Corporate Spinoffs and Capital Allocation Decisions[*]

Emilie R. Feldman
The Wharton School
University of Pennsylvania
feldmane@wharton.upenn.edu
+1-215-746-7676

Abstract

This paper investigates how spinoffs affect capital allocation decisions in diversified firms. The sensitivity of capital expenditures to investment opportunities, representing the efficiency of capital allocation decisions, improves when firms undertake spinoffs. The improvement in the efficiency of capital allocation decisions is most pronounced immediately following the completion of spinoffs (though it attenuates thereafter), and in companies that operate in a moderate (as opposed to a high or a low) number of businesses pre-spinoff. Together, these findings uncover a novel benefit that is associated with spinoffs, an improvement in the process by which managers allocate capital in the divesting firms. These results also suggest that an important theoretical mechanism that may be driving this improvement is that spinoffs enable managers to devote more attention to the capital allocation process within their remaining businesses.

Keywords: corporate spinoffs, capital allocation, divestitures, diversification, corporate strategy

Introduction

Amidst the significant amount of corporate development activity that is occurring in the economy today, spinoffs (a type of divestiture in which a "parent firm" distributes shares in one of its business units *pro-rata* to its shareholders, resulting in the creation of a "spinoff firm") represent an increasingly prominent strategic form. Extant research has produced a large volume of knowledge about the *external* implications of these deals, with numerous studies exploring the (largely positive) reactions they provoke in outside stakeholders like analysts and investors (Daley et al. 1997, Desai and Jain 1999, Zuckerman 2000, Gilson et al. 2001, Krishnaswami and Subramaniam 1999, Bergh et al. 2008, Feldman 2016).

With this being said, however, far less information is available from the existing literature about the implications that spinoffs have for the *internal* processes that operate within divesting parent firms. Given that spinoffs are highly complex transactions that often remove large shares of the divesting firms' operations (Gilson 2000, Feldman et al. 2014) and usually necessitate the reconfiguration of existing relationships between parent firms and their spun-off subsidiaries (Miles and Woolridge 1999, Semadeni and Cannella 2011), it seems likely that these deals will induce major changes in many of the divesting parent companies' internal processes. Chief among these is the capital allocation process, a central strategic function in which the managers of a diversified firm must decide how to divide a pool of financial resources among their business units based on the available investment opportunities (Scharfstein 1998, Ozbas and Scharfstein 2009), as well as various social and political considerations within their firms (Scharfstein and Stein 2000, Bardolet et al. 2010, Vierreger 2012, Arrfelt et al. 2013, Arrfelt et al. 2015). Because businesses can only pursue opportunities when they have the financial means to do so, the capital allocation process is a critical mechanism by which firm strategies are enacted.

Accordingly, this study seeks to address how spinoffs affect the capital allocation process in the parent firms that undertake these deals. To do this, I integrate insights from the literatures on spinoffs, internal capital markets, and managerial attention. I argue that spinoffs would be expected to improve the efficiency of capital allocation decisions (defined as the sensitivity of capital expenditures to investment opportunities) in parent firms, for two key reasons. First, these deals may remove businesses to which

2

parent firm managers were misallocating capital in the first place, enabling those individuals to reallocate capital to a set of businesses with stronger investment opportunities. Second, spinoffs may enable parent firm managers to devote more attention to their firms' remaining businesses, facilitating a deeper analysis of available investment opportunities and a better match between capital expenditures and those opportunities. I then conduct a series of empirical tests to isolate, as cleanly as possible, the release of managerial attention as an important theoretical mechanism that could be driving the predicted post-spinoff improvement in the efficiency of capital allocation decision-making.

The empirical work in this study is based on a proprietary panel dataset consisting of segment-level data from 196 companies that undertook 228 spinoffs between 1995 and 2010, as well as a propensity score matched set of comparable firms. I find that, relative to this control set, the efficiency of capital allocation improves among the parent firms that undertake these deals. This improvement is most pronounced immediately following the completion of spinoffs (but attenuates thereafter) and in parent firms that operate in a moderate (as opposed to a high or a low) number of businesses pre-spinoff. These findings suggest that the theoretical mechanism of spinoffs enabling parent firm managers to devote more attention to their remaining businesses is an important driver of the observed improvement in the efficiency of capital allocation decisions.

In sum, this study introduces a novel predicted benefit of spinoffs (and possibly other modes of corporate refocusing as well) for the internal functioning of diversified firms—an improvement in the efficiency of the process by which managers allocate capital to the business segments in those companies—and provides evidence that managerial attention is a key mechanism driving this improvement. These findings contribute to the strategy literature by enhancing our understanding of the potential benefits and costs of internal capital markets in diversified firms, as well as the ways in which spinoffs (and potentially other scope-reducing deals like sell-offs and closures), might influence these issues.

Theory and Hypotheses

Capital Allocation in Diversified Firms

The critical importance of capital allocation in diversified firms is widely acknowledged. Chandler (1962: 13) defined strategy itself as "the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals." Underscoring the role of managers in these decisions, Bower (1970) conceptualized capital allocation decisions as resource allocation processes influenced in unique ways by managers at various levels within the corporate hierarchy. Field research built upon this insight by showing that managers' failure to respond appropriately to the threat of new technologies due to their cognitive biases limits their abilities to allocate capital efficiently within the multi-business firms they run (Christensen and Bower 1996, Sull 1999, Gilbert 2001). Even more recently, studies have productively taken steps towards more precisely unpacking the contingencies in which managers make efficient versus inefficient capital allocation decisions (Khanna and Tice 2001, Maksimovic and Phillips 2002), particularly by developing new frameworks that analyze how the tradeoff between growth and profitability influences these decisions (Bardolet et al. 2010, Vierreger 2012) and by introducing the ideas of historical and social aspiration levels and how they might affect capital allocation decision-making (Arrfelt et al. 2013, Arrfelt et al. 2015).

The predominant empirical approach used to measure the "efficiency" of managers' capital allocation decisions is forward-looking and involves correlating the capital investments made by business units in diversified firms (as measured by their capital expenditures) to the investment opportunities in the industries in which these units operate (typically represented by the median Tobin's q of single-business firms operating in the same SIC code). Research using this methodology has shown the challenges of efficient capital allocation decision-making to be manifold. Firms appear to over-invest in businesses operating in industries with weak investment opportunities, and vice versa, indicating that "internal capital markets"—defined as a method of capital allocation in which a company's headquarters disburses funds to its business units—do not allocate capital efficiently (Lamont 1997, Shin and Stulz 1998,

Scharfstein 1998, Billett and Mauer 2003, Ozbas and Scharfstein 2009). Divisional managers have been shown to exacerbate this problem by displaying rent-seeking behavior that results in the misallocation of capital across a diversified firm's businesses (Scharfstein and Stein 2000, Rajan et al. 2000).

As an even sharper test of the purported inefficiency of internal capital markets at allocating capital resources to the appropriate investment opportunities, Gertner et al. (2002) use corporate spinoffs as an empirical context in which to compare the pre- and post-spinoff correlations between spun-off subsidiaries' capital expenditures and their investment opportunities. As mentioned previously, spinoffs are a type of divestiture in which a divesting ("parent") firm separates one of its divisions or business units into a new, publicly-traded company by distributing shares in the new entity (the "spinoff firm") *pro-rata* to its existing shareholders. These deals are an attractive empirical context in which to more closely examine the potential inefficiency of capital allocation decisions in diversified firms, since they facilitate comparisons of the pre- and post-spinoff characteristics of both diversified firms and the business units they spin off. Leveraging this insight, Gertner et al. (2002) find that post-spinoff, the capital allocation decisions made by *divested spinoff firms* are more closely correlated with the investment opportunities in their industries than these decisions had been pre-spinoff, when these same entities operated as subsidiaries within their parent firms. The authors explain that this result illustrates the inefficiency of internal capital markets, since former subsidiaries of diversified firms appear to allocate capital more efficiently when they become independent companies that are subject to external capital market forces than they did as subsidiaries that experienced the well-documented distortions associated with internal capital markets.

An interesting question, left unaddressed by Gertner et al. (2002) and hence taken up for investigation in this study, is how the post-spinoff efficiency of capital allocation decisions within *the remaining businesses of parent firms that have undertaken spinoffs* (rather than in the spinoff firms that have been divested) compares to the pre-spinoff efficiency of such decisions. This issue is important both for its potential to more clearly elucidate why capital allocation decisions may be inefficient in diversified

firms in the first place, and for its ability to shed light on how spinoffs might improve the efficiency of capital allocation decisions in these companies.

Corporate Spinoffs and the Efficiency of Capital Allocation Decisions

This section of the paper explores three key reasons why the efficiency of capital allocation decisions might be expected to improve when diversified firms undertake spinoffs. The first two of these have to do with the possibility that spinoffs might lead to changes in the relative strength of the investment opportunities that are available within the various business units of the divesting firms. The third is that spinoffs might enable parent firm managers to devote more attention to their firms' remaining businesses, thereby improving the allocation of capital within these companies.

