foundation giving and innovation suggests that corporate giving does not affect innovation through the advertising mechanism.

The real effect of direct giving that we document is present in the industries for which we would most expect this association. It is also concentrated in firms with greater levels of information asymmetries and industries with more intense innovation competition, consistent with our proposition that using direct giving to promote innovation is subject to disclosure and competition pressure. Similarly, we show that direct giving affects innovation several years further into the future. Moreover, our propensity score matching, instrumental variable regressions, and Heckman selection tests suggest that our results are reasonably robust to endogeneity issues and voluntary disclosure issues.

Our empirical investigation leads to a number of implications. First, our results suggest that what is generally referred to as "direct giving" actually reflects (at least in part) firms' investments in certain high-risk research performed in collaboration with non-profit organizations. Second, our results indicate that different reasons exist for the decision to give through corporate-sponsored foundations compared to giving directly by the firm, and it is important for researchers to be aware of this difference when studying corporate philanthropy.

Finally, our study provides new insights to understanding optimal boundaries of the firm. We show that certain kinds of projects – in particular, those outside of a firm's traditional area of expertise – appear to be pursued through collaborations that involve direct corporate giving, rather than through internal research and development. Creating research networks provides an alternative external mechanism to the market for corporate control for developing new innovations.

APPENDIX: ANECDOTAL EVIDENCE OF PHILANTHROPY AND INNOVATION

We provide three motivating examples of research networks created through direct giving by Texas Instruments, Quest Diagnostics, and Hewlett-Packard that are consistent with our hypothesis.

Texas Instruments (TI) is one of the firms that actively engage in generous philanthropy. In 2010, TI gave approximately $15 million through direct contributions and approximately $10 million through its philanthropic foundation. Reviewing its foundation's 990-PF filing for 2010 shows significant outlays to societal causes such as various United Way affiliates (approximately $3.9 million), the Dallas Center for the Performing Arts Foundation ($2 million) and other cultural organizations (for example, $1.3 million to a matching gift program for education and arts). It is possible to identify each of the organizations that received grants from any firm's foundation, and the amount received.

Although we cannot identify every use of TI's direct giving, we are able to examine some of its uses. One result of TI's direct giving is the funding it provides for its Analog Design Contest. The contest has a first-place award of $10,000. TI features the program prominently in its corporate citizenship report, noting:

> "Our commitment covers campuses across the United States and around the globe. TI develops partnerships and programs to promote excellence in research, contributes financial resources, offers expertise and donates equipment – all with the specific goal to make higher education better and more accessible." (http://www.ti.com/corp/docs/csr/factsheets/cthe.shtml)

Clearly, a program such as this one enables TI to engage students in its products, and also to provide a mechanism in which students can innovate for TI because this contest enables TI to make use of the contest submissions for its future products. Its official contest rules state, among other items,

> "Entrant hereby grants TI a non-exclusive, worldwide, perpetual, irrevocable and royalty-free license to use the Designs in, or as part of, TI products, to implement the Designs using TI products, to modify the Designs for such uses, and to publish the Designs for such uses by TI or by customers of TI under all applicable intellectual property rights related to the Designs, including but not limited to, patents, trade secrets, copyrights (including all moral and statutory copyrights), and trademarks. (http://www.ti.com/corp/docs/landing/universityprogram/rules.htm)

Quest Diagnostics, a member of the Fortune 500 and the S&P 500, is the largest U.S. lab-testing services provider. In 2014 it formed a partnership with the University of California, San Francisco (UCSF) to develop new diagnostic tools to identify genetic mutations and other biological markers that can be used to predict patients' responses to various treatments.[21] On the one hand, Quest Diagnostics gives UCSF researchers access to its exclusive patient database, which contains more than 1.5 billion patient encounters and is the largest private clinical database in the U.S.; in addition, the company also will provide grants ranging from $100,000 to $500,000 per project to UCSF researchers. On the other hand, the company is able to accelerate its transition into advanced diagnostics in the field of precision medicine by leveraging UCSF researchers' expertise and capability in identifying biomarkers that may lead to new markets and profitable products.

