# Corporate Divestitures: Spin-Offs vs. Sell-Offs

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## Abstract

This paper investigates the determinants of the choice between two forms of corporate divestitures—spin-offs versus sell-offs. We hypothesize that the choice is driven by the characteristics of divesting firms (their pre-divestiture market valuation relative to intrinsic value and marginal tax rates), the characteristics of assets being divested (their performance under parent firm's management relative to their full potential), and by the prevailing market conditions at the time of divestiture (such as the degree of investor optimism or pessimism). Our hypotheses generate testable predictions regarding the announcement effects of divestitures and the post-divestiture operating and stock return performance of divesting firms. Our empirical findings using a sample of 322 spin-offs and 3,280 sell-offs from 1980 to 2006 are as follows. First, firms with lower market valuations relative to their intrinsic value and higher marginal tax rates are more likely to spin off their assets. Second, assets which underperform relative to their full potential are more likely to be sold off. Third, spin-offs are more likely during periods of investor optimism. Fourth, spin-offs are associated with more positive announcement effects than sell-offs. Finally, firms which sell off their assets exhibit a greater improvement in their post-divesture long-term operating and stock return performance compared to those that spin off their assets.

# Corporate Divestitures: Spin-Offs vs. Sell-Offs

## 1. Introduction

When a firm decides to divest an asset, it may totally relinquish its ownership or retain a partial ownership. In the former case, a firm may choose to divest an asset either through a spin-off or a sell-off. Although the existing literature provides significant insights regarding the reasons why firms choose spin-offs or sell-offs, numerous questions remain regarding the factors driving the choice between spin-offs and sell-offs and on possible differences between these two forms of divestitures.[1] Does pre-divestiture market valuation of divesting firms affect their choice between spin-offs and sell-offs? Do firms divesting through spin-offs realize greater improvements in their post-divestiture performance compared to those divesting through sell-offs? Do market conditions at the time of divestiture affect a firm's choice of divestiture form? Why the announcement effects of spin-offs are in general larger than those of sell-offs?

We study the above questions which were not addressed in prior literature by implementing a comprehensive study of the effects of divesting firm characteristics, the characteristics of assets being divested, and the market conditions at the time of divestiture on the choice between spin-offs and sell-offs. We develop several testable hypotheses which allow us for the first time in the literature to empirically examine the effect of divesting firms' pre-divestiture under- or overvaluation on their choice between spin-offs and sell-offs and to study the differences between post-divestiture long-term operating and stock return performance of such firms.[2] Our testable hypotheses also allow us to empirically examine how investor sentiment at the time of divestiture affects the decision by a firm to spin off or to

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[1] Prior literature has demonstrated that firms sell off their assets to increase focus (John and Ofek, 1995 and Dittmar and Shivdasani, 2003), to obtain cheap financing (Lang, Poulsen, and Stulz, 1995), or because they are a poor fit (Hite, Owers, and Rogers, 1987), and have low productivity (Maksimovic and Phillips, 2001). Prior literature has also demonstrated that firms spin off their assets to relax regulatory and tax constraints and increase managerial efficiency (Schipper and Smith, 1983), to allow parent firm and spun-off unit to specialize in areas they have a comparative advantage as well as to facilitate future mergers (Hite and Owers, 1983 and Cusatis, Miles, and Woolridge, 1993), to cater to different clienteles who may wish to invest either in spun-off unit or in parent firm (Vijh, 1994), to mitigate information asymmetry (Krishnaswami and Subramaniam, 1999 and Gilson, Healy, Noe, and Palepu, 2001), to increase focus (Daley, Mehrotra, and Sivakumar, 1997 and Desai and Jain, 1999), to improve the allocation of capital (Gertner, Powers, and Scharfstein, 2002), or to transfer wealth from bondholders to shareholders (Parrino, 1997 and Maxwell and Rao, 2003).

[2] Several papers mentioned above investigate the post-divestiture performance of firms which either spin off or sell off assets. However, to the best of our knowledge, there are no studies directly comparing the post-divestiture performance of such firms.

sell off its assets and to identify the factors behind the differences in the announcement effects of spin-offs and sell-offs.

Although suitable for direct comparison in the sense that both spin-offs and sell-offs allow a firm to fully release ownership and control of its assets, these two forms of corporate divestitures are quite different from each other. In a spin-off a certain asset (a unit, division, or subsidiary) of a firm is split off from the parent firm into a separate publicly traded company. Shares of this new independent firm are distributed to the existing shareholders of the parent firm on a pro rata basis.[3] Usually, a spin-off has no tax consequences for the divesting firm which treats the newly created shares as a stock dividend to its existing shareholders. On the other hand, in a sell-off a certain asset of the divesting firm is sold off for cash or securities to another firm or entity. Sale proceeds are taxable to the parent firm which may use them for other corporate purposes or distribute to its shareholders.

