Asset Restructuring and the Cost of Capital

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Abstract

We empirically examine whether the elimination of negative synergies, the reduction of internal capital market inefficiencies, and the mitigation of information problems following spinoffs lower cost of equity. The results indicate that there is no decrease in the cost of equity in the full sample, which suggests that the gains around spinoffs are primarily a consequence of improvements in cash flow and operating performance rather than a decline in systematic risk or the cost of equity. However, we find a positive relation between the spinoff gains and a decrease in the cost of equity for the subsample of firms with high information asymmetry, and for the subsample of non-focus-increasing spinoffs shown in prior studies to have no improvements in future cash flow or operating performance. For firms with high information asymmetry, the relation between the spinoff gains and the decline in cost of equity is attributable to a decline in the cost of equity of the post-spinoff *parent* entity. The results indicate that spinoffs facilitate a decrease in adverse selection costs, and this is especially value enhancing for the parent firms, which are higher growth and more reliant on external capital.

1. Introduction

The recent decade has seen a resurgence in corporate refocusing initiatives by firms through divestitures. Extant literature documents that most of these divestitures are value enhancing for the shareholders of these firms.[1] Several arguments have been proposed for the observed gains around divestitures, foremost among them being the improvement in focus and the elimination of the inefficiencies of internal capital markets, mitigation of information asymmetry regarding the different divisions of multi-division firms, and improved alignment of managerial incentives with shareholder incentives.[2]

Most of the prior studies imply that the gains around divestitures are achieved primarily through an improvement in the future cash flows due to the elimination of the existing inefficiencies. However, given that a firm's equity value is the present value of future cash flows to equity discounted at the cost of equity, any increase in the share price may be explained either by an expected improvement in future cash flows, or an anticipated decline in the cost of equity, or both. While several theoretical studies provide implications for why the reallocation of assets and the elimination of inefficiencies through divestitures could affect the cost of equity, none of the prior empirical studies examine the link between the divestiture gains and changes in the cost of equity. In this paper, we focus on a specific type of divestiture, corporate spinoffs, and analyze changes in the systematic risk around spinoffs to study whether the gains can be explained by a decrease in the cost of equity.

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[1] See for example, Hite and Owers (1983), Schipper and Smith (1983 and 1986), Comment and Jarrell (1995), John and Ofek (1995), Lang, Poulsen, and Stulz (1995) Allen and McConnell (1998), and Berger and Ofek (1999).

[2] Evidence of divestiture gains from improvement in focus and the elimination of internal capital market inefficiencies is in Comment and Jarrell (1995), Daley, Mehrotra, and Sivakumar (1997), Desai and Jain (1999), Gertner, Powers, and Scharfstein (2002), Ahn and Denis (2002), and Burch and Nanda (2002), theory and evidence of gains from the mitigation of information asymmetry are in Habib, Johnson, and Naik (1997), Krishnaswami and Subramaniam (1999), Nanda and Narayanan (1999), and Gilson, Healy, Noe, and Palepu (2001), and arguments relating the gains to improved alignment of managerial incentives is in Aron (1991).

Firms typically divest assets through asset sales, equity carve-outs, or spinoffs. While the impact of divestitures on systematic risk and cost of equity capital may be important in all three modes of divestitures, there are specific advantages to focusing on corporate spinoffs. Spinoffs provide a cleaner vehicle to study risk changes because, unlike equity carve-outs, a spinoff separates the divisions of a multi-division firm completely so that there can no longer be any internal transfers between the divisions, and each division trades as a stand-alone entity after the spinoff. In contrast, the parent in an equity carve-out maintains a controlling interest in the carved-out subsidiary so that some residual cross-subsidization and investment inefficiency may persist even after the divestiture. Therefore, if the post-divestiture elimination of internal inefficiencies leads to a decline in the cost of equity, this effect would be most discernable in spinoffs. In the case of asset sales, the analysis of risk profiles and cost of equity changes is confounded because the divested assets become part of another firm and the cost of equity of the divested division cannot be measured unambiguously. A spinoff is free from these effects since it cleanly separates the assets while essentially preserving the assets completely in the two entities created post spinoff. Therefore, any changes in systematic risk and the cost of equity around the spinoffs must be a consequence of the elimination of inefficiencies.

Our paper is motivated by and complements prior studies on corporate spinoffs that have examined whether improvements in the operating performance of the post-spinoff entities explain the positive abnormal returns around spinoff announcements. In this context, Daley, Mehrotra, and Sivakumar (1997) document a significant increase in operating performance from before to after the spinoff for focus-increasing spinoffs. Desai and Jain (1999) present similar results and further report a positive relation between the announcement-period returns and future operating performance changes. These studies conclude that investors' expectation of

improvements in future cash flows explains part of the announcement period abnormal returns. However, they do not analyze whether changes in cost of equity may also be responsible for the gains from spinoffs.

There are at least four reasons to believe that spinoffs could affect the cost of equity capital. First, the diversity cost hypothesis in Rajan, Servaes, and Zingales (2000) and Scharfstein and Stein (2000) argues that there is a cost to firm diversity due to the rent-seeking behavior by divisional managers of multi-division firms. Ahn and Denis (2002) and Burch and Nanda (2002) find evidence consistent with lowered agency costs and a reduced discount in share price following spinoffs. Hence, as manager-shareholder agency costs decrease following spinoffs, we would expect an associated decrease in the cost of equity. Second, Gertner, Powers, and Scharfstein (2002) show that asset restructuring through spinoffs leads to efficient redeployment of the assets and improvement in investment efficiency. To the extent that the restructuring and redeployment of the assets alters the systematic risk characteristics of the assets, we would expect a change in the cost of equity following spinoffs. Third, Parrino (1997), Dittmar (2002), and Mehrotra, Mikkelson, and Partch (2002) document that debt is reallocated and capital structure is altered following spinoffs, which may cause a change in the financial risk of the firm. Therefore, we would expect to observe a change in the cost of equity around spinoffs. Finally, Krishnaswami and Subramaniam (1999) and Gilson, Healy, Noe, and Palepu (2001) show that there is lower information asymmetry and increased transparency following spinoffs. Merton (1987) argues that any such changes that reduce the cost of obtaining reliable information should lower adverse selection costs of equity.

Using Fama-French (1993) four-factor regressions, we first study whether there is a change in the systematic risk of equity subsequent to a spinoff. We compare the betas of the four

factors (equity betas) of a weighted combination of the post-spinoff parent and subsidiary with the equity betas of the pre-spinoff firm. We examine whether the reallocation of assets, focus improvements, reduced information asymmetry, and the mitigation of agency costs and other inefficiencies lead to a decline in the equity betas subsequent to spinoffs. Individually analyzed, the Fama-French factor betas represent the sensitivity of equity returns to specific systematic risk factors. In addition, the predicted returns from the Fama-French regressions provide a measure of the *overall* expected returns specified by the systematic risk factors. We use these predicted returns as our measure of the overall expected cost of equity for firms undertaking spinoffs. In addition to analyzing the individual equity betas, we also study whether this overall cost of equity declines for the sample firms subsequent to the spinoffs.

Evidence in prior studies of capital structure changes following spinoffs suggest that any changes in systematic risk of the post-spinoff entities could be due to changes in financial risk rather than changes in asset risk. Therefore, we directly study whether there is a change in the *asset risk* subsequent to spinoffs. We use the debt ratios of the pre-spinoff and post-spinoff entities to unlever the equity betas and estimate the asset betas of the entities. We also compare the systematic risk and cost of equity of the post-spinoff parent firms with that of the post-spinoff subsidiary firms to examine whether spinoffs separate divisions with assets that are in different risk classes. Finally, in a multiple regression framework, we study whether the gains around spinoffs are related to the anticipated changes in cost of equity.

When we analyze the Fama-French factor betas for the pre-spinoff entity and the weighted combination of the post-spinoff parent and subsidiary, our results do not reveal any systematic decreases in any of the betas. These patterns hold for the asset betas as well. Furthermore, when we analyze the changes in the overall cost of equity, we find no evidence of a

decline in the overall cost of equity in the sample. We further explore whether similar results obtain even in subsamples of spinoffs shown (in prior studies) to have the greatest increase in value for the shareholders – focus-increasing spinoffs and spinoffs by firms with high information asymmetry. We find this is largely the case. The results therefore suggest that the gains around spinoffs are primarily a consequence of improvements in cash flow and operating performance rather than due to a decline in systematic risk or the cost of equity.

An interesting finding emerges when we compare the equity betas and the cost of equity of the pre-spinoff firm with those of the post-spinoff *parent* firm. We again find that there is no significant difference in the equity betas or in the cost of equity in the full sample. However, when we analyze the subsample of firms with high levels of information asymmetry prior to the spinoffs, we find a significant decrease in the overall cost of equity for the post-spinoff parent compared to the pre-spinoff firm.