Hewlett-Packard (HP) is both a highly innovative firm and a firm that is engaged in a significant amount of corporate philanthropy. In 2009, HP gave $22.5 million directly and approximately $4.7 million through its corporate foundation. The donations from its foundation were largely for matching employee contributions (approximately $2.7 million) and other social causes (for example, approximately $800,000 to the American Red Cross and $300,000 to Save the Children). In contrast, its Global Citizenship Report shows a much clearer link with its business focus. As one example, its report notes its partnership with mPedigree to combat

[21] Sources: http://online.wsj.com/news/articles/SB20001424052702304347904579308702500522072 and https://www.ucsf.edu/news/2014/01/111016/uc-san-francisco-and-quest-diagnostics-launch-collaboration-advance-field

counterfeit pharmaceuticals through a unique authentication process. HP notes that its "patented anti-counterfeiting technology is the result of work we've done to develop and refine technologies in imaging and printing, cloud computing, and analytics." Subsequent to the implementation of this program in Africa, HP announced in August 2011 that it had engaged in a partnership with the Indian pharmaceutical firm Themis Medicare to apply its technology to Themis Medicare's products; this initiative, together with subsequent initiatives, suggests that HP's ostensibly "socially responsible" activities in Africa were part of further developing its business strengths in pharmaceutical authentication.

HP leadership has previously noted the role of innovation in its philanthropy. For example, in its 2008 Global Citizenship Report, then-CEO Mark Hurd discussed the ways in which its global citizenship activities strengthen its business. One of the ways mentioned by Hurd is innovation. Indeed, in noting customer emphasis on recycling and energy efficiency, he wrote that "responding to these growing market opportunities drives innovation within HP."

These three examples (TI, Quest, and HP) thus reflect some of the ways in which innovation-related investments could in fact be officially publicized and classified as "philanthropic."

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Table I: Sample Statistics and Correlations

Panel A of this table provides the summary statistics for the variables of interest in our paper, and Panel B provides the Pearson correlation coefficients for these variables. The variables are: Direct giving (the disclosed level of direct giving by the firm), Foundation giving (the level of giving by corporate-sponsored foundations), DirectGiving (%) is direct giving scaled bye sales, FoundationGiving/Sales (%) is foundation giving scaled by sales, Counts (the number of patent applications in the subsequent year that are eventually approved, scaled by sales in million dollars), Cites (the number of non-self forward patent citations in the following year for patents that are subsequently approved, scaled by sales in million dollars), Influence (the logged ratio of Cites to Counts), CollabInnov (the number of patents filed in the following year that are subsequently approved citing patents that are owned by universities, research institutions, governments or hospitals, scaled by sales in million dollars), Originality is defined as the sum of one minus the Herfindahl index based on the technology class of all patents that have been cited by each patents filed by the firm, R&D (the Research & Development expenditure) scaled by sales in million dollars, Advertising (the advertising expenditure in that year) scaled by sales in million dollars, MarketToBook (the market value of assets divided by the book value of assets), Leverage (using the market value of the firm), LogRevenue (the log of sales), and InstiOwn (the percentage of institutional ownership. Originality is multiplied by 10. Our main sample includes 615 firm-year observations.

Panel A: Summary statistics

	Mean	Q1	Median	Q3	Std. Dev.
Direct giving ($Million)	19.2	3.0	10.8	24.6	24.2
Foundation giving ($Million)	9.8	0.6	4.3	10.5	19.8
DirectGiving (%)	1.003	0.216	0.539	1.073	1.677
FoundationGiving (%)	0.532	0.045	0.341	0.700	0.897
Counts	0.012	0.000	0.005	0.016	0.017
Cites	0.173	0.001	0.030	0.168	0.375
Influence	1.540	0.000	1.792	2.563	1.290
CollabInnov	0.005	0.000	0.002	0.007	0.007
Originality	0.245	0.000	0.241	0.394	0.213
R&D	0.042	0.000	0.028	0.063	0.048
Advertising	0.027	0.000	0.011	0.042	0.039
MarketToBook	2.315	1.291	1.772	2.770	1.619
Leverage	0.224	0.063	0.169	0.318	0.204
LogRevenue	9.615	9.293	9.810	10.389	1.009
InstiOwn(%)	49.0%	43.1%	54.6%	65.1%	24.7%