The first explanation for the predicted post-spinoff improvement in the efficiency of capital allocation is that the business units that parent firms choose to spin off may be the ones that have the worst investment opportunities to begin with, such that spinoffs stop parent firm managers from misallocating capital resources to these particular businesses. As noted by Semadeni and Cannella (2011: 1087), "spinoffs generally occur to advance the parent's interests," meaning that parent firms may undertake these deals to correct structural inefficiencies within their organizations (Powers 2001, Golden and Ma 2003). This implies that parent firms may choose to spin off businesses with the worst prospects for capital investment, that is, the businesses with the lowest Tobin's q. Accordingly, spinoffs may remove the exact businesses to which parent firm managers might be misallocating capital resources (Shin and Stulz 1998, Scharfstein 1998, Billett and Mauer 2003, Ozbas and Scharfstein 2009), especially if the incidence of politicking or rent-seeking behavior is highest in the businesses with the worst investment opportunities (Scharfstein and Stein 2000, Rajan et al. 2000). As a result, the sensitivity of capital expenditures to investment opportunities in parent firms that undertake spinoffs—the efficiency of capital allocation decisions—would be expected to be higher post-spinoff than it had been pre-spinoff.

The second reason why the post-spinoff efficiency of capital allocation might be expected to improve in parent firms that undertake spinoffs is a corollary to the first. Specifically, if the businesses that parent firms choose to spin off have the worst investment opportunities to begin with, this implies

that the average Tobin's q of the remaining businesses that parent firms continue operating post-spinoff will be higher than the average Tobin's q of the businesses they operated pre-spinoff. By comparison, spinoffs are non-cash-generating transactions and the leverage of parent firms that undertake these deals has been shown not to differ from that of comparable firms (Desai and Jain 1999), meaning that the absolute amount of capital resources that parent firms have to allocate among their businesses post-spinoff is unlikely to change much from its pre-spinoff level. This implies that the average efficiency of capital allocation decisions among parent firms would be expected to improve post-spinoff, since these companies are allocating a similar amount of capital to a set of businesses with better investment opportunities, on average.

The third reason why the post-spinoff efficiency of capital allocation decisions might be expected to improve in parent firms that undertake spinoffs is that these deals may enable parent firm managers to devote more of their attention to their remaining businesses and thereby allocate capital more efficiently to them. Managers are boundedly rational (Simon 1947), due to the fact that these individuals have limited attention (Ocasio 1997), as well as incomplete information about all possible alternatives available to them and the consequences thereof. As a result, managers follow standardized rules and heuristics when making decisions (March and Simon 1958), and devote attention to the stimuli within their organizations that demand it (Simon, 1947). The constraints on managerial attention are particularly high in multi-business firms, given their operation in numerous lines of business that may have competing demands (Ambos and Birkinshaw 2010, Joseph and Ocasio 2012). For example, when a multi-business firm operates in a large number of businesses, the scope of these businesses' operations means that a change in the functioning or performance of one of these units has a high likelihood of affecting the firm's other divisions, to which managers must then respond (Gaba and Joseph 2013). Similarly, in diversified firms where the businesses are industrially unrelated, the drivers of each division's performance, as well as the risks and opportunities that each faces, are likely to be unique, imposing high "information processing requirements" on the firm's managers (Hoskisson et al. 1993: 278). For these reasons, the "diseconomies of managing" (Shaver and Mezias 2009) multi-business firms may be

significant (Coase 1937, Hill and Hoskisson 1987, Jones and Hill 1988). These diseconomies may manifest themselves in the context of capital allocation decision-making as managers being compelled to take the financial health, growth prospects, and investment opportunities of a diverse set of operations into consideration when deciding how to allocate capital to any single one of their business units.

When a manager's need to allocate attention to a particular issue is reduced or even obviated, his attention is freed and can be directed to alternate issues (Ocasio 1997). Divestitures facilitate this by reducing the number and often the diversity of segments in which diversified firms operate, freeing managers to focus on their companies' remaining businesses. Various authors have interpreted their findings of positive relationships between divestitures (particularly unrelated divestitures) and firm performance as reflecting increased managerial focus and attention to those companies' "core" businesses (Markides 1992, Comment and Jarrell 1995, John and Ofek 1995, Daley et al. 1997, Desai and Jain 1999). Accordingly, when a multi-business firm undertakes a spinoff, the attention that parent firm managers previously devoted to the spun-off subsidiary can be reallocated to the company's remaining divisions. This release of managerial attention would be expected to improve the efficiency of capital allocation decision-making by giving managers room to better analyze and evaluate the investment opportunities that are available in the divesting firms' remaining businesses, and therefore to better match capital expenditures to those opportunities.

While each of the above three explanations implies a distinct mechanism for the expected post-spinoff improvement in the efficiency of capital allocation decisions in diversified firms that undertake spinoffs, together, they all suggest the following hypothesis:

Hypothesis 1. The capital allocation decisions of businesses operating in diversified firms

that undertake spinoffs will be more efficient post-spinoff than they had been pre-spinoff.

Having generated this baseline hypothesis, it now remains to explore the potential mechanisms that could be driving this predicted post-spinoff improvement in the efficiency of capital allocation decisions in firms that undertake spinoffs. The next subsection focuses on the attentional argument described above and its implications for the efficiency of capital allocation decision-making by

developing further predictions intended to isolate the role of managerial attention. At the same time, the first two processes, regarding the relative strength of the investment opportunities that are available in the divested and retained businesses, are recognized and analyzed empirically later in this paper.

Managerial Attention and the Efficiency of Capital Allocation Decisions

Time. If increased managerial attention resulting from the removal of a spun-off subsidiary is an important mechanism driving Hypothesis 1, the predicted post-spinoff improvement in the efficiency of capital allocation decisions in parent firms would be expected to be the most significant immediately after the completion of a spinoff, but to attenuate thereafter.

One reason why the post-spinoff improvement in the efficiency of capital allocation decisions would be expected to be the most significant upon the completion of a spinoff is that this is when managers should most prominently experience the transition of their company becoming less diversified. At this point in time, the magnitude of the pre- to post-spinoff reduction in the demands on their attention is likely to be the most apparent and salient to managers, given the proximity of the transition. To the extent that these managers reallocate their newfound attention to the remaining businesses in their firms, the gains therefrom would be expected to be most pronounced immediately following the completion of that spinoff.

A second reason why the post-spinoff improvement in the efficiency of capital allocation decisions would be expected to be the most significant upon the completion of a spinoff is the attentional demands imposed by the spinoff itself. Specifically, the organizational preparation that occurs prior to a spinoff and the implementation of that deal are both highly complex processes. From a tactical perspective, for example, a parent firm must decide which business to spin off, structure the spinoff in such a way as to be tax-free to both of the separated companies, execute the relevant legal separation arrangements, and comply with all relevant SEC disclosure requirements (Aquila 2015). From an organizational standpoint, moreover, the parent firm must allocate its directors and officers between its own company and the divested spinoff firm (Seward and Walsh 1996, Semadeni and Cannella 2011), incentivize its employees (Moschieri 2011), and delineate the identities and reputations of the two

companies prior to their separation (Corley and Gioia 2004, Tripsas 2009). Given the magnitude of the demands imposed by these and related activities, it is quite likely that the attention the divesting firm's top leadership might normally pay to internal processes like capital allocation will be dissipated during the process of completing a spinoff. However, once that deal is complete, managers should be able to return to their regular activities. As a result, the post-spinoff improvement in the efficiency of capital allocation should be greatest immediately following the completion of those deals.

As the years pass following the completion of a spinoff, however, managerial attention is quite likely to again be pulled in different directions, resulting in an attenuation of the magnitude of the improvement in the efficiency of capital allocation. While a major event like a corporate spinoff may occasion an explicit and conscious reconsideration of capital allocation processes, after this initial assessment, the divesting firm is likely to settle into a new, steady-state routine of capital allocation decision-making. Additionally, spinoffs (and divestitures more generally) are often followed by other significant corporate strategic activities, such as mergers and acquisitions (Capron et al. 2001, Chang 1996), and divestitures are also known to occur contemporaneously with CEO turnover (Wiersema and Bantel 1992, Bigley and Wiersema 2002). Moreover, competitive, industry, and macroeconomic conditions are also likely to begin to change in the years following the completion of a spinoff. All of these (and potentially other) changes would be expected to pull the attention of the parent firm's top management team away from the new, steady-state process of allocating capital to the company's various businesses, suggesting that the initial post-spinoff improvement in the efficiency of capital allocation decisions will begin to dissipate over time.

In sum, if increased managerial attention is a significant driver of the post-spinoff improvement in the efficiency of parent firms' capital allocation decisions, the foregoing discussion suggests the following hypothesis:

> *Hypothesis 2. The predicted post-spinoff improvement in the efficiency of capital allocation decisions in firms that undertake spinoffs will be greatest immediately following the completion of those deals, but will attenuate thereafter.*

10

Diversification. If increased managerial attention resulting from the removal of a spun-off subsidiary is an important mechanism driving Hypothesis 1, the predicted post-spinoff improvement in the efficiency of capital allocation decisions in parent firms would be expected to be the greatest among firms operating in a moderate (rather than a high or a low) number of businesses pre-spinoff.[1]

As mentioned previously, multi-business firms are arguably the most complex type of company to manage (Coase 1937, Hill and Hoskisson 1987, Jones and Hill 1988, Hoskisson et al. 1993), given the potentially competing demands of (Ambos and Birkinshaw 2010, Joseph and Ocasio 2012) and the high likelihood of spillovers between their lines of business (Gaba and Joseph 2013). As a result, spinoffs and other divestitures are thought to alleviate some of these diseconomies of managing (Shaver and Mezias 2009) by removing one (or more) of a diversified firm's businesses and thereby enabling its managers to focus their attention on the company's remaining operations (Markides 1992, Comment and Jarrell 1995, John and Ofek 1995, Daley et al. 1997, Desai and Jain 1999). With this being said, however, the magnitude of the attentional gain produced by a spinoff is quite likely to be contingent on the number of businesses in which the divesting firm operated prior to the completion of that deal.