The existing literature has identified several factors affecting the choice between spin-offs and sell-offs. Khan and Mehta (1996) show that the likelihood of spin-offs (relative to sell-offs) increases with the operating risk of the assets being divested. In Maydew, Schipper, and Vincent (1999) the likelihood of sell-offs decreases as the incremental net tax cost of choosing a sell-off instead of a spin-off increases.[4] Nixon, Roenfeldt, and Sicherman (2000) find that firms which have smaller boards of directors and separate offices for CEOs and those that are not financially distressed are more likely to divest larger units through spin-offs. Powers (2001) shows that firms in need of cash are likely to sell off badly-performing divisions, while firms which do not need cash are likely to spin off average-performing divisions. Chen and Guo (2005) find that firms with low revenue growth and low book-to-market ratios are more likely to spin-off larger units during periods of low investor sentiment, while firms with high capital expenditures, high book-to-market ratios, and lower dividend yields are more likely to sell off

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[3] This is substantially different from a carve-out where the parent firm retains the majority of the shares in the new company and sells the rest in a public offering.

[4] For sell-offs the net tax cost is defined as the difference between the direct tax cost (or benefit) incurred from a sell-off minus the estimated premium that the sold-off asset receives over its pre-sale value. For spin-offs the net tax cost is defined as the difference between the tax cost (benefit) the parent firm avoids (gives up) by choosing a non-taxable spin-off instead of a taxable sell-off minis the premium the spun-off asset would have commanded if it was sold off instead.

smaller units. Finally, Bergh, Johnson, and Dewitt (2008) demonstrate that less diversified firms are more likely to spin off assets in their primary and related business lines, while more diversified firms are more likely to sell off assets in secondary and unrelated business lines.

This paper makes several contributions to the existing literature on divesting firm's choice between spin-offs and sell-offs. First, we consider the effect of a firm's pre-divestiture under- or overvaluation relative to its intrinsic value on its decision to spin off or sell off its assets; this effect has not been studied before in the literature.[5] Specifically, we hypothesize that overvalued firms will be more likely to sell-off their assets to lock in higher market valuations, while undervalued firms will be more likely to spin-off their assets. We design several proxies that capture divesting firms' equity under- or overvaluation by comparing their intrinsic value estimates to their pre-divestiture market values. Our empirical findings indicate that firms which are undervalued (overvalued) relative to their intrinsic value are more likely to spin off (sell off) their assets and that the pre-divestiture market valuation (relative to intrinsic value) of firms which sell off assets is significantly greater than that of firms which spin off assets.

Another contribution of this paper to the literature is our analysis of the differences in the post-divestiture operating and stock return performance of firms which use either spin-offs or sell-offs to divest their assets. Existing literature has studied the post-divestiture performance of firms which either spin off or sell off their assets, but not both.[6] We hypothesize that firms are more likely to sell off assets which underperform relative to their full potential and to spin off assets with better performance closer to their full potential. This is because the after-tax proceeds from the sell-off of underperforming assets are

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[5] Krishnaswami and Subramaniam (1999) conjecture that spin-offs reduce the degree of information asymmetry faced by divesting firms and, therefore, firms which are undervalued due to information asymmetry are expected to experience positive announcement effects when they divest through spin-offs. Their empirical results provide support for this conjecture. However, since they do not explicitly measure undervaluation, they do not establish its direct link with a divesting firm's decision to spin off its assets. In this paper, we consider the effect of not only undervaluation but also the effect of overvaluation on the firm's choice of divestiture type, and directly measure the degree of pre-divesture under- or overvaluation (relative to intrinsic value) and use it to infer the firm's divestiture choice.

[6] Woo, Willard, and Daellenbach (1992) and Daley, Mehrotra, and Sivakumar (1997) find firms divesting through spin-offs realize improved operating performance. John and Ofek (1995) find improved performance for firms divesting through focus-increasing sell-offs. Cusatis, Miles, and Woolridge (1993) find firms divesting through spin-offs experience positive post-divestiture long-term excess stock returns.

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likely to be higher (assuming that the competition among potential asset buyers will allow the parent firm to sell off its assets at the highest value reflecting their full potential) than the value commanded by the same underperforming assets in the market if spun off (which is likely to be the same as their low pre-divestiture value). On the other hand, the assets which perform relatively better are likely to command a higher value in the market if spun off (which is likely to be the same as their relatively higher pre-divestiture value) compared to the after-tax proceeds these assets would generate if sold off. Thus, the firms which sell off their underperforming assets are likely to realize greater improvements in their post-divestiture long-term operating performance compared to the firms which spin off their better performing assets. As long-term operating and stock return performance generally move in tandem, firms which divest through sell-offs are likely to realize greater improvements in their post-divestiture long-term stock return performance as well compared to the firms which divest through spin-offs. Our empirical results provide support for these hypotheses and indicate that the firms which divest their assets through a sell-off realize significantly larger improvements in their long-term post-divestiture operating and stock return performance compared to the firms which divest their assets through a spin-off.