Panel B: Correlations

	Counts	Cites	Influence	Collab Innov	Origin-ality	Direct Giving /Rev	Found Giving /Rev	R&D /Rev	Advert-ising/Rev	Market ToBook	Leve-rage	Log Rev	Insti Own
Counts	1												
Cites	0.802***	1											
Influence	0.366***	0.469***	1										
CollabInnov	0.610***	0.328***	0.210***	1									
Originality	0.817***	0.553***	0.163***	0.535***	1								
DirectGiving/Rev	0.347***	0.246***	0.166***	0.510***	0.179***	1							
FoundationGiving/Rev	0.0791	0.0242	0.0778	0.173***	0.0516	0.194***	1						
R&D/Rev	0.405***	0.259***	0.110*	0.411***	0.350***	0.559***	0.212***	1					
Advertising/Rev	0.034	-0.0349	-0.0236	-0.086	-0.0201	0.0792	0.0957*	0.224***	1				
MarketToBook	0.0989*	-0.029	-0.0804	0.179***	0.0863	0.410***	0.249***	0.501***	0.406***	1			
Leverage	-0.203***	-0.175***	-0.00505	-0.129**	-0.188***	-0.273***	-0.150**	-0.363***	-0.310***	-0.578***	1		
LogRevenue	-0.241***	-0.235***	-0.216***	-0.222***	-0.133**	-0.151***	-0.192***	-0.0943*	-0.0376	0.0185	0.177***	1	
InstiOwn	0.0950*	0.0676	-0.156***	0.118**	0.127**	0.113*	0.0146	0.00308	0.0222	-0.00798	-0.066	-0.158	1

Table II: Effects of Corporate Philanthropy on Innovation Output

This table examines the effects of direct giving and foundation giving on innovation. The dependent variables are: Counts (the number of patent applications in the subsequent year that are eventually approved, scaled by sales), Cites (the number of non-self forward patent citations in the following year for patents that are subsequently approved, scaled by sales), and Influence (the logged ratio of Cites to Counts). The independent variables are: DirectGiving (the disclosed level of direct giving by the firm scaled by sales and multiplied by 1,000), FoundationGiving (the level of giving by corporate sponsored foundations scaled by sales and multiplied by 1,000), RD (Research & Development expenditure scaled by sales), Advertising (advertising expenditure scaled by sales), MarketToBook (the market value of assets divided by the book value of assets), Leverage (using the market value of the firm), LogRevenue (the log of sales), and InstiOwn (the percentage of institutional ownership). We include year and Fama-French 48 (FF48) industry fixed-effects. All sample firms are required to have non-zero direct giving. Panel A studies the effects of direct giving and Panel B studies the effects of giving by corporate-sponsored foundations. T-statistics based on robust firm-clustered standard errors are provided in parentheses below the coefficient value. *, **, and *** denote significant differences from zero at the 10%, 5%, and 1% levels respectively.

	Panel A: Direct giving			**Panel B: Foundation giving**		
	Counts	**Cites**	**Influence**	**Counts**	**Cites**	**Influence**
DirectGiving	0.002***	0.032***	0.061***			
	(3.747)	(3.528)	(3.014)			
FoundationGiving				-0.000	0.002	0.014
				(-0.365)	(0.096)	(0.321)
RD	0.041	-0.191	-1.272	0.078	0.334	-0.341
	(0.888)	(-0.201)	(-0.615)	(1.627)	(0.336)	(-0.160)
Advertising	-0.030	-1.006*	-0.049	-0.055	-1.392**	-0.784
	(-0.931)	(-1.849)	(-0.034)	(-1.630)	(-2.272)	(-0.458)
MarketToBook	-0.001	-0.034**	-0.012	-0.000	-0.029*	-0.002
	(-0.703)	(-2.065)	(-0.262)	(-0.205)	(-1.766)	(-0.050)
Leverage	-0.006	-0.236*	-0.023	-0.004	-0.205*	0.038
	(-0.983)	(-1.921)	(-0.081)	(-0.650)	(-1.664)	(0.137)
LogRevenue	-0.002	-0.047	0.243*	-0.003	-0.057	0.227*
	(-0.752)	(-0.742)	(1.969)	(-1.111)	(-0.892)	(1.805)
InstiOwn	0.005	0.194*	0.098	0.007	0.214**	0.136
	(1.095)	(1.917)	(0.417)	(1.377)	(2.128)	(0.553)
Constant	0.031	0.811	0.179	0.038	0.892	0.293
	(1.350)	(1.245)	(0.145)	(1.648)	(1.359)	(0.235)
Observations	615	615	615	615	615	615
R-square	61.0%	55.1%	71.3%	58.7%	54.0%	70.9%
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
FF48 fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table III: Propensity Score Matching