Specifically, if a diversified firm operates in a large number of businesses, managerial attention is likely to be widely dissipated across the businesses that these individuals must oversee, suggesting that their pre-spinoff capital allocation decisions will be particularly inefficient. However, the magnitude of the attentional gain created by a spinoff of one of those businesses should not be very large, since managerial attention would still be highly dissipated across the remaining businesses in that company. This suggests that the post-spinoff improvement in the efficiency of capital allocation decisions of highly diversified firms will not be very large. Similarly, if a diversified firm operates in a small number of businesses, there is already ample managerial attention in that company, since that attention is not dissipated across a large number of business units. This suggests that pre-spinoff capital allocation decisions in these firms will not be particularly inefficient. As a result, the magnitude of the attentional

---

[1] I am grateful to two anonymous reviewers for suggesting this implication of the attentional argument.

gain created by a spinoff, and hence, the post-spinoff improvement in the efficiency of capital allocation, should not be very large in these companies, since there is not much room for improvement to begin with.

By contrast, in a diversified firm that operates in a moderate number of businesses pre-spinoff, managerial attention is likely to be dissipated to some extent across these businesses, meaning that pre-spinoff capital allocation decisions are likely to be somewhat inefficient. Accordingly, a spinoff of one of this firm's businesses would be expected to free up the most managerial attention, since the proportional reduction in the number of businesses, and hence, the demands on managerial attention, will be the largest. Thus, the improvement in the efficiency of capital allocation decisions will be the most significant when firms operating in a moderate number of businesses undertake spinoffs. The constraints on managerial attention, and hence, decision-making capabilities, will be relaxed to a greater degree than in either (a) firms that operate in a large number of businesses, where the constraints on managerial attention remain significant post-spinoff, or (b) firms that operate in a small number of businesses, where the constraints on managerial attention are less severe to begin with.

In sum, if increased managerial attention is a significant driver of the post-spinoff improvement in the efficiency of parent firms' capital allocation decisions, the foregoing discussion suggests the following hypothesis:

> *Hypothesis 3. The predicted post-spinoff improvement in the efficiency of capital allocation in firms that undertake spinoffs will be greatest among companies that operate in a moderate (rather than a large or a small) number of businesses pre-spinoff.*

Methods

Empirical Strategy

There are three major empirical challenges that must be addressed in analyzing the research question of how spinoffs affect the efficiency of capital allocation decisions in the diversified parent firms that undertake these deals. First, diversified firms are, by definition, comprised of multiple lines of business, each of which has its own demands for and opportunities to use capital, and to which corporate headquarters must decide how to allocate such resources. Second, firms choose to undertake spinoffs, and

the characteristics of these companies (especially their existing capital allocation processes and investment opportunities) could be correlated with their decisions to undertake these deals. Third, firms may choose to spin off particular businesses (for example, those that allocate capital inefficiently or have poor investment opportunities) as part of broader reorganizations, such that spinoffs are signals of corporate reconfiguration rather than catalysts of changes in the firms' capital allocation processes.

The analyses conducted in this paper center on a set of diversified firms that undertake spinoffs. To deal with the second of the above-described challenges, I develop a propensity score matching model to identify a set of comparable firms, which I then use as a counterfactual against which to benchmark the changes in the efficiency of capital allocation among the focal sample of diversified firms that undertook spinoffs. In response to the first issue, I collect and analyze data on the investment opportunities and capital allocation decisions of the business segments within each of these two groups of firms. Finally, to address the third problem, I conduct a series of tests about whether the characteristics of the spun-off businesses differ systematically from those of the non-divested businesses. I will now describe each of these steps in greater detail.

Sample Construction

The sample analyzed in this paper consists of segment-level data pertaining to two different types of companies: a set of "treated" divesting parent firms that undertook spinoffs, and a propensity score matched "control" set of comparable firms that did not undertake these deals.

Parent Firms. The sample of parent firms that undertook spinoffs is comprised of 196 Fortune 500 firms that undertook 228 spinoffs between 1995 and 2009, inclusive. To construct this sample of companies, I used SDC Platinum to compile a list of all of the spinoffs that were announced and completed between January 1, 1995 and December 31, 2009. There were 761 total spinoffs undertaken during this fifteen-year period. I identified the firms that were in the Fortune 500 at any point between 1995 and 2009, and matched the sample of Fortune 500 companies to the list of spinoffs to identify the Fortune 500 firms that had undertaken spinoffs during this period. There were 260 such spinoffs. Thirty-two of these transactions were eliminated because SDC had mis-classified tracking stock issuances as

13

spinoffs (*e.g.*, Applera's 1999 tracking stock issuance for Celera Genomics) or because the spinoff firm lost its independence immediately following the completion of the spinoff (*e.g.*, Cargill's acquisition of Agribrands International immediately following its 1998 spinoff from Ralston Purina).[2] 196 unique parent firms undertook the remaining 228 spinoffs: 176 parent firms undertook only one spinoff each, fourteen firms undertook two spinoffs each, two firms undertook three spinoffs each, two firms undertook four spinoffs each, and two firms undertook five spinoffs each. Using this sample of 228 spinoffs, I constructed seven-year divesting firm-year panels for each individual parent firm that undertook every one of these deals: the three years pre-spinoff, the effective year of the spinoff, and the three years post-spinoff. This resulted in a panel dataset consisting of 1,596 parent firm-spinoff-year observations.[3]

Matched Control Set of Comparable Firms. As mentioned previously, one major empirical challenge in analyzing the capital allocation decisions of the above-described parent firms is that of bias due to non-random selection in the firms that *choose* to undertake spinoffs. For example, the capital allocation decisions of such firms could already be the least sensitive to investment opportunities prior to the completion of these deals, driving these companies to undertake spinoffs in the first place. To account for this issue of non-random selection, I develop a propensity score matching model in which the first-stage regression predicts the likelihood that a given firm is or is not involved in a spinoff, leading to the identification of a control group against which to benchmark the changes in the efficiency of capital allocation decisions among the above-described parent firms. I can then run differences-in-differences regressions to test how the efficiency of capital allocation decisions changes pre- to post-spinoff, for the parent firms versus this control group.

---

[2] The loss of a spinoff firm's independence immediately post-spinoff can cause the spinoff event to be taxable to the divesting parent company: one of the conditions for spinoffs to be treated as tax-free deals is that parent firm shareholders must maintain a continuity of interest (50% equity ownership interest) in both the parent and spinoff firms for a four-year period beginning two years before the spinoff. Because spinoffs in which the spinoff firm loses its independence have different tax implications for parent firms than spinoffs in which this is not the case, it is appropriate to eliminate the potentially-taxable spinoffs from the sample.

[3] If a parent firm undertakes multiple spinoffs, that company's firm-year pairs are treated as independent observations for each of its deals. This means that the same parent firm can be involved in multiple seven-year panels. For example, Baxter International undertook two spinoffs: Allegiance Corporation in 1996 and Edwards Lifesciences Corp in 2000. Thus, there are fourteen firm-year observations pertaining to Baxter in this panel dataset: one seven-year panel ranging from 1993 to 1999, and another seven-year panel ranging from 1997 to 2003.

To implement this propensity score matching model, I initially gathered financial data for the entire Compustat universe, except for the parent firms and the spinoff firms they divested, from 1995 through 2009. There were 36,809 firm-year observations in this set, which I then combined with the 1,596 parent firm-spinoff-year observations. The first-stage probit regression of the above-referenced propensity score matching model predicts the likelihood that a given company is involved in a spinoff. As such, its dependent variable takes the value one if a firm was involved in a spinoff (*i.e.*, if it is one of the parent firms), and zero if it was not (*i.e.*, if it is a non-spinoff company from the remaining Compustat universe). To ensure that this regression is matching comparable firm-year pairs, the independent variables in this probit regression are total assets, total sales, net income, and market capitalization. The results of this probit regression appear in Table 1.

-----Table 1 here-----

From there, the five "nearest-neighbors" that were matched to each parent firm-year observation in the year prior to treatment, as predicted by the propensity scores generated by this probit model, are identified as the control group. There are 1,514 matched parent firm-year observations[4] and 7,570 matched control-firm year observations, for a total of 9,084 firm-year observations. Table 2 shows that this propensity score matching model is balanced, since the mean values of the independent variables for the matched sets of treated and control observations are not statistically significantly different from one another.

-----Table 2 here-----

Data

By definition, diversified firms operate in multiple lines of business that are active in different industries, making it desirable to study the efficiency of the capital allocation decisions that are made at the business unit-level rather than the corporate-level. To accomplish this objective, my data collection and analysis proceeded in several steps.

---

[4] 82 out of the 1,596 total parent firm-year observations were eliminated due to a lack of common support with the control firm-year observations.

15

First, using the Compustat Segments File, I gathered identifying information, including the industry descriptions, of each of the business segments operating within the parent firms that undertook spinoffs. I matched this information to the descriptions I already had of the industries in which the spinoff firms in my sample operated, allowing me to identify which of the business segments the diversified firms in my sample had spun off. I removed these matched segments from my analysis, since I am interested in measuring the efficiency of capital allocation decisions in the segments that are *not* divested by the diversified parent firms.