We also study the announcement effects of spin-offs and sell-offs, which we expect to be influenced by the two effects discussed above.[7] First, we hypothesize that if spin-offs signal divesting firms' undervaluation and sell-offs signal divesting firms' overvaluation, all else the same, the announcement effects of spin-offs will be positive and those of sell-offs will be negative. Second, if firms divesting through sell-offs are expected to realize a greater value from the sale of their assets compared to their pre-divestiture value, the announcement effects of sell-offs will be positive; on the other hand, if the assets divested through spin-offs are expected to command the same value after divestiture as before

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[7] Prior literature has found positive announcement period returns for both spin-offs and sell-offs. See, e.g., Alexander, Benson, and Kampmeyer (1984), Jain (1985), Hite, Owers, and Rogers (1987), and Lang, Poulsen, and Stulz (1995) for the announcement effects of sell-offs, and Hite and Owers (1983), Miles and Rosenfeld (1983), Schipper and Smith (1983), Vijh (1994), and Krishnaswami and Subramanian (1999) for the announcement effects of spin-offs. However, the only paper which directly compares the announcement effects of spin-offs and sell-offs is Rosenfeld (1984), who uses a small sample of spin-offs and sell-offs to show that the announcement effects of spin-offs are significantly larger than those of sell-offs. Rosenfeld (1984), however, does not provide an explanation for the documented differences in the announcement effects between the two divestiture forms.

divestiture, the announcement effects of spin-offs will be close to zero. These two conjectures, if combined together, predict that the announcements effects of spin-offs will be positive, while the announcement effects of sell-offs will be either positive or negative depending on which of the above two effects dominates.

We find that the announcement effects of both spin-offs and sell-offs are significantly positive and those of spin-offs are significantly larger than those of sell-offs. These findings are in line with Rosenfeld (1984) and point to their robustness over time while using a larger sample.[8] Unlike Rosenfeld (1984) however, this paper provides an intuitive explanation for the documented differences in the announcements effects of spin-offs and sell-offs. Specifically, the higher positive announcement effects that spin-offs enjoy over sell-offs appear to be driven by the undervaluation of spin-off parent firms and the overvaluation of sell-off parents firms. Also, the positive announcement effects of sell-offs alone seem to suggest that the value realized from the sale of underperforming assets outweighs the loss realized from the signaling of divesting firm's overvaluation to the market.

Since the tax treatment of sell-offs is quite different from that of spin-offs, we also examine the effect that divesting firms' marginal tax rates have on their choice between spin-offs and sell-offs. Unlike spin-offs which are predominantly non-taxable transactions, sell-offs can potentially generate sizable tax obligations (if the proceeds from asset sales are greater than their tax basis). Therefore, firms with higher marginal tax rates will be more likely to divest their assets through a spin-off to avoid the potential tax consequences of a sell-off. Our empirical findings indicate that firms with higher marginal tax rates are more likely to spin off their assets and firms with lower marginal tax rates are more likely to sell off their assets.

Finally, we also investigate the effect of investor sentiment on the choice between spin-offs and sell-offs. Our inquiry is prompted by a similarity between spin-offs and IPOs in the sense that a new firm is created in both cases which starts trading publicly for the first time. Similar to the effect that investor

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[8] There is only a two year overlap between Rosenfeld's (1984) sample of 35 spin-offs and 62 sell-offs in 1963-1981 and our sample of 322 spin-offs and 3,280 sell-offs in 1980-2006.

sentiment has on "hot" and "cold" IPO market waves (Lowry, 2003 and Helwege and Liang, 2004) we hypothesize that investors in the market are more likely to value the shares of new firms higher when they are relatively optimistic, which creates an incentive for divesting firms to spin off their assets during periods of investor optimism. We create a monthly index of investor sentiment after Baker and Wurgler (2006) which captures intra-year variations in sentiment and find that spin-offs are more likely during periods when this index is relatively high (investors are optimistic) and sell-offs are more likely during periods when this index is relatively low (investors are pessimistic).

Our analysis in this paper shows that the choice between spin-offs and sell-offs is driven by several factors such as the characteristics of divesting firms (pre-divestiture market valuation and marginal tax rates), the characteristics of assets being divested (how well they perform), and by the prevailing market conditions at the time of divestiture (proxied by investor sentiment). The results of our multivariate logit regressions indicate that all these factors have a significant impact on the choice between spin-offs and sell-offs even after controlling for other important variables such the extent of information asymmetry and the degree of financial constraints faced by divesting firms, and the size of divesting firms and divested units.

The rest of this paper is organized as follows. Section 2 discusses our theoretical arguments and develops testable hypotheses. Section 3 describes data. Section 4 presents our research methodology and the results of our empirical tests. Section 5 concludes.


## 2. Hypotheses

As indicated in the previous section, a large body of the existing literature explains the reasons for which firms engage in divestitures. The objective of this paper is to explain the choice between the two major forms of divestitures, spin-offs and sell-offs, taking the firm's decision to divest as given. We hypothesize that the choice between spin-offs and sell-offs will be driven by the characteristics of divesting firms (such as their pre-divestiture valuation in the market relative to their intrinsic value and their marginal tax rates), by the characteristics of the assets being divested (such as their current

performance relative to their full potential), and by the prevailing market conditions at the time when the decision to divest is made (such as the degree of investor optimism or pessimism).

