

The Innovation Effects of Corporate Spinoffs

Wenjin Feng*

Linfeng Tian[†]

Jingxuan Zhang[‡]

August 18, 2026

Abstract

We examine how changes in firm boundaries affect corporate innovation using the setting of corporate spinoffs. We find that innovation output increases significantly following corporate spinoffs, with the gains concentrated among spun-off firms rather than parent firms. Comparing completed spinoffs with announced but subsequently withdrawn spinoffs, we provide a causal interpretation of the effect of spinoffs on innovation. Further, we document that changes in firm boundaries are accompanied by a systematic reallocation of innovation assets and innovative human capital across parent and spun-off firms, which is then reflected in the composition of subsequent innovation activities. Our findings provide new evidence that changes in firm boundaries affect innovation by changing how innovation resources are allocated across organizational boundaries, thereby reshaping the organization of innovation.

Keywords: Corporate spinoffs; Innovations; Corporate restructuring; Innovation productivity; Exploratory innovations

JEL classification: G34, O31, O32, L25

*Ph.D. Candidate in Finance, Department of Finance, Southwest Jiaotong University. Email: wenjin-feng@my.swjtu.edu.cn.

[†]Ph.D. Candidate in Finance, Department of Finance, Alberta School of Business, University of Alberta. Email: ltian1@ualberta.ca.

[‡]Corresponding Author and Assistant Professor of Finance, Department of Finance, Alberta School of Business, University of Alberta. Email: jingxuan.zhang@ualberta.ca.

1 Introduction

Firm boundaries play a central role in shaping how firms organize economic activities. By determining which activities are conducted within and across the firm and how resources, decision-making, and incentives are organized, firm boundaries influence firms' ability to create value (Coase (1937); Williamson (1985)). Corporate restructuring changes these organizational boundaries and has therefore been the subject of a large literature examining its implications for firm value, investment, productivity, and operating performance (e.g., John and Ofek (1995); Lang et al. (1995); Daley et al. (1997); Desai and Jain (1999); Maksimovic and Phillips (2001); Li (2013)). Despite this large literature, much less is known about how changes in firm boundaries reshape the organization of innovation activities.

Innovation activities are particularly susceptible to changes in firm boundaries, because successful innovation depends on firms' ability to coordinate technologies, specialized human capital, and long-term investment over extended periods of time. Changes in firm boundaries reshape how these resources are coordinated and deployed, potentially altering not only firms' innovation output, but also how innovative activities are organized within and across organizational boundaries.

In this paper, we examine how corporate spinoffs affect innovation, with a particular focus on how changes in firm boundaries reshape the organization of innovation activities. Corporate spinoffs provide a natural setting to examine this question. Unlike many other forms of corporate restructuring, spinoffs redefine firm boundaries by separating previously integrated business units into independent firms while preserving many technological linkages established before the spinoff. This feature makes corporate spinoffs particularly well-suited to studying how innovation activities respond to changes in firm boundaries in

a setting where the underlying technologies and businesses remain related.

The effect of corporate spinoffs on innovation is theoretically ambiguous, because corporate spinoffs give rise to two economic forces that may have opposite effects on innovation. On the one hand, corporate spinoffs may facilitate innovation by improving the allocation of innovation resources. Existing literature argues that diversified firms may suffer from inefficient internal capital allocation because of rent-seeking and bargaining among divisional managers. This results in resources being allocated away from divisions with better investment opportunities (e.g., [Rajan et al. \(2000\)](#); [Scharfstein and Stein \(2000\)](#)). In addition, conglomerates may face greater hierarchical frictions that impede information transmission and processing and resource allocation (e.g., [Williamson \(1967\)](#); [Aghion and Tirole \(1997\)](#); [Garicano \(2000\)](#); [Stein \(2002\)](#); [Liberti and Mian \(2008\)](#)). This effect is likely greater for information that is inherently “soft” (such as information on internal innovation), as it is mostly tacit, qualitative, and can sometimes be costly to verify ([Stein \(2002\)](#); [Liberti and Mian \(2008\)](#)). By separating business units into independent firms, corporate spinoffs may alleviate the above frictions and enable both the parent and the spun-off firm to allocate resources more closely to their own investment opportunities, thereby fostering innovation.

On the other hand, corporate spinoffs may hinder innovation. Organizational separation resulting from corporate spinoffs may make coordination across previously integrated activities more difficult. This reduces firms’ ability to exploit complementarities embedded in existing knowledge and capabilities (e.g., [Kogut and Zander \(1992\)](#)). In addition, corporate spinoffs may reduce organizational slack and internal resource sharing, which are important for supporting experimentation and long-term innovation investments (e.g., [Nohria and Gulati \(1996\)](#)). Finally, independent firms are likely to face stronger short-

term performance pressure from external capital markets, potentially discouraging R&D investments whose benefits are realized over relatively longer horizons (e.g., [Stein \(1989\)](#); [Bushee \(1998\)](#); [Graham et al. \(2005\)](#)). Therefore, the overall effect of corporate spinoffs on innovation is ultimately an empirical question that we take to the data.

To examine how corporate spinoffs affect innovation and reshape the organization of innovation activities, we construct a comprehensive dataset of corporate spinoffs by combining multiple data sources on corporate spinoffs, innovation, inventors, patent transfer, organizational structure, and firm characteristics. Specifically, we combine corporate spinoff transaction information from SDC Platinum with patent and inventor data from USPTO PatentsView, patent transfer information from the USPTO Patent Assignment Dataset, organizational structure information from BoardEx, and firm financial information from Compustat. This comprehensive dataset allows us to simultaneously track parent firms and spun-off firms before and after corporate spinoffs, together with the dynamics of their innovation activities, innovative human capital, and patent ownership. The richness of the data enables us not only to examine whether corporate spinoffs affect innovation, but also to study how innovation assets, innovative human capital, and subsequent innovation activities are reallocated and reorganized following changes in firm boundaries.

We begin by examining whether corporate spinoffs affect innovation. We find that, following corporate spinoffs, spun-off firms significantly increase their innovation output, whereas parent firms exhibit no change in their innovation. Further, we find that the innovation effects of corporate spinoffs are more pronounced among spun-off firms whose parent firms have greater organizational hierarchy and more investment opportunities prior to spinoffs. These results are consistent with the view that corporate spinoffs improve the allocation of innovation resources by alleviating hierarchical frictions and internal capital

market inefficiencies.

The baseline findings above indicate that corporate spinoffs are positively associated with innovation output of spun-off firms while leaving parent firms' innovation largely unchanged. However, these findings alone do not establish whether the differential innovation effects are driven by changes in firm boundaries or by the underlying factors that lead firms to undertake corporate spinoffs. To establish a causal interpretation of the baseline findings, we exploit corporate spinoffs that were announced but subsequently withdrawn as a counterfactual. Firms announcing both completed and withdrawn corporate spinoffs have intended to undertake the same organizational restructuring and are therefore likely to be at a similar stage of their corporate life cycle. However, only completed spinoff transactions result in actual changes in firm boundaries. In addition, because the withdrawn spinoffs in our control sample are carefully screened such that firms in this sample withdraw their announced spinoffs for reasons unrelated to innovation activities, assignment to the treatment group (completed spinoffs) or the control group (withdrawn spinoffs) can be viewed as plausibly exogenous with respect to the innovation outcomes we examine. This research design therefore allows us to isolate the innovation effects of changes in firm boundaries from firms' underlying incentives to undertake corporate spinoffs.

Our DiD analysis shows that, relative to firms withdrawing spinoffs, firms completing corporate spinoffs experience a significant increase in innovation output, with the increase driven primarily by spun-off firms rather than parent firms. These results are consistent with our baseline findings. Two additional findings further support a causal interpretation of our baseline effects. First, we find no evidence of differential pre-treatment trends between completed and withdrawn corporate spinoffs, while the increase in innovation takes place only after the completion of corporate spinoffs. Second, placebo tests that falsely assign

spinoff dates three to five years before the actual transaction yield insignificant effects of corporate spinoffs on innovation. Together, these findings support a causal interpretation that corporate spinoffs have a positive effect on spun-off firms' innovation output.

Having established that corporate spinoffs increase innovation, we next examine how innovation activities are reorganized following changes in firm boundaries. We first document a reallocation of innovation assets (i.e., patents): parent firms are more likely to transfer patents that are technologically further from their core operations to spun-off firms. Consistent with this reallocation, spun-off firms are more likely to build subsequent innovations on transferred patents following corporate spinoffs, whereas parent firms are more likely to build subsequent innovations on patents they have retained after spinoffs. The reallocation of innovation assets is further reflected in the composition of subsequent innovation conducted by spun-off firms and parent firms. At the firm level, we find that spun-off firms conduct more exploratory innovations following corporate spinoffs, while exploratory innovation activity at parent firms remains largely unchanged. Consistent with this change in innovation composition, exploratory inventors are more likely to move from parent firms to spun-off firms following corporate spinoffs. Further, relative to inventors who stay at parent firms, these moving inventors conduct more exploratory innovations following corporate spinoffs, both on the extensive and intensive margins. Taken together, these findings suggest that the innovation effects of corporate spinoffs extend well beyond an increase in innovation output and are accompanied by a broader reorganization of innovation assets, innovative human capital, and subsequent innovation activities across the new organizational boundaries.

Our paper contributes to two strands of the existing literature. First, we contribute to the literature on corporate restructuring, particularly the literature that examines the

economic consequences of corporate spinoffs. Previous research primarily documents the valuation, operating, and productivity effects of corporate spinoffs (e.g., [Miles and Rosenfeld \(1983\)](#); [Hite and Owers \(1983\)](#); [Schipper and Smith \(1983\)](#); [Daley et al. \(1997\)](#); [Desai and Jain \(1999\)](#); [Gertner et al. \(2002\)](#)) and attributes these gains to changes in information environment, organizational focus, managerial incentives, and investment efficiency (e.g., [Lang et al. \(1995\)](#); [Daley et al. \(1997\)](#); [Desai and Jain \(1999\)](#); [Krishnaswami and Subramaniam \(1999\)](#); [Maksimovic and Phillips \(2001\)](#); [Gertner et al. \(2002\)](#); [Li \(2013\)](#)). We extend this literature by documenting the innovation consequences of corporate spinoffs. More importantly, apart from documenting that corporate spinoffs increase innovation, we show that these effects are accompanied by a systematic reallocation of innovation assets, innovative human capital, and subsequent innovation activities across the parent and spun-off firms. Our findings suggest that the innovation consequences of corporate restructuring extend beyond changes in innovation output to the way innovation activities are reorganized across firm boundaries.

Second, we contribute to the literature examining how firm boundaries and organizational structure shape innovation. Existing studies show that changes in firm boundaries, such as mergers and acquisitions, as well as public listings, have important consequences for firms' innovation outcomes (e.g., [Fulghieri and Sevilir \(2011\)](#); [Bena and Li \(2014\)](#); [Seru \(2014\)](#); [Bernstein \(2015\)](#)). Our paper extends this literature by showing that changes in firm boundaries reshape not only firms' innovation outcomes, but also the reallocation of innovation resources and innovation activities across the newly created organizational boundaries. By exploiting the unique setting of corporate spinoffs, where firm boundaries are redefined by the *separation* of previously integrated business units while preserving many technological linkages established before the spinoff, we are able to provide new

evidence on how changes in firm boundaries reshape the organization of innovation activities, rather than their innovation outcomes alone. Our findings therefore complement the existing evidence on the innovation consequences of changes in firm boundaries by showing how innovation activities are reorganized following changes in firm boundaries.

The rest of the paper is organized as follows. Section 2 describes our data and sample selection procedures and presents the summary statistics of our sample. Section 3 analyzes the effect of spinoff on subsequent innovation output. Section 4 analyzes the different channels through which spinoffs influence innovation outcomes. Section 5 concludes.

2 Data and Sample Selection

2.1 Data on Corporate Spinoffs

The key challenge in constructing our sample is to accurately identify completed corporate spinoffs together with their corresponding parent firms and spun-off subsidiaries. We begin by obtaining the initial universe of potential corporate spinoffs between 1980 and 2020 from the Security Data Corporation (SDC) Platinum database, which records corporate restructuring transactions classified as spinoffs. Because the SDC provides broad coverage of corporate restructuring transactions, its transaction classifications occasionally include events that do not correspond to genuine corporate spinoffs. We therefore manually verify every candidate transaction to ensure the accuracy of our sample. This manual verification is necessary because accurately identifying genuine corporate spinoffs is particularly important for our empirical analysis that exploits changes in firm boundaries generated by these transactions.