Second, for this sample of "retained" business segments operating within parent firms, I collected pre- and post-spinoff data on their capital expenditures, as well as other financial data, from the Compustat Segments File. There were 2,083 retained business segment-year observations pertaining to the 1,514 parent firm-spinoff-year observations.

Third, and finally, I collected analogous data on the business segments operating within the matched control firms. There were 8,640 business segment-year observations pertaining to the 7,570 control firm-year observations.

In sum, since the analyses in this paper are conducted at the segment-level, there are a total of 10,723 segment-year observations, 2,083 pertaining to firms that undertook spinoffs and 8,640 pertaining to the matched set of comparable control firms.

Variables

Dependent Variable. The dependent variable is Segment Capex/Assets, defined as the capital expenditures made by a business segment in a given year, scaled by its total assets.

Key Independent Variables. There are four key independent variables: Median Segment Industry q, Treated, After, and # Segments. I will now describe these variables, and in the next subsection, explain how the interactions among them will be used to test the various hypotheses proposed in this study.

Median Segment Industry q is defined as the median Tobin's q of all of the single-segment firms operating in the same industry (identified by its three-digit SIC code) as a given business segment in a given year. This variable measures the investment opportunities that are available to the individual

16

business units that are operated by the firms in my sample. As such, the coefficient on Median Segment Industry q is a measure of the sensitivity of segment capital expenditures to segment investment opportunities, with positive (negative) coefficients indicating alignment (misalignment) between segments' capital allocation decisions and segments' investment opportunities.[5]

Treated is defined as an indicator variable taking the value one if a segment-year observation pertains to one of the treated parent firms that was matched by the propensity score matching model, and zero if the observation pertains to one of the control firms.

After is defined as an indicator variable taking the value one in the three years after the completion of a spinoff, and zero in the three years before its completion. After1, After2, and After3 are defined as indicator variables respectively taking the value one in the first, second, and third year after the completion of a spinoff, and zero in the three years before its completion.

Segments is a count of the number of business segments operating within a company, for parent firms, in the year prior to the completion of their spinoffs, and for control firms, in the same fiscal year as their matched parent firms. # Segments^2 is the squared term of # Segments.

Hypothesis Testing. The three-way interaction term,[6] After×Median Segment Industry q×Treated, will be used to represent Hypothesis 1's prediction of a pre- to post-spinoff improvement in the efficiency of capital allocation decisions among the parent firms that undertook spinoffs, relative to the control group. To understand the intuition behind this construction, it is necessary to begin with After×Median Segment Industry q. This two-way interaction term represents, for both parent firms and control firms, the improvement in the efficiency of capital allocation decisions in the post-spinoff period, relative to pre-spinoff levels. Accordingly, After×Median Segment Industry q×Treated represents, for parent firms relative to control firms, the improvement in the efficiency of capital allocation decisions in the post-

[5] The construction of this variable and its interpretation as a forward-looking measure of capital allocation efficiency is similar to Gertner et al.'s (2002) empirical approach. I also attempted to employ the variables and empirical methodology that were developed by Arrfelt et al. (2013) and Arrfelt et al. (2015) to measure the role of historical and social aspiration levels in capital allocation processes. However, my results using this approach were not statistically significant.

[6] All of the lower-order interaction terms for After×Median Segment Industry q×Treated (and for all of the other three-way interaction terms described in this subsection) are included in the upcoming regressions.

spinoff period, relative to pre-spinoff levels. If Hypothesis 1 is supported, the coefficient on After×Median Segment Industry q×Treated should be positive and significant.

Hypothesis 2 predicts that the post-spinoff improvement in the efficiency of capital allocation decisions among parent firms (relative to control firms) will be significant immediately following the completion of a spinoff, but will attenuate thereafter. The three-way interaction terms After1×Median Segment Industry q×Treated, After2×Median Segment Industry q×Treated, and After3×Median Segment Industry q×Treated will be used to test these predictions.

Hypothesis 3 predicts that the post-spinoff improvement in the efficiency of capital allocation decisions among parent firms (relative to control firms) will exhibit an inverted-U shaped relationship based on the number of segments in which a diversified firm operates pre-spinoff. To test this hypothesis, I use the three-way interaction terms, After×Median Segment Industry q×# Segments and After×Median Segment Industry q×# Segments^2, within separate subsamples respectively consisting of the parent firms and the control firms.[7] If Hypothesis 3 is supported, in the parent firm subsample, the coefficient on After×Median Segment Industry q×# Segments should be positive and significant, while the coefficient on After×Median Segment Industry q×# Segments^2 should be negative and significant.[8] By contrast, there should be no analogous pattern in the control firm subsample.

Control Variables. The upcoming models also include a set of control variables that would be expected to affect Segment Capex/Assets, a business segment's scaled capital expenditures in a given year. Operating Profit is defined as segment operating profits scaled by total segment assets, representing the availability of segment-level cash flows for capital expenditures. Negative Net Income is an indicator variable taking the value one if a segment has negative net income and zero if not, representing financial

---

[7] This approach is preferable to the alternative of keeping the two subsamples together, which would necessitate the use of four-way interaction terms between After×Median Segment Industry q×Treated and both # Segments and # Segments^2.

[8] An alternative approach to modeling this inverted U-shaped relationship is to replace # Segments and # Segments^2 as a spline, in order to account for potential multicollinearity between these two variables. In my models, however, this would then require me to create interaction terms between each component of the spline with After, Median Segment Industry q, and After×Median Segment Industry q, rendering the interpretation of all of those coefficients difficult. As a result, I decided not to pursue this approach here.

distress. Current Ratio is defined as the ratio of a firm's current assets to current liabilities, reflecting the availability of internal firm-level cash flows to fund capital expenditures. Leverage is defined as the total current and long-term debt of a firm scaled by the sum of its total debt and its market capitalization, reflecting the availability of external funding for capital expenditures at the firm-level.

Summary statistics and a correlation matrix for all of the variables described in this section of the paper appear in Table 3.

-----Table 3 here-----

Characteristics of Spun-Off versus Retained Subsidiaries

Although the above-described propensity score matching model mitigates the potential problem of non-random selection bias among *firms* that choose to undertake spinoffs, the second empirical challenge of non-random selection bias in the *business units* that firms choose to spin off remains outstanding. More specifically, firms might choose to spin off business units that have particularly inefficient capital allocation processes, or that systematically display other characteristics that might be correlated with the hypothesized post-spinoff improvement in the efficiency of capital allocation decisions. This potential empirical problem also constitutes an alternative explanation to improved managerial attention for Hypothesis 1's predicted post-spinoff improvement in the efficiency of capital allocation decisions.

I take a first step towards addressing this issue by conducting differences-in-means tests of whether, in each of the pre-spinoff years, the financial characteristics of business segments that are later spun off differ systematically from those of the business segments that are retained by the parent firms. As shown in Table 4, there are no statistically significant differences in the Median Segment Industry q, Segment Capex/Assets, Segment Capex, or Segment Assets of the segments that are either spun off or retained by the parent firms that undertook spinoffs in any of the three years prior to the completion of these deals. The fact that there are no significant *ex ante* differences in the characteristics of these two types of business segments provides some initial reassurance that selection bias from the parent firm's

choice of which business unit to spin off may not be the core driver of the predicted post-spinoff improvements in the efficiency of these companies' capital allocation decisions.

-----Table 4 here-----

A second potential explanation for the predicted improvement in the efficiency of capital allocation decisions in firms that undertake spinoffs is that these companies are simply reallocating a relatively fixed base of capital resources to a set of business units whose investment opportunities are better, on average, than those in which these companies operated pre-spinoff. Figure 1 provides suggestive evidence that this is not the case, since there do not appear to be major pre- to post-spinoff differences in the average Tobin's q of the businesses that are retained by the companies that undertake spinoffs.

-----Figure 1 here-----

Results

Hypothesis 1

The results of regressions testing Hypothesis 1 appear in Table 5. As mentioned previously, the dependent variable is Segment Capex/Assets, and the key independent variable is After×Median Segment Industry q×Treated, whose coefficient represents, for parent firms relative to control firms, the improvement in the efficiency of capital allocation decisions in the post-spinoff period, relative to pre-spinoff levels. All regressions include firm and year fixed effects, and robust standard errors are clustered by firm to account for intra-group correlation.

-----Table 5 here-----

Regression [1] includes only the main effects of the key independent variables: After and Median Segment Industry q.[9] While neither of the coefficients on these variables is statistically significant, After measures the change in the *level* of segment capital expenditures between the pre- and post-spinoff years for all of the firms in the sample, and Median Segment Industry q measures the overall (pre- and post-

---

[9] The main effect on Treated drops out of all of the firm-fixed effects regressions that appear in Table 5 because this variable is invariant by firm.

spinoff) sensitivity of segment-level capital expenditures to segment-level investment opportunities for all of the firms (both parent and control) in the sample.

Regression [2] incorporates all three of the two-way interaction terms among After, Median Segment Industry q, and Treated. The coefficient on After×Treated is negative and statistically significant at 5%, meaning that post-spinoff segment capital expenditures decline relative to pre-spinoff levels among the parent firms (relative to the control firms). While the coefficients on After×Median Segment Industry q and Treated×Median Segment Industry q are not significant, After×q measures the post-spinoff sensitivity of segment capital expenditures to investment opportunities among both parent and control firms, and Treated×q measures the overall (pre- and post-spinoff) sensitivity of parent firms' segment capital expenditures to investment opportunities, relative to that of the control firms.