In this table, we provide results for a propensity score matched sample: We estimate the propensity to be a direct-giving firm given various firm characteristics with a logit model, regressing an indicator variable for firm-years with nonzero direct giving against the following variables (as defined in Table II): RD, Advertising, MarketToBook, Leverage, LogRevenue, and InstiOwn, as well as Cash (cash balance, scaled by assets) and ROA (earnings before interest and taxes, scaled by assets). For our results in Panels C and D, we also include the variable E-Index, defined as the Entrenchment Index from Bebchuk, Cohen, and Ferrell (2009), backfilled for years where it is not available. We then rank the estimated propensity score and match each direct giving firm to a non-direct giving sample firm in the same industry with the closest propensity score. We omit observations where the matched firm has revenue less than 25% or greater than 175% of the giving firm's value. In Panels A and C, we provide results for t-tests on the control variables for direct giving firms and non-direct giving firms matched based on propensity score matching. In Panels B and D, we estimate the following regression model by using direct-giving firms and matched non-direct giving firms: $Innov_{i,t+1} = \alpha_j + \alpha_t + \beta \times DirectGiving_{i,t} + \gamma \times X_{i,t} + \varepsilon_{i,t}$, where α_j is the Fama-French 48 industry fixed effect; α_t is the year fixed effect; X is a vector of control variables measured at *t*; and the innovation measures are the patent count, patent citation count, patent influence, collaborative innovation, and patent originality measured at *t+1*. T-statistics based on robust standard errors are provided in parentheses below the coefficient value. *, **, and *** denote significant differences from zero at the 10%, 5%, and 1% levels respectively.

Panel A: T-tests on matched sample

	Matched control firms	**Direct giving firms**	**P-value**
RD	0.033	0.030	0.382
Advertising	0.010	0.018	0.000
MarketToBook	2.081	2.047	0.770
Leverage	0.238	0.246	0.590
LogRevenue	9.387	9.284	0.215
InstiOwn	51.4%	49.2%	0.293
Cash	0.064	0.063	0.926
ROA	0.121	0.118	0.591

Panel B: Regressions on matched sample

	Counts	Cites	Influence	Collab Innov	Originality
DirectGiving	0.003***	0.048***	0.090***	0.002***	0.004***
	(6.968)	(5.471)	(3.330)	(5.409)	(3.484)
RD	0.060	0.079	-0.811	0.061*	0.412**
	(1.162)	(0.058)	(-0.301)	(1.725)	(2.551)
Advertising	-0.010	0.008	-0.085	-0.016	-0.005
	(-0.628)	(0.016)	(-0.051)	(-1.595)	(-0.077)
MarketToBook	0.000	-0.033*	-0.012	0.001*	0.001
	(0.096)	(-1.789)	(-0.295)	(1.691)	(0.520)
Leverage	-0.007	-0.292**	-0.008	-0.001	-0.013
	(-1.421)	(-2.335)	(-0.027)	(-0.300)	(-0.690)
LogRevenue	-0.001	-0.007	0.239***	-0.000	-0.002
	(-0.568)	(-0.287)	(3.503)	(-0.077)	(-0.857)
InstiOwn	0.002	0.067	-0.210	0.000	-0.001
	(0.804)	(1.172)	(-1.140)	(0.159)	(-0.082)
Constant	0.019*	0.398	-0.022	0.002	0.043
	(1.734)	(1.310)	(-0.033)	(0.382)	(1.432)
Observations	684	684	684	684	684
R-square	61.2%	53.7%	63.2%	53.5%	60.2%
Year fixed effects	Yes	Yes	Yes	Yes	Yes
FF48 fixed effects	Yes	Yes	Yes	Yes	Yes

Panel C: T-tests on matched sample

	Matched control firms	Direct giving firms	P-value
RD	0.032	0.028	0.224
Advertising	0.011	0.016	0.027
MarketToBook	2.145	2.062	0.520
Leverage	0.238	0.237	0.927
LogRevenue	9.287	2.207	0.374
InstiOwn	56.5%	55.8%	0.689
Cash	0.062	0.063	0.868
ROA	0.118	0.123	0.432
E-index	2.040	2.140	0.278