The verification process relies on two independent information sources. First, we search

the Nexis Uni news database, which provides comprehensive coverage of corporate press releases, news wires, and major financial newspapers. Second, we conduct targeted Google searches to collect additional corporate announcements, regulatory filings, and news reports related to each transaction. A transaction is retained only if these independent sources jointly confirm that it involves the separation of a subsidiary from its parent firm through a corporate spinoff.

This manual verification procedure allows us to exclude transactions that are incorrectly classified as spinoffs in SDC or that represent other forms of corporate restructuring. Specifically, we exclude observations that are not genuine corporate spinoffs, as well as spinoffs that are not tax-free. We further remove spinoffs mandated by antitrust regulations, carve-outs, and employee stock ownership plan (ESOP) transactions. These exclusions are consistent with the existing literature (e.g., [Gertner et al. \(2002\)](#); [Chemmanur et al. \(2014\)](#)) and ensure that our final sample consists of voluntary and complete corporate spinoffs in which the parent firm relinquishes both ownership and managerial control of the subsidiary.

In addition to manually validating the transactions themselves, we also identify the corresponding parent firm and spun-off subsidiary for every corporate spinoff. When SDC does not provide sufficient information on the parent–subsidiary relationship, we supplement the missing information using Nexis Uni and Google searches. This process enables us to accurately link each corporate spinoff transaction to the corresponding parent firm and spun-off subsidiary, allowing us to merge the transaction data with accounting and innovation data in the subsequent analysis.

In addition to completed corporate spinoffs, we also collect withdrawn spinoff transactions from the SDC database. These transactions correspond to announced corporate

spinoffs that were subsequently withdrawn. Similar to completed spinoffs, we manually verify every withdrawn transaction using Nexis Uni and Google searches to confirm both the announced spinoff and its subsequent withdrawal. As we discuss later in Section 3.2, these withdrawn spinoffs form the basis of the counterfactual we use to identify the causal effect of corporate spinoffs on innovation.

2.2 Data on Corporate Innovation

To measure firms' innovation output, we use patent-based metrics, following the corporate innovation literature. We first obtain the extended list of public firms as well as the patents filed by them following Kogan et al. (2017) (hereafter "KPSS").¹ We then augment this dataset with the patent-level data from the U.S. Patent and Trademark Office (USPTO) PatentsView Database. This database provides detailed information on patent applications, patent grants, technology classifications of patents, inventors, and patent citations. Together, the resulting comprehensive dataset allows us to examine the innovation output of a firm during a given period, the type of innovation activities a firm conducts during a given period (i.e., whether a patent is exploratory, as we discuss in detail in Section 4.3), and the flow of inventors across firms.

Throughout the paper, we use patent application year, rather than patent grant year, to measure a firm's innovation output in a given year, consistent with the corporate innovation literature. This is because the application year more accurately reflects the timing of the underlying technology, whereas the grant year is affected by administrative delays in the patent examination process. However, when we use patent application year to measure

¹Specifically, we download the list from the website maintained by the authors. See <https://github.com/KPSS2017/Technological-Innovation-Resource-Allocation-and-Growth-Extended-Data>.

a firm’s innovation output, this introduces truncation bias that arises from the time lag between patent application and grant. Specifically, information about a given patent will appear in USPTO’s database once it is granted. However, on average, it takes approximately two years for a patent to be examined and successfully granted, if any. Therefore, toward the end of our sample period, many patent applications will mechanically not appear in the USPTO database because they may still be under examination. In other words, this truncation mechanically understates firms’ innovation output in the later years of the sample and may bias our empirical analyses. To address this issue, we follow the time- and technology-class adjustment procedures (see, for example, [Hall et al. \(2001\)](#), [Seru \(2014\)](#), and [Lerner and Seru \(2022\)](#)). Broadly speaking, we scale each patent by the mean number of patents filed in the corresponding application year and technology class before aggregating them to the firm-year level. We discuss in detail how we adjust the truncation bias in Appendix [B.1](#) of the Internet Appendix.

After combining the above datasets, we construct two primary measures of firms’ innovation output, *Num_Pat_3* and *Cite_Weight_Pat_3*, and use them as our baseline measures of innovation output. Specifically, *Num_Pat_3* measures the truncation-adjusted number of patents filed by firm *i* over the subsequent three years following a given year *t*. While this measure assigns equal weight to every patent filed by a firm, patents differ substantially in their technological and economic importance. To account for this, we also construct *Cite_Weight_Pat_3*, where we weight each patent by the number of forward citations it receives within three years after grant before aggregating patents to the firm-year level.

In addition to patent application data, we obtain patent assignment data from the USPTO Patent Assignment Dataset to track changes in patent ownership following corporate spin-offs. The USPTO Patent Assignment Dataset, compiled by the Office of the Chief Economist

of the USPTO, contains detailed information on more than 10 million patent transactions affecting patent ownership, including patent assignments, transfers associated with mergers and acquisitions, licensing agreements, and security interests.² For each transaction, the dataset records the assignor (i.e., seller), the assignee (i.e., buyer), the patents involved, the transaction type, and the execution date, among other information.³ A key advantage of this dataset is that it allows us to directly observe the transfer of innovation assets (e.g., patents) across firms. In our setting, we use these data to identify patent transfers between parent and spun-off firms following corporate spinoffs. Combining the patent assignment data with patent-level innovation data enables us not only to examine whether corporate spinoffs affect innovation output, but also to study how innovation assets are reallocated across the newly established firm boundaries after spinoffs.

2.3 Sample Construction

The final sample for our empirical analysis integrates data from multiple sources to construct a comprehensive firm-level dataset linking corporate spinoffs, innovation activities, organizational characteristics, and financial information. Specifically, we merge the corporate spinoff sample constructed from the SDC Platinum database with firm-level accounting information from Compustat, patent and inventor information from the USPTO PatentsView

²See [Graham et al. \(2018\)](#) for a detailed description of the dataset and existing studies (e.g., [Serrano \(2010\)](#); [Akcigit et al. \(2016\)](#); [Ma et al. \(2022\)](#); [Zhang \(2020\)](#); [Arora et al. \(2022\)](#)) for the use of this dataset.

³It should be noted that recording patent assignments with the USPTO is not mandatory. However, both patent statutes and federal regulations strongly encourage such recording because it protects buyers' legal ownership of the transferred patents. According to 35 U.S.C. (United States Code) 261, "... an interest that constitutes an assignment, grant, or conveyance shall be void as against any subsequent purchaser or mortgagee for valuable consideration, without notice, unless it is recorded in the Patent and Trademark Office within three months from its date or prior to the date of such subsequent purchase or mortgage...". Therefore, especially for buyers, they should have incentives to record such transactions at the USPTO to maintain their claims of ownership of corresponding patents, and the patent assignment data collected from the USPTO should thus have relatively good coverage of patent transfer incidence in the U.S.

database, patent assignment records from the USPTO Patent Assignment Dataset, and organizational hierarchy information from BoardEx. By integrating the above datasets, we are thus able to simultaneously observe firms’ innovation output, patent ownership, innovative human capital, organizational structure, and financial characteristics surrounding corporate spinoffs.

Following the existing literature, we restrict our final sample to U.S. non-financial firms and exclude firms with Standard Industrial Classification (SIC) codes between 6000 and 6799. The sample period spans from 1980 to 2020. In addition, we trim all continuous variables at the 1st and 99th percentiles to mitigate the influence of outliers. Table 1 reports the firm-level and patent-level summary statistics of key variables used in our empirical analysis.

3 The Effect of Spinoff on Firm Innovation Output

In this section, we examine whether corporate spinoffs affect firms’ subsequent innovation output.

3.1 Baseline Regression Analysis

We begin by first examining the association between corporate spinoffs and firm-level innovation output in the baseline. To this end, we estimate the following baseline specification:

$$y_{i,t} = \alpha_i + \alpha_t + \beta_1 Spin_{i,t} \text{ (or } Parent_{i,t}) + Controls_{i,t} + \epsilon_{i,t} \quad (1)$$

where $y_{i,t}$ measures firm i 's innovation output over the three years following year t . As discussed in Section 2.2, we use two measures of innovation output. The first, *Num_Pat_3*, measures the number of patents filed by firm i during the three years following year t . The second, *Cite_Weight_Pat_3*, measures the number of patents filed by firm i during the three years following year t , but here we weight each patent by the number of citations it receives within three years after grant. This is to account for the fact that patents differ in their technological and economic importance.

The main independent variables of interest in our baseline specification (1) are *Spin* and *Parent*. *Spin* is a dummy variable that equals one if firm i is the spun-off firm in a completed corporate spinoff in year t . It is equal to zero otherwise. *Parent* is a dummy variable that equals one if firm i is the parent firm in a completed corporate spinoff in year t . It is equal to zero otherwise. *Controls_{i,t}* includes firm-level controls that may be correlated with firms' spinoff decisions and also affect their innovation output at the same time. These controls include *Size*, *R&D*, *ROA*, *Leverage*, and *CAPEX*. All of these variables are measured in year t and are defined in Appendix A of the Internet Appendix. We include firm fixed effects to absorb any firm-specific unobservables. We include year or industry-by-year fixed effects alternatively to absorb any time-varying or industry-year-specific unobservables that may affect firms' innovation output. Robust standard errors are clustered at the firm level.

Table 2 reports the baseline regression results of the effect of corporate spinoffs on firms' subsequent innovation output. Columns (1) and (2) show that spun-off firms experience a significant increase in subsequent patenting activity following corporate spinoffs. The coefficient on *Spin* is positive and statistically significant at the 5% significance level across both specifications. The economic magnitude is also large: for example, in Column (1), the estimated effect of 0.600 corresponds to approximately 84% of the sample mean of

Num_Pat_3. This indicates that spun-off firms experience a substantial increase in their innovation output following corporate spinoffs. The estimated effect remains economically and statistically similar after we replace the year fixed effects with industry-by-year fixed effects in Column (2). This suggests that the results are not driven by common year shocks or industry-year changes in innovation activity.

By contrast, Columns (3) and (4) of Table 2 show that the coefficients on *Parent* is small in magnitude and statistically insignificant across specifications. The results in Columns (1) through (4) show that, while spun-off firms experience a substantial increase in subsequent innovation output, we find no evidence that parent firms exhibit a comparable change in their innovation output following corporate spinoffs. Overall, the results in Columns (1) through (4) of Table 2 suggest that the innovation gains associated with corporate spinoffs are primarily concentrated within the newly independent spun-off firms.

We next examine whether the above pattern is also reflected in the citation-weighted innovation output. Columns (5) through (8) of Table 2 show a similar pattern. The coefficients on *Spin* remain positive and statistically significant at the 1% significance level across specifications. In Column (5), the estimated effect of 0.026 translates into approximately 47% of the sample mean of *Cite_Weight_Pat_3*. The coefficient estimate on *Spin* remains nearly unchanged after we include industry-by-year fixed effects in Column (6). In contrast, the coefficients on *Parent* remain economically small and statistically insignificant in Columns (7) and (8). These findings indicate that the increase in innovation following corporate spinoffs extends to citation-weighted innovation output. Specifically, spun-off firms experience a significant increase in citation-weighted innovation output over the three years following corporate spinoffs, whereas parent firms exhibit no meaningful change.

Overall, our baseline evidence establishes that corporate spinoffs are followed by a significant increase in the subsequent innovation output of spun-off firms, whereas parent firms experience no corresponding change in innovation. This asymmetric effect is robust across both patent counts and citation-weighted innovation measures and suggests that the innovation gains associated with corporate spinoffs are primarily realized by the newly independent firms. An important remaining question is whether the positive association documented above reflects the causal effect of corporate spinoffs on innovation. We address this question in the next subsection.