Finally, Regression [3] brings in the three-way interaction term, After×q×Treated. The coefficient on this variable is positive and statistically significant at 5%, meaning that among parent firms (relative to control firms), the efficiency of capital allocation decisions improves in the post-spinoff period (relative to pre-spinoff levels). This finding provides support for Hypothesis 1. Economically, the magnitude of this coefficient estimate indicates that a one standard deviation increase in Median Segment Industry q (0.48) among the parent firms, from the pre- to the post-spinoff time period, would be associated with an increase of 0.018 in Segment Capex/Assets; this represents a 25% increase over Segment Capex/Assets' mean value of 0.07.

Hypothesis 2

Table 6 presents the results of regressions testing Hypothesis 2's prediction that the pre- to post-spinoff improvement in the efficiency of capital allocation decisions among parent firms (relative to control firms) will be most significant immediately following the completion of a spinoff, but will attenuate in the years thereafter. To test this prediction, I run three separate regressions in which I replace the main effect and all interaction terms involving the After variable with After1, After2, and After3. Thus, the key independent variables are now After1×q×Treated, After2×q×Treated, and

After3×q×Treated, while the dependent variable is still Segment Capex/Assets. All regressions include firm and year fixed effects, and robust standard errors are again clustered by firm.

-----Table 6 here-----

In Regressions [1] and [2], the coefficients on After1×q×Treated and After2×q×Treated are both positive and significant at the 1% level.[10] By contrast, in Regression [3], the coefficient on After3×q×Treated is not significant. This indicates that among parent firms (relative to control firms), the efficiency of capital allocation decisions is higher in the first and second years after the completion of a spinoff than it had been before that deal. By comparison, the efficiency of capital allocation decisions among parent firms (relative to control firms) is no different in the third year following the completion of a spinoff than it had been prior to that deal.

To determine whether the coefficients on these three key independent variables are significantly different from one another, I re-estimated the three possible pairs of regressions as seemingly-unrelated regressions and used Wald tests to measure the differences between these key coefficients. The coefficient on After1×q×Treated was significantly different from the coefficient on After2×q×Treated at 5% ($X^2(1)$ = 4.32) and from the coefficient on After3×q×Treated at 5% as well ($X^2(1)$ = 4.52). Furthermore, the coefficient on After2×q×Treated was significantly different from the coefficient on After3×q×Treated at 10% ($X^2(1)$ = 3.12). Together, these findings provide evidence in support of Hypothesis 2's prediction that the post-spinoff improvement in the efficiency of capital allocation decisions will be greatest immediately following the completion of a spinoff, but will attenuate thereafter.

---

[10] The magnitude of the coefficient estimate on After1×q×Treated in Regression [1] indicates that a one standard deviation increase in Median Segment Industry q (0.48) among the parent firms from the pre-spinoff time period to one year after the deal's completion would be associated with an increase of 0.033 in Segment Capex/Assets, representing a nearly 50% increase over Segment Capex/Assets' mean value of 0.07. Similarly, the magnitude of the coefficient estimate on After2×q×Treated in Regression [2] indicates that a one standard deviation increase in Median Segment Industry q among the parent firms from the pre-spinoff time period to two years after the deal's completion would be associated with an increase of 0.018 in Segment Capex/Assets, representing a 25% increase over Segment Capex/Assets' mean value.

Hypothesis 3

Finally, Table 7 presents the results of regressions testing Hypothesis 3's prediction that the pre-to post-spinoff improvement in the efficiency of capital allocation decisions among parent firms (relative to control firms) will exhibit an inverted-U shaped relationship based on the number of business segments in which a diversified firm operates pre-spinoff. To test this prediction, I split the parent firms and control firms from each other and run separate regressions on each of the two subsamples. As such, my models no longer include Treated or any of the interaction terms involving that variable. Instead, within each of the two subsamples, the key independent variables are After×q×# Segments and After×q×# Segments^2. The dependent variable is Segment Capex/Assets, and regressions include firm and year fixed effects with robust standard errors clustered by firm.

-----Table 7 here-----

Regressions [1] and [2] pertain to the parent firm subsample. In Regression [1], the coefficient on After is negative and significant, indicating that the post-spinoff *level* of capital expenditures is lower than its pre-spinoff level. By comparison, the coefficient on After×Median Segment Industry q is positive and significant, meaning that the segment capital expenditures of parent firms that undertook spinoffs become more sensitive to investment opportunities in the years post-spinoff than they had been pre-spinoff.

Regression [2] incorporates the interaction terms with # Segments and # Segments^2. After×q remains positive and statistically significant; additionally, the coefficient on After×q×# Segments is positive and significant, while the coefficient on After×q×# Segments^2 is negative and significant.[11] This pair of findings indicates that the post-spinoff improvement in the sensitivity of capital expenditures to investment opportunities among parent firms exhibits an inverted-U shaped relationship[12] with the number of segments in which those companies operated pre-spinoff.[13]

---

[11] The coefficient on After remains negative and significant in this regression. Additionally, the coefficient on After×# Segments is positive and significant, while the coefficient on After×# Segments^2 is negative and significant. This indicates that the post-spinoff *level* of capital expenditures also exhibits an inverted-U shaped relationship with the number of segments in which the parent companies operated pre-spinoff.

[12] To confirm that these results are truly indicative of an inverted U-shaped relationship, I follow the three-step procedure outlined by Haans, Pieter, and He (2016). First, and as expected, the coefficient on After×q×# Segments^2

23

Regressions [3] and [4] pertain to the control firm subsample. In Regression [3], the coefficient on Median Segment Industry q is positive and significant, indicating that overall, among the control firms in the sample, segment-level capital expenditures are sensitive to investment opportunities. Importantly, the coefficient on After×Median Segment Industry q is not significant, meaning that there is no incremental post-spinoff improvement in the sensitivity of capital expenditures to investment opportunities among the control firms in the sample. Regression [4] incorporates all of the interaction terms with # Segments and # Segments^2. None of these interaction terms is significant, meaning that there is no post-spinoff improvement in the sensitivity of capital expenditures to investment opportunities among the control firms, nor is there an inverted-U shaped relationship with the number of segments in which those firms operate.[14] Together, the findings in Table 7 provide suggestive evidence in support of Hypothesis 3 by showing that, among parent firms, but not among control firms, the post-spinoff improvement in the sensitivity of capital expenditures to investment opportunities exhibits an inverted-U shaped relationship with the number of segments in which those companies operated pre-spinoff.

Discussion and Conclusion

This study has investigated how spinoffs affect the capital allocation process in the firms that undertake these deals. I find that the efficiency of capital allocation decisions, as measured by the sensitivity of capital expenditures to industry investment opportunities, improves when firms undertake spinoffs. This improvement is most pronounced immediately following the completion of the spinoffs

is negative and significant. Second, the slope at the low end of the range of # Segments (0.058 - 2×0.015×X_L, where X_L = 2) is positive and significantly different from zero at 5% (t = 2.23), while the slope at the high end of the range of # Segments (0.058 - 2×0.015×X_H, where X_H = 7) is negative and significant at 5% (t = -2.30). Third, the turning point of the inverted U-shaped relationship (-0.058/2×0.015) falls at 3.87 segments, and the 95% confidence interval falls within the data range for # Segments. Given the results of these three tests, it is possible to conclude that an inverted U-shaped relationship is at play in this instance.

[13] Economically, the magnitude of the coefficient estimate on After×q indicates that, for parent firms of all pre-spinoff diversification levels, a one standard deviation increase in Median Segment Industry q (0.48) from the pre- to post-spinoff time period would be associated with an increase of 0.009 in Segment Capex/Assets, a 13% increase over Segment Capex/Assets' mean value of 0.07. Incorporating the coefficient estimates on After×q×# Segments and After×q×# Segments^2 reveals that the largest improvement in the post-spinoff efficiency of capital allocation decisions would occur among parent firms that operated between two and three business segments (on average) in the year pre-spinoff.

[14] Unlike in the parent firm subsample analyzed in Regressions [1] and [2], all three of Haans et al.'s (2016) tests for the existence of an inverted U-shaped relationship fail for the control firm subsample analyzed in Regressions [3] and [4].

that these companies undertake, and attenuates thereafter. It is also larger in companies that operate in a moderate number of businesses pre-spinoff than it is in firms that operate in either a large or a small number of businesses. Together, these results contribute to management theory in several important ways.

First, and most fundamentally, this study speaks to the literature on internal capital markets in diversified firms (Lamont 1997, Shin and Stulz 1998, Scharfstein 1998, Billett and Mauer 2003, Ozbas and Scharfstein 2009, Bardolet et al. 2010, Vierreger 2012). This research has shown the challenges of efficient capital allocation to be numerous, ranging from agency problems (Scharfstein and Stein 2000, Rajan et al. 2000) to cognitive distortions (Christensen and Bower 1996, Sull 1999, Gilbert 2001) and even to inefficient comparisons relative to aspiration levels (Arrfelt et al. 2013, Arrfelt et al. 2015). This study takes these ideas a step further by introducing the possibility that the limit to managerial attention is an additional constraint that could (and appears to) prevent the managers of multi-business firms from allocating capital in an efficient manner to all of the businesses operating in these companies.