Panel D: Regressions on matched sample

	Counts	Cites	Influence	Collab Innov	Originality
DirectGiving	0.002***	0.043***	0.086***	0.001***	0.004***
	(7.480)	(5.397)	(2.779)	(5.555)	(3.550)
RD	0.124***	1.136	0.624	0.094***	0.532***
	(2.834)	(1.012)	(0.317)	(2.742)	(3.263)
Advertising	-0.008	-0.180	-0.884	-0.010	0.008
	(-0.391)	(-0.349)	(-0.407)	(-0.923)	(0.079)
MarketToBook	-0.000	-0.035**	-0.048	0.001**	0.000
	(-0.477)	(-2.153)	(-1.457)	(2.059)	(0.182)
Leverage	-0.009*	-0.332***	-0.102	-0.002	-0.023
	(-1.808)	(-2.628)	(-0.358)	(-0.788)	(-1.038)
LogRevenue	-0.001	-0.018	0.150*	-0.000	-0.002
	(-0.511)	(-0.592)	(1.891)	(-0.227)	(-0.654)
InstiOwn	0.003	0.153	-0.172	-0.002	-0.003
	(0.729)	(1.471)	(-0.738)	(-0.956)	(-0.195)
E-index	-0.000	-0.025*	-0.006	0.001**	0.001
	(-0.718)	(-1.849)	(-0.116)	(2.121)	(0.380)
Constant	0.016	0.524	1.701**	-0.001	0.033
	(1.448)	(1.506)	(2.372)	(-0.251)	(1.035)
Observations	598	598	598	598	598
R-square	61.3%	55.7%	59.8%	55.9%	55.7%
Year fixed effects	Yes	Yes	Yes	Yes	Yes
FF48 fixed effects	Yes	Yes	Yes	Yes	Yes

Table IV: Direct Giving and Innovation – Granger Causality Tests

This table provides Granger causality tests for the results in Table II; all dependent variables and independent variables are as defined in Table II, and we include year and Fama-French 48 fixed-effects. All sample firms are required to have non-zero direct giving. T-statistics based on robust firm-clustered standard errors are provided in parentheses below the coefficient value. *, **, and *** denote significant differences from zero at the 10%, 5%, and 1% levels respectively.

	$Counts_{t+1}$	**$DirectGiving_{t+1}$**	**$Cites_{t+1}$**	**$DirectGiving_{t+1}$**	**$Influence_{t+1}$**	**$DirectGiving_{t+1}$**
$DirectGiving_t$	**0.809*** **	0.2901***	**4.297**	0.2847***	**30.555** **	0.2855***
	(2.779)	(2.683)	(1.063)	(2.646)	(2.523)	(2.650)
$Counts_t$	0.843***	**-0.0006**				
	(19.360)	(-0.216)				
$Cites_t$			0.855***	**0.0001**		
			(24.116)	(0.721)		
$Influence_t$					0.540***	**0.0001**
					(5.534)	(1.018)
RD_t	-0.008	0.0021	0.030	0.0021	-0.263	0.0022
	(-0.921)	(1.057)	(0.146)	(1.063)	(-0.256)	(1.149)
$Advertising_t$	-0.010	-0.0010	-0.236	-0.0008	0.248	-0.0009
	(-1.267)	(-0.398)	(-1.266)	(-0.355)	(0.346)	(-0.370)
$MarketToBook_t$	-0.000**	-0.0000	-0.017***	-0.0000	-0.027	-0.0000
	(-2.032)	(-0.842)	(-2.824)	(-0.773)	(-1.246)	(-0.859)
$Leverage_t$	0.000	-0.0005**	-0.021	-0.0005**	0.048	-0.0005**
	(0.233)	(-2.558)	(-0.622)	(-2.598)	(0.249)	(-2.565)
$LogRevenue_t$	-0.000	0.0001	-0.008	0.0001	0.042	0.0001
	(-0.135)	(1.357)	(-0.774)	(1.406)	(0.677)	(1.229)
$IntiOwn_t$	-0.000	0.0002	0.009	0.0002	0.017	0.0002
	(-0.019)	(1.480)	(0.282)	(1.309)	(0.159)	(1.446)
Constant	0.003	-0.0008	0.102	-0.0009	0.436	-0.0008
	(0.542)	(-0.930)	(0.842)	(-1.031)	(0.691)	(-0.912)
Observations	588	588	588	588	588	588
R-squared	90.4%	63.4%	91.2%	63.6%	81.4%	63.6%
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
FF48 fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table V: Direct Giving and Innovation – Two-Stage Least Squares Regressions

This table provides two-stage least squares regression results, where the instrument is the mean direct giving of the firm's Fama-French 12 industry group (*IndustryGiving*). All other variables are defined as in Table II. We include year and Fama-French 48 industry fixed-effects. T-statistics based on robust firm-clustered standard errors are provided in parentheses below the coefficient value. *, **, and *** denote significant differences from zero at the 10%, 5%, and 1% levels respectively.

