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Divisional diversity and the conglomerate discount: evidence from spinoffs ☆

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Abstract

Existing literature argues that disparity in investment opportunities within diversified firms can erode firm value. We investigate the diversity cost hypothesis of spinoffs by using post-spinoff data to (1) reconstruct the diversified firm after the spinoff and assess the aggregate improvement in value and (2) relate any value improvements to changes in diversity. We find that improvements in aggregate value depend significantly on changes in both a direct measure of diversity and measures based on industry proxies. We conclude that diversification discounts at least partially reflect a value loss due to the diversified nature of the firm itself, rather than selection bias or measurement error.

JEL classification: G30; G34

Keywords: Diversified firms; Internal capital markets; Spinoff; Diversification discount

1. Introduction

A rationale for the multidivisional firm is that its management is better informed about investment opportunities than are outside investors and can more efficiently allocate resources across divisions. In theory, these internal capital markets allow

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diversified firms to reduce financing costs and information gaps relative to single-division firms (see Williamson, 1975; Stein, 1997). Such benefits can be hard to realize in practice, however. Empirical studies suggest that diversified firms routinely overinvest in divisions with relatively poor prospects (see Shin and Stulz, 1998; Scharfstein, 1998; Rajan et al., 2000). Furthermore, the overall market assessment of conglomeration appears negative, with a majority of diversified firms valued at a substantial "discount" relative to focused firms (see Berger and Ofek, 1995; Lang and Stulz, 1994).

Some recent papers ascribe these "diversification discounts" or "negative excess values" to agency problems that are exacerbated within the multidivisional structure. In particular, Rajan et al. (2000), henceforth RSZ, and Scharfstein and Stein (2000) argue that misallocation of capital across divisions can arise from rent-seeking and bargaining between divisional managers and corporate headquarters. According to this *diversity cost hypothesis*, diversity in investment opportunities across divisions aggravates intrafirm rent-seeking, worsening the diversification discount or negative excess value.

Others have proposed alternative (and more benign) interpretations of the diversification discount. One view claims the discounts reflect systematic differences between divisions of a diversified firm and single-segment firms in the same industry. Such systematic differences can arise if, for instance, diversification is accomplished through the acquisition of less productive firms in an industry. Alternatively, the discounts could largely be the result of measurement error and inherent methodological flaws (e.g., Whited, 2001).

Our primary objective is to use spinoff events to examine the diversity cost hypothesis. Spinoffs facilitate the investigation of divisional diversity in investment opportunities because stock market values and accounting information are separately available for the spun-off firm and remaining parent firm following the divestiture. This allows us to gauge the benefit from the spinoff by examining the change in the combined-firm's excess value. The pre-spinoff excess value is just that of the parent firm prior to the spinoff. The combined post-spinoff excess value is obtained by reconstructing the diversified firm using the separately available post-spinoff market and book values of the spun-off unit and remaining parent. The change in excess value of the combined firm thus provides a measure of the aggregate benefit resulting from the spinoff. We relate this benefit to changes in diversity surrounding the spinoff event to examine our primary research question, which is whether a reduction in diversity leads to an improvement in value.

Our sample consists of 106 spinoffs announced during 1979–1996 and taken from the Securities Data Corporation (SDC) database. The spinoffs are associated with a median increase of 6.1% in combined-firm excess value. Not all spinoffs achieve improvements in excess value, however, and reorganization benefits are concentrated among firms with negative excess values prior to the spinoff.

We employ multiple measures of diversity in investment opportunities. One measure is that proposed in RSZ, which is a type of coefficient of variation in asset-weighted investment opportunities. We also employ a similar, but simpler, measure that is implicitly in keeping with Scharfstein and Stein (2000). The empirical construction of these two metrics relies on industry proxies for investment opportunities. Industry proxies, however, are noisy and possibly even biased if there are systematic differences between divisions and stand-alone firms. Therefore, we propose an ex post, direct measure based on the post-spinoff market-to-book values of the divested division(s) and remaining parent firm. This diversity metric avoids the use of industry proxies. The disadvantage, of course, is that the metric implicitly assumes that diversity in post-spinoff investment opportunities is a reasonable proxy for the diversity prior to the spinoff. The inherent advantages of each approach (the direct, ex post approach and the alternatives using industry proxies) help to counter the limitations that each can have on its own.

The evidence for each metric strongly supports the diversity cost hypothesis, and the results are robust to the inclusion of various definitions of change in focus and other control variables in the regression analysis. We interpret the results as providing direct evidence that reductions in diversity play a unique role in explaining the gains to spinoffs. More broadly, the results suggest that diversity in investment opportunities is a source of value loss for diversified firms in general. In this respect our results corroborate RSZ and Lamont and Polk (2002). We also contend that for the firms we examine, discounts reflect more than just measurement error or selection bias. These explanations are very unlikely to account for the improvements in aggregate excess value (that of the combined firm including the divested division(s)) for the firms we study. Any measurement error will affect both the pre- and post-spinoff excess values. Therefore, it is very unlikely to drive the types of changes between the two that we show. The self-selection bias explanation is also unlikely to explain our results, because our post-spinoff excess values include all of the units included in the pre-spinoff excess values. Furthermore, there is no reason to expect aggregate value improvements to be related to changes in diversity under these alternative explanations.

Existing literature reports that relative to their single-segment counterparts, diversified firms underinvest (overinvest) in divisions that are in industries with better (worse) prospects (RSZ; Scharfstein, 1998; Shin and Stulz, 1998). Our finding is that changes in investment patterns are weakly related to changes in excess value. Our regression results, however, suggest that the negative effects of diversity manifest themselves in ways other than just distorted investment policy. This is perhaps not surprising. Some models (e.g., Meyer et al., 1992) suggest that lobbying efforts by divisional managers can lead to value losses irrespective of whether the efforts result in distorted investment policy. Diversity might also negatively affect a firm's human capital, for example, by limiting the ability of strong divisions to hire or retain top talent when weak divisions are perceived to harm overall firm performance or employee morale.

For completeness, we also examine the stock price reaction to spinoff announcements. We do not find a significant relation between announcement effects and reductions in diversity, although the regression coefficient is estimated with the predicted sign. Possible reasons for the lack of significance are discussed in the paper.

The rest of the paper proceeds as follows. After discussing related literature in Section 2, we develop the empirical predictions and discuss our empirical design in

Section 3. Section 4 discusses data sources and the sample, and the empirical analysis is contained in Section 5. Section 6 concludes.

2. Related literature

There is a substantial literature on spinoffs and on the discounting of diversified firms. As noted, the literature offers two broad (non-mutually exclusive) reasons for diversification discounts which are (1) value destruction from the diversified structure itself and (2) methodological problems arising from measurement error or fundamental differences between firm segments and single-segment firms. Several studies suggest that value destruction is caused by misallocation of investment resources across divisions. Berger and Ofek (1995) find that diversified firms tend to overinvest in segments with poor investment opportunities and that the over-investment is associated with lower firm value. Lamont (1997) finds that oil firms distort investment decisions by reacting to declines in oil revenue by reducing investment in non-oil segments. RSZ, Shin and Stulz (1998), and Scharfstein (1998) provide further evidence of cross-subsidization across divisions of diversified firms, consistent with a form of 'socialism' across divisions. We uncover weak evidence that changes in investment policy are related to changes in aggregate excess value in our sample firms. As mentioned, however, our results suggest that diversity in investment opportunities affects firm value even after controlling for contemporaneous investment policy.

The value loss and distortion in investment allocation in a diversified firm are explained by RSZ and Scharfstein and Stein (2000) in terms of agency problems between divisional managers and corporate headquarters. These papers predict the distortion to be worse with greater diversity in investment opportunities across divisions, which can be referred to as the diversity cost hypothesis. RSZ find support for their model by analyzing cross-sectional patterns in excess values using industry-based diversity measures. Further evidence on the diversity cost hypothesis is provided by Lamont and Polk (2002), whose paper is perhaps the closest to ours in spirit. They find that exogenous increases in diversity are negatively related to firm value. Our results corroborate theirs, although the two papers differ in their empirical design. Most notably, the papers use different approaches to minimize the potential effects of measurement error caused by using industry Qs to measure divisional investment opportunities. Using a broad sample, Lamont and Polk focus on identifying exogenous changes in diversity inferred from changes in industry investment levels instead of industry Qs. Their econometric approach allows them to isolate and analyze the effects of measurement error. In contrast, we use a specific sample of restructuring firms and propose a metric that measures changes in diversity from the sample firms themselves.

As mentioned previously, a variety of papers suggest that at least part of the diversified firm discount is the result of endogenous diversifying behavior and reflects characteristics of the divisions constituting diversified firms. Such papers include Burch et al. (2001), Campa and Kedia (2001), Chevalier (1999), Graham et al.

(2002), and Hyland (2001). The findings in these studies are consistent with those in Maksimovic and Phillips (2002), who use plant-level data to show that investment decisions by diversified firms are, for the most part, as efficient as those made by focused firms. In a similar vein, Fluck and Lynch (1999) offer a theoretical model to argue that the lower valuation of diversified firms reflects their greater propensity to fund marginally profitable projects. Our findings, however, suggest that the separation of divisions with diverse opportunities can, in and of itself, create value. While self-selection can play an important role, our results suggest that discounts reflect more than just characteristics of the divisions themselves.