First we consider how divesting firm's valuation in the market relative to its intrinsic value affects its choice between spin-offs and sell-offs. Consider a firm which possesses information superior to outsiders about its future earnings and cash flows (and therefore about the intrinsic value of its equity). Let's assume no taxes and that the firm's (including the assets it considers divesting) productivity is at its full potential. If the firm is undervalued in the market (and assuming the market, on average, extends this undervaluation to the assets it tries to divest) it will have an incentive to divest its assets through a spin-off. This is because selling the assets at their current market value will generate proceeds which will be less than the intrinsic value of such assets. However, if such undervalued assets are spun off, their market value will be expected to increase over time as the favorable information about the firm (and its divested assets) is eventually revealed to the market. On the other hand, if the firm is overvalued in the market (and assuming the market, on average, extends this overvaluation to the assets it tries to divest) it will have an incentive to divest its assets through a sell-off since the proceeds from the sell-off will be larger than the intrinsic value of such assets. Alternatively, if such overvalued assets are spun off, their market value will be expected to decrease in the near future as the unfavorable information about the firm (and its divested assets) is revealed to the market over time. Further, the decision of the firm to divest its assets through a spin-off or a sell-off will be perceived by the market as a signal of the firm's under- or overvaluation relative to its intrinsic value, respectively, and therefore the announcements of spin-offs will be associated with positive announcement effects and the announcements of sell-offs will be associated with negative announcement effects. The above discussion generates the following two hypotheses:

**H1**. *Firms which are undervalued (overvalued) in the market relative to their intrinsic value will be more likely to divest their assets through a spin-off (sell-off)*.

**H2**. *Firms which divest their assets through a spin-off (sell-off) will be more likely to realize positive (negative) announcement effects in the equity market*.

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A divesting firm's marginal tax rate may also affect its choice between spin-offs and sell-offs. A spin-off is usually structured as a tax-free transaction for the parent firm which treats it as a stock dividend and realizes no taxable gain or loss.[9] The transaction is tax-deferred for the parent firm's shareholders and the spun-off unit carries the book value reported in the financial statements prior to the divestiture. Cleary, tax-free spin-offs result in considerable tax savings for parent firms and the higher their marginal tax rate the greater the incentive to spin off rather than to sell off. On the other hand, sell-offs as a rule are taxable transactions where parent firms usually receive cash and/or securities for the divested asset. Depending on whether the divested asset is a part of the parent firm (such as a division) or a separate legal entity (such as a subsidiary), the parent firm either sells the assets of the division directly or sells the stock of the subsidiary. In both cases, the parent firm realizes a taxable gain if the proceeds from the sale are greater than the tax basis of the division or the subsidiary's stock. The higher the marginal tax rate of the parent firm, the greater the tax liability generated by the transaction, and thus the slighter the incentive to sell.[10] Although sell-offs potentially generate substantial tax liability, firms may still choose to divest their assets through a sell-off for several reasons such as larger proceeds compared to spin-off value, financial reporting benefits, and improved liquidity for the parent firm (see, e.g., Maydew, Schipper, and Vincent, 1999). The above discussion leads to our next hypothesis:

**H3**. *Firms with higher marginal tax rates will be more likely to divest their assets through a spin-off rather than a sell-off.*

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[9] To avoid taxable consequences, a spin-off must be structured to satisfy the conditions specified in section 355 of the IRS code. Namely, parent firm must own at least 80% of the asset prior to its divestiture and must distribute at least 80% of the interest in the divested asset to its shareholders. Further, the transaction must have a substantial business purpose, it may not be used as a vehicle to avoid taxation, shareholders of the parent firm must continue holding a significant interest both in the parent firm and the spun-off unit after the divestiture, and immediately after the spin-off both the parent firm and the spun-off unit must continue actively conducting the business in which they were engaged for at least five years prior to the divestiture. If these conditions are not met, the parent firm can be liable for the taxes on the taxable gains generated by the divestiture.

[10] Of course, if the proceeds from the sale are less than the tax basis, the parent firm will realize a taxable loss and will be entitled to a tax refund. While taxable gains are fully taxable, the tax code imposes certain restrictions on the recognition of taxable losses; for example, capital losses are tax-deductible only to the extent of capital gains. If such capital gains are not available, capital losses realized by the parent firm on the sale of its subsidiary's stock may not result in tax benefits.

Next we consider how the characteristics of the assets being divested, namely their performance level, may affect the choice between spin-offs and sell-offs. Consider a firm which in addition to its core business owns two subsidiaries $A$ and $B$, which are not directly related to its core business. Assume that the firm and its subsidiaries are correctly valued by the market at their intrinsic value. Both subsidiaries have a maximum potential value of $V$, however due to various reasons (for example, the lack of parent firm management's expertise running these units) the firm is unable to realize this full value. In other words, under parent firm's management these two units generate less earnings per dollar of assets employed compared to what these assets are capable of generating under optimal management. Further, let's assume that subsidiary $A$ has better performance (generates more earnings per dollar of assets employed) than subsidiary $B$. Therefore, if retained by the firm, subsidiary $A$ will have a value of $V_A \leq V$ and, *ceteris paribus*, subsidiary $B$ will have a value of $V_B < V_A \leq V$. The firm considers divesting both subsidiaries and has to decide on the form of the divestiture—either a sell-off or a spin-off.