3.2 Difference-in-Differences (DiD) Analysis

While our baseline analysis documents a strong positive association between corporate spinoffs and subsequent innovation output, it does not establish whether the observed increase in innovation output is caused by corporate spinoffs or by the underlying characteristics of firms that lead them to undertake spinoffs in the first place. For example, firms initiating corporate spinoffs may differ systematically from other firms in their life-cycle stage. To address this identification concern, we exploit a quasi-natural experiment based on completed versus withdrawn corporate spinoffs and estimate a difference-in-differences (DiD) model.⁴

The key idea underlying our identification strategy is that firms that announce a corporate spinoff but ultimately withdraw the transaction provide a natural counterfactual for firms that successfully complete a corporate spinoff. Because both groups initially intended

⁴Similar identification strategies have been employed in other settings. For example, [Seru \(2014\)](#) uses failed mergers to study the effect of conglomerate organizational form on innovation; [Bena and Li \(2014\)](#) use withdrawn bids to study the effect of mergers and acquisitions (M&As) on innovation; [Bernstein \(2015\)](#) exploits withdrawn IPOs to identify the innovation effects of firms' going public decision.

to undertake a corporate spinoff, they are likely to face similar organizational considerations and to be at a similar stage of their corporate life cycle prior to the spinoff announcement. Therefore, comparing completed with withdrawn corporate spinoffs allows us to isolate the effect of changes in firm boundaries from firms' underlying incentives to undertake corporate spinoffs.

To construct a credible control group, we manually verify every withdrawn corporate spinoff and only retain spinoff transactions that are withdrawn for reasons plausibly unrelated to firms' innovation activities. Specifically, we cross-check Nexis Uni and Google and conduct the following screening procedure. We first exclude spinoff deals that were withdrawn for reasons correlated with corresponding firms' innovation activities or R&D strategy.⁵ We then exclude spinoff transactions that were withdrawn for reasons reflecting strategic shifts or corporate restructurings. This is an intentionally conservative screening, since strategic shifts or corporate restructurings frequently involve R&D resource reallocation and thus may reflect changes in corresponding firms' innovation trajectory. In addition, we also remove withdrawals driven by improved subsidiary performance or operational turnarounds, as these outcomes may themselves be the result of innovation success of withdrawn firms. Finally, to be on the conservative side, we exclude a type of withdrawal where the reasons for the withdrawal are ambiguous.⁶ By contrast, in the final control sample, we retain spinoffs that are withdrawn for reasons plausibly orthogonal to the firm's innovation choices: macroeconomic and capital market disruptions, hostile takeovers or third-party acquisitions of the parent, and regulatory requirements. As a result, the remaining variation in whether an announced corporate spinoff is ultimately completed is

⁵These include cases where withdrawal was driven by R&D interdependencies between business units, patent cross-licensing resolutions, drug pipeline reallocation, and technology portfolio refocusing.

⁶This includes cases where firms withdraw for financial distress reasons, for unfavorable market conditions combined with firms' decision of strategic shifts, for governance-based reasons such as shareholder rejections.

plausibly exogenous to firms' subsequent innovation outcomes, thereby providing an ideal control group for our DiD analysis.

We construct a seven-year event window spanning three years before and three years after the corporate spinoff announcement and estimate the following difference-in-differences specification:

$$y_{i,t} = \alpha_j + \alpha_t + \beta_1 Spinoff_i \times After_{i,t} + \beta_2 After_{i,t} + \epsilon_{i,t} \quad (2)$$

where the dependent variable $y_{i,t}$ measures firm i 's innovation output in year t . In our DiD analysis, we use two measures of innovation output as the dependent variable, *Num_Pat_Comb* and *Cite_Pat_Comb*. For firms that complete corporate spinoffs, these variables measure the *combined* innovation output of the parent and spun-off firms. Specifically, *Num_Pat_Comb* (*Cite_Pat_Comb*) is constructed as the sum of the (citation-weighted) innovation output of the parent and spun-off firms. We choose to use combined innovation output because a completed corporate spinoff transforms one firm into two independent firms. In other words, measuring innovation at only the parent or the spun-off firm would not capture the organization's total innovation output following the transaction. By doing this, we ensure that the overall innovation generated by the organization is measured consistently before and after the corporate spinoff, despite the change in firm boundaries. For firms that withdraw corporate spinoffs, these measures capture the corresponding innovation output of the withdrawn firms. The key variable of interest is the interaction term $Spinoff \times After$, which captures the difference in innovation output between completed and withdrawn firms following corporate spinoffs. We include deal and year fixed effects to absorb time-invariant deal-specific heterogeneity and aggregate time trends. Standard

errors are clustered at the deal level.

Table 3 reports the difference-in-differences estimates. Columns (1) and (2) examine the effect of completed corporate spinoffs on combined innovation output. The coefficients on *Spinoff* $\times$ *After* are positive and statistically significant at the 1% significance level for both patent counts and citation-weighted innovation output. These results indicate that, following the announcement of spinoffs, firms that complete corporate spinoffs experience a larger increase in innovation output than firms that had announced but ultimately withdrew corporate spinoffs. The estimated effects are also economically large, corresponding to approximately 62% and 39% of the sample means of *Num_Pat_Comb* and *Cite_Pat_Comb*, respectively.

We next examine whether the increase in combined innovation output is driven primarily by the spun-off firms or the parent firms. We do this by decomposing the combined innovation output into innovation output of spun-off firms versus that of parent firms. Columns (3) and (4) compare the innovation output of spun-off firms with that of the corresponding withdrawn firms. The interaction term remains positive and statistically significant at the 1% significance level for both innovation measures, with the magnitude of the effect larger than in the case of combined innovation output. This suggests that newly independent firms experience a substantial increase in subsequent innovation following corporate spinoffs compared to withdrawn firms. Columns (5) and (6) perform the same analysis for parent firms. Although parent firms exhibit a modest increase in patent counts, we find no statistically significant increase in citation-weighted innovation output. Overall, these results suggest that the innovation gains associated with completed corporate spinoffs are driven primarily by the newly independent firms, consistent with the baseline evidence reported in Table 2.

A key identifying assumption underlying our DiD design is that completed and withdrawn corporate spinoffs would have exhibited parallel innovation trends in the absence of organizational separation. Specifically, the assumption requires that if the corporate spinoffs did not happen, the innovation output of successful spinoff firms and withdrawn firms should have followed similar trends. To test the parallel trend assumption, we estimate the following dynamic DiD model:

$$y_{it} = \alpha_j + \alpha_t + \sum_{t=-3, t \neq -1}^3 \beta_t \text{Spinoff}_i \times \text{Period}_t + \gamma_1 \text{After}_{it} + \epsilon_{it} \quad (3)$$

where we drop the year before the spinoff announcement to avoid collinearity. The results are presented in Figure 1. Prior to the announcements of corporate spinoffs, the estimates of β_t remain small and statistically insignificant. This pattern suggests that the innovation output between successful spinoff firms and withdrawn firms does not exhibit diverging trends. After the spinoff announcement, β_t becomes positive and statistically significant for both measures of innovation output. These results provide strong support for the parallel trends assumption and suggest that the divergence in innovation output occurs only after corporate spinoffs.

As an additional identification check, we conduct a series of falsification tests by assigning placebo announcement dates three, four, and five years before the actual corporate spinoff announcement and re-estimating our difference-in-differences specification. Table 4 reports the corresponding estimates. Across all placebo announcement dates, the interaction term $\text{Spinoff} \times \text{After}$ remains statistically indistinguishable from zero for both innovation measures. Further, the estimated coefficients display no systematic pattern across different placebo specifications. These findings provide no evidence that firms completing corporate

spinoffs were already on a different innovation trajectory prior to the actual announcement. In other words, if our findings were indeed driven by pre-existing differential trends or other persistent differences between successful spinoff firms and withdrawn firms, we would expect to observe significant treatment effects around these false announcement dates.

Taken together, the difference-in-differences estimates, the absence of differential pre-treatment trends, and the placebo tests provide consistent evidence that the increase in innovation following corporate spinoffs is unlikely to be driven by pre-existing differences between completed and withdrawn corporate spinoffs. Instead, the evidence supports a causal interpretation that changes in firms' boundaries resulting from completed corporate spinoffs increase subsequent corporate innovation.

4 Further Evidence on the Innovation Effects of Corporate Spinoffs

In the previous section, we establish that corporate spinoffs increase the subsequent innovation output of spun-off firms, and we provide evidence that this effect likely reflects the causal impact of changes in firm boundaries resulting from the organizational separation. In this section, we take a step further and move beyond documenting the average innovation effects of corporate spinoffs. Broadly speaking, we examine the economic forces underlying these effects and how innovation activities are reorganized following changes in firm boundaries. We first present cross-sectional evidence consistent with the view that corporate spinoffs improve innovation by alleviating hierarchical frictions and internal capital market distortions. We then directly examine how innovation assets, innovative human capital, and subsequent innovation activities are reallocated and reorganized across

the newly created organizational boundaries following corporate spinoffs.

4.1 Heterogeneity in the Innovation Effects of Corporate Spinoffs

The theoretical framework developed in Section 1 suggests that the innovation effects of corporate spinoffs should be heterogeneous based on the extent of the organizational frictions facing the firms. In particular, if corporate spinoffs facilitate innovation by reducing hierarchical frictions and alleviating distortions in internal capital allocation, the innovation gains should be more pronounced among firms where these frictions are expected to be more costly/binding. We examine these predictions using two sources of cross-sectional variation: ex ante organizational hierarchy and ex ante investment opportunities.

We first examine whether the innovation effects of corporate spinoffs are stronger among firms with more complex organizational hierarchies before the spinoffs. As discussed in Section 1, innovation activities often rely on soft information that is difficult to summarize, verify, and transmit across multiple organizational layers (Stein (2002); Liberti and Mian (2008)). As organizational hierarchies become more complex, innovation-related information is more likely to be delayed or distorted as it moves through the organization, reducing the efficiency of resource allocation and decision-making (Garicano (2000); Stein (2002)). By separating business units into independent firms, corporate spinoffs reduce these hierarchical frictions and allow innovation-related decisions to be made closer to the underlying projects. As a result, we would expect to find that the innovation gains from corporate spinoffs should be larger among firms with more complex ex ante organizational hierarchies.

Measuring organizational hierarchy directly is challenging because comprehensive employer-employee datasets typically do not contain information on employees' hierarchical

positions within the firm (Ewens and Giroud (2025)). We therefore construct a firm-level measure of managerial hierarchy using BoardEx, which provides detailed information on executives’ employment histories, job titles, and job descriptions.⁷ We classify executives into eight managerial layers and measure organizational hierarchy as the number of distinct managerial layers observed within a firm-year.⁸ We define *High Hierarchy* as an indicator equal to one if a firm’s managerial hierarchy in year $t-1$ is above the sample median.

Table 5 reports the corresponding results. Across specifications, the coefficients on the interaction term $Spin \times High\ Hierarchy$ are positive and statistically significant at the 5% significance level for both patent counts and citation-weighted innovation output. These results indicate that the innovation gains associated with corporate spinoffs are substantially larger among spun-off firms whose parent firms have more complex organizational hierarchies. By contrast, the corresponding interaction term for parent firms is consistently statistically insignificant. Together, these findings are consistent with the view that corporate spinoffs generate larger innovation gains when they alleviate more severe hierarchical frictions.

While the previous cross-sectional analysis focuses on organizational frictions arising from less efficient information processing and decision-making induced by hierarchy, the theoretical framework we develop in Section 1 also suggests that corporate spinoffs may enhance innovation by alleviating distortions in internal capital allocation. Prior studies argue that diversified firms may allocate capital inefficiently across business units because

⁷We start constructing the managerial hierarchy by excluding supervisory executives and members of the board of directors, since we want to focus on operational management rather than governance. We then classify executives’ hierarchical positions based on their job titles and job descriptions. When these sources do not allow for a clear classification, we use a zero-shot text classification approach, combined with manual checking, to resolve the remaining ambiguous cases.