We are not the first to examine the gains to spinoffs. Papers in this area include, but are not limited to, Cusatis et al. (1993), Daley et al. (1997), Desai and Jain (1999), Hite and Owers (1983), Krishnaswami and Subramaniam (1999), Miles and Rosenfeld (1983), and Schipper and Smith (1983). Numerous studies show a positive stock price reaction to spinoff announcements, a result we also find. Collectively, several studies have also found that announcement returns, longer-run returns, and operating performance are higher when spinoffs increase the focus of the surviving parent (e.g., Daley et al., 1997; Desai and Jain, 1999). The empirical evidence in most of the literature is interpreted as evidence that focus-improving events create value by removing negative synergies between divisions or allowing managers to return to what they do best. These interpretations are consistent with more general studies linking value gains to changes in focus (e.g., Comment and Jarrell, 1995; John and Ofek, 1995). Most studies, however, do not directly link value gains from spinoffs to attributes of the diversified firm's internal capital market as we do. Two exceptions are Gertner et al. (2002) and McNeil and Moore (2001). These studies, however, examine divisional investment policies instead of the broader notion of diversity costs that we have in mind.

3. Diversity costs and implications for spinoffs

3.1. The diversity cost hypothesis and empirical predictions

In the context of spinoffs, the diversity cost hypothesis implies that improvements in the reconstructed firm's excess value surrounding a spinoff should be positively related to the resulting decrease in the diversity of investment opportunities. The rationale is that higher diversity prior to the spinoff contributes to greater value destruction in the pre-spinoff firm. The first prediction we test can thus be stated as follows:

Hypothesis 1. Controlling for other factors, the change in the reconstructed firm's excess value following a spinoff is positively related to the reduction in diversity in investment opportunities available to the parent and spun-off subsidiary (or subsidiaries).

We also wish to examine the nature of changes in investment allocations surrounding the spinoff and determine whether they are related to changes in aggregate excess value. The next hypothesis thus concerns the diversified firm's investment allocation relative to stand-alone firms, without regard to investment opportunities.

Hypothesis 2. Following a spinoff, diversified firms exhibiting a larger move in the direction of the investment patterns of single-segment firms will be associated with a greater increase in excess value.

The final hypothesis is similar, but considers the change in the quality of the parent firm's internal capital market. Here, we relate improvements in excess value to the extent to which the parent firm makes improvements in the efficiency of its investment allocations, directing more (less) capital toward divisions with the better (poorer) investment opportunities.

Hypothesis 3. A greater increase in the efficiency of the parent firm's investment policy will be associated with a greater increase in excess value.

It should be noted that rejection of either Hypothesis 2 or Hypothesis 3 is not necessarily inconsistent with the diversity cost hypothesis. As noted, diversity can lead to losses in firm value in ways other than investment distortion. Furthermore, sometimes changes in investment policy around a spinoff do not adequately capture expected changes in investment policy over the long term.

3.2. Measuring excess value

We assess the benefits from spinoffs in terms of their impact on excess value, which measures the diversified firm's market value relative to that of its single-segment counterparts. As has become standard in the literature, we define the parent firm's excess value, PEV, as the (log-transformed) ratio of the parent's market value, PMV (defined as market value of equity plus book values of preferred, debt, and current liabilities), to the parent's *imputed* value, obtained by summing the imputed values of its divisions, where division i's imputed value is the product of its assets, DA_i, and the median market-to-book ratio, M/B, for single-segment firms in the same industry:

$$PEV = \ln\left[\frac{PMV}{\sum_{i=1}^{n} DA_i[Ind_i(M/B)]}\right]. \quad (1)$$

Here, M/B equals the market value of common equity plus the book values of preferred stock, debt, and current liabilities, divided by the book value of assets. Following Berger and Ofek (1995), industry medians are taken from the narrowest standard industrial classification (SIC) grouping that includes at least five single-segment firms with sufficient data. We also follow their methodology and gross-up divisional assets on a pro rata basis to equal parent assets, throwing out cases in which the sum of divisional assets differs from parent assets by more than 25%.

Unlike Berger and Ofek (1995), however, we do not restrict the calculation to include only firms with assets in excess of \$20 million.

We calculate PEV before and after the spinoff, allowing us to measure the change in the parent firm's excess value as $\Delta PEV = Post\text{-}spin\, PEV - Pre\text{-}spin\, PEV$. For this and other metrics in our study, pre-spinoff values are calculated at the latest fiscal year-end prior to the spinoff's announcement date. Post-spinoff values are calculated at the end of the first full fiscal year following the spinoff's effective date. This date is chosen so that all post-spinoff metrics in our study will be measured at the same point in time. Constructing metrics requiring spinoff data immediately following the spinoff is problematic due to unavailable data. Also, the investment policy metrics we examine (defined later) are based on income statement items and are therefore appropriately measured to allow a full year of operation after the spinoff event.

Although we report ΔPEV in the descriptive statistics, it is obviously affected by the nature of the divested division(s) and is therefore not a reliable measure of the aggregate gains from the spinoff. We therefore focus our analysis primarily on ΔCEV, the change in the *combined* firm's excess value. The combined firm's post-spinoff excess value is defined as follows:

$$CEV = \ln\left[\frac{PMV + SMV}{\sum_{i=1}^{n} DA_i[Ind_i(M/B)]}\right], \tag{2}$$

where SMV is the market value of the spinoff unit(s), and the denominator sums the imputed values of segments operating in both the parent and spinoff firms. In some cases the post-spinoff parent firm, the spinoff firm, or both are focused. We simply treat the focused firm as a segment and add its imputed value as usual. The change in the combined firm's excess value is defined as follows:

$$\Delta CEV = Post\text{-}spin\, CEV - Pre\text{-}spin\, PEV. \tag{3}$$

3.3. Measuring firm diversity and investment policy

We employ three alternative measures of diversity: one that we propose, one based on RSZ, and one in line with the intuition underlying Scharfstein and Stein (2000). Our measure is based on ex post, market-to-book ratios of the parent and spinoff firms. As discussed previously, a significant benefit of this approach is that the measure uses the actual market values of the parent and the spinoff, rather than relying on industry-based measures to indicate investment opportunities. This is useful in light of the emerging literature which argues that the discount, at least in part, can be attributed to measurement problems and/or a self-selection bias. The proposed metric is the weighted average of the absolute deviations of the market-to-book ratios of the parent and the spinoff firm,

$$CPost\, Div = (W_P)Abs[M/B_P - M/B_C] + (W_S)Abs[M/B_S - M/B_C], \tag{4}$$

where W_P is the ratio of the parent's assets to the sum of the parent's and spun-off unit's assets, and W_S is a similarly defined asset weight for the spun-off unit (such that the sum of W_P and W_S is one). In the equation, M/B_P and M/B_S are the actual ex post market-to-book ratios of the parent and spun-off firms. M/B_C is the combined firm's market-to-book ratio, which equals the asset-weighted average of M/B_P and M/B_S. When multiple firms are created from the spinoff event, we simply adjust the formula to allow for more firms as needed. *CPost Div* is calculated at the end of the first full fiscal year after the spinoff (at the same point in time that all post-spinoff variables are calculated). Implicitly, the assumption is that *CPost Div* is a reasonable proxy for the diversity of investment opportunities between the eventual parent and the spun-off unit prior to the spinoff. Since the resulting parent and spun-off unit(s) operate separately after the spinoff, the metric represents the diversity that is eliminated as a consequence of the spinoff event. The more positive this variable, the greater is the amount of diversity reduction caused by the spinoff. Hence, the diversity cost hypothesis (Hypothesis 1) predicts that this variable will be positively related to the change in excess value for the combined firm, ΔCEV.

The second metric, *PRSZ Div*, is based on the measure defined in RSZ (Eq. (17) in their paper). Their diversity measure is basically a type of coefficient of variation in industry Tobin's Qs. It is the standard deviation of asset-weighted Q across segments divided by the simple average of the segment Qs, where industry Q values are used to proxy for segment Qs. As in Lamont and Polk (2002), we use market-to-book ratios for Q. To ease the exposition, we provide details on this and subsequent variables in the Appendix A. We define Δ*PRSZ Div* as the change in the parent firm's diversity measure around the spinoff. Since Δ*PRSZ Div* will be negative when diversity (as measured by *PRSZ Div*) is reduced, Hypothesis 1 predicts Δ*PRSZ Div* will be negatively related to ΔCEV.

Scharfstein and Stein (2000) present a model of diversity costs that suggests a simpler measure of diversity in investment opportunities that is not scaled by the simple average of segment Qs. Thus, we define *PStd Dev* as the weighted standard deviation of equally weighted segment Qs, with industry market-to-book values again proxying for segment Qs (see Appendix A). Δ*PStd Dev* is then defined as the change in this diversity measure around the spinoff. This measure is also predicted to be negatively related to ΔCEV. (In the empirical results we also discuss the use of an alternative version of *PStd Dev* that ignores divisional asset weights altogether). A potentially important distinction between *PStd Dev* and *PRSZ* is that *PRSZ* measures diversity in asset-weighted Q, whereas both versions of *PStd Dev* measures diversity in raw divisional Qs. For example, consider a firm with two divisions A and B with asset weights of $W_A = 0.40$ and $W_B = 0.60$, and Q-values of $Q_A = 1.20$ and $Q_B = 0.80$. Here, *PRSZ* will show a diversity value of zero since $WQ = 0.48$ for both divisions, whereas *PStd Dev* will show a positive diversity value to reflect the difference in the raw Q-values.