The sale of either unit is expected to redeploy them in the hands of new owners who will extract the full value $V$ from such subsidiaries. The competition among potential buyers ensures that the subsidiaries are acquired by the buyers who are in the position to realize their full potential and who will outbid other competitors by offering the highest price $V$ for these subsidiaries.[11] The firm will realize an after-tax value of $V(1 - T)$ from the sale of either subsidiary.[12] Alternatively, spinning off either subsidiary does not change their ownership; existing owners of the parent firm still own these subsidiaries. Since the management of spun-off units does not usually change, both subsidiaries are expected to maintain their pre-divestiture values of $V_A$ and $V_B$, respectively, following their spin-off.

It then follows that there are three scenarios regarding the ordering of the possible post-divestiture values of the two subsidiaries. In the first scenario, $V_B < V_A < V(1 - T) \leq V$. Since the after-tax

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[11] Hite, Owers, and Rogers (1987), Sicherman and Pettway (1992), and John and Ofek (1995) show that the average abnormal returns to equity over the two-day [-1 to 0] window around the announcements of asset sell-offs are between 0.40 to 0.83% for asset buyers and between 0.92 to 1.66% for asset sellers. This suggests that most of the benefits of asset sell-offs are captured by the sellers and the buyers pay a price for such assets close to their full potential value.

[12] For simplicity, we assume here that the tax basis of both subsidiaries is zero. Our conclusions will be the same as above if we assume the tax basis is non-zero.

value from the sale of either subsidiary exceeds their respective values after the spin-off, the firm optimally chooses to sell both $A$ and $B$. In the second scenario, $V(1 - T) < V_B < V_A \leq V$. Now the spin-off values of both subsidiaries exceed their after-tax sale value and the firm selects to spin off both $A$ and $B$. In the final scenario, $V_B < V(1 - T) < V_A \leq V$. In this case the parent firm is inclined to sell off the relatively underperforming subsidiary $B$ and to spin off the relatively better-performing subsidiary $A$ because the sell-off value $V(1 - T)$ is greater than the spin-off value $V_B$ of subsidiary $B$ but it is less than the spin-off value $V_A$ of subsidiary $A$.

The discussion above has two connotations. The first implication is that a firm is more likely to sell off its relatively underperforming assets and spin off its relatively better-performing assets. If this is the case, the operating performance of the divesting firm is expected to improve significantly relative to its pre-divestiture performance since the firm rids itself of a relatively underperforming asset. In other words, following the sell-off the remaining assets of the firm will, on average, generate greater earnings per dollar of assets employed. On the other hand, a spin-off is expected to result in a less notable (if any at all) improvement in the post-divestiture operating performance of the parent firm relative to its pre-divestiture performance since the firm divests a relatively better-performing asset. This generates our next hypothesis:

**H4**. *Firms which divest their assets through a sell-off are likely to realize greater improvement in their post-divesture operating performance compared to firms which spin off their assets.*

The second implication is that when selling a subsidiary parent firm shareholders will realize a premium equal to the difference between the after-tax sell-off proceeds and the pre-divestiture value of that subsidiary. On the other hand, when spinning off a subsidiary parent firm shareholders realize no additional value since the post- and pre-divestiture values of the subsidiary are expected to be the same. This suggests that, in general, sell-offs will be associated with positive announcement effects reflecting the premium that parent firm shareholders expect to realize from the sell-off, while spin-offs will be associated with no announcement effects. This leads to our fifth hypothesis:

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**H5**. *Firms which divest their assets through a sell-off are more likely to realize positive announcement effects while firms which divest their assets through a spin-off are more likely to realize no announcement effects*.

Note that **H5** considers an announcement effect which is complementary to that in **H2**. Hypothesis **H5** predicts positive announcement effects for firms which sell off their assets, whereas hypothesis **H2** predicts negative announcement effects for such firms. On the other hand, hypothesis **H5** predicts no announcement effects for firms which spin off their assets, while hypothesis **H2** predicts positive announcement effects for such firms.[13] If both hypotheses **H2** and **H5** are jointly correct, the announcement effects of spin-offs will be expected to be unequivocally positive, whereas the announcement effects of sell-offs will be either positive or negative, depending on the relative magnitude of the overvaluation effect versus the effect of divesting underperforming assets.

Since long-term stock returns generally move hand-in-hand with operating performance, the above analysis also implies that firms which divest their assets through a sell-off will, on average, experience a greater improvement in their post-divestiture stock return performance compared to those which divest their assets through a spin-off. This is our sixth hypothesis:

**H6**. *Firms which divest their assets through a sell-off are likely to realize greater improvement in their post-divesture stock return performance compared to firms which spin off their assets*.