⁸The eight managerial layers include chief executive officer (CEO), C-suite members (CFO, COO and etc.), vice president, director or senior director, group managers, division managers, plant managers, and an uncategorized category.

of internal bargaining and agency conflicts, causing resources to be diverted away from divisions with stronger investment opportunities (Rajan et al. (2000); Scharfstein and Stein (2000)). Such distortions are likely to be particularly costly for innovation activities, which typically require substantial investment and involve long development horizons and uncertain payoffs. By separating business units into independent firms, corporate spinoffs allow investment decisions to be made independently and more closely aligned with each firm's own growth opportunities. Further, the costs of these distortions are likely to increase with firms' investment opportunities. When firms have more valuable growth opportunities, inefficiently allocating capital away from high-return innovation projects entails a greater opportunity cost. As a result, we would expect to find that innovation gains should be larger among firms with stronger ex ante investment opportunities. We next examine this conjecture.

We measure firms' ex ante investment opportunities using Tobin's Q, a standard proxy for firms' growth opportunities in the corporate finance literature. We define *More_Invest_Opp* as an indicator equal to one if a firm's Tobin's Q in year $t-1$ is above the sample median.

Table 6 reports the results. Across different specifications, the coefficients on the interaction term $Spin \times More_Invest_Opp$ are positive and statistically significant at the 5% significance level for both patent counts and citation-weighted innovation output. These results suggest that the innovation gains associated with corporate spinoffs are larger among spun-off firms whose parent firms have stronger ex ante investment opportunities. By contrast, the corresponding interaction term for parent firms is consistently statistically insignificant. Together, these findings are consistent with the view that the innovation benefits of corporate spinoffs are greater when improvements in internal capital allocation are expected to generate larger economic benefits.

Taken together, the evidence in Tables 5 and 6 is consistent with the two economic forces discussed in Section 1. The innovation gains associated with corporate spinoffs are larger when organizational separation alleviates more severe hierarchical frictions and when improvements in internal capital allocation are expected to generate greater benefits. We next take a step further and directly examine how corporate spinoffs reshape the allocation of innovation assets across the newly established organizational boundaries.

4.2 Reallocation of Innovation Assets Following Spinoffs

The evidence in the previous subsection shows that the innovation gains associated with corporate spinoffs are larger when organizational separation alleviates more severe organizational frictions. In this subsection, we directly examine how innovation assets are reorganized following changes in firm boundaries.

Patents are among the most important innovation assets of technology firms, and their allocation determines not only the ownership of existing technologies but also the technological foundation on which future innovation is built. If corporate spinoffs reorganize innovation activities across newly established organizational boundaries, we should observe a systematic reallocation of patent ownership from parent firms to their spun-off firms.

To examine whether innovation assets are systematically reallocated following corporate spinoffs, we construct an indicator variable, *Patent_Transfer*, which equals one if at least one patent is transferred from a parent firm to its spun-off firm within three years following the corporate spinoff. It is equal to zero otherwise. We compare actual parent-spinoff pairs with matched counterfactual firm pairs constructed using propensity-score matching based

on firms' observable characteristics.⁹

Table 7 reports the results from conditional logit regressions. We use conditional logit models here to account for the matching (Bena and Li (2014); Cunningham et al. (2021)). In addition, we include cohort fixed effects so that we are comparing all the firm pairs within the same cohort. Across all specifications, the coefficients on *Actual Spinoff Pair* are positive and statistically significant at the 1% significance level. These results suggest that the actual parent-spinoff pairs are substantially more likely to engage in patent transfers than matched comparable firm pairs. The results remain robust after we control for the innovation characteristics of both parent firms and spun-off firms (as well as their matched firms). These findings provide direct evidence that corporate spinoffs are accompanied by a systematic reallocation of innovation assets across newly established organizational boundaries.

Having established that innovation assets are systematically reallocated following corporate spinoffs, we next examine which types of innovation assets are more likely to be reallocated. If corporate spinoffs reorganize innovation activities by allowing parent firms and spun-off firms to specialize around different technological opportunities, patents that are technologically less relevant for the parent firm's existing knowledge base should be more likely to be transferred to the spun-off firm.

We examine this prediction at the patent level, and Table 8 presents the corresponding results. The dependent variable, *I(Spun Patent)*, is a dummy variable that equals one

⁹Specifically, to construct matched control groups, for each actual parent or spinoff firm, we select five matched control firms in the same industry and year that have the closest propensity score calculated based on *Size*, *R&D*, *ROA*, *Leverage*, and *CAPEX*. To find control firms in the same industry, for each treated firm, we first search for control firms within the same four-digit SIC industry. If fewer than five matches are found, the industry definition is gradually broadened to the three-digit, two-digit, and one-digit SIC levels. After matching every actual parent or spinoff firm with five control firms, we form all pairwise combinations of firm pairs. We then stack these pairwise combinations into a cohort for a given parent-spinoff pair and stack all the cohorts to be used in our analysis.

if a patent is transferred from the parent firm to the spun-off firm within three years following the corporate spinoff. It is equal to zero otherwise. Our key independent variable, *Tech_Dist*, measures the technological distance between a focal patent and the owning firm's existing patent portfolio. Following [Akçigit et al. \(2016\)](#), this measure is constructed based on citation patterns across technology classes and captures how far a patent is from the firm's existing knowledge space. A larger value of *Tech_Dist* indicates that the patent is technologically further from the firm's existing patent portfolio. We discuss the details of the construction in Section [B.2](#) of the Internet Appendix.

Across all specifications of Table [8](#), the coefficients on *Tech_Dist* are positive and statistically significant. These results indicate that patents technologically further from the parent firm's existing knowledge base are more likely to be transferred to spun-off firms following corporate spinoffs. The results remain robust after we control for a rich set of patent characteristics and alternative fixed effects: in Columns (1) and (2), we control for firm fixed effects to absorb any firm-specific unobservables; in Columns (3) and (4), we control for firm-by-filing-year fixed effects so that we are comparing patents filed by the same firm in the same year; in addition, we control for technology-class-by-filing-year fixed effects throughout to account for the technological trends over time. Together with the patent transfer results in Table [7](#), these findings provide direct evidence that the innovation assets that are less relevant to the parent firm's existing knowledge base are more likely to be reallocated to spun-off firms following corporate spinoffs.

A remaining question is whether these reallocated innovation assets become the technological foundation for subsequent innovation within the spun-off firm. If transferred patents are effectively integrated into the spun-off firm's innovation activities, subsequent innovations should build more heavily on these patents than should innovations developed

by the parent firm. We therefore examine both the extensive and intensive margins of subsequent innovation building on transferred patents.

Table 9 reports the results associated with this conjecture. In Panel A, *Cited_by_Spin* (*Cited_by_Parent*) is an indicator variable that equals one if patent i is cited by at least one subsequent patent filed by the spun-off firm (parent firm), respectively. The key independent variable, *Transferred_Pat*, is a dummy variable. It equals one if patent i is transferred from the parent firm to the spun-off firm. It equals zero if patent i is retained by the parent firm. In Panel B, *Num_Cite_Spin* (*Num_Cite_Parent*) measures the number of subsequent patents filed by the spun-off firm (parent firm) that cite patent i . On the other hand, *Frac_Cited_by_Spin* measures the fraction of patents filed by the spinoff firm, among all patents filed by the spinoff and the parent firm over the same period, that cite patent i . All specifications include spinoff-deal fixed effects and the patent-level controls used in Table 8.

Overall, the results in Table 9 provide strong evidence that transferred patents become the technological foundation for subsequent innovation within spun-off firms, while parent firms build more on patents retained by them during the spinoffs. Panel A shows that transferred patents are significantly more likely to be cited by subsequent patents of the spun-off firm and significantly less likely to be cited by subsequent patents of the parent firm (or equivalently, patents retained by parent firms are more likely to be cited by subsequent patents of the parent firm). Panel B shows a similar pattern along the intensive margin: transferred patents receive more follow-on citations from the spun-off firm and fewer from the parent firm; further, a significantly larger fraction of their subsequent citations comes from the spun-off firm's innovation activities. Taken together, these findings indicate that transferred patents do not merely change ownership following corporate spinoffs. Rather, they become the technological foundation upon which subsequent innovation is built within

the spun-off firm, while parent firms continue to build on the patents they retain.

4.3 Reallocation of Innovative Human Capital and Innovation Activities Following Spinoffs

Having shown that corporate spinoffs reorganize the allocation of innovation assets, we next examine whether they also reorganize innovative human capital and subsequent innovation activities. Innovation depends not only on technological assets but also on the inventors who create, combine, and develop new technologies. Consequently, if corporate spinoffs reshape the organization of innovation following changes in firm boundaries, we should expect innovative human capital to be reallocated across the newly established organizational boundaries. We further examine whether such reallocation is accompanied by changes in the composition of firms' subsequent innovation activities.

In this subsection, we focus on exploratory innovation, because it is expected to be particularly susceptible to changes in firm boundaries. Relative to exploitative innovation, exploratory innovation requires firms to combine knowledge beyond their existing technological expertise and is therefore more likely to be affected by the reallocation of innovation assets and innovative human capital following corporate spinoffs. Conceptually, exploratory innovation provides a particularly useful setting for examining whether changes in firm boundaries reshape the organization of innovation activities. Following [Benner and Tushman \(2002\)](#) and [Gao et al. \(2018\)](#), we classify a patent as exploratory if 80% or more of its citations are based on new knowledge outside of the owning firm's existing expertise, where the firm's existing expertise is represented by the firm's existing patents and the citations made by these patents.

We begin by examining whether inventors who engage more in exploratory innovation

prior to the spinoff are more likely to move from parent firms to spun-off firms following corporate spinoffs. The dependent variable, *Mover_Parent_Spin*, equals one if an inventor moves from the parent firm to the spun-off firm within three years following the corporate spinoff announcement. It is equal to zero for inventors who stay at the parent firm during the same period. We measure the prior exploratory innovation of an inventor in two ways: *Explore_Inventor* is a dummy variable that equals one if an inventor produces at least one exploratory patent during the five years preceding the spinoff announcement, while *Inventor_Num_Explore* measures the number of exploratory patents she produces within the same period.

Table 10 reports the results. Across specifications, both measures of the prior exploratory innovation of an inventor are positively and significantly associated with the probability of her moving from the parent firm to the spun-off firm. This effect is robust to the inclusion of deal fixed effects (so that we are comparing inventors within the same deal) and/or inventor technology class fixed effects (so that we are comparing inventors who work in the same technology spaces). These findings indicate that the reallocation of innovative human capital following corporate spinoffs is concentrated among inventors with greater prior exploratory innovation.

A natural question is whether the reallocation of innovative human capital is accompanied by changes in inventors' subsequent innovation activities. Organizational separation may provide inventors with greater autonomy, clearer incentives, and improved access to resources that are better aligned with the technological opportunities of the newly established firm. We therefore examine whether inventors who move to spun-off firms become more engaged in exploratory innovation following corporate spinoffs.

Using a difference-in-differences framework, we compare the difference in exploratory

innovation conducted by inventors who move to the spun-off firm versus by inventors who remain at the parent firm. *Explore Pat* is an indicator that equals one if an inventor produces at least one exploratory patent in a given year, while *Num Explore Pat* measures the number of exploratory patents she produces during the year. *Mover* equals one for inventors who move to the spun-off firm. It equals zero for inventors who stay in the parent firm. *Post* equals one for observations within three years following the corporate spinoff announcement.

Table 11 reports the corresponding results. Across specifications, the interaction term $Mover \times Post$ is positive and statistically significant for both measures of exploratory innovation. Relative to inventors who remain at the parent firm, inventors who move to spun-off firms become significantly more likely to engage in exploratory innovation and also conduct more exploratory innovation following corporate spinoffs. These findings suggest that organizational separation not only reallocates innovative human capital across firm boundaries but also reshapes the subsequent innovation behavior of the inventors who move.

Finally, we examine whether the reallocation of innovative human capital documented above is reflected in firms' subsequent innovation activities. If exploratory inventors are disproportionately reallocated to spun-off firms and become more engaged in exploratory innovation following organizational separation, spun-off firms should experience a corresponding increase in exploratory innovation at the firm level.

Table 12 reports the firm-level results. Across specifications, the coefficients on *Spin* are positive and statistically significant at the 5% significance level for both the number of exploratory patents and citation-weighted number of exploratory patents. By contrast, we find little evidence that parent firms experience comparable changes following corporate

spinoffs. Overall, these findings indicate that the increase in innovation following corporate spinoffs is accompanied not only by greater innovation output, but also by a shift in the composition of innovation toward more exploratory activities among spun-off firms.