To examine our hypotheses on the nature of investment allocations surrounding a spinoff (Hypotheses 2 and 3) we construct various measures of investment policy. Δ*CExc RInv* is a measure of the change in the combined firm's excess investment relative to stand-alone firms and adjusted for the overall level of firm investment. (In the empirical analysis we also consider an alternative measure that does not adjust for the overall firm investment level.) Hypothesis 2 predicts that this measure will be negatively related to changes in the combined firm's excess value. We also consider changes in an alternative measure of investment efficiency, $\Delta PInv\ Eff$, that takes into account the extent to which the firm allocates more (less) capital to divisions with better (poorer) investment opportunities. This is RSZ's "relative value added" measure (their Eq. (18)) and is detailed in Appendix A. We also consider their "absolute value added" measure (as defined in their Table V). Hypothesis 3 predicts that these measures will be positively related to ΔCEV.

3.4. Additional variables

We now briefly discuss the other variables used in our analysis. Most of these are motivated by other studies and serve as control variables here. Expected signs, detailed motivations, and more precise definitions are in the Appendix A. We use $\Delta Log\ PHerf$, the change in the log of the parent's Herfindahl index, to control for changes in focus (see Desai and Jain, 1999). Alternative controls for focus are noted in the discussion of the empirical results. $\Delta CStd\ Dev$ is the change in the combined firm's residual standard deviation of stock returns. This controls for the change in information asymmetries surrounding the spinoff (see Krishnaswami and Subramaniam, 1999). To control for stock market returns, *Ctotret* is the total holding-period return of the combined firm over the entire period surrounding the spinoff (i.e., from the pre-spinoff date to the post-spinoff date based on when the variables are calculated). *Spin-off size*, based on post-spinoff assets, controls for the size of the spun-off unit relative to the combined firm (see Hite and Owers, 1983; Miles and Rosenfeld, 1983). Since the diversity metrics include (either implicitly or explicitly) the investment opportunities of the spun-off unit, a possible concern is that the relation between diversity and value improvements is affected by whether the parent spins off a division with particularly good (or poor) opportunities. To control for this possibility, we include *Spin-off* M/B, the market-to-book ratio of the spun-off unit. *Log* (*Passets*) is the log of the parent's assets, used to control for any size effects of the parent. *Stand-aloneD* is an indicator variable to control for whether the divestiture results in a single-segment parent firm.

4. Data sources and descriptive statistics

4.1. Data sources and requirements

Our sample consists of spinoffs announced during 1979–1996 and is from the Securities Data Corporation (SDC) database.[1] SDC data include both the

[1] We owe special thanks to Chris McNeil for providing us with his base sample of SDC-derived spinoff firms, which we add to our initial SDC data from an earlier version of this paper. Like our data, the McNeil data is checked against news articles to confirm the spinoff event (with erroneous events eliminated). Also, data such as pre-spinoff divisional assets and capital expenditures is checked against financial statements, with missing data on COMPUSTAT backfilled. We supplement our initial data and the McNeil data with some more recent spinoff events, performing the same checks and backfills.

announcement and effective dates, the cusip identifiers for both the parent firm and spun-off unit, and a brief description of the spinoff. To be included in the sample, data for the parent firm must be available on both the COMPUSTAT annual industrial database and the COMPUSTAT Business Segment Information database for the dates we use. Further, data for the spun-off unit (after it becomes an independently traded firm) must also be available. If data for the spun-off unit or parent firm are missing, financial statements are used to backfill wherever possible. Stock return data must be available from the Center for Research in Security Prices for both the parent and spun-off firms. There are numerous additional data screens we apply that are motivated and detailed in the Appendix A. Briefly, these ensure that divested units were once parent segments (operationally) that became independent and that the sum of all segment assets does not deviate more than 25% from aggregate parent assets. We eliminate parents with tracking stock, those that are American Depository Receipts (ADRs), and those without multiple segments on the segment data or who are not diversified according to company-provided descriptions (although in the study we define divisions according to the segment tapes). Spinoffs motivated by mergers or bankruptcies are also eliminated. Our final sample consists of 106 separate spinoff events by 95 parent firms. Seven parent firms have two spinoffs separated by multiple years, and two parent firms have three. We do not consolidate these spinoffs, but our results are robust to excluding all of them.

4.2. Data description

Table 1 provides a description of the data. The pre-spinoff data are based on end-of-fiscal-year information prior to the spinoff announcement, while the post-spinoff data are derived from end-of-fiscal-year information for the first full fiscal year after the effective date of the spinoff. The spinoff size numbers show that the spinoffs result in a mean (median) divestment of 24.5% (20.0%) of the consolidated firm in terms of post-spinoff asset value. Overall, the post-spinoff market-to-book ratios of the parent and spun-off firms are quite similar in terms of means, although the median market-to-book ratio is somewhat higher for the parent. Table 1 also indicates that the spinoffs result in the parent firm's asset-based Herfindahl index rising from a pre-spinoff mean (median) of 0.489 (0.473) to a post-spinoff mean (median) of 0.712 (0.700). The spinoffs also reduce the pre-spinoff number of divisions (as derived from segment data) for the parent firm from a mean (median) of 3.396 (3.000) to a mean (median) of 2.217 (2.000).

The mean (median) excess value for the pre-spinoff parent is −0.035 (−0.057). These values are somewhat smaller in magnitude than those reported for diversified firms in general. Berger and Ofek (1995), for instance, report excess values in the range of −0.10 to −0.15. This indicates that the agency problems faced by the firms in our sample could be less severe than for the average diversified firm. This is consistent with the fact that the managers of these firms are willing to engage in a divestiture that will reduce the assets under their control.

Table 1
Univariate statistics for descriptive variables, diversity measures, and investment measures
No. observations equals 106. Accounting variables are derived from COMPUSTAT or the firm's financial statements. Pre-spinoff values are calculated at the latest date possible prior to the announcement date. Post-spinoff values are calculated one full fiscal year after the effective date. The "Comb." column is for the post-spinoff diversity measure of the combined (reconstructed) firm. Parent post–pre statistics are for firm-by-firm changes (as opposed to the difference in the pre- and post-statistics). The parent's excess value (*PEV*) is the natural log of the ratio of market value of the parent firm (market value of all equity plus book value of debt) to the parent's imputed value (the sum of each division's imputed value). The spinoff's excess value (*SEV*) is similarly constructed. For the combined firm's excess value (*CEV*), market value is the sum of *PEV* and *SEV*, and for the imputed value the spun-off entity is treated as if it were still a division within the parent. *Herfindahl* indices are asset-based. *CPost Div* measures diversity between the parent and spun-off firm using ex-post, actual book-to-market ratios instead of industry proxies. *PRSZ Div* is the coefficient of variation in divisional investment opportunities from Rajan et al. (2000). *PStd Dev* is the weighted standard deviation of industry *M/B* values for parent segments. *Excess relative investment* is a measure of how closely investment allocations are aligned with those implied by the investments of stand-alone firms, holding the investment of the diversified firm as a whole constant. *Investment efficiency* measures the extent to which the parent firm allocates capital toward (away from) divisions with superior (inferior) investment opportunities relative to other divisions in the firm. *Excess relative investment* and *Investment efficiency* have been multiplied by one-hundred in this table

		Pre-spin.	Post-spinoff			Changes (Δ)	
Descriptive variables		Parent	Parent	Spinoff	Comb.	Parent post–pre	Combined post–pre
Assets ($mil)	Mean	4,681	4,166	769	—	−515	—
	Median	1,996	1,336	321	—	−34	—
	Std. dev.	9,047	9,682	1,247	—	6,210	—
Spinoff size (spinoff assets/sum of spinoff & parent assets)	Mean	—	—	0.245	—	—	—
	Median	—	—	0.200	—	—	—
	Std. dev.	—	—	0.205	—	—	—
Market-to-book ratio	Mean	1.094	1.261	1.267	—	0.167	—
	Median	0.955	1.077	0.875	—	0.099	—
	Std. dev.	0.507	0.595	1.282	—	0.493	—
Asset-based Herfindahl (*PHerf*)	Mean	0.489	0.712	—	—	0.223	—
	Median	0.473	0.700	—	—	0.184	—
	Std. dev.	0.181	0.267	—	—	0.216	—
Number of divisions	Mean	3.396	2.217	—	—	−1.179	—
	Median	3.000	2.000	—	—	−1.000	—
	Std. dev.	1.300	1.287	—	—	1.194	—
Excess value (*PEV*, *SEV*, *CEV*)	Mean	−0.035	0.039	−0.107	0.042	0.074	0.078
	Median	−0.057	−0.002	−0.112	−0.019	0.058	0.061
	Std. dev.	0.350	0.432	0.614	0.395	0.366	0.345
Diversity measures							
Combined firm post diversity (*CPost Div*)	Mean	—	—	—	0.192	—	—
	Median	—	—	—	0.120	—	—
	Std. dev.	—	—	—	0.202	—	—

Table 1 (*continued*)