	First-stage	**Second-stage**		
	Direct Giving	**Counts**	**Cites**	**Influence**
DirectGiving		0.004**	0.108*	0.048
		(2.512)	(1.817)	(0.718)
RD	17.427***	0.009	-1.452	-1.050
	(2.941)	(0.192)	(-1.089)	(-0.451)
Advertising	-10.224	-0.007	-0.095	-0.209
	(-1.532)	(-0.185)	(-0.119)	(-0.122)
MarketToBook	0.086	-0.001	-0.048**	-0.009
	(1.198)	(-1.020)	(-2.093)	(-0.204)
Leverage	0.543	-0.008	-0.311*	-0.010
	(0.986)	(-1.236)	(-1.945)	(-0.034)
LogRevenue	-0.321	-0.001	-0.022	0.238*
	(1.607)	(-0.490)	(-0.406)	(1.909)
InstiOwn	0.602	0.004	0.146	0.106
	(1.465)	(0.874)	(1.532)	(0.452)
IndustryGiving	0.842**			
	(2.600)			
Constant	1.815	0.016	0.353	-2.590*
	(0.998)	(0.691)	(0.560)	(-1.944)
Observations	615	615	615	615
R-square	51.0%	59.0%	48.9%	71.3%
Year fixed effects	Yes	Yes	Yes	Yes
FF48 fixed effects	Yes	Yes	Yes	Yes
Underidentification test:				
Kleibergen-Paap rk LM stat.	5.29			
P-value	0.0215			

Table VI: Heckman Specification

This table examines the effects of direct giving on innovation with a Heckman two-step specification. All variables are defined as in Table II. We include year and Fama-French 48 industry fixed-effects. In the first stage (selection equation), we regress a dummy variable that equals one if direct giving is non-missing and zero if direct giving is missing on all control variables (except R&D) and the fixed effects considered in our baseline results shown in Table II Panel A. In the second stage, we regress innovation measures on direct giving, the inverse Mills ratio, and all other control variables used in Table II Panel A. T-statistics based on robust standard errors are provided in parentheses below the coefficient value. Our regression sample includes all year observations of firms that have ever reported direct giving or foundation giving. *, **, and *** denote significant differences from zero at the 10%, 5%, and 1% levels respectively.

	Counts	**Cites**	**Influence**
DirectGiving	0.002***	0.030***	0.058**
	(5.135)	(3.728)	(2.570)
RD	0.038*	-0.234	-1.354
	(1.736)	(-0.528)	(-1.139)
Advertising	-0.130***	-2.442***	-2.764
	(-3.034)	(-2.908)	(-1.249)
MarketToBook	-0.000	-0.030***	-0.004
	(-0.490)	(-2.648)	(-0.132)
Leverage	-0.001	-0.163	0.116
	(-0.165)	(-1.645)	(0.437)
LogRevenue	-0.013***	-0.212***	-0.070
	(-3.300)	(-2.617)	(-0.321)
InstiOwn	0.007**	0.221***	0.148
	(2.500)	(3.901)	(0.993)
Inverse Mills ratio	-0.018***	-0.263**	-0.496
	(-3.084)	(-2.147)	(-1.502)
Constant	0.147***	2.334***	0.792
	(3.319)	(2.618)	(0.332)
Observations (first-stage)	3,962	3,962	3,962
Observations (second-stage)	615	615	615
Pseudo R-square	36.4%	43.2%	66.7%

Table VII: Direct Giving and Innovation – Conditional on Information Asymmetries

This table examines the effects of information asymmetries on the relation between direct giving and innovation. We measure information asymmetries using analyst dispersion, which is defined as the standard deviation divided by the mean of forecasts of earnings per share (EPS) made in three months before the announcement of actual annual EPS. All other variables are defined as in Table II. We include year and Fama-French 48 industry fixed-effects. All sample firms are required to have non-zero direct giving. T-statistics based on robust firm-clustered standard errors are provided in parentheses below the coefficient value. *, **, and *** denote significant differences from zero at the 10%, 5%, and 1% levels respectively.

	Counts	**Cites**	**Influence**
DirectGiving	0.002***	0.023**	0.051**
	(2.929)	(2.584)	(2.505)
Disp_Med_3	-0.005	-0.055	0.060
	(-1.289)	(-0.623)	(0.140)
DirectGiving	0.018***	0.433***	0.041
x Disp_Med_3	(3.448)	(3.083)	(0.097)
RD	0.051	-0.069	-1.219
	(1.093)	(-0.074)	(-0.656)
Advertising	-0.032	-1.070**	-0.675
	(-0.997)	(-2.067)	(-0.485)
MarketToBook	-0.001	-0.034**	-0.002
	(-0.783)	(-2.054)	(-0.047)
Leverage	-0.007	-0.269*	0.090
	(-1.182)	(-1.957)	(0.297)
LogRevenue	-0.002	-0.049	0.241*
	(-0.842)	(-0.728)	(1.941)
InstiOwn	0.006	0.194*	0.091
	(1.076)	(1.810)	(0.378)
Constant	0.025	0.565	-2.655*
	(0.941)	(0.752)	(-1.928)
Observations	602	602	602
R-square	62.1%	56.2%	72.6%
Year fixed effects	Yes	Yes	Yes
FF48 fixed effects	Yes	Yes	Yes