This result may initially appear to be not very important given that we find no significant difference in the cost of equity between the pre-spinoff firm and the weighted combination of post-spinoff parent and subsidiary. After all, shareholders receive proportional ownership in both the post-spinoff parent and the subsidiary, and so a decrease in the cost of equity of one entity may not be valuable if it is offset by the other entity. However, it is possible that the cost of equity of the weighted combination of the post-spinoff entities is not lowered, yet there is an improvement in *value* because the decrease in the cost of equity is in that entity which benefits disproportionately more from the change. For instance, a decrease in the cost of equity of the parent may be more *value enhancing* and may more than offset the value lost due to an increase in the cost of equity of the subsidiary. This could be the case in spinoffs since, as documented in Jongbloed (1994) and Krishnaswami and Subramaniam (1999), the parent firms are typically

higher growth than the subsidiaries, more reliant on external capital, and issue more external equity following spinoffs. Thus, the parent firms may benefit disproportionately more from a decrease in the cost of equity.

Consistent with the view that the decrease in the cost of equity for the parent affects value disproportionately, regression results show a significant negative relation between the change in cost of equity and the stock price reaction around spinoffs for firms with high information asymmetry. The regression results also indicate a statistically significant relation between decrease in the cost of equity and the stock price reaction in the subsample of non-focus-increasing spinoffs. This latter subsample contains firms that divest subsidiaries that are in the same 2-digit SIC code as the parent, and has been shown by Daley, Mehrotra, and Sivakumar (1997) and Desai and Jain (1999) to have little improvement in future cash flow. Yet, there is a positive stock price reaction even for these spinoffs, and our results suggest that these gains accrue predominantly through a decrease in the cost of equity. Overall, our results indicate that in the full sample, gains from spinoffs are mainly due to cash flow and operating performance improvements. But a more detailed analysis reveals that for firms with high information asymmetry and for firms that divest related subsidiaries, the gains are related to a decrease in the cost of equity in addition to any potential cash flow increases.

The remainder of the paper is organized as follows. In Section 2 we present arguments for why cost of equity could decline around corporate spinoffs. In Section 3 we describe the data, sample characteristics, and the methodology used to measure changes in systematic risk and the overall cost of equity. In Section 4 we discuss the results of our empirical analyses. Section 5 provides some concluding comments.

2. The Impact of Spinoffs on the Cost of Equity

Extant empirical evidence supports theories that argue that spinoffs enhance shareholder value by improving the post-spinoff cash flow and operating performance of firms. Most of these theories also provide implications for value enhancement arising from a decrease in the cost of equity. Although cash flow and operating performance improvements and a decrease in cost of equity are not mutually exclusive sources of the gains around spinoffs, the possibility that cost of equity decreases may explain some of the gains has been largely ignored in the empirical literature. Below we summarize several reasons why spinoffs could lead to a decline in the cost of equity of the post-spinoff entities.

One of the arguments for a decline in the cost of equity following spinoffs arises from the inefficiencies of corporate diversification. Meyer, Milgrom, and Roberts (1992), Rajan, Servaes, and Zingales (2000), and Scharfstein and Stein (2000) argue that internal capital markets provide incentives to divisional managers to engage in value-eroding bargaining and divisional rent-seeking behavior that could lead to overinvestment in divisions with poor investment opportunities.[3] Their arguments imply a discounted share price and a higher cost of equity for diversified firms due to the increased manager-shareholder agency conflicts in these firms. Daley, Mehrotra, and Sivakumar (1997), Desai and Jain (1999), Ahn and Denis (2002), and Burch and Nanda (2002) argue that the gains documented around spinoffs are due to the elimination of such inefficiencies in multi-division firms. The evidence suggests that because spinoffs break-up conglomerates and create stand alone entities they mitigate some of these manager-shareholder agency conflicts. This would imply a reduction in the discount in share prices and a decrease in the cost of equity subsequent to spinoffs.

[3] Lamont (1997) and Shin and Stulz (1998) find evidence of cross-subsidization across divisions of diversified firms and show that capital allocation is inefficient in these firms.

Rajan, Servaes, and Zingales (2000) argue that the internal capital market inefficiencies are increasing in the diversity of the divisions of a firm. Consistent with this argument, Gertner, Powers, and Scharfstein (2002) report that investment of the subsidiary is relatively insensitive to growth opportunities prior to a spinoff, but becomes more sensitive subsequent to the spinoff, especially for spinoffs that separate unrelated divisions. Ahn and Denis (2002) present similar evidence in the post-spinoff parent-subsidiary combination. The Rajan, Servaes, Zingales (2000) argument implies a higher agency cost of equity for firms that are diversified across unrelated lines, and a bigger decline in the cost of equity when these firms spinoff unrelated divisions and eliminate the negative synergies. We would therefore, expect a bigger decline in the cost of equity for spinoffs that separate unrelated divisions (focus-increasing spinoffs) than for spinoffs that separate related divisions (non-focus-increasing spinoffs).

Another reason for a change in the cost of equity is the potential change in financial risk around spinoffs. In a case study of the Marriott spinoff, Parrino (1997) documents that debt is reallocated in a manner that is disproportionate to the debt servicing abilities of the assets of the entities created in the spinoff. In a broader sample of spinoffs, Dittmar (2002) documents that firms utilize spinoffs to restructure the post-spinoff parent and subsidiary capital structures closer to their respective industry counterparts. Mehrotra, Mikkelson, and Partch (2002) also show that capital structure is reallocated following spinoffs in accordance with the trade-off theory.[4] Krishnaswami and Subramaniam (1999) report increased external financing activity following spinoffs, which may also cause a change in capital structure. These capital structure changes lead to a change in the financial risk of the firm, affecting in turn the systematic risk and the cost of equity of firms engaging in spinoffs.

[4] In fact, Maxwell and Rao (2002) show that reallocation of debt around spinoffs significantly affects debt values, thereby potentially altering capital structure.

Finally, the information hypothesis for the gains around spinoffs provides another reason for a change in the cost of equity following spinoffs. Merton (1987) argues that any institutional development that reduces the costs of obtaining reliable information about a firm should reduce the rate of return required by investors. In the context of spinoffs the information hypothesis argues that there is increased transparency post-spinoff. Because parents and subsidiaries trade separately, it facilitates an increase in analyst following and a better matching of the industry specialization of the analysts to the post-spinoff entities (Gilson, Healy, Noe, and Palepu, 2001). In conjunction with Merton's arguments the information hypothesis implies a decline in the cost of equity following spinoffs due to the reduced information costs.

Habib, Johnsen, and Naik (1997) and Nanda and Narayanan (1999) formally model the information asymmetry problem and demonstrate that gains in spinoffs can arise from the mitigation of information asymmetry and the intermediation improvements associated with spinoffs. Krishnaswami and Subramaniam (1999) provide direct empirical evidence consistent with the predictions of the information hypothesis. They find that spinoffs enhance value because they mitigate the information asymmetry in the market about the riskiness, profitability, and operating efficiency of the different divisions of a firm. Since the amount of information, as well as the quality of information about the different divisions improves after a spinoff, adverse selection costs decrease, and we would expect to see a decline in the cost of equity subsequent to the spinoff.[5] Another implication of this argument is that the decline in the cost of equity should be positively related to the level of information asymmetry about a firm prior to the spinoff.

[5] In fact, Krishnaswami and Subramaniam (1999) show that consistent with the view that adverse selection costs are lowered, firms raise more external equity following spin-offs.

3. Data and Methodology

3.1. Sample selection and characteristics

The sample consists of firms that complete spinoffs during the period 1979 to 1995. We obtain spinoff transactions from the following sources: (i) stock distributions by firms trading on the NYSE, Amex, and Nasdaq, that the Center for Research in Security Prices (CRSP) classifies as spinoffs, (ii) firms in the National Automated Accounting Research System whose annual reports disclose spinoffs, and (iii) news wires and articles on Lexis-Nexis and the Wall Street Journal that report spinoff transactions by firms. From this sample, we eliminate equity carve-outs, new issues of a different class of a firm's own stock, stock dividends in the stock of other previously existing firms that are not subsidiaries of the firm, tracking stock issues, and other non-spinoff events that some of the above mentioned sources occasionally identify as spinoffs. We also exclude distributions of shares in royalty trusts, real estate investment trusts, closed-end funds and limited partnerships because these are often undertaken for tax motives and don't represent the separation of different segments of a firm. Finally, we exclude spinoffs undertaken solely to facilitate the merger or sale of either the parent or subsidiary firm. These procedures result in an initial sample of 253 spinoff transactions. We require that these spinoffs have declaration and ex-dividend dates available on CRSP or Moody's Dividend Records, and stock returns data on CRSP. This reduces our sample to 200 spinoff transactions in which 211 subsidiaries are divested.

The subsidiaries divested in the spinoff transactions are identified by cross-checking the transactions with the details in Moody's Dividend Records, and in news wires and Wall Street Journal articles on Lexis-Nexis. Of the 200 spinoffs, in 195 spinoffs the parent firm divested 1 subsidiary each, in 3 spinoffs the parent divested 2 subsidiaries each, in 1 spinoff the parent

divested 3 subsidiaries, and in 1 spinoff the parent divested 7 subsidiaries. Table 1 reports the frequency of spinoffs in each of the years in the sample period.