Descriptive variables		Pre-spin. Parent	Post-spinoff Parent	Post-spinoff Spinoff	Post-spinoff Comb.	Changes (Δ) Parent post–pre	Changes (Δ) Combined post–pre
Parent RSZ diversity	Mean	0.104	0.113	—	—	0.009	—
measure (*PRSZ Div*)	Median	0.059	0.063	—	—	0.006	—
	Std. dev.	0.169	0.135	—	—	0.146	—
Weighted standard	Mean	0.149	0.135	—	—	−0.013	—
deviation of industry	Median	0.106	0.096	—	—	−0.006	—
M/Bs for parent segments	Std. dev.	0.138	0.133	—	—	0.144	—
(*PStd Dev*)							
Investment measures							
Excess relative investment	Mean	2.852	1.519	—	2.878	−1.333	0.025
(×100)	Median	1.942	0.719	—	1.544	−0.720	−0.041
(*PExc RInv*, *CExc Rinv*)	Std. dev.	3.952	2.650	—	4.077	4.446	4.863
Investment efficiency (×100)	Mean	0.130	0.114	—	0.176	−0.016	0.046
(*PInv Eff*, *CInv Eff*)	Median	0.017	0.000	—	0.010	−0.030	−0.009
	Std. dev.	0.704	0.508	—	0.794	0.716	0.954

The mean (median) excess value for the post-spinoff combined firm is 0.042 (−0.019), while the firm-by-firm change in excess value (ΔCEV) has a mean of 0.078 (0.061).[2] The mean and median changes are statistically significant and hence, on average, the spinoffs yield value improvements. Not all combined firms, however, experience an increase in excess value. In fact, in 42 cases (40%) there is a decrease.

CPost Div, the diversity measure based on ex post data, has a mean (median) of 0.192 (0.120). In spite of the mean market-to-book ratios of the parents and spun off firms having similar sample means, *CPost Div* does suggest that there are differences in the market-to-book ratios on a firm-by-firm basis. *PRSZ Div* and *PStd Dev* suggest that the spinoff events in our sample do not have a large, systematic effect on diversity in a particular direction. For example, the mean (median) *PRSZ Div* moves from 0.104 (0.059) to 0.113 (0.063), and the event-by-event change has a small (and insignificant) mean (median) of 0.009 (0.006). The fact that some spinoff events result in an increase in this particular diversity measure is consistent with the decrease in aggregate excess value observed in 40% of observations in our sample. Although it seems counterintuitive that a divestiture could result in an increase in these two diversity measures, this is a consequence of their construction. For example, consider a parent firm with four, equally sized divisions with industry

[2] The mean CEV is greater than a weighted average of the means of PEV and SEV. We note that it need not be the case that the mean CEV is a weighted average of the means of PEV and SEV.

market-to-book ratios of 0.5, 0.8, 1.2, and 1.6, respectively. By construction, divesting the division with either a M/B of 0.5 or 1.6 reduces the standard deviation of the M/B values of the remaining divisions, but divesting either of the other divisions has the opposite effect. For our purposes, the goal is to exploit the cross-sectional variation of the change in diversity metrics and examine the extent to which it can explain value changes around the spinoff events.

Overall, the combined firms have a mean change in *CExc RInv*, the excess relative investment measure, of close to zero. The pre-spinoff parent has a mean of 2.852 while the post-spinoff combined firm has a mean of 2.878; the mean firm-by-firm change is 0.025 (note we have multiplied investment measures by one hundred in Table 1). Thus, the average excess investment is not reduced in the combined firm, although there is some degree of reduction in the median (from 1.942 to 1.544). There is a statistically significant reduction, however, in the excess relative investment for the parent firm alone, to a mean (median) of 1.519 (0.719). The implication is that parent firms in our sample tend to divest units that were receiving relative investment allocations (as a percent of assets) that were substantially different from those for stand-alone firms in their industries. The results regarding investment efficiency are not as notable. The parent firms alone experience a slight decrease in their investment efficiency metric, with a mean (median) change in *PInv Eff* of −0.016 (−0.030), but the change in the combined firm's efficiency metric is mixed, with a mean (median) of 0.046 (−0.009).

5. Empirical analysis

5.1. Univariate analysis of excess value

In untabulated univariate analysis, we examine whether changes in the combined firm's excess value, ΔCEV, are related to changes in the parent's Herfindahl index, the relative size of the spinoff, the parent's pre-spinoff excess value, and changes in the investment policy metrics. For all but the parent's pre-spinoff excess value, we divide the sample by whether the variable in question is above or below its median to see if ΔCEV is different in each group. There is weak evidence that ΔCEV is greater (more positive) for the group of parent firms with greater increases in their Herfindahl index (the difference in the mean ΔCEV is insignificant while the difference in medians has a p-value of 0.093). We do not find univariate evidence that ΔCEV depends on the relative size of the spinoff. Firms with negative pre-spinoff excess values (there are 58) have a mean (median) ΔCEV of 0.154 (0.094). This contrasts with those having positive pre-spinoff excess values (there are 48)—these firms experience a mean (median) ΔCEV of −0.014 (−0.023). The differences between the two groups are highly significant ($p = 0.011$ for the means and 0.010 for the medians). This indicates that the greatest value improvements are observed where they are most needed, that is, in firms that are trading at a discount. It is worth emphasizing that these are improvements in the combined firm's excess value (including the spun-off unit), not just gains for the parent firm.

Lastly, we examine investment policy. In untabulated results we find that changes in *CExc RInv* are related to value improvements. The means and medians for ΔCEV are higher for the half of the sample that experiences greater reductions in *CExc RInv*. The *p*-value for the differences in means (medians) is 0.027 (0.077), and we conclude that the univariate analysis supports the hypothesis that firms moving toward the investment patterns of single-segment firms experience greater increases in value (Hypothesis 2). We also find similar, although weaker, evidence supporting Hypothesis 3 regarding investment efficiency and increases in value. Both the means and medians of ΔCEV are more positive in the group of spinoffs that increase *PInv Eff* the most (the *p*-values for the differences in means and medians are 0.089 and 0.088, respectively). What remains to be seen is whether these results hold after controlling for other factors.

5.2. Multivariate analysis of diversity and excess value

To analyze the relation between diversity and excess value, we use multivariate regression analysis, controlling for various factors including those discussed in the univariate analysis. Table 2 presents the main results of this paper on whether decreasing the diversity in investment opportunities via a spinoff improves corporate value. Each regression has the change in the combined firm's excess value, or ΔCEV, as the dependent variable. Models 1 through 3 use the full sample of 106 spinoff events and measure diversity by *CPost Div*, Δ*PRSZ Div*, and Δ*PStd Dev*, respectively, while models 4 through 6 focus on a narrower sample that excludes 13 cases in which the pre-spinoff parent firms' segments all have the same two-digit SIC code (although their three-digit codes do differ). One might argue that such firms are not very diversified, so excluding them provides a sample in which the changes in diversity are potentially more pronounced.

In all six models we include the pre-spinoff parent excess value, *Pre-spin PEV*, because, as the univariate analysis indicates, the potential for improvements in corporate value appears to depend on its magnitude prior to the spinoff. Consistent with the univariate results, all regressions show that *Pre-spin PEV* is negatively and significantly related to ΔCEV, the change in the combined firm's excess value (*t*-values range from -2.44 to -3.44). We also include Δ*Log Herf*, the log of the parent's post-spinoff Herfindahl index (excluding the spinoff) minus that of the parent's pre-spinoff index, but it is not significant in the regressions, nor is the size of the spinoff relative to the parent firm significant.

We also try alternative measures of increase in focus used in Desai and Jain (1999) by including indicator variables for (1) whether the reported number of divisions decreases or not, and (2) whether the Herfindahl index increases or not (although they use a sales-based index instead of an asset-based index as we do). These indicator variables are insignificant, while the diversity results remain robust. We also try another of their measures, by using an indicator variable for whether or not the spun-off unit and parent firm have the same two-digit SIC code. This indicator variable is insignificant as well.