Table VIII: Direct Giving and Innovation – Conditional on Innovation Competition

This table examines the effects of innovation concentration on the relation between direct giving and innovation. Innovation concentration is measured by the Herfindahl Index based on the distribution of patents filed by all firms in the same industry in the same year, and is a reverse indicator of innovation competition. All other variables are defined as in Table II. We include year and Fama-French 48 industry fixed-effects. All sample firms are required to have non-zero direct giving. T-statistics based on robust firm-clustered standard errors are provided in parentheses below the coefficient value. *, **, and *** denote significant differences from zero at the 10%, 5%, and 1% levels respectively.

	Counts	**Cites**	**Influence**
DirectGiving	0.003***	0.035***	0.102**
	(7.860)	(3.657)	(2.259)
Herfindahl	0.001	0.054	0.229
	(0.319)	(0.423)	(0.769)
DirectGiving	-0.003***	-0.064***	-0.158
x Herfindahl	(-2.913)	(-3.103)	(-1.662)
RD	0.076**	0.846	-0.360
	(2.079)	(0.933)	(-0.143)
Advertising	-0.002	-1.517**	-0.764
	(-0.079)	(-2.143)	(-0.505)
MarketToBook	-0.001	-0.028	-0.056
	(-1.068)	(-1.250)	(-0.957)
Leverage	-0.019**	-0.434**	-0.188
	(-2.245)	(-2.401)	(-0.497)
LogRevenue	-0.004	-0.143	0.119
	(-1.258)	(-1.364)	(0.705)
InstiOwn	-0.002	0.140	0.028
	(-0.369)	(1.038)	(0.100)
Constant	0.048	1.470	-1.112
	(1.398)	(1.320)	(-0.678)
Observations	384	384	384
R-square	69.6%	61.3%	70.6%
Year fixed effects	Yes	Yes	Yes
FF48 fixed effects	Yes	Yes	Yes

Table IX: Effects of Industry Interaction Terms

This table examines the effects of direct giving on innovation with a focus on which industries the effects are most prevalent. All variables and regression specifications are defined as in Table II. Fama-French 12 industry groups (excluding financials and utilities) are used for the interaction terms. We include year and Fama-French 12 industry fixed-effects. The following explanatory variables are used in this table's regressions, but are not displayed for conciseness: RD, Advertising, MarketToBook, Leverage, LogRevenue, and InstiOwn. All sample firms are required to have non-zero direct giving. T-statistics based on robust firm-clustered standard errors are provided in parentheses below the coefficient value. *, **, and *** denote significant differences from zero at the 10%, 5%, and 1% levels respectively.

	Counts	**Cites**	**Influence**
DirectGiving × ConsumerNonDurables	0.001	0.052	0.258
	(0.343)	(0.661)	(0.772)
DirectGiving × ConsumerDurables	-0.044	-0.274	1.533
	(-1.013)	(-0.526)	(1.335)
DirectGiving × Manufacturing	0.007	0.021	-0.143
	(0.619)	(0.165)	(-0.725)
DirectGiving × OilGasCoal	-0.000	-0.098	0.830
	(-0.005)	(-1.223)	(1.402)
DirectGiving × Chemicals	-0.003	0.023	-0.371
	(-0.493)	(0.316)	(-1.178)
DirectGiving × BusEquipment	0.007***	0.190***	0.106
	(3.296)	(3.909)	(1.440)
DirectGiving × Phone	-0.001	-0.069	-0.085
	(-0.418)	(-0.869)	(-0.471)
DirectGiving × WholesaleRetail	-0.004	-0.086	-0.421
	(-1.151)	(-1.227)	(-1.243)
DirectGiving × HealthcareMedEqDrugs	0.003***	0.044***	0.079***
	(6.847)	(5.598)	(4.068)
DirectGiving × Other	-0.001	-0.009	-0.022
	(-1.293)	(-0.622)	(-0.504)
Constant	0.017	0.384	-0.583
	(1.038)	(1.030)	(-0.810)
Observations	615	615	615
R-squared	54.1%	50.8%	70.0%
Year fixed effects	Yes	Yes	Yes
FF12 fixed effects	Yes	Yes	Yes