Finally, we consider how market conditions at the time of divestiture affect the choice between spin-offs and sell-offs. Spin-offs are similar to IPOs in the sense that a new independent firm is established which starts trading publicly for the first time. It is well documented in the literature that firms go public in waves labeled as "hot" and "cold" IPO markets (see, e.g., Ibbotson and Jaffe, 1975 and Ritter, 1984). Lowry (2003) and Helwege and Liang (2004) argue that investor sentiment is one of the drivers of such "hot" and "cold" IPO markets. When investors are optimistic (either irrationally or based

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[13] The announcement effects of spin-offs and sell-offs may be affected by a variety of other factors. If parent firms expect to obtain additional benefits, such as increased focus, reduced information asymmetry, etc., from such divestitures, then the announcement effects of both forms of divestitures will be augmented by the expected magnitude of such benefits.

on rational expectations of the market potential) they may be willing to pay for new issues more than they are worth. This creates an incentive for divesting firms to spin off their assets during periods of investor optimism since it can potentially increase the wealth of parent firm shareholders who own the new shares resulting from the spin-off. If, instead, divesting firms decide to sell off their assets during a period of investor optimism, they will be less likely to receive a higher price from potential buyers since such buyers, being larger entities, will be in a better position to correctly value these assets (given the resources and the expertise they possess to conduct proper valuation). On the other hand, during periods of investor pessimism, retail investors in the market may pay less for the shares than they are worth and the firm will be better off selling its assets to buyers who can value them more correctly, instead of spinning them off. This leads to our final hypothesis:

**H7**. *Firms are more likely to spin off (sell off) their assets during periods of investor optimism (pessimism).*

There are other characteristics of divesting firms and their divested assets that may drive the choice between spin-offs and sell-offs. One of them is the degree of financial constraints faced by divesting firms. A firm is financially constrained when it is unable to finance its investments due to the lack of internally generated cash or inability to raise debt or equity in the financial market. One of the differences between spin-offs and sell-offs is that sell-offs generate an inflow of cash (or securities that can be converted to cash) for parent firms, whereas spin-offs do not. A firm which is more financially constrained will have an incentive to divest its assets through a sell-off and use the cash proceeds to relieve such constraints. For example, Lang, Poulsen, and Stulz (1995) provide evidence that asset sell-offs are used to relax parent firms' capital constrains, while Powers (2001) finds that parent firms with high leverage are more likely to divest through sell-offs than through spin-offs. Another firm characteristic that may potentially affect the choice between spin-offs and sell-offs is the degree of asymmetric information faced by divesting firms in the financial market. If a firm wishes to reduce the extent of information asymmetry it faces in the market it may choose to divest its assets through a spin-off. This is because spin-offs are subject to disclosure requirements and parent firms are required to file

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with regulating bodies, which releases a great deal of new information about the firm to the market. On the other hand, sell-offs are usually not subject to disclosure requirements and many of them are structured as private transactions with undisclosed terms. Krishnaswami and Subramaniam (1999) suggest that the likelihood of engaging in spin-offs is higher for firms with higher levels of information asymmetry. Finally, the size of divested assets may affect the choice between spin-offs and sell-offs. Nixon, Roenfeldt, and Sicherman (2000) and Chen and Guo (2005), among others, provide evidence that divesting firms are more likely to spin-off larger units. Since, these additional characteristics may be important for the choice between spin-offs and sell-offs we control for them in our empirical analysis.

## 3. Data and Sample Selection

The list of sell-offs comes from the SDC/Platinum Mergers & Acquisitions database. A sell-off is defined as a transaction where one firm acquires 100% of certain assets of another firm. Our sample includes sell-offs, identified as "Acquisition of assets" or "Acquisition of certain assets" in the database, completed in 1980-2006. After elimination of asset swaps, joint ventures, LBOs, block (privately negotiated) purchases, privatizations, reverse takeovers, stake purchases, transactions where asset sellers were either bankrupt, being liquidated, recapitalized, or restructured, and transactions where asset sellers were not present on CRSP or Compustat, we were left with our final sample of 3,280 sell-offs.

The list of spin-offs comes from the SDC/Platinum Global New Issues database. The sample period is 1980-2006 as well. After eliminating spin-offs for which we cannot find announcement dates from Factiva and Bloomberg databases, we are left with 600 spin-offs. Further, we exclude from our sample observations where parent firms are not public companies and therefore are not present either on CRSP or Compustat. This leaves us with our final sample of 322 spin-offs. The numbers of spin-offs and sell-offs in each year of the sample period are presented in Table 1.[14]

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[14] SDC Mergers & Acquisitions database reports only a few sell-off transactions in the early 1980s because the data coverage for those years is incomplete. As a robustness test, we conducted our empirical analysis excluding years 1980-1982 from our sample and our results were similar to those reported here.

Information on stock prices and returns necessary to analyze announcement effects and stock return performance is obtained from CRSP, while the accounting information necessary to study firms' operating performance and to calculate various financial ratios is obtained from Compustat. Asymmetric information data is obtained from IBES.