Table 2
OLS Regressions on the combined firm's excess value change
ΔCEV (the dependent variable) is the combined firm's post-spinoff excess value minus the parent firm's pre-spinoff excess value. *Pre-spin PEV* is the parent's pre-spinoff excess value. "Pre" values for this and other variables are calculated at the last fiscal year-end prior to the announcement date, and "post" values are calculated at the *second* fiscal year-end date after the effective date. Δ*Log Herf* is the log of the post-spinoff asset-based *Herfindahl* index (excluding the spinoff) minus that of the pre-spinoff index. *Spinoff size* is the spinoff firm's post-spinoff assets divided by the sum of parent and spinoff assets. The indicator Δ*CExc RInv Dum* = 1 for above median values of the change in the combined firm's *Relative excess investment* (1 means the combined firm is *not* in the group whose investment policy has moved closest to stand alone firms). Δ*PInv Eff Dum* is similar but measures changes in the *Investment efficiency* of investment allocation (for the parent only) in terms of investment opportunities (1 means the combined firm is in the group that has improved its investment efficiency the most). *CPost Div* measures diversity between the parent and spun-off firm using ex post, actual book-to-market ratios instead of industry proxies. Δ*PRSZ Div* is the change (post minus pre) in the parent firm's coefficient of variation in weighted divisional investment opportunities (based on Rajan et al., 2000). Δ*PStd Dev* is the change in the weighted standard deviation of industry M/B values for parent segments. *Ctotret* is the combined firm's return in between the pre- and post-dates of the variables. *Spinoff M/B* is the spun-off firm's market-to-book ratio. *Log* (*Passets*) is the log of the parent's assets using the pre-spinoff date. Δ*CVolatility* is the change in the residual standard deviation of the combined firm's stock return from the year prior to announcement to the year following the effective date. *Stand-aloneD* is an indicator variable equal to 1 if the parent has only 1 division after the spinoff. Heteroskedasticity-consistent *t*-values are in parentheses, and expected signs are italicized. Models (4) through (3) exclude cases in which all pre-spinoff parent segments have the same two-digit SIC code

	Using full sample			Using firms diversified at two-digit SIC level		
Exp. sign var. Model:	(1)	(2)	(3)	(4)	(5)	(6)
Constant	−0.300	−0.293	−0.289	−0.383	−0.401	−0.380
	(−2.05)	(−2.11)	(−2.22)	(−2.26)	(−2.41)	(−2.38)
Variables from univariate analysis						
Pre-spin PEV	−0.310	−0.287	−0.258	−0.325	−0.312	−0.253
Negative	(−3.44)	(−3.30)	(−2.99)	(−3.05)	(−3.11)	(−2.44)
Δ*Log Herf*	0.053	0.163	0.083	0.019	0.148	0.045
Positive	(0.53)	(1.41)	(0.86)	(0.19)	(1.29)	(0.45)
Spinoff size	−0.228	−0.199	−1.850	−0.173	−0.162	−0.128
No prediction	(−1.50)	(−1.40)	(−1.18)	(−1.13)	(−1.08)	(−0.77)
Δ*CExc RInv Dum*	−0.091	−0.099	−0.093	−0.092	−0.112	−0.096
Negative	(−1.88)	(−2.10)	(−1.93)	(−1.63)	(−2.09)	(−1.73)
Δ*PInv Eff Dum*	0.077	0.040	0.069	0.079	0.034	0.061
Positive	(1.69)	(0.86)	(1.62)	(1.60)	(0.69)	(1.34)
Diversity variables						
CPost Div	0.405	—	—	0.420	—	—
Positive	(2.73)	—	—	(2.81)	—	—
Δ*PRSZ Div*	—	−0.919	—	—	−1.203	—
Negative	—	(−2.07)	—	—	(−2.65)	—
Δ*PStd Dev*	—	—	−0.480	—	—	−0.488
Negative	—	—	(−2.80)	—	—	(−2.45)
Control variables						
Ctotret	0.151	0.169	0.180	0.160	0.183	0.188
Positive	(4.76)	(5.28)	(5.33)	(5.01)	(5.93)	(5.70)

Table 2 (*continued*)

Exp. sign var. Model:	Using full sample (1)	(2)	(3)	Using firms diversified at two-digit SIC level (4)	(5)	(6)
Spinoff M/B	0.009	0.035	0.034	0.025	0.044	0.039
No prediction	(0.47)	(1.81)	(1.74)	(1.29)	(1.98)	(1.70)
Log (Passets)	0.029	0.029	0.027	0.035	0.041	0.038
No prediction	(1.70)	(1.79)	(1.68)	(1.80)	(2.12)	(1.94)
Δ*CVolatility*	−3.258	−2.914	−2.131	−2.186	−1.700	−1.653
Negative	(−1.66)	(−1.69)	(−1.12)	(−0.84)	(−0.70)	(−0.65)
Stand-aloneD	0.032	0.049	0.045	0.035	0.051	0.054
Positive	(0.54)	(0.84)	(0.71)	(0.50)	(0.80)	(0.74)
Observations	106	106	106	93	93	93
Adjusted $R-sq.$	0.380	0.367	0.379	0.387	0.395	0.383

We also include two dummy variables for investment policy. The first is set to one when Δ*CExc RInv*, the change in the excess relative investment metric, is above its sample median. We predict that the coefficient on this variable will be negative (Hypothesis 2). The second is set to one when Δ*PInv Eff*, the change in the investment efficiency measure, is above its sample median. We predict that the coefficient on this variable will be positive (Hypothesis 3). Because of the differing constructions of these variables, we do not anticipate multicollinearity problems from including both in the same regression (the Pearson correlation coefficient between them is only 0.037). In all regressions the coefficients on these two variables have their predicted sign, but they are not especially significant. The first is significant at 10% or better in all but model 4, where the *t*-value is −1.63. The second is only significant at the 10% or better level in model 1, with a *t*-value of 1.69. Overall, the multivariate results for our sample are only weakly supportive of the investment policy hypotheses. Using the continuous versions of the variables instead of indicator variables does not improve the results.

The excess investment metric, Δ*CExc RInv*, is adjusted for the firm's overall investment level by construction. We substitute the change in an alternative measure which does not make such an adjustment, but it is not significant even with the indicator variable approach. We also try an absolute value adjustment so that overinvestment in one segment does not offset underinvestment in another in the measurement of overall excess investment, but this is insignificant. For Δ*PInv Eff* we try an alternative version that is similar to RSZ's absolute investment efficiency measure and this too is insignificant.

We find strong support for our principal hypothesis that improvements in value are related to reductions in diversity in investment opportunities (Hypothesis 1), regardless of which measure of diversity we use. All three diversity variables are significant with the appropriate signs. When diversity is measured by our ex post diversity measure, *CPost Div* (the weighted average of the absolute deviations of the market-to-book ratios of the parent and spinoff), the coefficient has a *t*-value of 2.73 with the full sample (model 1), and 2.81 with the narrower sample (model 4). When diversity is measured by $\Delta PRSZ\ Div$, the coefficient is negative as predicted, with a *t*-value of −2.07 for the full sample (model 2), and a *t*-value of −2.65 with the smaller sample (model 5). When we measure diversity by $\Delta PStd\ Dev$, the coefficient's *t*-value for the full sample is −2.80 (model 3), and it is −2.45 with the narrower sample (model 6). Comparing $\Delta PRSZ\ Div$ to $\Delta PStd\ Dev$ across models 2, 3, 5, and 6, we do not conclude that the results are very different when measuring diversity in asset-weighted *Q* versus equally weighted *Q*. In unreported results we try an alternative version of $\Delta PStd\ Dev$ that ignores asset weights entirely (see the definition in Appendix A). The change in this metric has a *t*-value of −2.32 with the full sample and −3.26 with the narrower sample. Thus, both versions of $\Delta PStd\ Dev$ are highly significant.

To get a sense of the economic significance of these results, consider the standard deviation of $\Delta CPost\ Div$, which is 0.202. The coefficient in model 1 on $\Delta CPost\ Div$ implies that a change of one standard deviation in this variable results in a change in the combined firm's excess value, ΔCEV, of 8.2%. A similar exercise using model 2 implies that a one standard deviation improvement in $\Delta PRSZ\ Div$ results in a 13.4% improvement in aggregate excess value. The analogous value improvement for $\Delta PStd\ Dev$ using model 3 is 6.9%. We now turn to a brief discussion of the additional control variables that we include. It is worth noting, however, that in unreported results the diversity variables remain significant if these additional controls are excluded.

The first control variable we include is *Ctotret*, the combined firm's overall return from the pre-spinoff date to the post-spinoff date (based on when variables are calculated). This is included to ensure that the diversity measure isn't simply proxying for market returns in some fashion. It is not surprising that this variable has strong, positive significance (*t*-values range from 4.76 to 5.93), since value gains should be positively associated with returns over the period. To confirm that the relation between our diversity metrics and value improvements is not merely due to the parent spinning off a division with particularly poor (or strong) investment opportunities, we also include the spinoff firm's market-to-book ratio as a control variable. To some extent, the inclusion of this variable also addresses the concern that the significance of *CPost Div* is hardwired since both it and the dependent variable contain the market and book values of the spinoff firm.

We find that the coefficient on the spinoff's market-to-book ratio is positive and significant at the 5% level in model 5, and is more weakly significant in models 2, 3, and 6. We note that because the change in the combined firm's excess value is the dependent variable, value improvements should not merely be driven by the parent spinning off a highly valued unit. To make sure, however, in unreported results we replace the spinoff's market-to-book ratio with the spun-off firm's excess value (measured at the post-spinoff date). The diversity results remain robust. We also control for possible size effects by including the log of the parent's assets, *Log* (*Passets*). This variable's coefficient is positive and weakly significant in all but model 5, where it is more significant with a *t*-value of 2.12. The change in the combined firm's residual standard deviation, $\Delta CVolatility$, is included to control for the finding in Krishnaswami and Subramaniam (1999) that reductions in informational asymmetries can lead to greater value improvements in a spinoff. Consistent with their results, the coefficient is negative as expected but only weakly significant at best in only two models. We do not regard this as an adequate test for the information asymmetry effects found in Krishnaswami and Subramaniam (1999) because we do not examine some of the variables for which they find the most explanatory power (such as analyst forecast errors). Finally, value improvements may depend on whether the spinoff results in the firm becoming a single-segment firm. *Stand-aloneD* is a dummy variable to control for this possibility, and it is not significant in any of the models.