Taken together, the evidence in Tables 10, 11, and 12 shows that corporate spinoffs reorganize not only innovation assets but also innovative human capital and subsequent innovation activities. Inventors who are more engaged in exploratory innovation prior to the spinoffs are more likely to move to spun-off firms. Further, these moving inventors subsequently become more engaged in exploratory innovation, and these changes are reflected in a corresponding increase in exploratory innovation at the firm level. Together with the earlier results on the reallocation of patents, these findings provide new evidence that changes in firm boundaries affect innovation through the reallocation of both innovation assets and innovative human capital across newly defined organizational boundaries.

5 Conclusion

This paper examines how changes in firm boundaries affect corporate innovation using the setting of corporate spinoffs. Corporate spinoffs provide a particularly useful setting for examining this question because they separate previously integrated business units into independent firms while preserving many technological linkages established before the separation. This unique setting allows us to examine not only whether changes in firm boundaries affect innovation, but also how innovation resources and subsequent innovation activities are reorganized following organizational separation.

Using a comprehensive dataset that combines information on corporate spinoffs, patents, patent transfers, inventors, organizational hierarchy, and firm characteristics, we document

three main findings. First, corporate spinoffs significantly increase innovation output at spun-off firms, while parent firms experience little change in innovation following the spinoffs. Second, the innovation gains associated with corporate spinoffs are more pronounced among firms with greater organizational hierarchy and more investment opportunities before the spinoff, consistent with the view that corporate spinoffs alleviate hierarchical frictions and improve the allocation of innovation resources. Third, we show that changes in firm boundaries are accompanied by a systematic reallocation of both innovation assets and innovative human capital across parent and spun-off firms. Patents that are technologically more distant from the parent firm's existing knowledge base are more likely to be transferred to the spun-off firm. In addition, exploratory inventors are more likely to move from the parent firms to the spun-off firms, and these changes are reflected in the composition of subsequent innovation activities conducted by the spun-off firms.

Taken together, our findings suggest that the innovation consequences of changes in firm boundaries extend well beyond changes in innovation output. Rather than simply affecting how much firms innovate, changes in firm boundaries reshape how innovation resources are reorganized across newly established organizational boundaries: our results show that corporate spinoffs reshape the allocation of both innovation assets and innovative human capital across organizational boundaries, and these changes are accompanied by systematic changes in subsequent innovation activities. More broadly, our findings highlight the importance of firm boundaries in shaping corporate innovation and suggest that the organization of innovation is an important channel through which changes in firm boundaries influence firms' innovation performance.

References

- Aghion, P. and J. Tirole (1997). Formal and real authority in organizations. *Journal of Political Economy* 105(1), 1–29.
- Akcigit, U., M. A. Celik, and J. Greenwood (2016). Buy, keep, or sell: Economic growth and the market for ideas. *Econometrica* 84(3), 943–984.
- Arora, A., S. Belenzon, and J. Suh (2022). Science and the market for technology. *Management Science* 68(10), 7176–7201.
- Bena, J. and K. Li (2014). Corporate innovations and mergers and acquisitions. *The Journal of Finance* 69(5), 1923–1960.
- Benner, M. J. and M. Tushman (2002). Process management and technological innovation: A longitudinal study of the photography and paint industries. *Administrative Science Quarterly* 47(4), 676–707.
- Bernstein, S. (2015). Does going public affect innovation? *The Journal of Finance* 70(4), 1365–1403.
- Bushee, B. J. (1998). The influence of institutional investors on myopic R&D investment behavior. *Accounting review*, 305–333.
- Chemmanur, T. J., K. Krishnan, and D. K. Nandy (2014). The effects of corporate spin-offs on productivity. *Journal of Corporate Finance* 27, 72–98.
- Coase, R. H. (1937). The nature of the firm. *Economica* 4(16), 386–405.

- Cunningham, C., F. Ederer, and S. Ma (2021). Killer acquisitions. *Journal of Political Economy* 129(3), 649–702.
- Daley, L., V. Mehrotra, and R. Sivakumar (1997). Corporate focus and value creation evidence from spinoffs. *Journal of Financial Economics* 45(2), 257–281.
- Desai, H. and P. C. Jain (1999). Firm performance and focus: long-run stock market performance following spinoffs. *Journal of Financial Economics* 54(1), 75–101.
- Ewens, M. and X. Giroud (2025). Corporate hierarchy. Working Paper 34162, National Bureau of Economic Research.
- Fulghieri, P. and M. Sevilir (2011). Mergers, spinoffs, and employee incentives. *The Review of Financial Studies* 24(7), 2207–2241.
- Gao, H., P.-H. Hsu, and K. Li (2018). Innovation strategy of private firms. *Journal of Financial and Quantitative Analysis* 53(1), 1–32.
- Garicano, L. (2000). Hierarchies and the organization of knowledge in production. *Journal of Political Economy* 108(5), 874–904.
- Gertner, R., E. Powers, and D. Scharfstein (2002). Learning about internal capital markets from corporate spin-offs. *The Journal of Finance* 57(6), 2479–2506.
- Graham, J. R., C. R. Harvey, and S. Rajgopal (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics* 40(1-3), 3–73.
- Graham, S. J. H., A. C. Marco, and A. F. Myers (2018). Patent transactions in the marketplace: Lessons from the uspto patent assignment dataset. *Journal of Economics & Management Strategy* 27(3), 343–371.

- Hall, B. H., A. B. Jaffe, and M. Trajtenberg (2001). The nber patent citation data file: Lessons, insights and methodological tools.
- Hite, G. L. and J. E. Owers (1983). Security price reactions around corporate spin-off announcements. *Journal of Financial Economics* 12(4), 409–436.
- John, K. and E. Ofek (1995). Asset sales and increase in focus. *Journal of Financial Economics* 37(1), 105–126.
- Kogan, L., D. Papanikolaou, A. Seru, and N. Stoffman (2017). Technological innovation, resource allocation, and growth. *The Quarterly Journal of Economics* 132(2), 665–712.
- Kogut, B. and U. Zander (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science* 3(3), 383–397.
- Krishnaswami, S. and V. Subramaniam (1999). Information asymmetry, valuation, and the corporate spin-off decision. *Journal of Financial Economics* 53(1), 73–112.
- Lang, L., A. Poulsen, and R. Stulz (1995). Asset sales, firm performance, and the agency costs of managerial discretion. *Journal of Financial Economics* 37(1), 3–37.
- Lerner, J. and A. Seru (2022). The use and misuse of patent data: Issues for finance and beyond. *The Review of Financial Studies* 35(6), 2667–2704.
- Li, X. (2013). Productivity, restructuring, and the gains from takeovers. *Journal of Financial Economics* 109(1), 250–271.
- Liberti, J. M. and A. R. Mian (2008). Estimating the effect of hierarchies on information use. *The Review of Financial Studies* 22(10), 4057–4090.

- Ma, S., J. T. Tong, and W. Wang (2022). Bankrupt innovative firms. *Management Science* 68(9), 6971–6992.
- Maksimovic, V. and G. Phillips (2001). The market for corporate assets: Who engages in mergers and asset sales and are there efficiency gains? *The Journal of Finance* 56(6), 2019–2065.
- Miles, J. A. and J. D. Rosenfeld (1983). The effect of voluntary spin-off announcements on shareholder wealth. *The Journal of Finance* 38(5), 1597–1606.
- Nohria, N. and R. Gulati (1996). Is slack good or bad for innovation? *Academy of Management Journal* 39(5), 1245–1264.
- Rajan, R., H. Servaes, and L. Zingales (2000). The cost of diversity: The diversification discount and inefficient investment. *The Journal of Finance* 55(1), 35–80.
- Scharfstein, D. S. and J. C. Stein (2000). The dark side of internal capital markets: Divisional rent-seeking and inefficient investment. *The Journal of Finance* 55(6), 2537–2564.
- Schipper, K. and A. Smith (1983). Effects of recontracting on shareholder wealth: The case of voluntary spin-offs. *Journal of Financial Economics* 12(4), 437–467.
- Serrano, C. J. (2010). The dynamics of the transfer and renewal of patents. *The RAND Journal of Economics* 41(4), 686–708.
- Seru, A. (2014). Firm boundaries matter: Evidence from conglomerates and R&D activity. *Journal of Financial Economics* 111(2), 381–405.
- Stein, J. C. (1989). Efficient capital markets, inefficient firms: A model of myopic corporate behavior. *The Quarterly Journal of Economics* 104(4), 655–669.

- Stein, J. C. (2002). Information production and capital allocation: Decentralized versus hierarchical firms. *The Journal of Finance* 57(5), 1891–1921.
- Williamson, O. E. (1967). Hierarchical control and optimum firm size. *Journal of Political Economy* 75(2), 123–138.
- Williamson, O. E. (1985). *The Economic Institutions of Capitalism*. New York: The Free Press.
- Zhang, J. (2020). Realizing the value of innovation through the secondary market for patents: Evidence from patent sales. Available at SSRN.

Table 1: Summary Statistics

This table reports the summary statistics of the main variables used in this paper. *Num_Pat_3* is the number of patents filed by firm *i* over the three years following year *t*. *Cite_Weight_Pat_3* is the number of patents filed by firm *i* over the three years following year *t*, where each patent is weighted by the number of citations it receives within three years after grant. *Num_Explore_Pat_3* is the number of exploratory patents filed by firm *i* over the three years following year *t*. *Cite_Weight_Explore_Pat_3* is the number of exploratory patents filed by firm *i* over the three years following year *t*, where each patent is weighted by the number of citations it receives within three years after grant. *Spinoff* is a dummy variable that equals one if firm *i* is the spinoff firm in a corporate spinoff taking place in year *t* and equals zero otherwise. *Parent* is a dummy variable that equals one if firm *i* is the parent firm in a corporate spinoff taking place in year *t* and equals zero otherwise. Firm-level control variables *Size*, *R&D*, *ROA*, *Leverage*, and *CAPEX* are defined as in Appendix A. *I(Spun Patent)* is an indicator equal to one if patent *i*, filed by firm *j* in year *t*, is transferred from the parent firm to the spinoff firm in a spinoff deal. It is equal to zero otherwise. *Tech_Dist* is the technological distance between patent *i* filed in year *t* and the patent portfolio of owner firm *j*. Patent-level control variables *Forward_Cite*, *Claims*, *Pat_Scope*, *Backward_Cite*, and *Litigation* are defined as in Appendix A.

Variables	Mean	Median	Std. Dev.	Num. of Obs.
	(1)	(2)	(3)	(4)
Panel A: Firm-level Variables				
Num_Pat_3	0.715	0	3.402	386,715
Cite_Weight_Pat_3	0.055	0	0.135	386,715
Num_Explore_Pat_3	0.145	0	0.651	386,715
Cite_Weight_Explore_Pat_3	0.149	0	0.675	386,715
Spinoff	0.001	0	0.033	390,621
Parent	0.001	0	0.035	390,621
Size	4.548	4.465	2.579	361,444
R&D	0.106	0.033	0.198	181,474
ROA	-0.055	0.094	0.587	358,502
Leverage	0.291	0.229	0.357	364,012
CAPEX	0.065	0.042	0.074	358,675
Panel B: Patent-level Variables				
I(Spun Patent)	0.001	0	0.038	1,700,552
Tech_Dist	0.607	0.676	0.282	1,666,542
Forward_Cite	0.000	0.000	0.001	1,683,556
Claims	16.315	16	9.630	1,684,208
Pat_Scope	1.811	1	1.040	1,691,024
Backward_Cite	11.651	7	17.270	1,683,637
Litigation	0.004	0	0.064	1,700,552

Table 2: Spinoffs and Innovation Output: Baseline Results

This table reports the results on the effect of spinoffs on the innovation output of both parent firms and spinoff firms. The dependent variables are *Num_Pat_3* and *Cite_Weight_Pat_3*. *Num_Pat_3* is the number of patents filed by firm *i* over the three years following year *t*. *Cite_Weight_Pat_3* is the number of patents filed by firm *i* over the three years following year *t*, where each patent is weighted by the number of citations it receives within three years after grant. The main independent variables of interest are *Spin* and *Parent*. *Spin* is a dummy variable that equals one if firm *i* is the spinoff firm in a corporate spinoff taking place in year *t* and equals zero otherwise. *Parent* is a dummy variable that equals one if firm *i* is the parent firm in a corporate spinoff taking place in year *t* and equals zero otherwise. Firm-level control variables include *Size*, *R&D*, *ROA*, *Leverage*, and *CAPEX*, all of which are defined the same as in Appendix A and are measured in year *t*. Industry-by-year, year, and firm fixed effects are included in different specifications. Robust standard errors are clustered at the firm level and are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively.