## 4. Empirical Tests and Results

### 4.1. Summary Statistics and Univariate Tests

We present the summary statistics of divesting firm characteristics and report the results of univariate tests of differences in their means and medians between firms divesting through spin-offs and sell-offs in Table 2.

The mean (median) *Marginal Tax Rate* of firms divesting through spin-offs is 35% (35%), which is significantly greater than the mean (median) *Marginal Tax Rate* of firms divesting through sell-offs of 33% (34%). *Marginal Tax Rate* is the non-parametric marginal tax rate developed in Blouin, Core, and Guay (2010) and reported in Compustat. The significantly higher marginal tax rates of firms divesting through spin-offs compared to those divesting through sell-offs provide support for our hypothesis **H3**.

Since we do not have any information about sold-off units and therefore cannot observe their pre-divestiture productivity or performance, we construct the variable *Relatedness* to proxy for such productivity. This variable takes values between 0 and 4, equal to the number of digit matches between the SIC codes of the parent firm and its divested unit; a higher value of *Relatedness* indicates that the parent firm and its unit are closer related. We conjecture that units with higher *Relatedness* values are more productive since their parent firms' management is expected to have more expertise managing them. The mean (median) *Relatedness* of firms divesting through spin-offs is 2.05 (2) and the mean (median) *Relatedness* of firms divesting through sell-offs is 1.40 (1); the differences in means and medians are statistically significant at the 1% level. This indicates that divesting firms tend to spin off assets which are more related to their own business (and perhaps are more productive) and sell off assets which are less related to their business (and perhaps are less productive).

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Next, we construct a monthly series of *Investor Sentiment Index* following Baker and Wurgler (2006). The greater the value of the index the more optimistic investors are and vice versa. Since one of the definitions of investor sentiment that Baker and Wurgler (2006) use in their work is "… optimism or pessimism about stocks in general," this index is a good proxy for the degree of outside investors' optimism or pessimism regarding future economic activity, the stock market in general, and the future stock return performance of firms.[15] Their index is constructed using several proxies suggested in the literature to measure investor sentiment; it is a composite index based on the first principal component of those proxies. The underlying proxies of investor sentiment are closed-end fund discount, NYSE share turnover, number of IPOs and their average first-day returns, equity share in new issues, and dividend premium. We measure these sentiment proxies monthly over the sample period. We follow Baker and Wurgler (2006) closely in constructing our *Investor Sentiment Index* which is a monthly series as opposed to the annual series they construct.[16] We have verified that our monthly series closely follows and has properties similar to the annual series of Baker and Wurgler (2006) and has the advantage of capturing intra-year variations in investor sentiment (which is not possible with an annual series).

In Table 2, the mean and median *Investor Sentiment Index* for spin-offs are significantly higher than those for sell-offs indicating that spin-offs are conducted during periods when investors are relatively optimistic, whereas sell-offs are implemented during periods when investors are relatively pessimistic. This finding provides support for our hypothesis **H7**.[17]

Further, Table 2 demonstrates that firms divesting through spin-offs are significantly smaller in size (both in terms of the book value of assets, *Ln*(*Assets*), and the market value of equity, *Ln*(*MVE*))

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[15] Baker and Wurgler (2006) construct an annual series of the investor sentiment index and use it to test how subsequent stock returns vary with beginning-of-period sentiment. They show that when beginning-of-period investor sentiment is low (investors are pessimistic), subsequent returns are relatively high for small, young, high volatility, unprofitable, non-dividend-paying, extreme growth, and distressed stocks. On the other hand, when sentiment is high (investors are optimistic), these categories of stock earn relatively low subsequent returns.

[16] The details of the construction of the above index and data sources are available to interested readers from the authors upon request.

[17] Chen and Guo (2005), using the annual series of Baker and Wurgler's (2006) investor sentiment index, find that spin-offs are more likely when investors are more pessimistic. Our finding here is opposite to that of Chen and Guo (2005) perhaps due to the fact that we use the monthly series of the same index instead of the annual series. Since the degree of investor sentiment can vary considerably within a given year, our monthly series captures such intra-year variations whereas the annual series does not.

compared to firms divesting through sell-offs. The differences in the mean and median size between the two groups are significant at the 1% level. There is also an indication that spun-off units are somewhat bigger than sold-off units. We measure the size of spun-off units, *Ln*(*Unit Size*), by the natural logarithm of the number of shares outstanding multiplied by the closing share price on the first day of trading, and we measure the size of sold-off units by the transaction value reported in SDC.[18] Although both the mean and median sizes of spun-off units are larger than those of sold-off units, the differences in the means and medians between the two groups are not statistically significant.

The next three variables reported in Table 2 measure the degree of financial constraints faced by divesting firms. First, firms divesting through spin-offs have significantly larger cash holdings than firms divesting through sell-offs as measured by the ratio of cash and equivalents over assets. The mean (median) *Cash*/*Assets* of firms divesting through spin-offs is 0.12 (0.05) compared to the 0.09 (0.04) mean (median) *Cash*/*Assets* of firms divesting through sell-offs; the differences in the means and medians of the two groups are significantly positive suggesting that firms divesting through spin-offs are less financially constrained.