5.3. Announcement returns

Although not the focus of our paper, for completeness we examine the parent's stock returns around the spinoff announcements. We calculate excess holding-period returns from -2 to $+1$ days surrounding the spinoff's announcement, where the holding-period return of the value-weighted NYSE/AMEX/Nasdaq index is subtracted from the parent's return (narrower or wider windows yield similar results). The mean and median announcement-period returns are 3.7% and 3.2%, respectively. These magnitudes are similar to those reported in the existing literature. For example, Desai and Jain (1999) report three-day average abnormal returns of 3.84%. The abnormal return appears to be highly significant, as the standard error is 0.6% and 74% of the returns are positive.

We estimate various regression models of the returns on the diversity measures and various control variables, but do not find that announcement returns are significantly related to reductions in diversity. There are several possible reasons for the insignificant results. First, it could be that our sample is too small and noisy to pick up the effect (we note that the estimated coefficients do have the right signs). Second, the effect of diversity could be a subtle one that tends to manifest itself over a longer period of time as operating cash flows are affected. Its impending effect may not be readily apparent to the market at the time of the spinoff's announcement. Third, for many spinoffs the announcement does not provide the market with sufficiently precise information as to which assets and liabilities are being divested and which are not. This is especially true when the firm's divisions are somewhat related in either a horizontal or vertical manner. Finally, any information released at times does not correspond very closely with the reorganization that eventually takes place (if at all). For example, in January 2002 Tyco International announced plans to spin off three units, but a few weeks later it announced an altered plan in which only two units might be divested (but considerable uncertainty remained).

5.4. Robustness

In Table 3, we assess the robustness of our diversity results. The first robustness check concerns the validity of our diversity measures themselves. It is possible that the diversity measures are simply measuring the extent to which the parent makes a clean break from its divested unit. For example, does it maintain substantial operations in the business line or not? To a large extent the size-weighted aspect of the diversity measures handles this concern. To examine the issue in more detail, however, we code a clean indicator variable equal to one if all three of the following conditions are met: (1) the number of reported divisions in the firm is reduced by one, (2) the division that is divested has a different two-digit SIC code from the surviving divisions, and (3) the divisions that are retained keep the same two-digit SIC codes as in the pre-spinoff data. In combination, these conditions are fairly restrictive and thus come close to representing the lower bound of spinoffs that could be classified as clean depending on one's subjective definition. In our sample, 29 spinoffs are so coded. If our diversity variables are simply measuring cleanness, the significance of our diversity measures should be negatively affected once we include the clean variable. As shown in Panel A1 of Table 3, when we add this variable the *t*-values on *CPost Div*, Δ*PRSZ Div*, and Δ*PStd Dev* remain significant at 2.84, −2.69, and −2.73, respectively (models 1 through 3, respectively), quite similar to those reported in Table 2. The results are therefore robust and our diversity variables seem to pick up more than cleanness. To see if the impact of diversity is greater for the observations that are coded as clean, we include the diversity variable, the clean variable, and an interaction term between the two. For convenience, we report these results in the table (Panel A2) even though this is not actually a robustness check on the basic diversity results. As shown, the interaction term has a *t*-value of −2.34 when Δ*PRSZ Div* is the diversity measure, while it is insignificant for the others. Thus, there is some evidence that the diversity results are stronger in these cases, but only for one of the diversity measures.

It is also interesting to examine whether the stark case in which the parent firm consists of two divisions before the spinoff and splits into two focused firms is largely responsible for the diversity results. We take an approach similar to the one described above and code a focused variable equal to one in these cases (22 spinoffs are thus coded). Panel B1 of Table 3 reports estimations with this variable. (The stand-alone dummy variable is excluded since it is highly correlated with the focused variable.) The *t*-values on the diversity variables are fairly similar to those reported in Table 2 and continue to show strong significance in the predicted directions. Thus, the diversity metrics capture more than whether or not the parent splits into two focused firms. To see if the impact of diversity is greater in the focused cases, we include the focused dummy and an interaction term between it and the diversity measure. The results are reported here for convenience (Panel B2). The interaction term is never significant, and thus there is no evidence that the relation between diversity and excess value is stronger in these cases.

Panel C in Table 3 addresses a concern over the timing of our ex post diversity metric and the ex post component of the RSZ metric, since some period of time has

Table 3
Robustness checks on regression models from Table 2

Below, heteroskedasticity-consistent *t*-values for the diversity measures are presented for various robustness estimations from Table 2 (models 1 through 3). Where appropriate, *t*-values on robustness variables (as defined below) are also presented. "Concern" refers to the robustness issue being examined, while "Test" refers to the test performed to address the issue. Panel A2 and B2 examine whether the impact of diversity is greater in certain cases

A1. Concern: Diversity results are driven by cases in which the parent makes a clean break from the divested unit.
Test: Incorporate an indicator variable coded *Clean* = 1 in cases where data suggest parent has spun off one distinct division in a different industry from the divisions that remain within the parent. Sample=106.

Model	Diversity variable	*t* for diversity	*t* for *Clean*
1	*CPost Div*	2.84	1.25
2	Δ*PRSZ Div*	−2.69	1.34
3	Δ*PStd Dev*	−2.73	0.62

A2. Question: Is the impact of diversity greater in cases in which the parent makes a clean break from divested unit?
Test: Include an interaction term for *Clean* × diversity. Sample = 106.

Model	Diversity variable	*t* for diversity	*t* for *Clean*	*t* for *Clean* × diversity
1	*CPost Div*	2.72	0.72	0.36
2	Δ*PRSZ Div*	−0.43	0.91	−2.34
3	Δ*PStd Dev*	−3.11	0.84	1.20

B1. Concern: Diversity results are driven by cases in which the parent firm splits from two divisions into two focused firms.
Test: Incorporate an indicator variable coded *Focused* = 1 when this scenario occurs. Sample=106.

Model	Diversity variable	*t* for diversity	*t* for *Focused*
1	*CPost Div*	2.77	1.39
2	Δ*PRSZ Div*	−2.43	1.62
3	Δ*PStd Dev*	−2.89	1.19

B2. Question: Is the impact of diversity greater in cases in which the parent firm splits from two divisions into two focused firms?
Test: Include an interaction term for *Focused* × diversity. Sample=106.

Model	Diversity variable	*t* for diversity	*t* for *Focused*	*t* for *Focused* × diversity
1	*CPost Div*	1.77	0.83	0.66
2	Δ*PRSZ Div*	−1.28	1.63	−0.84
3	Δ*PStd Dev*	−3.04	1.22	0.78

C. Concern: Asset sales and/or capital raising activity by the parent or spun-off firm before the post-spinoff diversity measure is calculated induces some sort of bias.
Test (i): Exclude observations where |*issuances* − *asset sales*|⩾10% of pre-spinoff assets for either the parent or spun-off firm.

Model	Diversity variable	*t* for diversity	Sample size
1	*CPost Div*	2.32	91
2	Δ*PRSZ Div*	−2.55	91
3	Δ*PStd Dev*	−2.14	91

Test (ii): Exclude observations where any of the following occur: (a) parent issues ⩾10%, (b) parent sells ⩾10%, (c) spun-off firm issues ⩾10%, (d) spun-off firm sells ⩾10%.

Model	Diversity variable	*t* for diversity	Sample size
1	*CPost Div*	2.18	89
2	Δ*PRSZ Div*	−2.69	89
3	Δ*PStd Dev*	−2.16	89

D. Concern: Results are dependent on using asset-based excess values.
Test: Use sales-based excess values.

Model	Diversity variable	*t* for diversity	Sample size
1	*CPost Div*	1.81	106
2	Δ*PRSZ Div*	−2.16	106
3	Δ*PStd Dev*	−3.35	106

Table 3 *(continued)*

E. Concern: Outliers cause the diversity results.

Test (i): Use an indicator variable for whether the change in diversity is above its sample median.

Model	Diversity variable	t for diversity	Sample size
1	*CPost Div Dummy*	3.09	106
2	Δ*PRSZ Div Dummy*	−1.63	106
3	Δ*PStd Dev Dummy*	−1.94	106

Test (ii): Exclude observations where the diversity measure being used is in the top or bottom 5% of values.

Model	Diversity variable	t for diversity	Sample size
1	*CPost Div*	2.52	95
2	Δ*PRSZ Div*	−2.07	95
3	Δ*PStd Dev*	−2.04	95

F. Concern: The post-spinoff diversity measure (Δ*CPost Div*) does not appropriately account for the diversity that remains within the post-spinoff parent or spun-off firm.

Test (i): Use *PRSZ Div* for the pre-spinoff diversity measure, but for the post-spinoff measure use a weighted-average of the RSZ measure for the parent and spun-off firm to measure the combined firm's diversity:

Post-spin $CRSZ\ Div = [(W_P)(Post\text{-}spin\ PRSZ\ Div) + (W_S)(Post\text{-}spin\ SRSZ\ Div)]$.

The combined firm's change in diversity is thus $\Delta CRSZ\ Div = (Post\text{-}spin\ CRSZ\ Div) - (Pre\text{-}spin\ PRSZ\ Div)$.

Model	Diversity variable	t for diversity	Sample size
2	Δ*CRSZ Div*	−2.10	106

Test (ii): Use *PStd Dev* for the pre-spinoff diversity measure, but for the post-spinoff measure use a weighted-average of the *Std Dev* measure for the parent and spun-off firm to measure the combined firm's diversity:

$Post\text{-}spin\ CStd\ Dev = [(W_P)(Post\text{-}spin\ PStd\ Dev) + (W_S)(Post\text{-}spin\ SStd\ Dev)]$.