In so doing, this study builds an important bridge between the literatures on internal capital markets in strategy and finance. This paper's empirical approach—studying diversified firms that undertake spinoffs and modeling the relationship between their pre- versus post-spinoff investment opportunities (as represented by the median Tobin's q of single-business firms operating in their focal industries) and their capital expenditures—draws directly from Gertner et al. (2002), a key study on the functioning of internal capital markets from the corporate finance literature. Using this empirical approach, however, this paper then considers the influence of a key behavioral issue in strategy—the scarcity and importance of managerial attention (Simon 1947, Penrose 1956, March and Simon 1958, Ocasio 1997)—on the efficiency with which managers allocate capital in these firms. The fact that this study is able to develop strategy-relevant insights using finance-relevant approaches suggests that these fields may have more to offer one another than initially meets the eye.

Second, this study also uses the concept of managerial attention to contribute to research on spinoffs, and perhaps divestitures more generally as well. Many papers have theorized that one of the key reasons that spinoffs (and other divestitures) may be valuable is that these deals liberate managerial

attention and allow managers to increase their focus on their so-called "core" businesses (Markides 1992, Comment and Jarrell 1995, John and Ofek 1995). One way in which these studies have tried to quantify this theoretical prediction is by showing that unrelated divestitures are more positively associated with stock market performance than related divestitures (Daley et al. 1997, Desai and Jain 1999). By comparison, this paper puts the theory that spinoffs liberate managerial attention to an even sharper test, in two key ways. One is that the empirical work in this paper takes steps to rule out key alternative explanations, such as the endogeneity of the spinoff decision and the endogeneity inherent in the choice of which business unit to spin off, leaving increased managerial attention as a key driver of the observed post-spinoff improvement in the efficiency of capital allocation decisions. The other is that this study proposes and tests two additional hypotheses (the intertemporal trend in the post-spinoff improvement in the efficiency of capital allocation decisions, and the inverted-U shaped relationship between pre-spinoff diversification levels and the post-spinoff improvement in the efficiency of capital allocation decisions) that point directly to managerial attention as a significant driver of the baseline results.

On a related note, this study generates two important insights with regard to the concept of managerial attention itself. The first is that spinoffs appear to be the most effective at releasing managerial attention in moderately-diversified firms: in companies with high levels of diversification, the incremental gains in managerial attention are not that significant because the firm still remains highly diversified after the spinoff, whereas in companies with low levels of diversification, the constraints on managerial attention are not that severe to begin with, meaning that the spinoff does not help very much either. This finding has important implications for the literature on diversification, which has traditionally focused on the relatedness (or lack thereof) of a diversified firm's portfolio of businesses rather than the changes that a spinoff can induce therein. The second key insight is that the release of managerial attention by spinoffs is a transient effect. While managerial attention may be scarce in multi-business firms (Ambos and Birkinshaw 2010, Joseph and Ocasio 2012, Gaba and Joseph, 2013) and spinoffs may help alleviate some of these pressures, the gains are not permanent, as managerial attention ultimately gets pulled in other directions as the divesting firm continues to evolve in the wake of its spinoff. An

important opportunity for extension by other scholars might therefore be to explore whether and to what extent other modes of divestiture, such as asset sales or equity carve-outs, result in similar patterns of change in the allocation of managerial attention as well.

Finally, this study closes a loop that Gertner et al. (2002) left open in their paper. Gertner et al. (2002) consider the efficiency of capital allocation decisions from the perspective of divested spinoff firms. These authors establish that the pre-spinoff investment decisions of these entities (when they operate as subsidiaries of their parent companies) are less efficient than their post-spinoff decisions (when they operate as independent firms), implying that internal capital markets in diversified firms may not function as efficiently as they could. Using a distinct sample of spinoffs undertaken in a different time period, this paper not only replicates Gertner et al.'s (2002) findings for the spinoff firms (in the Appendix), but also documents a consistent set of results from the perspective of the business units that remain within the divesting parent firms as well. Thus, the research in this paper both validates Gertner et al.'s (2002) findings and extends them to their logical end-state.

References

Ambos, T. C., J. Birkinshaw. 2010. Headquarters' attention and its effect on subsidiary performance. *Management International Review* **50**(4): 449–469.

Aquila, F. J. 2015. Key issues when considering a spin-off. *Practical Law* **June 2015**: 20–27.

Arrfelt, M., R. M. Wiseman, G. T. M. Hult. 2013. Looking backward instead of forward: aspiration-driven influences on the efficiency of the capital allocation process. *Academy of Management Journal* **56**(4): 1081–1103.

Arrfelt, M., R. M. Wiseman, G. McNamara, G. T. M. Hult. 2015. Examining a key corporate role: the influence of capital allocation competency on business unit performance. *Strategic Management Journal* **36**(7): 1017–1034.

Bardolet, D., D. Lovallo, R. Rumelt. 2010. The hand of corporate management in capital allocations: patterns of investment in multi- and single-business firms. *Industrial and Corporate Change* **19**(2): 591–612.

Bergh, D. D., R. A. Johnson, R.-L. DeWitt. 2008. Restructuring through spin-off or sell-off: transforming information asymmetries into financial gain. *Strategic Management Journal* **29**: 133–148.

Bigley, G. A., M. F. Wiersema. 2002. New CEOs and corporate strategic refocusing: how experience as heir apparent influences the use of power. *Administrative Science Quarterly* **47**(4): 707–727.

Billett, M. T., D. C. Mauer. 2003. Cross-subsidies, external financing constraints, and the contribution of the internal capital market to firm value. *Review of Financial Studies* **16**(4): 1167–1201.

Bower, J. L. 1970. *Managing the Resource Allocation Process.* Harvard University, Boston, MA.

Capron, L., W. Mitchell, A. Swaminathan. 2001. Asset divestiture following horizontal acquisitions: a dynamic view. *Strategic Management Journal* **22**(9): 817–844.

Chandler, A. D. 1962. *Strategy and Structure: Chapters in the History of the Industrial Enterprise.* MIT Press, Boston, MA.

Chang, S.–J. 1996. An evolutionary perspective on diversification and corporate restructuring: entry, exit, and economic performance during 1981–89. *Strategic Management Journal* **17**(8): 587–611.

Christensen, C. M., J. L. Bower. 1996. Customer power, strategic investment, and the failure of leading firms. *Strategic Management Journal* **17**(3): 197–218.

Coase, R. H. 1937. The nature of the firm. *Economica* **4**(16): 386–405.

Comment, R., G. A. Jarrell. 1995. Corporate focus and stock returns. *Journal of Financial Economics* **37**: 67–87.

Corley, K. G., D. A. Gioia. 2004. Identity ambiguity and change in the wake of a corporate spin-off. *Administrative Science Quarterly* **49**(2): 173–208.

Daley, L., V. Mehrotra, R. Sivakumar. 1997. Corporate focus and value creation: evidence from spinoffs. *Journal of Financial Economics* **45**: 257–281.

Desai, H., P. C. Jain. 1999. Firm performance and focus: long-run stock market performance following spinoffs. *Journal of Financial Economics* **54**: 75–101.

Feldman, E. R, S. C. Gilson, B. Villalonga. 2014. Do analysts add value when they most can? Evidence from corporate spinoffs. *Strategic Management Journal* **35**(10): 1446–1463.

Feldman, E. R. 2016. Corporate spinoffs and analysts' coverage decisions: the implications for diversified firms. *Strategic Management Journal* **37**(7): 1196–1219.

Gaba V., Joseph J. 2013. Corporate structure and performance feedback: aspirations and adaptation in M-form firms. *Organization Science* **24**(4): 1102–1119

Gertner, R. H., E. Powers, D. S. Scharfstein. 2002. Learning about internal capital markets from corporate spin-offs. *Journal of Finance* **57**(6): 2479–2506.

Gilbert, C. G. 2001. A dilemma in response: examining the newspaper industry's response to the Internet. *The Academy of Management Best Paper Proceedings*.

Gilson, S. 2000. Analysts and information gaps: lessons from the UAL buyout. *Financial Analysts' Journal* **Nov-Dec**: 82–110.

Gilson, S., P. Healy, C. Noe, K. Palepu. 2001. Analyst specialization and conglomerate stock breakups. *Journal of Accounting Research* **39**: 565–582.

Golden, B. R., H. Ma. 2003. Mutual forbearance: the role of intrafirm integration and rewards. *Academy of Management Review* **28**(3): 479–493.

Haans, R. F. J., C. Pieters, Z.–L. He. 2016. Thinking about U: theorizing and testing U- and inverted U-shaped relationships in strategy research. *Strategic Management Journal* **37**(7): 1177–1195.

Hill, C. W. L., R. E. Hoskisson. 1987. Strategy and structure in the multiproduct firm. *Academy of Management Review* **12**(2): 331–341.

Hoskisson, R. E., C. W. L. Hill, H. Kim. 1993. The multidivisional structure: organizational fossil or source of value? *Journal of Management* **19**(2): 269–298.

John, K., E. Ofek. 1995. Asset sales and increase in focus. *Journal of Financial Economics* **37**: 105–126.

Jones, G. R., C. W. L. Hill. 1988. Transaction cost analysis of strategy-structure choice. *Strategic Management Journal* **9**(2): 159–172.

Joseph, J., W. Ocasio. 2012. Architecture, attention, and adaptation in the multibusiness firm: General Electric from 1951 to 2001. *Strategic Management Journal* **33**(6): 633–660.