To measure equity betas and the cost of equity before and after spinoffs, our analysis uses monthly returns data on CRSP prior to the declaration date and after the ex-dividend date of the spinoffs. While all 200 spinoffs have returns data available prior to the spinoff, 3 parent firms and 22 subsidiaries do not have post-spinoff data available. Thus, our analysis of parent firms uses 197 spinoff transactions, and the analysis of subsidiaries uses 175 transactions. This is comparable to the sample size of 157 firms in Desai and Jain (1999), who use a similar set of criteria for selecting their sample. Like the sample in this study, the Desai and Jain sample also spans a 17-year period, but begins in 1975 instead of 1979, and ends in 1991 instead of 1995.

In Table 2, we present some descriptive statistics for the sample of spinoffs. The average market capitalization of the combined firm in the year prior to the spinoff completion is $2.2 billion. After the completion of the spinoff, the average market capitalizations of the parent entity and the spun-off subsidiaries are $1.8 billion and $735 million respectively in the year of the spinoff completion. Based on these post-spinoff market capitalizations, the average relative size of divested subsidiary, computed as the ratio of the market capitalization of the subsidiary to the sum of the market capitalizations of the parent and subsidiary, is just over 27%. This relative size measure is very comparable to the 29% relative size documented in Vijh (1994) and Desai and Jain (1999). We also compute an alternative relative size measure using the book value of *assets* of the entities. The average book value of assets of the combined firm in the year prior to the completion of the spinoff is $5.2 billion. After the spinoff the average book value of assets of the parent firm is $4.1 billion while that of the divested subsidiary is $2.9 billion. Based on the book values of assets, the average relative size of the divested unit is about 26.6%. Dittmar

(2002) reports a comparable mean relative size of 24% based on book value of assets.

3.2. Methodology

We estimate the systematic risk for each sample firm using the Fama-French four-factor regression model. Fama and French (1993) show that a three-factor model that includes the market risk premium, the return on a size factor, and the return on a book-to-market ratio factor explain the cross section of monthly stock returns better than the traditional one-factor market model. They argue that these factors represent latent risk variables that are not captured by the market risk premium. Recently, Carhart (1997) shows that including the return on a momentum factor (recent stock price performance) improves the explanation of returns. The coefficient of each factor in these regressions represents the systematic sensitivity of the monthly equity returns to each of the risk factors. Thus, the coefficients represent the equity betas for each firm.

We use these four factors in a time-series regression over a 36-month period ending in the month prior to the declaration date of the spinoff to estimate the systematic risk for each sample firm before the spinoff. The dependent variable in the regressions is the monthly return for each firm in excess of the monthly risk-free rate. We similarly estimate the post-spinoff systematic risk for each parent and each subsidiary by regressing the four factors on the monthly excess return in a 36-month period beginning the month after the ex-dividend date of the spinoff.[6] The change in these equity betas from before the spinoff to after the spinoff represent the effect of the spinoff. We compare the equity betas of the weighted combination of the post-spinoff parent and subsidiary with the equity betas of the pre-spinoff firm. We repeat the analysis by comparing the pre-spinoff firm with just the post-spinoff parent. The change in the

[6] Our estimation procedure is similar to that used by Grullon, Michaely, and Swaminathan (2002) to investigate systematic risk changes around dividend changes. The main difference is that they use a three-factor model while we include the momentum factor as the fourth factor. As a robustness test, we also use the three-factor model, but find qualitatively similar results. In addition, we follow Grullon, et. al., (2002) and Desai and Jain (1999) in our use of a 36-month estimation window.

equity betas for each firm is measured using the following model:

$$R_{it} - R_{ft} = \alpha_i + \alpha_{\Delta i} D_t + b_i RMRF + b_{\Delta i} RMRF D_t + s_i SMB_t + s_{\Delta i} SMB_t D_t + h_i HML_t + h_{\Delta i} HML_t D_t + p_i PR1YR_t + p_{\Delta i} PR1YR_t D_t + e_t \quad (1)$$

The four factors in the Fama-French regressions are RMRF, SMB, HML, and PR1YR. For each month, RMRF is the value-weighted return on all NYSE, AMEX, and Nasdaq firms minus the one-month T-Bill rate. SMB is the return on a zero-investment size portfolio, computed as the return on a portfolio of small firms minus the return on a portfolio of large firms. HML is the return on a zero-investment book-to-market ratio portfolio, computed as the return on a portfolio of high book-to-market ratio firms minus the return on a portfolio of low book-to-market ratio firms. PR1YR is the return on a zero-investment momentum portfolio, computed as the return on a portfolio of good performers minus the return on a portfolio of poor performers. Good (poor) performers are those in the top (bottom) 30 percent of all NYSE, AMEX, and Nasdaq firms based on one-year holding period returns. The intercept in each regression measures the risk-adjusted abnormal performance of the firms undertaking spinoffs.

To capture the pre-spinoff to post-spinoff change in the equity betas, we use an indicator variable D_t that is 1 in the 36 months after the spinoff ex-dividend date and 0 otherwise. We interact each of the four factors with this variable to capture the change in each equity beta after the spinoff. Thus, the coefficients b, s, h, and p, in equation 1 represent the equity betas in the pre-spinoff period, and the coefficients of the interaction terms b_Δ, s_Δ, h_Δ, and p_Δ, represent the incremental change in the equity betas in the post-spinoff period relative to the pre-spinoff betas.[7] If spinoffs eliminate agency costs, negative synergies, and internal capital market inefficiencies, we would expect the coefficients of the interaction terms to be negative.

[7] The coefficient of the interaction of the intercept with D_t in each regression measures the incremental risk-adjusted abnormal performance in the post-spinoff period relative to the pre-spinoff period. We also estimated equation (1) without the interaction of the intercept with D_t, but our results did not change qualitatively.

One concern with analyzing only the individual equity betas is that not all of the four equity betas need to decrease in order for the firm to experience a general decrease in risk following a spinoff. Moreover, some of the equity betas could actually increase, yet, the overall riskiness could decrease after the spinoff. Thus, we need a measure of riskiness that captures the overall impact of these four equity betas. We use the predicted returns from the Fama-French regressions to obtain a measure of the *overall* impact of the systematic risk factors. For each firm, the predicted risk premium is measured by multiplying each factor beta with the average return on the factor estimated over the 1963 to 1998 period, and summing over the four factors. We then add the average monthly risk free rate to the risk premium and then multiply by twelve to obtain the predicted annual return. The predicted returns can be interpreted as the overall expected cost of equity for firms undertaking spinoffs. We study whether this overall cost of equity declines subsequent to the spinoffs.

We perform three sets of analyses using the change in the equity betas and the change in the overall expected cost of equity. In our primary analysis, we compare the equity betas and cost of equity of a weighted combination of the post-spinoff parent and subsidiary firms with those of the pre-spinoff firm. For each spinoff, we synthetically combine the post spinoff entities using weights based on the market capitalization of the entities as well as weights based on their book value of assets. We elaborate on these weighting schemes in section 3.2.1.

We also analyze the asset betas and the unlevered cost of equity of the post-spinoff parent-subsidiary combination with those of the pre-spinoff firm. Here, we examine whether changes in systematic risk of the post-spinoff entities could be due to changes in their financial risk rather than changes in asset risk. Unlevereing the equity betas to obtain asset betas and the unlevered cost of equity allows us to examine changes in risk characteristics without the

confounding effects of changes in financial risk.

Following Healy and Palepu (1990), Dann, Masulis, and Mayers (1991), and Hertzel and Jain (1991) we use the modified Hamada (1972) equation to obtain the asset betas for each of the four risk factors before and after the spinoff.

$$\beta_A = \beta_S[S/(D(1-\tau)+S)] \quad (2)$$

where β_A is the asset beta, β_S is the beta of equity, τ is the corporate tax rate, D is the value of debt, and S is the value of equity. The modified Hamada equation presented above assumes that the beta of debt is zero.[8] To compute the pre-spinoff asset betas we use the leverage ratio measured as of the fiscal year end immediately prior to the spinoff announcement. To compute the post-spinoff asset betas we use the leverage ratio measured as of the fiscal year end immediately following the spinoff completion.

In order to gain insights into whether spinoffs separate entities with assets that are in different risk classes, we also directly compare the equity betas and the cost of equity of the post-spinoff parent and the post-spinoff subsidiary. If one of the disadvantages of operating as a combined firm is a mis-classification of the parent's assets into a higher risk class (say, that of the subsidiary), and if the spinoff eliminates this misperception, then we would expect to see a significant difference between the equity betas and the cost of equity of the post-spinoff parent firms and the post-spinoff subsidiaries. For each firm, we estimate the difference in the equity betas between the post-spinoff parent and the post-spinoff subsidiary by estimating an equation similar to (1) but in the 36-month period *following* the spinoff. Here, the indicator variable D is 1 for the parent and 0 for the subsidiary. Thus the coefficient of each interaction term measures

[8] In our computations we assume a zero tax rate. This should not bias our results, however, since we are interested in the *changes* in asset betas, and we assume the same tax rate both before and after the spin-off. Nevertheless, as a robustness check, we also compute the asset betas assuming a 39% corporate tax rate, as in Grullon, Michaely, and Swaminathan (2002), but this alternative assumption does not qualitatively affect our results.

the difference in the equity beta between the parent and the subsidiary (parent minus subsidiary). We report the cross-sectional mean and median of the coefficients of the interaction terms.