The combined firm's change in diversity is thus

$\Delta CStd\ Dev = (Post\text{-}spin\ CStd\ Dev) - (Pre\text{-}spin\ PStd\ Dev)$.

Model	Diversity variable	t for diversity	Sample size
3	Δ*CStd Dev*	−2.09	106

passed following the spinoff. Specifically, it is possible that there is a material change in firm size in the intervening period. While this can introduce noise, it is unlikely to affect our measures in a biased manner. To investigate, however, we search news articles in Lexis-Nexis for asset sales, equity issues, debt issues, etc., for both the parent and spinoff firm from the spinoff's effective date until the date the ex post measure is calculated. We also search the *Directory of Corporate Financing* as an additional source for information on issuances. We screen out cases in which the size of the net change (issuances less asset sales) in firm size is less than 10% of the firm's adjusted assets. The spinoff's adjusted assets are the post-spinoff assets plus the size of asset sales minus the size of issuances. Thus, the adjusted assets are an estimate of the spun-off unit's pre-spinoff assets. The parent's adjusted assets are similarly computed (and thus are an estimate of the parent's pre-spinoff assets excluding the divested unit). By screening out these cases we address the possibility of changing investment opportunities due to the firm's decision to change its size or makeup beyond that implied by normal asset growth and the spinoff itself.

Fifteen observations have a net change exceeding 10% for either the parent or the spinoff firm. As shown in Table 3 (see Test (i) in Panel C), the diversity results are qualitatively unchanged when we re-estimate the regressions without these 15 observations. We also repeat the analysis by excluding cases in which either the parent or spinoff firm either raises capital of more than 10% or sells assets of more than 10% of adjusted assets (instead of using the *net* change, issuances minus sales). This results in the exclusion of only two additional firms. The results are reported under Test (ii) of Panel C, and once again the results are largely unaffected.

We also consider an alternative construction of our excess value measures. Instead of asset-based measures, we compute sales-based excess values and reestimate models 1 through 3. As shown in Panel D, the significance level drops a bit for *CPost Div* and Δ*PRSZ Div*. The two variables remain significant, however, at the 10% and 5% level, respectively. The Δ*PStd Dev* variable remains highly significant, with a *t*-value of -3.35. Overall, the sales-based measures continue to lend support for a relation between value improvements and changes in diversity.

We also perform checks to make sure the diversity results are not driven by outliers. In Test (i) under Panel E, we use indicator variables for each diversity measure (coding each variable as one when it is above its sample median). *CPost Div* shows increased significance using the dummy approach. The significance level of Δ*PRSZ Div* is reduced such that the variable is not quite significant at the 10% level. Δ*PStd Dev* also experiences a drop in significance and is not quite significant at the 5% level. In Test (ii) we remove the top and bottom 5% of observations in order to exclude outliers for the diversity variables. The significance levels drop, but all diversity measures are still significant at the 5% level or better. Overall, we conclude that the results are not driven by outliers, although Δ*PRSZ Div* and Δ*PStd Dev* do seem more affected than *CPost Div*.

The final robustness check concerns the way in which the ex post diversity measure, *CPost Div*, treats the post-spinoff parent and spun-off firms as two homogeneous units when in fact they each could consist of multiple divisions. Although the market-to-book value of each should reflect the market's assessment of the effect of remaining diversity on overall investment opportunities, we construct a post-spinoff diversity measure that is a hybrid of the ex post measure *CPost Div* and the RSZ approach which uses industry market-to-book ratios. Specifically, we first calculate the post-spinoff RSZ diversity measure for the spun-off firm, and then set the overall post-spinoff RSZ diversity measure equal to the weighted average (based on relative asset sizes) of the post-spinoff parent and the spinoff firm's RSZ measures (*PRSZ Div* and *SRSZ Div*, respectively). Thus, the change in the combined firm's RSZ diversity measure, which we call $\Delta CRSZ\ Div$, is equal to

$$[(W_P)(Post\text{-}spin\ PRSZ\ Div) + (W_S)(Post\text{-}spin\ RSZ\ Div)] \\ - [Pre\text{-}spin\ PRSZ\ Div], \quad (5)$$

where W_P and W_S are the relative post-spinoff asset sizes of the parent and spun-off firm. This variable should be negatively related to changes in excess value. As reported in Test (i) of Panel F, this variable is significant at the 5% level, with a t-value of -2.10. We also construct a similar variable using *PStd Dev* (see Test (ii)). This variable is significant with a t-value of -2.09.

6. Concluding remarks

Conglomerate discounts have been attributed to diversity in divisional investment opportunities on the theory that such diversity exacerbates agency problems, distorting investment allocation, and causing a loss in firm value. The diversity cost hypothesis is difficult to test directly, however, because of the absence of stock market and other financial information at the divisional level. Our approach in this paper is to examine the diversity cost hypothesis by analyzing changes in excess values resulting from spinoffs. Spinoff events, we argue, provide a particularly useful setting for a test of the hypothesis due to the availability of post-spinoff market and accounting data for the spun-off unit and remaining parent. Using this approach, we reconstruct the firm after the spinoff and assess the aggregate improvement in excess value. For our diversity measure, we introduce a metric based on ex post market-to-book values for the spun-off unit and parent firm. Using this particular metric allows us to examine diversity without relying on noisy and potentially biased industry proxies. Drawing upon the existing literature on diversity, we examine diversity measures based on industry proxies for comparison purposes. All of the metrics indicate that reductions in diversity contribute significantly to improvements in excess value.

A recent stream of literature suggests that conglomerate discounts do not represent losses in firm value after all. They may be the result of a selection bias, reflecting characteristics of divisions constituting the conglomerate, rather than inefficiencies stemming from the diversified structure itself. Alternatively, they could result from methodological flaws. In this regard, our results provide support for the view that discounts at least partially reflect actual losses associated with the diversified structure. The spinoffs reduce these losses and increase excess value. The strong relation between aggregate value improvements and reduction in divisional diversity provides significant support for the agency cost view of discounts. There would be no reason to expect such a relation if the discounts only reflected inherent characteristics of the firm's divisions or flaws in empirical methodology. Finally, we show weak evidence that changes in investment policy are associated with improvements in excess value. Our results suggest, however, that diversity affects firm value in ways other than just contemporaneous investment policy.

Appendix A. Details of variable construction and data screens

A.1. Definitions of industry-based diversity and investment policy measures

1. $\Delta PRSZ\,Div$. We use industry median market-to-book values, $Ind_i(M/B)$, to proxy for segment i's value of Q and define our parent firm's asset-weighted RSZ diversity measure, $PRSZ\,Div$, as below:

$$PRSZ\,Div = \frac{\sqrt{\frac{\sum_{i=1}^{n}(W_i\,Ind_i(M/B) - [(1/n)\sum_{i=1}^{n} W_i\,Ind(M/B)])^2}{n-1}}}{\frac{\sum_{i=1}^{n} Ind_i(M/B)}{n}}. \qquad \text{(A.1)}$$

   W_i is the asset weight for segment i and the summation is taken over segments in the parent firm. Industry medians are calculated at the four-digit SIC level whenever there are at least five focused firms with available data, and at the three-digit SIC level or two-digit level as needed. The change in this diversity measure is then defined as $\Delta PRSZ\,Div = (Post\text{-}spin\,PRSZ\,Div) - (Pre\text{-}spin\,PRSZ\,Div)$.

2. (a) $\Delta PStd\,Dev$. Using similar notation to that for $\Delta PRSZ\,Div$, the weighted standard deviation of equally-weighted segment investment opportunities as follows:

$$PStd\,Dev = \sqrt{\frac{\sum_{i=1}^{n} W_i\,(Ind_i(M/B) - [(1/n)\sum_{i=1}^{n} Ind(M/B)])^2}{n-1}} \qquad \text{(A.2)}$$

   (b) For the equally weighted version discussed in the empirical results, W_i is simply removed from the formula.