	Num_Pat_3				Cite_Weight_Pat_3			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Spin	0.600** (0.273)	0.548** (0.274)			0.026*** (0.008)	0.025*** (0.008)		
Parent			0.013 (0.454)	0.015 (0.455)			-0.002 (0.008)	-0.003 (0.008)
Size	0.555*** (0.037)	0.545*** (0.040)	0.555*** (0.037)	0.545*** (0.040)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)
R&D	0.625*** (0.076)	0.580*** (0.082)	0.625*** (0.076)	0.579*** (0.082)	0.019*** (0.004)	0.018*** (0.004)	0.019*** (0.004)	0.018*** (0.004)
ROA	-0.179*** (0.029)	-0.175*** (0.030)	-0.179*** (0.029)	-0.175*** (0.030)	0.000 (0.001)	0.001 (0.001)	0.000 (0.001)	0.001 (0.001)
Leverage	0.023 (0.035)	0.012 (0.036)	0.023 (0.035)	0.012 (0.036)	-0.008*** (0.002)	-0.009*** (0.002)	-0.008*** (0.002)	-0.009*** (0.002)
CAPEX	0.353* (0.188)	0.548*** (0.188)	0.354* (0.188)	0.549*** (0.188)	0.032*** (0.008)	0.047*** (0.008)	0.032*** (0.008)	0.047*** (0.008)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No	Yes	No
Industry $\times$ Year FE	No	Yes	No	Yes	No	Yes	No	Yes
Num. of Obs.	168,501	168,271	168,501	168,271	168,511	168,283	168,511	168,283
Adj. R^2	0.620	0.627	0.620	0.627	0.631	0.641	0.631	0.641

Table 3: Spinoffs and Innovation Output: Difference-in-Differences (DiD) Analysis

This table reports the results from the difference-in-differences (DiD) analysis of the effect of spinoffs on firms' innovation output, where we compare the innovation output of firms that successfully conduct spinoffs with that of firms that had announced spinoffs but withdrew them later before and after the announcement of spinoffs. For firms that successfully complete spinoffs, *Num_Pat_Comb* is the combined number of patents filed by parent firm *i* and spinoff firm *j* in year *t*. *Cite_Pat_Comb* is the combined number of patents filed by parent firm *i* and spinoff firm *j* in year *t*, where each patent is weighted by the number of citations it receives within three years after grant. For firms that withdraw spinoffs, these dependent variables capture the number of patents and the citation-weighted number of patents filed by withdrawn firm *k* in year *t*. *Num_Pat* is the number of patents filed by spinoff firm *j* (Column (3)) or parent firm *i* (Column (5)) in year *t*. *Cite_Pat* is the number of patents filed by spinoff firm *j* (Column (4)) or parent firm *i* (Column (6)) in year *t*, where each patent is weighted by the number of citations it receives within three years after grant. For firms that withdraw spinoffs, these dependent variables capture the number of patents and citation-weighted number of patents filed by withdrawn firm *k* in year *t*. *Spinoff* is a dummy variable that equals one if a firm successfully completes a spinoff. It equals zero if a firm had announced a spinoff but withdrew it later. *After* is a dummy variable that equals one for the three years after the announcement of a spinoff. It equals zero for the three years prior to the announcement of a spinoff. Spinoff deal and year fixed effects are included. Robust standard errors are clustered at the deal level and are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively.

	Combined (Parent & Spinoff) Firms vs. Withdrawn Firms		Spinoff Firms vs. Withdrawn Firms		Parent Firms vs. Withdrawn Firms	
	Num_Pat_Comb	Cite_Pat_Comb	Num_Pat	Cite_Pat	Num_Pat	Cite_Pat
	(1)	(2)	(3)	(4)	(5)	(6)
Spinoff $\times$ After	1.163*** (0.396)	0.018*** (0.005)	1.340*** (0.351)	0.028*** (0.004)	0.777** (0.346)	0.005 (0.004)
After	-0.829*** (0.304)	-0.009** (0.004)	-0.861*** (0.275)	-0.013*** (0.003)	-0.668** (0.282)	-0.004 (0.004)
Deal FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Num. of Obs.	2,869	2,870	2,870	2,870	2,870	2,869
Adj. R^2	0.834	0.621	0.695	0.521	0.836	0.648

Table 4: Difference-in-Differences (DiD) Analysis of Spinoffs and Innovation Output:
Falsification Tests

This table reports the results from falsification tests for the difference-in-differences (DiD) analysis of the effect of spinoffs on firms' innovation output, where we falsely assume that spinoff announcements occur three, four, or five years before they actually do. For firms that successfully complete spinoffs, *Num_Pat_Comb* is the combined number of patents filed by parent firm *i* and spinoff firm *j* in year *t*. *Cite_Pat_Comb* is the combined number of patents filed by parent firm *i* and spinoff firm *j* in year *t*, where each patent is weighted by the number of citations it receives within three years after grant. For firms that withdraw spinoffs, these dependent variables capture the number of patents and citation-weighted number of patents filed by withdrawn firm *k* in year *t*. *Spinoff* is a dummy variable that equals one if a firm successfully completes a spinoff. It equals zero if a firm had announced a spinoff but withdrew it later. *After* is a dummy variable that equals one for the three years after the announcement of a spinoff. It equals zero for the three years prior to the announcement of a spinoff. Spinoff deal and year fixed effects are included. Robust standard errors are clustered at the deal level and are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively.

	False Announcements 3 Years Before the Actual Ones		False Announcements 4 Years Before the Actual Ones		False Announcements 5 Years Before the Actual Ones	
	Num_Pat_Comb	Cite_Pat_Comb	Num_Pat_Comb	Cite_Pat_Comb	Num_Pat_Comb	Cite_Pat_Comb
	(1)	(2)	(3)	(4)	(5)	(6)
Spinoff × After	0.159 (0.328)	0.003 (0.004)	-0.419 (0.310)	-0.005 (0.004)	-0.249 (0.276)	-0.006 (0.004)
After	-0.226 (0.274)	-0.005 (0.004)	0.232 (0.258)	0.005* (0.003)	0.030 (0.219)	0.005 (0.003)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Deal FE	Yes	Yes	Yes	Yes	Yes	Yes
Num. of Obs.	2,870	2,869	2,869	2,868	2,870	2,870
Adj. R^2	0.861	0.704	0.922	0.744	0.936	0.754

Table 5: Heterogeneous Innovation Effects of Corporate Spinoffs: Hierarchy

This table reports the results on the heterogeneous effects of spinoffs on firms' innovation output based on firms' ex-ante hierarchy level. The dependent variables are *Num_Pat_3* and *Cite_Weight_Pat_3*. *Num_Pat_3* is the number of patents filed by firm *i* over the three years following year *t*. *Cite_Weight_Pat_3* is the number of patents filed by firm *i* over the three years following year *t*, where each patent is weighted by the number of citations it receives within three years after grant. The main independent variables of interest are *Spin*, *Parent*, and their interactions with *High_Hierarchy*. *Spin* is a dummy variable that equals one if firm *i* is the spinoff firm in a corporate spinoff taking place in year *t* and equals zero otherwise. *Parent* is a dummy variable that equals one if firm *i* is the parent firm in a corporate spinoff taking place in year *t* and equals zero otherwise. *High_Hierarchy* is a dummy variable that equals one if firm *i*'s number of hierarchical layers in year *t*−1 is above the sample median and equals zero otherwise. Firm-level control variables include *Size*, *R&D*, *ROA*, *Leverage*, and *CAPEX*, all of which are defined the same as in Appendix A and are measured in year *t*. Industry-by-year, year, and firm fixed effects are included in different specifications. Robust standard errors are clustered at the firm level and are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively.

	Num_Pat_3				Cite_Weight_Pat_3			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Spin × High.Hierarchy	1.760** (0.745)	1.840** (0.773)			0.058** (0.027)	0.056** (0.027)		
Spin	-0.010 (0.221)	-0.078 (0.256)			-0.010 (0.023)	-0.007 (0.023)		
Parent × High.Hierarchy			1.165 (0.801)	0.947 (0.814)			0.035 (0.021)	0.028 (0.021)
Parent			-0.709** (0.359)	-0.515 (0.350)			-0.027 (0.018)	-0.023 (0.018)
Size	0.890*** (0.079)	0.859*** (0.083)	0.890*** (0.079)	0.859*** (0.083)	0.012*** (0.002)	0.010*** (0.002)	0.012*** (0.002)	0.011*** (0.002)
R&D	1.050*** (0.172)	1.001*** (0.184)	1.050*** (0.172)	1.002*** (0.184)	0.026*** (0.007)	0.022*** (0.007)	0.026*** (0.007)	0.022*** (0.007)
ROA	-0.258*** (0.071)	-0.233*** (0.072)	-0.258*** (0.071)	-0.233*** (0.072)	0.004* (0.002)	0.006** (0.002)	0.004* (0.002)	0.006** (0.002)
Leverage	0.002 (0.081)	0.010 (0.083)	-0.001 (0.081)	0.008 (0.083)	-0.007** (0.003)	-0.010*** (0.003)	-0.007** (0.003)	-0.010*** (0.003)
CAPEX	1.420*** (0.508)	2.090*** (0.515)	1.424*** (0.508)	2.095*** (0.516)	0.046*** (0.017)	0.081*** (0.016)	0.046*** (0.017)	0.081*** (0.016)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No	Yes	No
Industry × Year FE	No	Yes	No	Yes	No	Yes	No	Yes
Num. of Obs.	70,816	70,340	70,816	70,340	71,504	71,013	71,504	71,013
Adj. <i>R</i> ²	0.649	0.660	0.649	0.660	0.669	0.687	0.669	0.687

Table 6: Heterogeneous Innovation Effects of Corporate Spinoffs: Investment

This table reports the results on the heterogeneous effects of spinoffs on firms' innovation output based on their ex-ante investment opportunities. The dependent variables are *Num_Pat_3* and *Cite_Weight_Pat_3*. *Num_Pat_3* is the number of patents filed by firm *i* over the three years following year *t*. *Cite_Weight_Pat_3* is the number of patents filed by firm *i* over the three years following year *t*, where each patent is weighted by the number of citations it receives within three years after grant. The main independent variables of interest are *Spin*, *Parent*, and their interactions with *More_Invest_Opp*. *Spin* is a dummy variable that equals one if firm *i* is the spinoff firm in a corporate spinoff taking place in year *t* and equals zero otherwise. *Parent* is a dummy variable that equals one if firm *i* is the parent firm in a corporate spinoff taking place in year *t* and equals zero otherwise. *More_Invest_Opp* is a dummy variable that equals one if firm *i*'s Tobin's Q in year *t-1* is above the sample median and equals zero otherwise. Firm-level control variables include *Size*, *R&D*, *ROA*, *Leverage*, and *CAPEX*, all of which are defined the same as in Appendix A and are measured in year *t*. Industry-by-year, year, and firm fixed effects are included in different specifications. Robust standard errors are clustered at the firm level and are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively.