In addition to the above analysis, we compare the equity betas and cost of equity of the post-spinoff parent with the pre-spinoff firm. Since the parent firms are typically bigger and operate on a larger scale and scope, a unit decrease in the cost of equity of the parent may have a larger impact on the gains around spinoffs than a corresponding decrease in the cost of equity of the subsidiary. This is especially true if the parent firm has more growth opportunities and is more reliant on external capital as documented in Jongbloed (1994) and Krishnaswami and Subramaniam (1999). Thus, the benefits of a decline in the cost of equity may be disproportionately higher for the parent firm than for the subsidiary. Therefore, the relation between changes in cost of equity and gains around spinoffs may be more discernable when we focus on the comparison between the pre-spinoff firm and the post-spinoff parent entity.

3.2.1. Weighting schemes for combining post-spinoff parent and subsidiary

On the spinoff ex-dividend date, the parent and subsidiaries become independent firms with independently traded shares. Hence, it is necessary to construct weighted pro-forma combined firm returns for the months following the spinoff in order to allow for an appropriate comparison of the systematic risk of the newly created parent and subsidiary with that of the pre-spinoff firm. The ideal weights for this purpose would be the relative market values of the parent and the subsidiaries immediately before the spinoff. Unfortunately, these weights are not available because separate stock prices for the subsidiaries are not available prior to the spinoff. Therefore, in our first weighting scheme, following Desai and Jain (1999), we construct the weights using the next best option, the market capitalizations of the parent and subsidiary immediately *following* the spinoff.

The potential weakness of this weighting scheme is that value changes around the spinoff may influence the weights, which would in turn influence the measurements of systematic risk changes. In order to mitigate the impact of any value changes around the spinoffs on the weights, we use the book value of assets of the post-spinoff entities in our second weighting scheme. In contrast to the accounting rules for mergers, the accounting rules for spinoffs do not call for a revaluation of book assets to reflect market values. However, the book value weighting scheme has two disadvantages. The first one is simply that the relative book values of assets may differ from relative market values. Second, the book weights may be influenced by operating and financing activities not relevant to our analysis, that occur after the spinoff completion but before the first fiscal year end.

4. Empirical Results

4.1. Comparing post-spinoff parent-subsidiary combination to pre-spinoff firm

In Table 3 we present the equity betas from the Fama-French 4-factor model, and the changes in the equity betas for the post-spinoff entity compared to the pre-spinoff firm. In the post-spinoff period, we use the combination of parent and subsidiary, weighted using the two methods described in section 3.2.1. For each factor, the table reports the cross-sectional mean and median of its coefficient (factor loading) across all firms in the sample. Panel A presents the results using the market value weights to create the post-spinoff entity, and panel B presents the results using the book value weights. In the last column of Table 3 we report the overall cost of equity for the pre-spinoff firm and the change in the cost of equity for the post-spinoff entity compared to the pre-spinoff firm.

It may be seen from panels A and B of table 3 that the coefficients of the market risk factor (RMRF) and the size factor (SMB) are positive and significant, the coefficient of the

momentum factor (PR1YR) is negative and significant, while the coefficient of the book-to-market factor (HML) though positive is generally not statistically significant. Overall, from panel A, the mean cost of equity for the pre-spinoff firms is 13.67% while the median is 12.52%. If the improvement in focus, elimination of negative synergies, and the mitigation of information asymmetry through spinoffs affect the cost of equity, we would expect a decrease in the factor loadings and the overall cost of equity. However, the results presented in Table 3 do not provide evidence that the benefits from spinoffs accrue via a decrease in systematic risk or through an overall reduction in the cost of equity.

Table 3 shows that the mean difference in the factor loadings between the post-spinoff combined entity and the pre-spinoff firm (i.e., post–pre) is not statistically significant for any of the factor loadings in either the market or the book-weighted samples. Similar results are also true for the medians, except for the loading on the size factor. Panels A and B show that the median post-spinoff combined entity loads more heavily on the size factor compared to the pre-spinoff firm, indicating an increase in sensitivity to size risk. This is not surprising given that a spinoff breaks up a conglomerate firm into two or more smaller firms. The median change of 0.284 in the coefficient of the size factor in panel A suggests that a 1% increase in the return on the size factor would increase the cost of equity of the post spinoff combined entity by 28 basis points more than in the pre-spinoff firm. Thus, a weighted pro-forma combination of the post-spinoff parent and subsidiary is actually more susceptible to size risk than the pre-spinoff firm.

The finding that none of the systematic risk factors *decrease* significantly after the spinoff does not support the hypothesis that systematic risk changes contribute to the gains experienced by spinoff firms. This result is further borne out by the change in the overall cost of equity. From panel A, it may be seen that the mean cost of equity decreases by about 1.13% for

the post-spinoff entity compared to the pre-spinoff firm. However, this change is not statistically significant at conventional levels of significance. Similar results obtain even using book value weights and in the medians.[9]

Our finding of an absence of any post-spinoff decline in the equity betas in the full sample could have two interpretations – either there is no decline in the systematic risk, or *asset* risk declines but is offset by an increase in financial risk due to changes in leverage. In order to examine this, we compare the asset betas of the post-spinoff weighted combination of the parent and subsidiary firms with the asset betas of the pre-spinoff firm, and present the results in panel C of table 3. The results indicate that as with equity betas, there is no significant decline in any of the asset betas, and no significant change in the unlevered cost of equity following spinoffs.

Daley, Mehrotra, and Sivakumar (1997) and Desai and Jain (1999) document that the gains are higher for spin-offs that separate entities in unrelated lines of business due to the focus improvements and elimination of negative synergies in these firms. Krishnaswami and Subramaniam (1999) show that the gains around spin-offs are higher for firms with higher information asymmetry about their operations prior to the spinoffs. Motivated by these studies, in Table 4 we separately analyze the equity betas and cost of equity for spinoffs sorted based on whether they separate divisions in similar or unrelated lines, and spinoffs sorted based on the level of pre-spinoff information asymmetry.

In panels A and B of table 4, we compare the change in equity betas and cost of equity between focus-increasing and non-focus-increasing spinoffs. Spinoffs are defined as focus-increasing if the divested subsidiary has a two-digit SIC code that is different from the primary two-digit SIC code of the parent. Spinoffs that separate a subsidiary that has the same two-digit

[9] As a robustness test, following Grullon, Michaely, and Swaminathan (2002), we repeat our analysis using an estimation window of 18 months before and 18 months after the spinoff. The results do not change qualitatively.

SIC code as the parent are classified as non-focus-increasing. If the mitigation of agency costs of equity, elimination of negative synergies and other internal capital market inefficiencies through spinoffs are reflected through a decrease in the cost of equity, we would expect a bigger decline in the cost of equity for focus-increasing spinoffs than for non-focus-increasing spinoffs.

The results in panels A and B of table 4 indicate no significant post-spinoff decline in the equity betas for either subsample. Moreover, there is no significant difference between the change in the equity betas for the focus-increasing and the non-focus-increasing subsamples. Similar results are obtained for the change in the cost of equity. In panel A of table 4, the focus-increasing subsample shows a post-spinoff increase in the cost of equity of 1.235% while the non-focus-increasing subsample shows a decrease of 5.78%. However, neither change is statistically significant. Our results therefore suggest that the gains around spinoffs are primarily a consequence of improvements in cash flow and operating performance rather than due to a decline in systematic risk or the cost of equity.

In panels C and D of table 4, we compare the change in equity betas and cost of equity between firms with high pre-spinoff information asymmetry and those with low information asymmetry. Following Dierkens (1991) and Krishnaswami and Subramaniam (1999), we measure information asymmetry using the dispersion in the market-adjusted daily stock returns in the year preceding the spinoff announcement. This proxy relies on the assumption that stock price movements not explained by market movements are due to firm-specific information, and that at least some of this information is known to the managers but not to the outside investors.[10] Firms are classified as operating under high information asymmetry if the dispersion is higher than the median, otherwise they are classified as operating under low information asymmetry.

[10] To the extent that some of the stock price movements are due to industry-wide (and not market-wide) information that is a surprise to both the managers and the outside investors of the firm, this variable would overstate the level of information asymmetry about a firm. There is, however, no bias in the overstatement across the firms.

The information hypothesis implies a reduction in the adverse selection costs following spinoffs that is positively related to the level of pre-spinoff information asymmetry. We would therefore, expect a bigger decline in the cost of equity for spinoffs with high pre-spinoff information asymmetry than for spinoffs with low information asymmetry.