3. (a) $\Delta CExc\,RInv$. To measure a firm's relative excess investment, we first measure each division's capital expenditures, I_i, as a percentage of the beginning-of-the year assets (i.e., the prior year's end-of-year assets). We gross up divisional capital expenditures so that their sum totals capital expenditures for the firm as a whole. As RSZ note, matching prior-year assets to current-year data on a division-by-division basis is problematic. We therefore follow RSZ and estimate beginning-of-year assets. Specifically, we take the division's (unadjusted) end-of-year assets, DA_i, subtract capital expenditures, add depreciation, and then gross-up the

estimated segment beginning-of-year assets so that their sum equals the prior year's assets for the overall firm. The ratio is I_i/DA_i in the formula that follows. Qualitatively similar results are found if we do not gross up either I_i or DA_i. The firm's *Exc RInv* is defined as follows, where $Ind_i(I/A)$ is the median ratio of capital expenditures to assets for focused firms in the industry (we follow a procedure similar to that used in obtaining industry medians for $\Delta PRSZ\ Div$):

$$Exc\ RInv = \sum_{i=1}^{n} W_i\ Abs\left[\frac{I_i}{DA_i} - Ind_i\left(\frac{I}{A}\right) - \overline{EI}\right],\ \text{where}$$

$$\overline{EI} = \sum_{j=1}^{n} W_j\left[\frac{I_j}{DA_j} - Ind_j\left(\frac{I}{A}\right)\right]. \tag{A.3}$$

Both summations are taken over all divisions for the parent firm, and also include the spinoff firm(s) for the post-spinoff measure. For the spinoff firms, we use the actual prior-year assets when available and estimate them when they are not available, although results are qualitatively similar if we estimate prior-year assets using current-year data in all cases. Estimates of prior-year assets (when used) are obtained by adding depreciation and subtracting capital expenditures from end-of-year assets. $\overline{EI}$ can be thought of as the weighted absolute excess investment of the divisions. The larger *Exc RInv*, the less similar is the diversified firm's investment policy to that of stand-alone firms. By subtracting $\overline{EI}$, we are controlling for the overall investment level of the firm, since we wish to focus on allocation decisions given the firm's aggregate investment. *Exc RInv* is measured before the spinoff (for the parent firm) and after the spinoff (for the combined firm). Where the spinoff firm consists of multiple divisions, each division enters into the metric on its own. Otherwise the spinoff firm itself enters the formula as only one of the n terms being summed. We define the combined firm's change as follows $\Delta CExc\ RInv = (CPost\ Exc\ RInv) - (PPre\ Exc\ RInv)$. In the regression analysis we use a dummy variable set to one when $\Delta CExc\ RInv$ is above its median value.

(b) In the empirical analysis we discuss using the change in $\overline{EI}$ itself, so that we are not controlling for the firm's aggregate investment level. Such a measure is closer to that used in RSZ and Scharfstein and Stein (2000). We also try adjusting $\overline{EI}$ so that overinvestment in one segment does not offset underinvestment in another, by simply taking the absolute value of each term in the summation.

4. (a) $\Delta PInv\ Eff$. We use techniques and definitions similar to those for $\Delta CExc\ RInv$ to measure the change in the efficiency of the parent firm's investment policy. The firm's investment efficiency is analogous to RSZ's relative value added measure and is defined as follows:

$$PInv\ Eff = \sum_{i=1}^{n} W_i\left[\frac{I_i}{DA_i} - Ind_i\left(\frac{I}{A}\right) - \overline{EI}\right]\left[Ind_i\left(\frac{M}{B}\right) - \overline{Ind_i(M/B)}\right], \tag{A.4}$$

where $\overline{Ind_i(M/B)}$ is the asset-weighted average of $Ind_i(M/B)$ across all divisions (see the definition of $\Delta PRSZ\ Div$ for details on $Ind_i(M/B)$). The more positive (negative) *PInv Eff* is, the more (less) efficient is the parent firm's investment allocation. The spinoff firm is not included in the post-spinoff metric, so that the metric captures the quality of the internal capital market. The change in the parent firm's investment efficiency around the spinoff is defined as follows $\Delta PInv\,Eff = (PPost\,Inv\,Eff) - (PPre\,Inv\,Eff)$.

(b) In the empirical analysis we discuss the use of an alternative definition analogous to RSZ's absolute value added measure. This metric is similar but it does not subtract $\overline{EI}$ in the first term, and $\overline{Ind_i(M/B)}$ is replaced by the number one in the second term.

A.2. Definitions of control variables

1. $\Delta Log\,Herf$. Log of the post-spinoff parent's asset-based Herfindahl index minus that of the pre-spinoff index. Desai and Jain (1999) and others report that focus-increasing spinoffs result in greater stock market gains than non-focus-increasing spinoffs. The parent's asset-based Herfindahl index is defined in the usual way:
$$PHerf = \frac{\sum_{i=1}^{n}(DA_i)^2}{\left(\sum_{i=1}^{n} DA_i\right)^2}, \tag{A.5}$$
where DA_i refers the assets of division i. This is computed both prior to and following the spinoff, where the post-spinoff value does not include the spinoff unit(s). In the regression analysis, $\Delta Log\,Herf$ is calculated as Log ($Post\,PHerf$) minus Log ($Pre\,PHerf$). The expected relation to the change excess value is positive.
2. $\Delta CVolatility$. Change in the combined firm's residual standard deviation. Krishnaswami and Subramaniam (1999) find that a reduction in information asymmetry around spinoffs enhances value. They primarily focus on earnings forecast errors by stock analysts, but also find some explanatory power for the reduction in the residual standard deviation of stock returns following the spinoff event. $\Delta CVolatility$ is the change in the residual standard deviation of stock returns for the combined firm. Following Krishnaswami and Subramaniam, we find a match for both the parent firm and spun-off firm.[3] Following their method, the pre-spinoff residual standard deviation for the parent ($Pre\,PVolatility$) is computed as the standard deviation of daily stock returns for the parent firm, minus the standard deviation for the match firm, over the one-year period prior to the spinoff's announcement. The post-spinoff residual standard deviation is similarly computed for the parent ($Post\,PVolatility$) and spun-off unit ($Post\,SVolatility$), over the year following the effective date. To calculate a post-spinoff residual standard deviation for the combined firm, $Post\,CVolatility$, we simply compute the weighted average of $Post\,PVolatility$ and $Post\,SVolatility$, using relative asset sizes of the parent and spun-off unit(s). The change in the combined firm's standard deviation is then calculated as $\Delta CVolatility = (Post\,CVolatility) - (Pre\,PVolatility)$. Under the assumption that this metric

[3] See Krishnaswami and Subramaniam (1999) for more detail on the matching procedure. Ours follows their procedure, except that assets are used instead of market values. The matching procedure matches on both primary SIC codes and size.

proxies for the change in information asymmetries that affects spinoff gains, this variable should be negatively related to changes in excess value.

3. *Ctotret*. Total holding-period return of the combined firm, using raw (unadjusted) monthly returns, from the date *Pre-spin PEV* is calculated to the date *Post-spin CEV* is calculated. Until the spun-off unit begins trading, the parent firm's stock return is used. After that date the holding-period return is calculated for both the parent and spun-off firm(s), and the combined holding-period return is calculated as the weighted average of the returns, using asset weights. To the extent that changes in excess value reflect stock market returns, *Ctotret* is expected to be positively related to ΔCEV.
4. *Spin-off size*. The spun-off unit's assets divided by the sum of parent and spun-off unit assets (using post-spinoff values for assets, and summing multiple spinoff firms when needed). We make no prediction on this variable's expected relation to ΔCEV.
5. *Spin-off M/B*. Market-to-book ratio of the spun-off unit, where the numerator is the sum of the market value of common stock, the book value of preferred stock, and the book value of current and long-term debt, and the denominator is the book value of assets. Post-spinoff values are used, and an asset-weighted average is taken when multiple spinoff firms exist. We make no prediction on this variable's expected relation to ΔCEV.
6. *Log* (*Passets*). Log of the parent's asset size, using the *pre*-spinoff value. We have no predictions regarding this variable's expected relation to ΔCEV.
7. *Stand-aloneD*. An indicator equal to one if the number of divisions in the post-spinoff parent equals one and zero if the parent continues to have multiple reported divisions. Because these are cases in which the surviving parent is no longer diversified, ΔCEV may be larger in such cases.

A.3. Additional detail on data screens

After requiring appropriate data from SDC, CRSP, and COMPUSTAT, we ensure that the divested unit is effectively independent after the spinoff by eliminating cases in which the parent spins off less than 80% of the subsidiary. In only four cases does the parent retain any ownership. We also eliminate cases in which the spun-off unit exists as a publicly traded entity prior to the spinoff (i.e., cases in which the parent firm owns a large block of shares of an existing firm). Such scenarios do not generally entail the type of changes to the firm's organizational structure and internal capital market that we wish to study. In addition, we check news articles to confirm the spinoff event and eliminate cases in which the spinoff results from a bankruptcy reorganization or from preparations for a merger. When the sum of divisional assets deviates by more than 25% from the parent's assets, we examine financial statements to check (and occasionally correct) the divisional asset amounts. Following the convention in the literature, we eliminate cases in which the deviation remains at more than 25%. These data restrictions result in an initial sample of 163 spinoff events. Forty-four events are then eliminated because the segment data do not contain multiple segments. Three additional cases are eliminated because the parent has tracking stock (rendering many of our variables inappropriate). We eliminate two more observations because the parent firms are not truly diversified according to company-provided division descriptions, and then two more because the parent firm trades as an American Depository Receipt (ADR), making interpretation of financial data and the appropriateness of US industry matches questionable. This yields a sample of 112.

Nine of the parent firms in our sample have multiple divisions with the same four-digit SIC code, although all but two of them have at least one additional division with a different three-digit SIC code. Our results are robust to excluding these nine firms. In five cases, a parent spins off multiple divisions into multiple firms in an event with the same announcement and effective dates. Four of these cases result in two spun-off firms, and one results in three. The results are robust to excluding these cases, but the reported results consolidate these multiple spinoffs into a single observation. For each variable of interest we simply calculate an asset-weighted average of the variable values for individual spun-off units (unless otherwise noted in the variable definitions). After consolidating these cases, we are left with our final sample of 106. There are four cases in which a parent firm spins off a second division before the post-spinoff data are calculated for an earlier event. We include and treat these cases as separate events, although our results are robust to excluding parent firms with such overlapping events.

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