	Num_Pat_3				Cite_Weight_Pat_3			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Spin × More_Invest_Opp	1.434** (0.594)	1.485** (0.607)			0.047** (0.020)	0.047** (0.020)		
Spin	-0.253 (0.194)	-0.345 (0.230)			0.002 (0.013)	0.000 (0.014)		
Parent × More_Invest_Opp			-0.173 (0.914)	-0.151 (0.912)			0.007 (0.017)	0.006 (0.017)
Parent			0.082 (0.598)	0.072 (0.595)			-0.009 (0.013)	-0.011 (0.013)
Size	0.611*** (0.049)	0.611*** (0.052)	0.612*** (0.049)	0.612*** (0.052)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)
R&D	0.646*** (0.102)	0.594*** (0.110)	0.646*** (0.102)	0.594*** (0.110)	0.017*** (0.005)	0.016*** (0.005)	0.017*** (0.005)	0.016*** (0.005)
ROA	-0.191*** (0.039)	-0.197*** (0.040)	-0.191*** (0.039)	-0.197*** (0.040)	0.000 (0.001)	0.001 (0.001)	0.000 (0.001)	0.001 (0.001)
Leverage	0.027 (0.048)	0.001 (0.050)	0.026 (0.048)	0.000 (0.050)	-0.009*** (0.002)	-0.011*** (0.002)	-0.009*** (0.002)	-0.011*** (0.002)
CAPEX	0.488* (0.256)	0.767*** (0.260)	0.491* (0.256)	0.770*** (0.259)	0.036*** (0.010)	0.055*** (0.010)	0.036*** (0.010)	0.055*** (0.010)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No	Yes	No
Industry × Year FE	No	Yes	No	Yes	No	Yes	No	Yes
Num. of Obs.	132,450	132,176	132,450	132,176	132,641	132,375	132,641	132,375
Adj. R ²	0.639	0.646	0.639	0.646	0.644	0.655	0.644	0.655

Table 7: Corporate Spinoffs and Transfer of Patents from Parent to Spinoff Firms

This table reports the results of conditional logit regressions where we examine the effect of spinoffs on the subsequent transfer of patents from parent to spinoff firms. The dependent variable, *Patent_Transfer*, is a dummy variable that equals one if there is at least one transfer of patents from parent firm i (or its matched control firms) to spinoff firm j (or its matched control firms) within the three years after the announcement of a spinoff deal in year t . It is equal to zero otherwise. For each actual parent or spinoff firm, we select five matched control firms in the same industry and year that have the closest propensity score calculated based on *Size*, *R&D*, *ROA*, *Leverage*, and *CAPEX*. The details on how we form pairwise combinations and stack them into different cohorts are discussed in Section 4.2. The main independent variable of interest is *Actual_Spinoff_Pair*. It is a dummy variable that takes the value of one if a given firm pair is an actual pair between the corresponding parent firm and spinoff firm, and it is equal to zero for pseudo pairs. *Num_Pat_Parent* (*Num_Pat_Spin*) is the number of patents filed by parent firm i or its matched firms (spinoff firm j or its matched firms) in year t . *Cite_Weight_Pat_Parent* (*Cite_Weight_Pat_Spin*) is the number of patents filed by parent firm i or its matched firms (spinoff firm j or its matched firms) in year t , where each patent is weighted by the number of citations it receives within three years after grant. Other firm-level control variables include *Size*, *R&D*, *ROA*, *Leverage*, and *CAPEX* of both parent and spinoff firms (as well as their matched control firms), all of which are defined as in Appendix A and are measured in year t . Cohort fixed effects are included. Robust standard errors are clustered at the cohort level and are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively.

	Patent_Transfer			
	(1)	(2)	(3)	(4)
Actual_Spinoff_Pair	3.490*** (0.352)	3.294*** (0.433)	3.447*** (0.476)	3.478*** (0.432)
Num_Pat_Parent			0.019 (0.017)	
Num_Pat_Spin			0.112** (0.049)	
Cite_Weight_Pat_Parent				-3.839 (2.983)
Cite_Weight_Pat_Spin				5.747** (2.692)
Spinoff Firm Controls	No	Yes	Yes	Yes
Parent Firm Controls	No	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes
Num. of Obs.	1,085	924	905	914
Pseudo R^2	0.273	0.323	0.347	0.341

Table 8: The Technological Distance of Patents and the Probability of Patents Being Transferred in Corporate Spinoffs

This table reports the results of the effect of the technological distance of patents on the probability of them being transferred from parent to spinoff firms in the spinoffs. $I(\text{Spun Patent})$ is an indicator equal to one if patent i , filed by firm j in year t , is transferred from the parent firm to the spinoff firm over the three years following a spinoff. It is equal to zero otherwise. $Tech_Dist$ is the technological distance between patent i filed in year t and the patent portfolio of owner firm j . The methodology for constructing this variable is based on [Akçigit et al. \(2016\)](#) and is discussed in Section B.2 of the Internet Appendix. Patent-level control variables include *Forward_Cite*, *Claims*, *Pat_Scope*, *Backward_Cite*, and *Litigation*, all of which are defined as in Appendix A. Owner firm (or owner firm-by-filing year) and technology class-by-filing year fixed effects are included. Robust standard errors are clustered by technology class and are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively.

	I(Spun Patent)			
	(1)	(2)	(3)	(4)
Tech_Dist	0.002* (0.001)	0.002* (0.001)	0.001** (0.001)	0.001** (0.001)
Forward_Cite		-0.014 (0.056)		0.008 (0.055)
Claims		-0.000*** (0.000)		-0.000** (0.000)
Pat_Scope		-0.000*** (0.000)		-0.000* (0.000)
Backward_Cite		0.000 (0.000)		0.000 (0.000)
Litigation		0.005*** (0.002)		0.006*** (0.002)
Firm FE	Yes	Yes	No	No
Firm $\times$ Filing Year FE	No	No	Yes	Yes
Tech Class $\times$ Filing Year FE	Yes	Yes	Yes	Yes
Num. of Obs.	1,665,704	1,613,715	1,656,758	1,604,809
Adj. R^2	0.111	0.111	0.232	0.232

Table 9: Subsequent Innovation Building on Transferred and Retained Patents

This table reports the results of whether subsequent innovation conducted by parent and spinoff firms is built on transferred and retained patents. In Panel A, the dependent variable *Cited_by_Spin* (*Cited_by_Parent*) is an indicator equal to one if patent i is cited by at least one patent filed by the spinoff firm (the parent firm) over the three years following the announcement of a spinoff deal. In Panel B, the dependent variable *Num_Cite_Spin* (*Num_Cite_Parent*) is the number of patents filed by the spinoff firm (the parent firm) over the three years following the announcement of a spinoff deal that cite patent i . *Frac_Cited_by_Spin* is the fraction of patents filed by the spinoff firm, among all patents filed by the spinoff and the parent firm over the same period, that cite patent i . The main independent variable is *Transferred_Pat*, which is an indicator equal to one if patent i is transferred from the parent to the spinoff firm in a spinoff deal. It is equal to zero if a patent is retained by the parent firm. Patent-level controls include the same set of variables as in Table 8. Spinoff deal fixed effects are included in certain regressions. Robust standard errors are clustered by technology classes and are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively.

Panel A: Extensive Margin						
	Cited_by_Spin			Cited_by_Parent		
	(1)	(2)	(3)	(4)	(5)	(6)
Transferred_Pat	0.138*** (0.023)	0.124*** (0.020)	0.120*** (0.020)	-0.114*** (0.043)	-0.116*** (0.021)	-0.115*** (0.021)
Deal FE	No	Yes	Yes	No	Yes	Yes
Patent Controls	No	No	Yes	No	No	Yes
Num. of Obs.	23,901	23,901	22,983	23,901	23,901	22,983
Adj. R^2	0.058	0.100	0.098	0.005	0.139	0.150
Panel B: Intensity of Subsequent Innovation						
	Num_Cite_Spin		Num_Cite_Parent		Frac_Cited_by_Spin	
	(1)	(2)	(3)	(4)	(5)	(6)
Transferred_Pat	0.116*** (0.020)	0.114*** (0.021)	-0.565*** (0.143)	-0.572*** (0.147)	0.236*** (0.030)	0.236*** (0.029)
Deal FE	Yes	Yes	Yes	Yes	Yes	Yes
Patent Controls	No	Yes	No	Yes	No	Yes
Num. of Obs.	23,732	22,828	23,679	22,785	11,214	10,571
Adj. R^2	0.069	0.069	0.110	0.136	0.185	0.184

Table 10: The Reallocation of Exploratory Inventors Following Corporate Spinoffs

This table reports the results of the moves of exploratory inventors from parent to spinoff firms following corporate spinoffs. *Mover_Parent_Spin* is an indicator variable equal to one if inventor i moves from the parent firm to the spinoff firm within three years of a corporate spinoff deal. It equals zero for inventors who stay in the parent firm during this period. The main independent variables include *Explore_Inventor* and *Inventor_Num_Explore*. *Explore_Inventor* is an indicator variable equal to one if inventor i is defined as an exploratory inventor and equal to zero otherwise. We define an inventor to be exploratory if she files at least one exploratory patent over the last five years prior to the announcement year of a corporate spinoff. We define a patent to be exploratory the same as in Table 12. *Inventor_Num_Explore* is the number of exploratory patents filed by inventor i over the last five years before the announcement year of a corporate spinoff. We include two inventor-level controls, *Num_Pat* and *CPP*. *Num_Pat* is the number of patents filed by inventor i over the last five years prior to the announcement year of a corporate spinoff. *CPP* is the number of citations per patent for patents filed by inventor i over the last five years prior to the announcement year of a corporate spinoff. Corporate spinoff deal and inventor technology class fixed effects are included in different specifications. We define the technology class of an inventor as the one in which she files the most patents within the last five years. Standard errors are robust and are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively.

	Mover_Parent_Spin							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Explore_Inventor	0.015*** (0.003)	0.013*** (0.003)	0.005** (0.003)	0.006** (0.003)				
Inventor_Num_Explore					0.012*** (0.002)	0.013*** (0.002)	0.011*** (0.003)	0.011*** (0.003)
Num_Pat			0.061*** (0.012)	0.070*** (0.013)			0.010 (0.010)	0.018* (0.010)
CPP			0.776* (0.445)	0.405 (0.342)			0.838* (0.445)	0.460 (0.337)
Deal FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Inventor Tech Class FE	No	No	No	Yes	No	No	No	Yes
Num. of Obs.	7,044	7,044	6,834	6,824	6,979	6,979	6,795	6,785
Adj. R^2	0.003	0.086	0.101	0.106	0.010	0.085	0.088	0.092

Table 11: Exploratory Innovation by Reallocated Inventors Following Corporate Spinoffs

This table reports the DiD results of the exploratory innovation conducted by moving inventors following corporate spinoffs. The dependent variables include *Explore_Pat* and *Num_Explore_Pat*. *Explore_Pat* is an indicator variable equal to one if inventor i has filed at least one exploratory patent in a given year t , and it is equal to zero otherwise. *Num_Explore_Pat* is the number of exploratory patents inventor i has filed in a given year t . We define a patent to be exploratory the same as in Table 12. The main independent variable is the interaction term $Mover \times Post$. *Mover* is a dummy variable equal to one if inventor i moves from the parent firm to the spinoff firm in a corporate spinoff deal. It is equal to zero for inventors staying in the parent firm. *Post* is a dummy variable equal to one if an observation is within three years following the announcement of a spinoff deal. It is equal to zero if an observation is within three years prior to the announcement of a spinoff deal. *Num_Pat* is the number of patents filed by inventor i in year t . *CPP* is the number of citations per patent for patents filed by inventor i in year t . Spinoff deal or inventor fixed effects, as well as year fixed effects, are included in different regressions. Robust standard errors are clustered by inventors and are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively.