When we use market weights to combine the parent and subsidiary post-spinoff, the results in panel C of table 4 reveal no significant decline in the equity betas for either subsample. When we analyze the change in the overall cost of equity, we find that firms with high information asymmetry show a median (mean) decline of 1.48% (6.23%) in their cost of equity, while firms with low information asymmetry show an increase of 2.43% (3.58%). However, again, neither change is statistically significant. When we use book value weights to combine the parent and the subsidiary, the results in panel D are weakly consistent with the implications of the information hypothesis. The median change in the overall cost of equity is significantly negative (-4.86%) for firms with high information asymmetry, while it is significantly positive (2.971%) for firms with low information asymmetry. Overall, there is weak evidence of a decline in the cost of equity for firms with high levels of information asymmetry.

4.2. Comparison between post-spinoff parent and subsidiary

To examine whether spinoffs separate entities with assets that are in different risk classes, we compare the equity betas and the cost of equity of the post-spinoff parent with those of the post-spinoff subsidiary. We perform the analysis for the full sample and the subsamples sorted based on focus improvements and information asymmetry prior to the spinoffs. These results are presented in Table 5. In panel A of table 5, we find that the only significant difference in the equity betas is in the beta associated with the size factor, with the subsidiary firms loading higher

on this factor.[11] This is consistent with the subsidiaries being on average much smaller than the post-spinoff parents. None of the other equity betas is significantly different between the post-spinoff parent and subsidiary. Furthermore, even the difference in the size beta is not of much economic significance, since there is no difference in the overall cost of equity between the parents and the subsidiaries. Similar results obtain even in the subsamples of focus-increasing and non-focus-increasing spinoffs (panel B), and in spinoffs by firms with high and low levels of information asymmetry (panel C). These results indicate that spinoffs do not necessarily separate assets that are in different risk classes.

4.3. Comparison between pre-spinoff firm and the post-spinoff parent

The results in table 3 indicate that there is no decrease in the cost of equity of the post-spinoff parent-subsidiary combination compared to the pre-spinoff firm. Despite this finding, changes in the cost of equity of the *individual entities* could still explain the gains from spinoffs if the change in the cost of equity of one of the post-spinoff entities disproportionately affects value. For instance, a decrease in the cost of equity of the parent may be more *value enhancing* and may more than offset the value lost due to an increase in the cost of equity of the subsidiary. We pursue this line of reasoning by comparing the equity betas and the cost of equity of the pre-spinoff firm with those of the post-spinoff parent firm. We focus on the post-spinoff parent since prior literature reports evidence consistent with these firms standing to gain more from a decline in the cost of equity.[12]

The results in panels A and B of table 6 indicate no significant difference in the equity

[11] In fact, this result is mainly driven by the changes in the sensitivity to the size factor of the subsidiary. There is no significant change in the sensitivity to the size factor of the post-spinoff parent compared to the pre-spinoff firm, while there is an increase in the coefficient of the size factor for the post-spinoff subsidiary.

[12] Jongbloed (1994) and Krishnaswami and Subramaniam (1999) report that the parent firms in spinoffs are typically higher growth than the subsidiaries, more reliant on external capital, and issue more external equity following spinoffs. Thus, the parent firms stand to benefit disproportionately from a decrease in the cost of equity.

betas or in the cost of equity in the full sample and in the subsamples of focus-increasing and non-focus-increasing spinoffs. However, in panel C of table 6, when we analyze the subsample of firms with high levels of pre-spinoff information asymmetry, we find a significant decrease in the cost of equity for the post-spinoff parent compared to the pre-spinoff firm. There is no such decrease in the cost of equity for firms with low levels of pre-spinoff information asymmetry. Coupled with the findings in Krishnaswami and Subramaniam (1999) and Gilson, Healy, Noe, and Palepu (2001) that firms with high levels of information asymmetry gain more from spinoffs than do other firms, these results indicate that some of the gains for these spinoffs accrue through a decreased cost of equity for the parent.

4.4. Relation between gains around spinoffs and cost of equity changes

Overall, our results indicate that in the full sample, spinoffs do not lower the cost of equity of the post-spinoff parent-subsidiary combination compared to the pre-spinoff firm. However, in spinoffs by firms with high levels of information asymmetry, i.e., spinoffs likely to be motivated by the possible elimination of adverse selection problems, there is a decrease in the cost of equity. This suggests that the gains documented around spinoffs are predominantly driven by anticipated improvements in cash flow and operating performance, and the only instance where the gains are due to a decrease in the cost of equity is in the subsample of firms with high levels of information asymmetry.[13] We empirically examine the relation between the announcement period abnormal returns and the changes in cost of equity in the full sample and

[13] It should be noted that even a small change in the cost of equity can have a significant impact on prices. This may be seen through a simple back-of-the-envelope computation using the Gordon growth model. In our sample, the average annual dividend in the 3-year period prior to the spinoffs is $1.044 and the average stock price in the same period is $23.264 per share. Applying our estimated pre-spinoff average annual cost of equity of 13.67% in the Gordon growth model, the growth rate in dividends in the pre-spinoff period is inferred to be 9.18%. Assuming that there is no change in the dividends or the growth in dividends post-spinoff, and using the average decline in cost of equity of 1.13% estimated in Table 3, we compute a post-spinoff price per share of $31.094. This translates to about a 34% increase in stock price that is *solely* a consequence of a 1.13% decline in the cost of equity.

the different subsamples through OLS regressions. These results are reported in Table 7.

The dependent variable used in the regressions is the cumulative abnormal return (CAR) in the interval (–1,1). To compute the CARs, we employ a market model estimated over a 155-day period ending 45 days before the announcement of the spinoff, and the CRSP value-weighted (and equal-weighted) index as the proxy for the market portfolio. Regressions 1 through 4 use the CARs computed with the CRSP value-weighted index, while regressions 1a through 4a use the CARs computed with the CRSP equal-weighted index. Regressions 1 and 1a use the cost of equity of the post-spinoff parent-subsidiary combination minus the cost of equity of the pre-spinoff firm (ΔCE) as the only independent variable. In regressions 2 and 2a, we analyze the differential impact of ΔCE on abnormal returns between the focus-increasing and the non-focus-increasing subsamples using indicator variables that interact with ΔCE. FI is a dummy variable that is 1 if the spinoff separates a subsidiary that is in a different two-digit SIC code from the parent, and is 0 otherwise. Thus, the coefficient of ΔCE*FI captures the impact of the change in cost of equity on abnormal returns in the subsample of focus-increasing spinoffs, while ΔCE*(1–FI) captures the impact in the subsample of non-focus-increasing spinoffs.

In regressions 3, 3a, 4, and 4a, we analyze the differential impact of ΔCE on abnormal returns between the high-information asymmetry and low-information asymmetry subsamples. HIA is a dummy variable that is 1 for firms with pre-spinoff information asymmetry that is above the median, and 0 otherwise. Thus, the coefficient of ΔCE*HIA captures the impact of the change in cost of equity on abnormal returns in the subsample of spinoffs by firms with high information asymmetry, while ΔCE*(1–HIA) captures the impact in the subsample of spinoffs by firms with low information asymmetry.

The results in regressions 1 and 1a indicate that the coefficient of ΔCE is negative in both

regressions but statistically significant in only 1a. Thus, there is some evidence that larger is the *decline* in the cost of equity post-spinoff (i.e., more negative is ΔCE), higher is the announcement period abnormal return. Although the univariate results in table 3 indicate that the decline in the cost of equity is not statistically significant in the full sample, the regressions indicate that the *decline* in cost of equity is positively correlated with value increases around spinoffs. We also compute the economic impact of this variable.[14] The coefficient of ΔCE in regression 1a implies that when we decrease ΔCE by one standard deviation, the abnormal returns increase by about 71 basis points. This represents about 49% of the average value gains around spinoffs.

From regressions 2 and 2a, we find that the change in cost of equity is significantly negatively related to abnormal returns only for the subsample of non-focus-increasing spinoffs. The significant coefficient of –0.024 for ΔCE*(1–FI) in regression 2a implies that a decrease in ΔCE by one standard deviation in the subsample of non-focus-increasing spinoffs translates into an increase in abnormal returns of about 110 basis points. This is 75% of the average value gains around spinoffs. This suggests that the gains around spinoffs are, in part, driven by decreases in the cost of equity only in the subsample of non-focus-increasing spinoffs, while gains around focus-increasing spinoffs arise predominantly from anticipated improvements in cash flow and operating performance and not from decreases in cost of equity. This evidence is consistent with the finding in Desai and Jain (1999) that the cash flow and operating performance improvements are primarily found in focus-increasing spinoffs and no such improvements are seen in non-focus-increasing spinoffs.

[14] We measure the economic impact of an independent variable as the change in the gains around spinoffs (as a fraction of the mean wealth gain) when we change (in the direction that increases the gains) the variable by one standard deviation from its mean.