Khanna, N., and S. Tice. 2001. The bright side of internal capital markets. *Journal of Finance* **56**(4): 1489–1528.

Krishnaswami, S, V. Subramaniam. 1999. Information asymmetry, valuation, and the corporate spin-off decision. *Journal of Financial Economics* **53**: 73–112.

Lamont, O. 1997. Cash flow and investment: evidence from internal capital markets. *Journal of Finance* **52**(1): 83–109.

Maksimovic, V., G. Phillips. 2002. Do conglomerate firms allocate resources inefficiently across industries? Theory and evidence. *Journal of Finance* **57**(2): 721–767.

March, J. G., H. A. Simon. 1958. *Organizations*. John Wiley, New York, NY.

Markides, C. C. 1992. Consequences of corporate refocusing: *ex ante* evidence. *Academy of Management Journal* **35**(2): 398–412.

Miles, J. A., J. R. Woolridge. 1999. *Spin-Offs and Equity Carve-Outs: Achieving Faster Growth and Better Performance*. Financial Executives Research Foundation, Morristown, NJ.

Moschieri, C. 2011. The implementation and structuring of divestitures: the unit's perspective. *Strategic Management Journal* **32**: 368–401.

Ocasio, W. 1997. Towards an attention-based view of the firm. *Strategic Management Journal* **18**: 187–206.

Ozbas, O., D. S. Scharfstein. 2009. Evidence on the dark side of internal capital markets. *Review of Financial Studies, forthcoming.*

Penrose, E. T. 1959. *The Theory of the Growth of the Firm*. John Wiley, New York.

Powers, E. A. 2001. Spinoffs, selloffs and equity carveouts: an analysis of divestiture method choice. *Working Paper.*

Rajan, R., H. Servaes, L. Zingales. 2000. The cost of diversity: the diversification discount and inefficient investment. *Journal of Finance* **55**(1): 35–80.

Scharfstein, D. S. 1998. The dark side of internal capital markets II: evidence from diversified conglomerates. *Working Paper*.

Scharfstein, D. S., J. C. Stein. 2000. The dark side of internal capital markets: divisional rent-seeking and inefficient investment. *Journal of Finance* **55**(6): 2537–2564.

Semadeni, M. A. A. Cannella. 2011. Examining the performance effects of post spin-off links to parent firms: should the apron strings be cut? *Strategic Management Journal* **32**: 1083–1098.

Seward, J. K., J. P. Walsh. 1996. The governance and control of voluntary corporate spin-offs. *Strategic Management Journal* **17**(1): 25–39.

Shaver, J. M., J. M. Mezias. 2009. Diseconomies of managing in acquisitions: evidence from civil lawsuits. *Organization Science* **20**(1): 206–222.

Shin, H. H., R. M. Stulz. 1998. Are internal capital markets efficient? *Quarterly Journal of Economics* **113**(2): 531–552.

Simon, H. A. 1947. *Administrative Behavior: A Study of Decision-Making Process in Administrative Organization*. Free Press, New York, NY.

Sull, D. N. 1999. The dynamics of standing still: Firestone Tire & Rubber and the radial revolution. The Business History Review **73**(3): 430–464.

Tripsas, M. 2009. Technology, identity, and inertia through the lens of "The Digital Photography Company." *Organization Science* **20**(2): 441–460.

Vierreger, C. 2012. Strategic capital allocation: do firms really allocate capital so inefficiently? *Working Paper*.

Wiersema, M. F., K. A. Bantel. 1992. Top management team demography and corporate strategic change. *Academy of Management Journal* **35**(1): 91–121.

Zuckerman, E. W. 2000. Focusing the corporate product: securities analysts and de-diversification. *Administrative Science Quarterly* **45**(3): 591–619.

Table 1. Propensity Score Matching Model Results

Dependent Variable:	Spinoff
Total Assets	0.031***
	(0.011)
Total Sales	0.559***
	(0.069)
Net Income	-3.440***
	(0.538)
Market Cap	0.592***
	(0.055)
Constant	-1.837***
	(0.013)
Observations	38,405
Likelihood Ratio $X^2(4)$	526.550***

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 2. Tests of Balance from the Propensity Score Matching Model

Variable	Treated	Control	t-statistic
Total Assets ($000)	49,433	47,541	0.27
Total Sales ($000)	15,299	14,630	0.69
Net Income ($000)	874	957	-0.68
Market Cap ($000)	20,785	21,999	-0.82
Observations	1,514	7,570	-

Table 3. Summary Statistics and Correlation Matrix

Variable	Mean	Std. Dev.	Min	Max	[1]	[2]	[3]	[4]	[5]	[6]
[1] Segment Capex/Assets	0.070	0.128	0.000	5.569	1.000					
[2] Median Segment Industry q	1.497	0.479	0.685	7.440	0.002	1.000				
[3] Treated	0.265	0.441	0.000	1.000	-0.019	0.016	1.000			
[4] After	0.385	0.487	0.000	1.000	-0.023	-0.016	-0.044	1.000		
[5] After1	0.179	0.383	0.000	1.000	-0.001	-0.014	-0.031	1.000	1.000	
[6] After2	0.166	0.372	0.000	1.000	-0.032	-0.005	-0.040	1.000	-	1.000
[7] After3	0.172	0.378	0.000	1.000	-0.018	-0.019	-0.032	1.000	-	-
[8] # Segments	2.664	1.603	1.000	10.000	0.026	-0.044	0.163	-0.042	-0.018	-0.035
[9] # Segments^2	9.668	12.325	1.000	100.000	0.020	-0.040	0.064	-0.027	-0.008	-0.022
[10] Operating Profit	0.330	19.515	-19.996	1,799.000	-0.006	0.011	-0.007	-0.008	-0.006	-0.005
[11] Negative Net Income	0.019	0.136	0.000	1.000	-0.025	0.014	-0.037	0.066	0.033	0.063
[12] Current Ratio	1.894	1.325	0.171	21.474	-0.049	0.163	-0.131	-0.002	-0.006	-0.002
[13] Leverage	0.268	0.225	0.000	1.477	-0.003	-0.280	0.015	0.037	0.024	0.034

Variable	Mean	Std. Dev.	Min	Max	[7]	[8]	[9]	[10]	[11]	[12]
[7] After3	0.172	0.378	0.000	1.000	1.000					
[8] # Segments	2.664	1.603	1.000	10.000	-0.044	1.000				
[9] # Segments^2	9.668	12.325	1.000	100.000	-0.034	0.941	1.000			
[10] Operating Profit	0.330	19.515	-19.996	1,799.000	-0.006	0.024	0.023	1.000		
[11] Negative Net Income	0.019	0.136	0.000	1.000	0.074	-0.097	-0.069	-0.003	1.000	
[12] Current Ratio	1.894	1.325	0.171	21.474	0.003	-0.096	-0.076	0.002	0.083	1.000
[13] Leverage	0.268	0.225	0.000	1.477	0.031	0.077	0.073	-0.015	0.049	-0.280

Table 4. Pre-Spinoff Characteristics of Spun-Off Versus Retained Business Segments

Variable	Pre-Spinoff Year	Spun-Off Segment	Retained Segments	t-statistic
Median Segment Industry q	-1	1.458	1.549	-0.842
	-2	1.606	1.526	0.836
	-3	1.450	1.505	-0.791
Segment Capex/Assets	-1	0.069	0.063	0.478
	-2	0.082	0.056	1.135
	-3	0.072	0.062	1.252
Segment Capex ($000)	-1	250.455	258.592	-0.812
	-2	287.620	275.758	0.744
	-3	228.864	234.534	-0.912
Segment Assets ($000)	-1	8,400.150	8,311.714	0.109
	-2	7,496.014	7,686.748	-0.475
	-3	7,735.499	7,584.652	0.153

Figure 1. Pre- and Post-Spinoff Investment Opportunities of Retained Business Segments
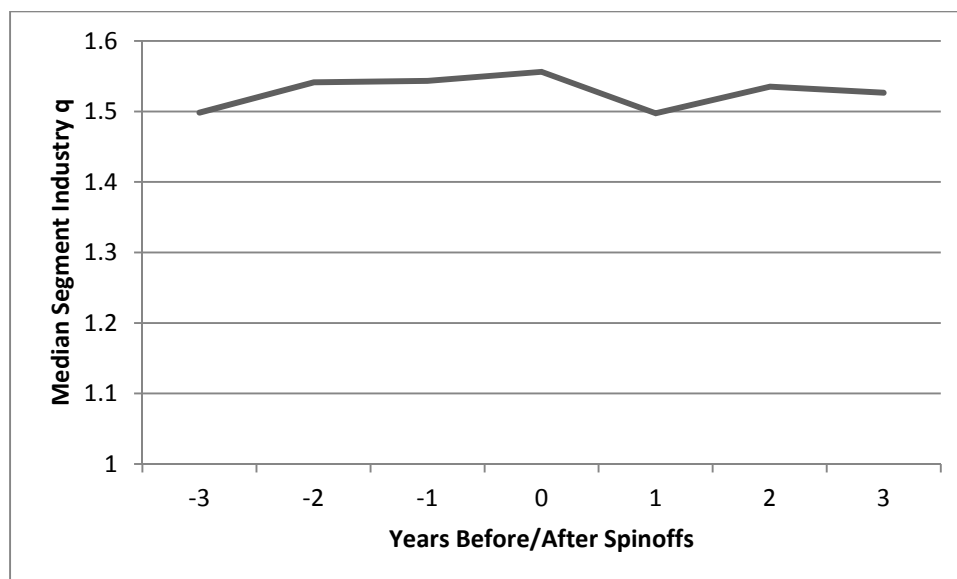
Table 5. Baseline Results

DV: Segment Capex/Assets	[1]	[2]	[3]
After×q×Treated			0.037**
			(0.017)
After×q		0.003	-0.007
		(0.007)	(0.007)
After×Treated		-0.017**	-0.047**
		(0.008)	(0.023)
Treated×q		0.005	-0.007
		(0.007)	(0.007)
After	0.000	-0.005	0.009
	(0.006)	(0.011)	(0.011)
Med Seg Ind q	-0.001	-0.004	0.000
	(0.003)	(0.004)	(0.004)
Operating Profit	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)
Negative Net Income	-0.004	-0.004	-0.003
	(0.006)	(0.006)	(0.006)
Current Ratio	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)
Leverage	0.003	0.002	0.002
	(0.015)	(0.015)	(0.015)
Constant	0.096***	0.102***	0.096***
	(0.011)	(0.011)	(0.011)
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	10,508	10,508	10,508
R^2	0.143	0.146	0.153

Sample includes parent and control firms identified by the first-stage
regression in the propensity score matching model.