	Explore_Pat		Num_Explore_Pat		Explore_Pat		Num_Explore_Pat	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Mover \times Post$	0.143*** (0.035)	0.064*** (0.025)	0.128*** (0.043)	0.064* (0.033)	0.155*** (0.035)	0.081*** (0.025)	0.142*** (0.044)	0.084** (0.034)
<i>Mover</i>	0.209*** (0.026)	0.052*** (0.019)	0.226*** (0.033)	0.070*** (0.025)				
<i>Post</i>	-0.040*** (0.007)	-0.010* (0.005)	-0.035*** (0.008)	-0.004 (0.006)	-0.041*** (0.007)	-0.007 (0.005)	-0.038*** (0.008)	-0.001 (0.006)
<i>Num_Pat</i>		2.401*** (0.050)		2.939*** (0.069)		2.520*** (0.050)		3.085*** (0.069)
<i>CPP</i>		10.326*** (3.057)		2.966 (3.553)		12.668*** (3.076)		5.073 (3.544)
Deal FE	Yes	Yes	Yes	Yes	No	No	No	No
Inventor FE	No	No	No	No	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Num. of Obs.	57,281	56,235	57,050	56,145	57,281	56,231	57,049	56,140
Adj. R^2	0.077	0.421	0.064	0.423	0.108	0.442	0.093	0.449

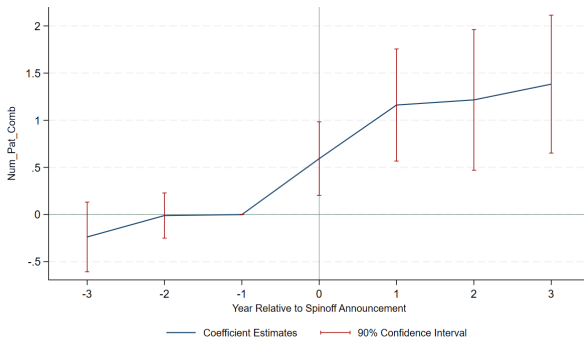
Table 12: Spinoff Firms' Exploratory Innovation Activity Following Spinoffs

This table reports the results of the effect of spinoffs on subsequent exploratory innovation activities of spinoff and parent firms. The dependent variables are *Num_Explore_Pat_3* and *Cite_Weight_Explore_Pat_3*. *Num_Explore_Pat_3* is the number of exploratory patents filed by firm *i* over the three years following year *t*. *Cite_Weight_Explore_Pat_3* is the number of exploratory patents filed by firm *i* over the three years following year *t*, where each patent is weighted by the number of citations it receives within three years after grant. We follow [Benner and Tushman \(2002\)](#) and [Gao et al. \(2018\)](#) and define a patent to be exploratory if 80% or more of its citations are based on new knowledge outside of the owning firm's existing expertise, where the firm's existing expertise is represented by the firm's existing patents and the citations made by these patents. The main independent variables of interest are *Spin* and *Parent*. *Spin* is a dummy variable that equals one if firm *i* is the spinoff firm in a corporate spinoff taking place in year *t* and equals zero otherwise. *Parent* is a dummy variable that equals one if firm *i* is the parent firm in a corporate spinoff taking place in year *t* and equals zero otherwise. Firm-level control variables include *Size*, *R&D*, *ROA*, *Leverage*, and *CAPEX*, all of which are defined as in Appendix A and are measured in year *t*. Industry-by-year, year, and firm fixed effects are included in different specifications. Robust standard errors are clustered at the firm level and are reported in parentheses. *, **, and *** denote the 10%, 5%, and 1% significance levels, respectively.

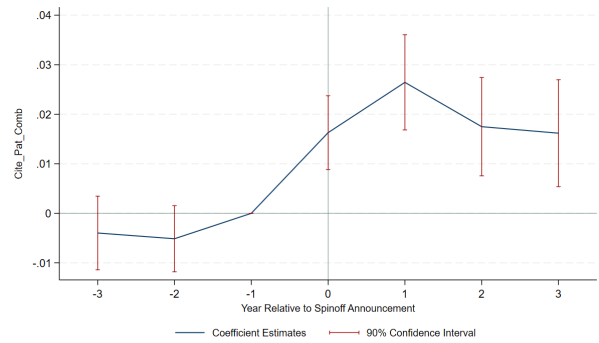
	Num_Explore_Pat_3				Cite_Weight_Explore_Pat_3			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Spin	0.185** (0.073)	0.173** (0.074)			0.149** (0.058)	0.136** (0.059)		
Parent			-0.028 (0.074)	-0.026 (0.074)			-0.107* (0.061)	-0.110* (0.060)
Size	0.060*** (0.006)	0.056*** (0.006)	0.060*** (0.006)	0.056*** (0.006)	0.080*** (0.007)	0.075*** (0.007)	0.080*** (0.007)	0.075*** (0.007)
R&D	0.073*** (0.013)	0.076*** (0.013)	0.073*** (0.013)	0.075*** (0.013)	0.084*** (0.015)	0.086*** (0.015)	0.084*** (0.015)	0.086*** (0.015)
ROA	-0.021*** (0.005)	-0.015*** (0.005)	-0.021*** (0.005)	-0.015*** (0.005)	-0.032*** (0.006)	-0.026*** (0.006)	-0.032*** (0.006)	-0.026*** (0.006)
Leverage	-0.004 (0.007)	-0.011 (0.007)	-0.004 (0.007)	-0.011 (0.007)	-0.004 (0.008)	-0.008 (0.008)	-0.004 (0.008)	-0.008 (0.008)
CAPEX	0.062 (0.039)	0.147*** (0.039)	0.062 (0.039)	0.147*** (0.039)	0.076** (0.038)	0.171*** (0.038)	0.076** (0.038)	0.171*** (0.038)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No	Yes	No
Industry × Year FE	No	Yes	No	Yes	No	Yes	No	Yes
Num. of Obs.	168,258	168,030	168,258	168,030	168,323	168,095	168,323	168,095
Adj. R^2	0.435	0.448	0.435	0.448	0.544	0.559	0.544	0.559

Figure 1: The Dynamic Effect of Spinoffs on Firms' Innovation Output

This figure shows the dynamic effect of spinoffs on firms' innovation output. The center points represent the point estimates of β_t and the vertical lines denote the 90% confidence intervals of β_t estimates in the regression specification (3). Panel A plots the coefficient dynamics where the dependent variable is *Num_Pat_Comb*. For firms that successfully complete spinoffs, it is the combined number of patents filed by parent and spinoff firms in year t . For firms that withdraw spinoffs, it is the number of patents filed by a firm in year t . Panel B plots the coefficient dynamics where the dependent variable is *Cite_Pat_Comb*. For firms that successfully complete spinoffs, it is the combined number of patents filed by parent and spinoff firms in year t , where each patent is weighted by the number of citations it receives within three years after grant. For firms that withdraw spinoffs, it is the citation-weighted number of patents filed by a firm in year t . *Spinoff* is a dummy variable equal to one if a firm successfully completes a spinoff, and it is equal to zero if a firm had announced a spinoff but withdrew it later. *Period_t* is a set of dummies denoting every year within a three-year window around the event year. The year before the announcement of spinoffs is dropped to avoid collinearity. Deal and year fixed effects are included. Robust standard errors are clustered at the deal level.



(a) Panel A: Dependent Variable:
Num_Pat_Comb



(b) Panel B: Dependent Variable:
Cite_Pat_Comb

Internet Appendix for

“The Innovation Effects of Corporate Spinoffs”

A Variable Definitions

This table shows the detailed constructions of all firm-level and patent-level control variables used across different specifications.

Panel A: Firm-level Control Variables	
Size	Natural logarithm of a firm's book assets (Compustat item: at) in a given year
R&D	The ratio of a firm's R&D expense (Compustat item: xrd) to its book assets (Compustat item: at) in a given year
ROA	The ratio of a firm's EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) (Compustat item: ebitda) to its book assets (Compustat item: at) in a given year
Leverage	The ratio of a firm's total debt (Compustat item: dlc+dltt) to its book assets (Compustat item: at) in a given year
CAPEX	The ratio of a firm's capital expenditure (Compustat item: capx) to its book assets (Compustat item: at) in a given year
Panel B: Patent-level Control Variables	
Forward_Cite	The number of (truncation-adjusted) forward citations received by a patent
Claims	The number of claims of a patent
Pat_Scope	The number of technology classes to which a patent belongs
Backward_Cite	The number of backward citations of a patent
Litigate	A dummy variable equal to one if a patent is ever litigated and equal to zero otherwise

B Construction of Key Variables

This section details the construction of several important variables used in our study. We first discuss how we construct different measures to capture a firm’s innovation output in Section B.1. We then discuss how we construct the patent-level technological distance of a patent to a firm’s patent portfolio in Section B.2.

B.1 Measures of Firms’ Innovation Productivity

Following the existing literature on corporate innovation, we use patent-based metrics to measure firm-level innovation output. Specifically, we use two measures alternatively, *Num_Pat_3* and *Cite_Weight_Pat_3*, to capture a firm’s innovation output over a given horizon. *Num_Pat_3* measures the truncation-adjusted number of patents filed by firm i over the subsequent three years following a given year t . In other words, *Num_Pat_3* assigns equal weight to every patent filed by a firm. However, patents differ substantially in their technological and economic importance. So, to account for this fact, we also construct *Cite_Weight_Pat_3*, where each patent is weighted by the number of forward citations it receives within three years after grant before aggregating patents to the firm-year level.

Throughout the paper, we use patent application year, rather than patent grant year, to measure a firm’s innovation output in a given year, consistent with the corporate innovation literature. This is because the application year more accurately reflects the timing of the underlying technology, whereas the grant year is affected by administrative delays in the patent examination process. However, when we use patent application year to measure a firm’s innovation output, this introduces truncation bias that arises from the time lag between patent application and grant. Specifically, information about a given patent will

appear in USPTO's database once it is granted. However, on average, it takes approximately two years for a patent to be examined and successfully granted, if any. Therefore, toward the end of our sample period, many patent applications will mechanically not appear in the USPTO database because they may still be under examination. In other words, this truncation mechanically understates firms' innovation output in the later years of the sample and may bias our empirical analyses. To address this issue, we adjust for truncation bias in patent counts following, for example, [Hall et al. \(2001\)](#), [Seru \(2014\)](#), and [Lerner and Seru \(2022\)](#). Specifically, for each technology-class-filing-year cohort, we first calculate the mean number of patents filed by firms in this cohort. Then, for every patent in a given cohort, we scale it by the number that we obtain in the last step. Finally, we aggregate this class-year adjusted measure to the firm-year level and construct *Num_Pat_3* and *Cite_Weight_Pat_3* accordingly. In addition, throughout the empirical analysis, we include year fixed effects, which, to some extent, account for the trend of innovation across different years.

B.2 Construction of Patents' Technological Distance

This patent-level measure is constructed following the methodology in [Akcigit et al. \(2016\)](#). Overall, the technological distance of a patent captures the extent of how close the patent is to the owning firm's knowledge space (as represented by the firm's existing patent portfolio).

The construction of this measure consists of two steps. The first step is to figure out how close one technology class is to another by examining the citation pattern of these two technology classes. The closeness between patent technology class X and Y can be

calculated using the following expression.

$$d(T_X, T_Y) \equiv 1 - \frac{\#(T_X \cap T_Y)}{\#(T_X \cup T_Y)} \quad (4)$$

The numerator $\#(T_X \cap T_Y)$ in the equation (4) represents the number of patents that cite patents in both technology class X and Y simultaneously, while the denominator $\#(T_X \cup T_Y)$ represents the number of patents that cite patents in either technology class X or Y. This symmetric measure is intuitive: among all the patents that cite patents in either technology class X or Y, if the number of patents that simultaneously cite patents in technology class X and Y is larger, then it indicates that technology class X and Y are more proximate in the knowledge space. This in turn leads to the distance measure $d(T_X, T_Y)$ in (4) closer to zero. Therefore, the closer this measure $d(T_X, T_Y)$ is to zero, the more proximate the technology class X is to technology class Y. Note that the distance between any technology class X and itself is exactly zero.

After we obtain the distance between every pair of technology classes, the technological distance between a patent p and the owning firm's existing patent portfolio, $d_t(p, P_f)$, can be calculated as follows.

$$d_t(p, P_f) \equiv \left[\frac{1}{\|P_f\|} \sum_{p' \in P_f} d(T_p, T_{p'})^t \right]^{\frac{1}{t}} \quad (5)$$

Specifically, to calculate the technological distance of the focal patent p from the owning firm's existing patent portfolio P_f (i.e., the portfolio of all the patents that had been invented before the focal patent p), we figure out the distance between the technology class of patent p and that of every other patent p' in the patent portfolio P_f . Next, we aggregate these individual technological distances into a single master variable according to equation (5).

Here, $\|P_f\|$ denotes the number of patents in the firm's patent portfolio, and ι is set to $2/3$ following the existing literature (but my results are robust to different values of ι , e.g., $\iota = 1/3$ or $\iota = 1$). The larger this measure, the further away the focal patent is from the owning firm's knowledge space (as represented by its existing patent portfolio).