From regressions 3 and 3a, we find that the change in cost of equity is significantly negatively related to abnormal returns only for the subsample of spinoffs by firms with high information asymmetry. The coefficient of ΔCE*HIA is –0.029 and –0.030 in regressions 3 and 3a respectively, and they are significant at least at the 5% level of significance. In terms of the economic impact of ΔCE in the subsample of spinoffs by firms with high information asymmetry, using the coefficient from regression 3a, a decrease in ΔCE by one standard deviation translates into an increase in abnormal returns of about 143 basis points. This is 98% of the average value gains around spinoffs. This evidence is consistent with the information hypothesis that spinoffs reduce information asymmetry and the resulting decrease in adverse selection costs is reflected through a lowering in the cost of equity post-spinoff. These results persist in regressions 4 and 4a, even when we control for the gains arising from focus improvements. Overall, the results indicate that decreases in cost of equity are weakly positively related to value gains around spinoffs in the full sample. This positive relation between decrease in cost of equity and announcement period gains are confined to non-focus-increasing spinoffs and spinoffs by firms with high levels of information asymmetry.

5. Conclusion

Prior studies report significantly positive announcement period abnormal returns for firms that divest through spinoffs. These gains imply that investors expect either an improvement in cash flow, a decrease in the cost of equity, or a combination of both effects following spinoffs. Daley, Mehrotra, and Sivakumar (1997) and Desai and Jain (1999) study the operating performance of firms reorganizing through spinoffs and find significant improvements in future cash flow and operating performance, especially following spinoffs that separate divisions in unrelated lines of business. Prior studies, however, do not examine changes in

systematic risk and cost of equity following spinoffs. In this paper, we empirically investigate whether the elimination of negative synergies and other inefficiencies, improvements in information transparency, and improved alignment of managerial incentives through spinoffs translate into a decrease in the cost of equity. We further examine whether the changes in cost of equity explain the gains around spinoffs.

We use Fama-French (1993) four-factor regressions to estimate the equity betas before and after the spinoffs. We also estimate the predicted returns from the Fama-French regressions to obtain a measure of the overall expected cost of equity for firms undertaking spinoffs. When we compare the equity betas and the cost of equity of the pre-spinoff firm with those of a weighted combination of the post-spinoff parent and subsidiary, we do not find any significant decrease in the systematic risk or the cost of equity. These results persist even when we analyze subsamples of focus-increasing and non-focus-increasing spinoffs. When we study the subsample of spinoffs by firms with high levels of pre-spinoff information asymmetry, we find only weak evidence of a decrease in the cost of equity. Our results therefore suggest that the gains around spinoffs are primarily a consequence of improvements in cash flow and operating performance rather than due to a decline in systematic risk or the cost of equity.

We also compare the equity betas and the cost of equity of the pre-spinoff firm with those of the post-spinoff parent firm. We again find that there is no significant difference in the equity betas or in the cost of equity in the full sample. However, when we analyze the subsample of firms with high levels of information asymmetry prior to the spinoffs, we find a significant decrease in the overall cost of equity for the post-spinoff *parent* compared to the pre-spinoff firm. This result is important because prior studies report that the parent firms are typically higher growth than the subsidiaries, more reliant on external capital, issue more external equity

following spinoffs, and would benefit greatly from a reduction in adverse selection costs. So, a unit decrease in the cost of equity of the parent may be more value enhancing and may more than offset the value lost due to an increase in the cost of equity of the subsidiary. Our evidence indicates that although for a majority of spinoffs the gains accrue via anticipated improvements in cash flows and operating performance, the gains are also driven by a decrease in the cost of equity for the subsample of firms with high adverse selection costs.

Finally, we directly examine the relation between change in cost of equity and the gains around spinoffs. Consistent with the view that the decrease in the cost of equity for the parent affects value disproportionately, we find a significantly positive relation between the decrease in cost of equity and the stock price reaction around spinoffs for firms with high information asymmetry. Thus, the results indicate that the mitigation of information asymmetry though spinoffs translates into a decrease in the overall cost of equity for the parent entity in addition to any potential cash flow increases it could generate. Additionally, in the subsample of spinoffs that separate related divisions (non-focus-increasing spinoffs) we find that the announcement period gains are related to the decline in the cost of equity. This is the subsample in which prior literature has reported no subsequent cash flow improvements but yet a positive stock price reaction. Our results suggest that the gains around these spinoffs accrue primarily through a decrease in the cost of equity.

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Table 1
Frequency Distribution of Spinoffs

Panel A of the table lists the distribution of a sample of 200 spinoffs completed between January 1979 and December 1995. Spinoffs are identified from CRSP, the National Automated Accounting Research System, Lexis-Nexis, and the Wall Street Journal Index. Panel B presents the number of subsidiaries spun-off by the parent firm in each of the 200 spinoff events.

Panel A: Number of spinoffs in each sample year.

Year	Number of Spinoffs
1979	4
1980	7
1981	10
1982	5
1983	12
1984	17
1985	15
1986	13
1987	17
1988	21
1989	13
1990	8
1991	6
1992	7
1993	15
1994	16
1995	14
Total spinoffs:	200

Panel B: Number of subsidiaries spun-off by the parent firm in each of the 200 spinoff events.

Number of Subsidiaries Spun-off	Frequency
1	195
2	3
3	3
7	1
Total spinoffs:	200

Table 2
Descriptive Statistics of Firms that Completed Spinoffs

Descriptive statistics for a sample of 175 spinoffs completed in the period 1979-1995 for which data is available from CRSP for the subsidiaries after the spinoff and for the parent before and after the spinoff. Spinoffs are identified from CRSP, the National Automated Accounting Research System, Lexis-Nexis and the Wall Street Journal Index. Market capitalization of the combined firm is the product of the total number of shares outstanding and the closing price per share of the firm on the last trading day of the year before the spinoff announcement year. Market capitalizations for the post-spinoff parent and subsidiaries are computed similarly at the end of the completion month. Relative size-market equity is the ratio of the market capitalization of the subsidiaries to the market capitalization of the subsidiaries plus the market capitalization of the parent, measured at the end of the spinoff completion month. Book value of assets for the combined firm is measured in the fiscal year before the spinoff announcement, while book value of assets for the post-spinoff parent and subsidiaries is measured in the fiscal year after the spinoff. Relative size-book assets is computed as the ratio of the book value of assets of the subsidiaries in the fiscal year after the spinoff completion to the book value of assets of the parent plus the book value of assets of the subsidiaries in the fiscal year after the spinoff. Equity to total value is the ratio of market value of equity to market value of equity plus book value of debt measured in the fiscal year before the spinoff announcement for the combined firm and in the fiscal year after the spinoff completion for the parent and the subsidiaries. All statistics except ratios are in millions of dollars.

Variable	Mean	Median	Number of Observations
Market capitalization of combined firm	2206.875	407.389	175
Market capitalization of parent after	1811.134	304.880	175
Market capitalization of subsidiaries	735.237	79.215	175
Relative size-market equity	0.273	0.175	175
Book value of combined firm assets	5219.525	661.709	157
Book value of parent assets after	4111.557	659.690	157
Book value of subsidiary assets	2886.560	169.302	149
Relative size-book assets	0.266	0.223	133
Equity to total value for combined firm	0.682	0.731	156
Equity to total value of parent after	0.666	0.701	155
Equity to total value of subsidiaries	0.659	0.714	149

Table 3
Comparison of Systematic Risk and Cost of Equity of the Post-spinoff Parent-Subsidiary Combination relative to the Pre-spinoff Firm

Firms completing spinoffs during the period 1979-1995 are identified from CRSP, the National Automated Accounting Research System, Lexis-Nexis and the Wall Street Journal Index. To obtain a measure of pre-spinoff systematic risk and the post-spinoff change in systematic risk, for each firm we estimate the following four-factor Fama-French regression using monthly data over 36-months each before the announcement and after the completion month of the spinoff.

$$R_{it} - R_{ft} = a_i + a_{Di}D_t + b_i(R_{mt} - R_{ft}) + s_iSMB_t + h_iHML_t + p_iPR1YR + b_{Di}D_t(R_{mt} - R_{ft}) + s_{Di}D_tSMB_t + h_{Di}D_tHML_t + p_{Di}D_tPR1YR + e_i$$

For each firm, the dependent variable is the firm's monthly return in excess of the monthly riskfree rate. RMRF is the value-weighted market return on all NYSE, AMEX, and Nasdaq firms minus the one-month T-Bill rate. SMB is the return on a portfolio of small firms minus the return on a portfolio of large firms. HML is the return on a portfolio of high book-to-market ratio firms minus the return on a portfolio of low book-to-market ratio firms. PR1YR is the return on a portfolio of good performers minus the return on a portfolio of poor performers. Good (Poor) performers are those in the top (bottom) 30 percent of all NYSE, AMEX, and Nasdaq firms based on one-year holding period returns. D_t is a dummy variable that equals 1 in the 36 months after the completion month and 0 otherwise. For each firm in the post-spinoffs months, the monthly excess returns are computed as a weighted average of the excess returns of the post-spinoff parent and subsidiaries using two sets of weights. The results using market weights are presented in Panel A and the results using book weights are presented in Panel B. Market weights are constructed using the market value of equity of the parent and the subsidiaries immediately after the spinoff completion. Book weights are based on the book value of the assets of the parent and the subsidiaries at the year-end of the spinoff completion. The panels present the cross-sectional mean (median) of the corresponding coefficients from the regressions. The predicted values from the regressions, multiplied by 12, provide the annual expected cost of equity pre-spinoff, and the change in the predicted values from before to after the spinoff represent the change in the cost of equity post-spinoff. Panel C presents the mean (median) of the estimated changes in asset betas and the unlevered cost of equity from before to after the spinoffs. For each firm, asset beta for each of the four factors is estimated using the following equation:

$$\beta_{a,i} = \beta_{e,i}\left(S/(D+S)\right)$$

where $\beta_{a,i}$ is the asset beta for factor i, $\beta_{e,i}$ is the equity beta for factor i estimated from the Fama-French regressions, S is the market value of equity and D is the book value of debt. Change in the unlevered cost of equity is estimated by multiplying the change in the asset betas from before to after the spinoff by the average annual factor returns for each of the four factors. Significance levels on the means (medians) are obtained from a two-tailed t-test (signed rank test). N denotes the sample size. ***, **, and * represent significance at the 1%, 5% and 10% levels respectively.