Robust standard errors clustered by firm in parentheses.

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

Table 6. Intertemporal Trends

DV: Segment Capex/Assets	[1]	[2]	[3]
After1×q×Treated	0.069***		
	(0.020)		
After1×q	-0.002		
	(0.008)		
After1×Treated	-0.057**		
	(0.028)		
After2×q×Treated		0.038***	
		(0.011)	
After2×q		-0.010	
		(0.007)	
After2×Treated		-0.026	
		(0.019)	
After3×q×Treated			0.026
			(0.050)
After3×q			-0.015
			(0.010)
After3×Treated			-0.086
			(0.065)
Treated×q	-0.008	-0.006	-0.007
	(0.007)	(0.007)	(0.007)
After1	0.007		
	(0.012)		
After2		0.003	
		(0.012)	
After3			0.020
			(0.017)
Med Seg Ind q	0.000	-0.001	-0.001
	(0.004)	(0.004)	(0.004)
Operating Profit	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)
Negative Net Income	-0.004	-0.001	-0.007
	(0.009)	(0.008)	(0.008)
Current Ratio	0.007***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)
Leverage	0.004	-0.003	0.001
	(0.018)	(0.018)	(0.018)
Constant	0.095***	0.099***	0.097***
	(0.012)	(0.012)	(0.012)
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	7,000	6,885	6,931
R^2	0.091	0.085	0.101

Sample includes parent and control firms identified by the first-stage

regression in the propensity score matching model.

Robust standard errors clustered by firm in parentheses.

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

Table 7. Pre-Spinoff Diversification Levels

Subsample:	Parent Firms		Control Firms	
DV: Segment Capex/Assets	[1]	[2]	[3]	[4]
After	-0.038***	-0.017**	0.019	0.013
	(0.014)	(0.008)	(0.014)	(0.014)
After×# Segments		0.009*		-0.016
		(0.005)		(0.024)
After×# Segments^2		-0.011*		0.002
		(0.007)		(0.004)
Med Seg Ind q	-0.003	-0.007	0.008**	0.047**
	(0.004)	(0.004)	(0.004)	(0.022)
q×# Segments		-0.024		-0.014
		(0.022)		(0.014)
q×# Segments^2		0.002		0.003
		(0.003)		(0.002)
After×q	0.021**	0.019**	-0.003	-0.002
	(0.010)	(0.008)	(0.006)	(0.003)
After×q×# Segments		0.058***		0.012
		(0.011)		(0.020)
After×q×# Segments^2		-0.015**		-0.015
		(0.006)		(0.017)
Operating Profit	-0.027	-0.028	0.002***	0.002***
	(0.023)	(0.025)	(0.000)	(0.000)
Negative Net Income	-0.011	-0.012	-0.014**	-0.016***
	(0.014)	(0.015)	(0.006)	(0.006)
Current Ratio	0.002	0.018	0.005***	0.005**
	(0.005)	(0.011)	(0.002)	(0.002)
Leverage	0.033	0.065	-0.021	-0.022
	(0.030)	(0.045)	(0.034)	(0.035)
Constant	0.065***	0.002	0.105***	0.107***
	(0.017)	(0.026)	(0.016)	(0.015)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,939	1,939	8,569	8,569
R^2	0.025	0.048	0.015	0.016

Subsamples include parent and control firms identified by the first-stage

regression in the propensity score matching model.

Robust standard errors clustered by firm in parentheses.

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

Appendix: Spinoff Firm Results

In this Appendix, I replicate the results of Gertner et al.'s (2002) study, which explores the relationship between capital expenditures and investment opportunities in divested spinoff firms. The dependent variable is Spinoff Capex/Assets, defined as the spinoff firm's capital expenditures scaled by its total assets. Median Spinoff Industry q is the median Tobin's q of all single-segment firms operating in the same three-digit SIC code as each spinoff firm. The key variable of interest is After×Median Spinoff Industry q, the interaction between After and Median Spinoff Industry q, where After is an indicator variable taking the value one in each of the three post-spinoff years, and zero in each of the three pre-spinoff years. As in Gertner et al. (2002), the coefficient on After×Median Spinoff Industry q should be positive and significant.

In addition to this baseline prediction, Gertner et al. (2002) also test two contingencies: the efficiency of spinoff firms' capital allocation decisions will improve by more (a) in spinoffs that enjoy a favorable (rather than unfavorable) stock market response, and (b) in spinoffs where the spun-off subsidiary is industrially-unrelated (rather than industrially-related) to its parent firm's primary operations. To measure the stock market's response to the spinoffs in my sample, I conduct an event study with a 250-day estimation window, [-800, -551], prior to the announcement dates of those transactions, and a three-day event window surrounding those announcement dates, [-1, +1]. Positive CAR is defined as an indicator variable taking the value one if the cumulative abnormal return (CAR) to a given spinoff was positive, and zero if the CAR was null or negative. To measure the industrial relatedness of a spun-off subsidiary to its parent company, I define Unrelated as an indicator variable taking the value one if a spinoff firm operates in a different three-digit SIC code than its parent company, and zero if the two firms operate in the same three-digit SIC code.

Spinoff firm regression results appear in Table A-1. All models include deal and year fixed effects with robust standard errors clustered by deal. Consistent with Gertner et al. (2002), in Regression [2], the coefficient on After×Median Spinoff Industry q is positive and significant, meaning that the sensitivity of spinoff firms' capital expenditures to the investment opportunities available in their

industries is higher post-spinoff than it had been pre-spinoff.[15] Regressions [3] and [4] respectively incorporate the three-way interaction terms, After×Median Spinoff Industry q×Positive CAR and After×Median Spinoff Industry q×Unrelated. The coefficients on After×Median Spinoff Industry q×Positive CAR in Regression [3] and After×Median Spinoff Industry q×Unrelated in Regression [4] are both positive and statistically significant.[16] Consistent with Gertner et al.'s (2002) results, these findings indicate that the post-spinoff improvement in the efficiency of capital allocation decisions in spinoff firms is larger when investors react favorably to the announcements of those deals, and when the spinoff firms are unrelated to the primary operations of their former parent companies.

-----Table A-1 here-----

---

[15] Economically, the magnitude of the coefficient estimate on After×Median Spinoff Industry q reveals that a one standard deviation increase in Median Spinoff Industry q (0.500) would be associated with an increase of 0.053 in Spinoff Capex/Assets, representing a nearly 75% increase over Spinoff Capex/Assets' mean value of 0.07.

[16] The incremental gain associated with a one standard deviation increase in Median Segment Industry q in spinoffs that have a positive stock market response is an additional increase of 0.082 in Spinoff Capex/Assets, and the incremental gain associated with unrelated spinoffs is an additional increase of 0.038 in Spinoff Capex/Assets.

Table A-1. Spinoff Firm-Level Results

DV: Spinoff Capex/Assets	[1]	[2]	[3]	[4]
After		-0.103	-0.105	-0.094
		(0.113)	(0.116)	(0.112)
Median Spinoff Industry q	0.012	-0.090	-0.094	-0.103*
	(0.042)	(0.057)	(0.061)	(0.056)
After×Median Spinoff Industry q		0.106**	0.112**	0.129**
		(0.051)	(0.057)	(0.051)
After×q×Positive CAR			0.163**	
			(0.074)	
After×q×Unrelated				0.075***
				(0.028)
Operating Profit	-0.031	-0.030	-0.031	-0.024
	(0.038)	(0.038)	(0.038)	(0.038)
Negative Net Income	-0.001	-0.001	-0.008	-0.016
	(0.038)	(0.038)	(0.039)	(0.038)
Current Ratio	0.056**	0.057**	0.055**	0.066**
	(0.026)	(0.026)	(0.026)	(0.026)
Leverage	0.129	0.148	0.137	0.147
	(0.114)	(0.117)	(0.118)	(0.115)
Constant	0.211*	0.465***	0.484***	0.482***
	(0.117)	(0.149)	(0.155)	(0.147)
Spinoff Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,012	1,012	1,012	1,012
R^2	0.080	0.181	0.184	0.197

Robust standard errors clustered by spinoff firm in parentheses.

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