Table X: Effects of Corporate Philanthropy on Collaborative Innovation and Originality

This table examines the effects of direct giving and foundation giving on innovation. The dependent variables are CollabInnov (the number of patents filed that are subsequently approved and cite patents owned by universities, research institutions, governments or hospitals, scaled by sales) and Originality based on the distribution of cited patents' technology class. Originality is multiplied by 10. The independent variables are: DirectGiving (the disclosed level of direct giving by the firm scaled by sales and multiplied by 1,000), FoundationGiving (the level of giving by corporate sponsored foundations scaled by sales and multiplied by 1,000), RD (Research & Development expenditure scaled by sales), Advertising (advertising expenditure scaled by sales), MarketToBook (the market value of assets divided by the book value of assets), Leverage (using the market value of the firm), LogRevenue (the log of sales), and InstiOwn (the percentage of institutional ownership. We include year and Fama-French 48 industry fixed-effects. All sample firms are required to have non-zero direct giving. Panels A and B study the effects of direct giving and Panels C and D study the effects of giving by corporate-sponsored foundations. The dependent variables in Panels A and C (B and D) are for collaborative innovation and originality in the following year (following three years). T-statistics based on robust firm-clustered standard errors are provided in parentheses below the coefficient value. *, **, and *** denote significant differences from zero at the 10%, 5%, and 1% levels respectively.

	Panel A: Following year's innovation		**Panel B: Cumulative three-year innovation**	
	CollabInnov	**Originality**	**$CollabInnov_{[t+1,t+3]}$**	**$Originality_{[t+1,t+3]}$**
DirectGiving	0.002***	0.003**	0.005***	0.014**
	(2.778)	(1.999)	(2.901)	(2.570)
RD	0.016	0.282*	0.035	0.595
	(1.066)	(1.858)	(0.747)	(1.267)
Advertising	-0.027	-0.051	-0.116*	-0.213
	(-1.654)	(-0.506)	(-1.697)	(-0.702)
MarketToBook	0.000	-0.002	0.000	-0.005
	(0.357)	(-0.816)	(0.260)	(-0.530)
Leverage	-0.000	-0.028	-0.002	-0.077
	(-0.073)	(-1.365)	(-0.266)	(-1.208)
LogRevenue	0.000	-0.007	0.001	-0.018
	(0.214)	(-0.934)	(0.263)	(-0.782)
InstiOwn	0.002	0.011	0.008	0.052
	(0.863)	(0.789)	(1.208)	(1.151)
Constant	0.002	0.100	0.007	0.298
	(0.216)	(1.376)	(0.307)	(1.312)
Observations	615	615	615	615
R-square	52.5%	58.9%	57.7%	61.7%
Year fixed effects	Yes	Yes	Yes	Yes
FF48 fixed effects	Yes	Yes	Yes	Yes

	Panel C: Following year's innovation		Panel D: Cumulative three-year innovation	
	Collab Innov	**Originality**	**Collab Innov$_{[t+1,t+3]}$**	**Originality$_{[t+1,t+3]}$**
FoundationGiving	0.000	-0.001	0.001	0.001
	(1.099)	(-0.502)	(0.935)	(0.070)
RD	0.039	0.344**	0.111	0.832*
	(1.590)	(2.366)	(1.360)	(1.788)
Advertising	-0.046*	-0.090	-0.176*	-0.387
	(-1.720)	(-0.974)	(-1.707)	(-1.316)
MarketToBook	0.000	-0.001	0.001	-0.002
	(0.866)	(-0.546)	(0.744)	(-0.246)
Leverage	0.001	-0.025	0.003	-0.063
	(0.449)	(-1.237)	(0.303)	(-1.000)
LogRevenue	-0.000	-0.008	-0.001	-0.022
	(-0.264)	(-1.161)	(-0.254)	(-0.995)
InstiOwn	0.003	0.013	0.011	0.061
	(1.195)	(0.942)	(1.447)	(1.358)
Constant	0.004	0.113	0.017	0.336
	(0.618)	(1.572)	(0.731)	(1.486)
Observations	615	615	615	615
R-square	45.3%	58.4%	50.1%	60.6%
Year fixed effects	Yes	Yes	Yes	Yes
FF48 fixed effects	Yes	Yes	Yes	Yes