Table 3 (continued)

Panel A: Equity Betas using Market Weights

	RMRF	SMB	HML	PR1YR	Cost of Equity (%)	N
Pre-Spinoff	1.096*** (1.107***)	0.482*** (0.404***)	0.117 (0.125*)	-0.114* (-0.189***)	13.67 (12.52)	175
Δ in Coefficients (Post – Pre)	-0.225 (0.026)	0.170 (0.284*)	-0.480 (0.032)	0.208 (0.020)	-1.13 (0.63)	175

Panel B: Equity Betas using Book Weights

	RMRF	SMB	HML	PR1YR	Cost of Equity (%)	N
Pre-Spinoff	1.091*** (1.104***)	0.518*** (0.378***)	0.089 (0.111)	-0.108 (-0.146***)	13.63 (12.51)	133
Δ in Coefficients (Post – Pre)	-0.030 (0.011)	0.038 (0.277**)	-0.192 (-0.009)	-0.069 (0.034)	-1.92 (0.23)	133

Panel C: Asset Betas

	Δ in RMRF beta	Δ in SMB beta	Δ in HML beta	Δ in PR1YR beta	Δ Cost of Equity (%)	N
Market Weighted	-0.030 (0.000)	0.021 (0.125)	0.026 (0.009)	-0.012 (0.036)	-0.184 (0.771)	126
Book Weighted	-0.025 (-0.005)	0.048 (0.110)	0.021 (-0.002)	-0.009 (0.048)	-0.091 (0.274)	126

Table 4
Systematic Risk and Cost of Equity of the Post-spinoff Parent-Subsidiary Combination relative to Pre-spinoff Firm Classified by Change in Focus and Level of Information Asymmetry

Firms completing spinoffs during the period 1979-1995 are identified from CRSP, the National Automated Accounting Research System, Lexis-Nexis and the Wall Street Journal Index. Panels A and B report the mean (median) values of the change in equity betas and the change in cost of equity for the subsamples of non-focus-increasing and focus-increasing spinoffs. Changes in equity betas and cost of equity are estimated using a Fama-French four-factor model in a 72-month window around the spinoff. A spinoff is classified as focus-increasing (non-focus-increasing) if the spunoff subsidiary is in a different (same) 2-digit SIC code than the parent. In Panel A the post-spinoff combined entity is weighted using market weights, and in Panel B it is weighted using book weights. Market weights are constructed using the market value of equity of the parent and the subsidiaries immediately after the spinoff completion. Book weights are based on the book value of the assets of the parent and the subsidiaries at the year-end of the spinoff completion. Panels C and D report the mean (median) values of the change in equity betas and the change in cost of equity for the subsamples of firms with high levels of pre-spinoff information asymmetry and those with low levels of information asymmetry. Firms are classified as having high (low) levels of information asymmetry if the standard deviation of market-adjusted returns in the year preceding the spinoff announcement exceeds (is lower than) the sample median. In Panel C the post-spinoff combined entity is weighted using market weights, and in Panel D it is weighted using book weights. Significance levels on the means (medians) are obtained from a two-tailed t-test (sign rank test). N denotes the sample size. ***, **, and * represent significance at the 1%, 5% and 10% levels respectively.

Panel A: Comparison between Non-focus-increasing and Focus-increasing subsamples - using Market Weights

	Δ in RMRF beta	Δ in SMB beta	Δ in HML beta	Δ in PR1YR beta	Δ in Cost of Equity (%)	N
Non Focus Increasing	-0.084 (0.187)	-0.037 (0.189)	-0.281 (0.119)	-0.310 (-0.004)	-5.780 (1.050)	59
Focus Increasing	-0.296 (-0.008)	0.276 (0.298)	-0.580 (0.029)	0.471 (0.054)	1.235 (0.523)	116
p-value of difference t-test Wilcoxon Z	0.626 (0.330)	0.375 (0.991)	-0.641 (0.773)	0.122 (0.488)	0.296 (0.812)	

Table 4 (continued)

Panel B: Comparison between Non-focus-increasing and Focus-increasing subsamples - using Book Weights

	Δ in RMRF beta	Δ in SMB beta	Δ in HML beta	Δ in PR1YR beta	Δ in Cost of Equity (%)	N
Non Focus Increasing	-0.128 (0.025)	-0.117 (0.254)	-0.436 (0.068)	-0.183 (0.060)	-5.441 (0.924)	46
Focus Increasing	0.022 (-0.014)	0.120 (0.277)	-0.063 (-0.044)	-0.008 (0.031)	-0.064 (-0.482)	87
p-value of difference t-test Wilcoxon Z	0.559 (0.463)	0.463 (0.925)	0.450 (0.927)	0.487 (0.870)	0.424 (0.742)	

Panel C: Comparison between Firms with High and Low Information Asymmetry - using Market Weights

	Δ in RMRF beta	Δ in SMB beta	Δ in HML beta	Δ in PR1YR beta	Δ in Cost of Equity (%)	N
High Information Asymmetry	-0.495 (0.196)	0.227 (0.164)	-1.120 (-0.021)	0.195 (-0.116)	-6.230 (-1.481)	84
Low Information Asymmetry	0.024 (-0.030)	0.118 (0.304)	0.112 (0.086)	0.212 (0.172**)	3.576 (2.425)	91
p-value of difference t-test Wilcoxon Z	0.321 (0.503)	0.744 (0.796)	0.097 (0.591)	0.969 (0.026)	0.093 (0.035)	

Panel D: Comparison between Firms with High and Low Information Asymmetry - using Book Weights

	Δ in RMRF beta	Δ in SMB beta	Δ in HML beta	Δ in PR1YR beta	Δ in Cost of Equity (%)	N
High Information Asymmetry	-0.164 -0.024)	-0.200 (0.315)	-0.343 (-0.044)	-0.443 (-0.157)	-8.523 (-4.860**)	58
Low Information Asymmetry	0.074 (0.017)	0.221* (0.266*)	-0.075 (0.078)	0.221** (0.212**)	3.181* (2.971*)	75
p-value of difference t-test Wilcoxon Z	0.298 (0.883)	0.125 (0.316)	0.523 (0.973)	0.004 (0.002)	0.040 (0.006)	

Table 5
Comparison of Changes Systematic Risk and Cost of Equity between the Post-spinoff Parent and Subsidiaries

Firms completing spinoffs during the period 1979-1995 are identified from CRSP, the National Automated Accounting Research System, Lexis-Nexis and the Wall Street Journal Index. To obtain a measure of pre-spinoff systematic risk and the post-spinoff change in systematic risk, for each firm we estimate the following four-factor Fama-French regression using monthly data over 36-months after the completion month of the spinoff.

$$R_{it} - R_{ft} = a_i + a_{Di}D_t + b_i(R_{mt} - R_{ft}) + s_iSMB_t + h_iHML_t + p_iPR1YR + b_{Di}D_t(R_{mt} - R_{ft}) + s_{Di}D_tSMB_t + h_{Di}D_tHML_t + p_{Di}D_tPR1YR + e_i$$

For each firm, the dependent variable is the firm's monthly return in excess of the monthly riskfree rate. RMRF is the value-weighted market return on all NYSE, AMEX, and Nasdaq firms minus the one-month T-Bill rate. SMB is the return on a portfolio of small firms minus the return on a portfolio of large firms. HML is the return on a portfolio of high book-to-market ratio firms minus the return on a portfolio of low book-to-market ratio firms. PR1YR is the return on a portfolio of good performers minus the return on a portfolio of poor performers. Good (Poor) performers are those in the top (bottom) 30 percent of all NYSE, AMEX, and Nasdaq firms based on one-year holding period returns. D_t is a dummy variable that equals 1 for parent firm returns, and 0 otherwise. The panels present the cross-sectional mean (median) of the difference in the coefficients between the parent firms and the subsidiaries. Panel A presents the results for the full sample, panel B presents the results for the subsamples of non-focus-increasing and focus-increasing spinoffs, and panel C presents the results for the subsamples of firms with high and low information asymmetry. A spinoff is classified as focus-increasing (non-focus-increasing) if the spunoff subsidiary is in a different (same) 2-digit SIC code than the parent. Firms are classified as having high (low) levels of information asymmetry if the standard deviation of market-adjusted returns in the year preceding the spinoff announcement exceeds (is lower than) the sample median. Significance levels on the means (medians) are obtained from a two-tailed t-test (signed rank test). N denotes the sample size. ***, **, and * represent significance at the 1%, 5% and 10% levels respectively.

Panel A: Full Sample

	Δ in RMRF beta	Δ in SMB beta	Δ in HML beta	Δ in PR1YR beta	Δ in Cost of Equity (%)	N
Coefficients	0.346 (0.031)	-0.625*** (-0.521***)	0.263 (-0.184)	-0.446 (0.128)	-2.741 (-0.761)	175

Table 5 (continued)

Panel B: Comparison between Non-focus-increasing and Focus-increasing subsamples

	Δ in RMRF beta	Δ in SMB beta	Δ in HML beta	Δ in PR1YR beta	Δ in Cost of Equity (%)	N
Non Focus Increasing	-0.060 (-0.009)	-0.541 (-0.613**)	0.194 (-0.179)	-0.011 (0.106)	-0.488 (0.582)	59
Focus Increasing	0.553 (0.044)	-0.688** (-0.507***)	0.299 (-0.299)	-0.668 (0.140)	-3.887 (-3.360)	116
p-value of difference						
t-test	0.417	0.785	0.910	0.463	0.707	
Wilcoxon Z	(0.787)	(0.694)	(0.535)	(0.941)	(0.379)	

Panel C: Comparison between Firms with High and Low Information Asymmetry

	Δ in RMRF beta	Δ in SMB beta	Δ in HML beta	Δ in PR1YR beta	Δ in Cost of Equity (%)	N
High Information Asymmetry	0.740 (0.440)	-0.487 (-0.133)	0.738 (-0.042)	-1.134 (0.081)	-5.758 (1.591)	84
Low Information Asymmetry	-0.018 (0.008)	-0.753*** (-0.746***)	-0.175 (-0.527*)	0.188 (0.155)	0.044 (-2.577)	91
p-value of difference						
t-test	0.423	0.563	0.379	0.253	0.475	
Wilcoxon Z	(0.766)	*(0.029)*	(0.453)	(0.771)	(0.460)	

Table 6
Comparison of Changes in Systematic Risk and Cost of Equity between the Post-spinoff Parent and the Pre-spinoff Firm

Firms completing spinoffs during the period 1979-1995 are identified from CRSP, the National Automated Accounting Research System, Lexis-Nexis and the Wall Street Journal Index. To obtain a measure of pre-spinoff systematic risk and the post-spinoff change in systematic risk, for each firm we estimate the following four-factor Fama-French regression using monthly returns for the pre-spinoff firm over 36-months before the announcement, and monthly returns for the post-spinoff parent over 36-months after the completion month of the spinoff.

$$R_{it} - R_{ft} = a_i + a_{Di}D_t + b_i(R_{mt} - R_{ft}) + s_iSMB_t + h_iHML_t + p_iPR1YR + b_{Di}D_t(R_{mt} - R_{ft}) + s_{Di}D_tSMB_t + h_{Di}D_tHML_t + p_{Di}D_tPR1YR + e_i$$

For each firm, the dependent variable is the firm's monthly return in excess of the monthly riskfree rate. RMRF is the value-weighted market return on all NYSE, AMEX, and Nasdaq firms minus the one-month T-Bill rate. SMB is the return on a portfolio of small firms minus the return on a portfolio of large firms. HML is the return on a portfolio of high book-to-market ratio firms minus the return on a portfolio of low book-to-market ratio firms. PR1YR is the return on a portfolio of good performers minus the return on a portfolio of poor performers. Good (Poor) performers are those in the top (bottom) 30 percent of all NYSE, AMEX, and Nasdaq firms based on one-year holding period returns. D_t is a dummy variable that equals 1 for returns in the post-spinoff period, and 0 otherwise. The panels present the cross-sectional mean (median) of the difference in the coefficients between the post-spinoff parent firms and the pre-spinoff firm. Panel A presents the results for the full sample, panel B presents the results for the subsamples of non-focus-increasing and focus-increasing spinoffs, and panel C presents the results for the subsamples of firms with high and low information asymmetry. A spinoff is classified as focus-increasing (non-focus-increasing) if the spunoff subsidiary is in a different (same) 2-digit SIC code than the parent. Firms are classified as having high (low) levels of information asymmetry if the standard deviation of market-adjusted returns in the year preceding the spinoff announcement exceeds (is lower than) the sample median. Significance levels on the means (medians) are obtained from a two-tailed t-test (signed rank test). N denotes the sample size. ***, **, and * represent significance at the 1%, 5% and 10% levels respectively.

Panel A: Full Sample

	Δ in RMRF beta	Δ in SMB beta	Δ in HML beta	Δ in PR1YR beta	Δ in Cost of Equity (%)	N
Coefficients	-0.190 (-0.040)	-0.037 (0.126)	-0.088 (-0.022)	-0.077 (0.007)	-2.744 (-0.794)	197

Table 6 (continued)

Panel B: Comparison between Non-focus-increasing and Focus-increasing subsamples

	Δ in RMRF beta	Δ in SMB beta	Δ in HML beta	Δ in PR1YR beta	Δ in Cost of Equity (%)	N
Non Focus Increasing	-0.035 (0.196)	0.025 (0.150)	0.216 (0.039)	-0.155 (0.084)	-1.012 (1.759)	59
Focus Increasing	-0.057 (-0.025)	0.105 (0.189)	-0.054 (-0.105)	0.063 (-0.004)	0.276 (0.265)	116
p-value of difference t-test Wilcoxon Z	0.956 (0.556)	0.846 (0.744)	0.690 (0.593)	0.473 (0.635)	0.888 (0.866)	

Panel C: Comparison between Firms with High and Low Information Asymmetry

	Δ in RMRF beta	Δ in SMB beta	Δ in HML beta	Δ in PR1YR beta	Δ in Cost of Equity (%)	N
High Information Asymmetry	-0.335 (0.018)	-0.144 (-0.053)	-0.254 (-0.088)	-0.346 (-0.188)	-7.999 (-5.637**)	103
Low Information Asymmetry	-0.032 (-0.042)	0.079 (0.192)	0.094 (-0.008)	0.218 (0.198**)	3.014 (2.632)	94
p-value of difference t-test Wilcoxon Z	0.294 (0.809)	0.450 (0.218)	0.460 (0.762)	0.020 (0.003)	0.087 (0.005)	

Table 7
Regressions Relating Announcement Period Returns to Changes in the Cost of Equity

Firms completing spinoffs during the period 1979-1995 are identified from CRSP, the National Automated Accounting Research System, Lexis-Nexis and the Wall Street Journal Index. The dependent variable is the three-day cumulative abnormal return generated over the interval (-1,1). Abnormal returns are calculated using the market model parameters estimated over a 155-day period ending 45 days before the spinoff announcement date. The table presents the results using both the CRSP value-weighted and equal-weighted indices in the market model to estimate the betas. ΔCE is change in the cost of equity from before to after the spinoff. FI is a dummy variable that takes the value 1 if the spinoff is focus-increasing and 0 otherwise, and HIA is a dummy variable that takes the value 1 for firms with high levels of information asymmetry and 0 otherwise. A spinoff is classified as focus-increasing (non-focus-increasing) if the post-spinoff subsidiary is in a different (same) 2-digit SIC code than the parent. Firms are classified as having high (low) levels of asymmetric information if the standard deviation of market-adjusted returns in the year preceding the spinoff announcement exceeds (is lower than) the sample median. p-values are in parenthesis. N denotes the sample size. a, b, and c represent significance at the 1%, 5% and 10% levels respectively.

	Value-weighted Index				Equal-weighted Index			
	1	2	3	4	1a	2a	3a	4a
Intercept	1.464 (<0.001)	1.438 (<0.001)	1.363 (<0.001)	1.325 (0.026)	1.455 (<0.001)	1.431 (<0.001)	1.370 (<0.001)	1.431 (0.018)
ΔCE	-0.016 (0.114)				-0.019[c] (0.063)			
ΔCE*FI		-0.009 (0.602)				-0.011 (0.461)		
ΔCE*(1-FI)		-0.021[c] (0.103)				-0.024[c] (0.070)		
ΔCE*HIA			-0.029[b] (0.011)	-0.029[b] (0.012)			-0.030[a] (0.010)	-0.029[b] (0.011)
ΔCE*(1-HIA)			0.024 (0.223)	0.024 (0.224)			-0.015 (0.455)	0.015 (0.451)
FI				0.057 (0.938)				-0.094 (0.900)
N	172	172	172	172	172	172	172	172
$\overline{R^2}$	0.009	0.006	0.034	0.028	0.014	0.011	0.030	0.024