We also construct an index of financial constraints suggested by Kaplan and Zingales (1997) using the modified methodology described in Lamont, Polk, and Saa-Requejo (2001). According to this modified methodology *KZ Index* = -1.002(*Cash Flow*/*K*) + 0.283*Q* + 3.139(*Debt*/*Total Capital*) − 39.368(*Dividends*/*K*) − 1.315(*Cash*/*K*), where *Cash Flow* is income before extraordinary items (Compustat item 18) plus depreciation (item 14); *K* is net property, plant, and equipment (item 8); *Q* is the ratio of the book value of assets (item 6) plus CRSP December Market Value of Equity minus the book value of common equity (item 60) minus deferred taxes (item 74) over the book value of assets; *Debt* is the sum of long-term debt (item 9) and debt in current liabilities (item 34); *Total Capital* is the sum of long-term debt, debt in current liabilities, and stockholders' equity (item 216); *Dividends* is the sum of common and preferred dividends (items 21 and 19, respectively); and *Cash* is cash and short-term

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[18] We are able to obtain transaction values from SDC for only 1,965 sold-off units in our sample. Transaction values of the remaining sold-off units in our sample were not disclosed and therefore are not available in SDC.

investments (item 1). Firms with higher values of *KZ Index* are more financially constrained. Table 2 shows that the mean *KZ Index* of firms divesting through spin-offs is significantly smaller than that of firms divesting through sell-offs indicating that firms divesting through spin-offs are less financially constrained; the difference is medians is positive but not statistically significant.

Firms divesting through spin-offs also appear to invest less as measured by the ratio of capital expenditures and R&D expenses over assets. The median (*CapEx + R&D*)/*Assets* of firms divesting through spin-offs is 0.069 which is significantly less than the median (*CapEx + R&D*)/*Assets* of firms divesting through sell-offs of 0.076 at the 10% level. Since capital expenditures and R&D expenses use firms' financial resources, the lower investment levels of firms divesting through spin-offs further indicate that such firms are less financially constrained.

Table 2 also shows that firms divesting through spin-offs face a significantly greater extent of information asymmetry in the financial market compared to firms divesting through sell-offs. We use three proxies of information asymmetry measured at the end of the fiscal year prior to divestiture announcement: *Number of Analysts* following the firm; *StDev of Forecasts*, the standard deviation of analyst forecasts; and *Dispersion*, the standard deviation of analyst forecasts normalized by the stock price. Firms divesting through spin-offs are followed by significantly fewer financial analysts and are associated with significantly greater *StDev of Forecasts* and *Dispersion*. The mean (median) *Number of Analysts* following firms divesting through spin-offs is 8.44 (5), while it is 10.92 (9) for firms divesting through sell-offs. The mean (median) *StDev of Forecasts* for firms divesting through spin-offs is 0.139 (0.060), while it is 0.094 (0.040) for firms divesting through sell-offs. The mean (median) *Dispersion* for firms divesting through spin-offs is 0.009 (0.003), and it is 0.007 (0.002) for firms divesting through sell-offs.

Finally, Table 2 shows that the operating performance of the two groups of firms in the fiscal year prior to divestiture announcement is roughly the same; the differences in the mean and median return on assets, *ROA*, are not statistically significant. Firms divesting through spin-offs have significantly higher leverage, captured by *Long-Term Debt*/*Assets*, than firms divesting through sell-offs.

In sum, the results in Table 2 suggest that, compared to firms divesting through sell-offs, firms which divest through spin-offs are smaller and less financially constrained, are subject to more information asymmetry and higher marginal tax rates, and tend to divest more related units in periods of investor optimism.

*4.2. Pre-Divestiture Equity Valuation of Spin-Off and Sell-Off Parent Firms*

In this section we study the extent of divesting firms' equity under- or overvaluation relative to intrinsic value, i.e., the value conditional on the private information of firm insiders. Hypothesis **H1** predicts that firms announcing spin-offs are more likely to be undervalued relative to their intrinsic value and firms announcing sell-offs are more likely to be overvalued relative to their intrinsic value.

To estimate the degree of under- or overvaluation, we make use of two methodologies. Our first methodology is based on matched firm multiples. It uses the realized values of divesting firms' sales, operating income before depreciation (OIBD), earnings, and book value of equity in the fiscal year subsequent to divestiture. If at the time of divestiture announcement firm insiders (managers) have private information about their firm's future cash flows, and have rational expectations (so that there is no systematic bias in their prediction of the firm's future cash flow stream), then the aforementioned realized values will yield an unbiased estimate of the insiders' valuation of the firm conditional on their private information at the time of divestiture announcement.[19]

To obtain intrinsic values of divesting firms' equity, we multiply the realized values of divesting firms' sales (Compustat item 12), OIBD (item 13), earnings (item 18), or book value of equity (item 60) in the fiscal year after divestiture announcement by the price-to-sales, price-to-OIBD, price-to-earnings, or price-to-book value ratios, respectively, of matched firms calculated using sales, OIBD, earnings, and book value of equity of these matched firms at the end of the fiscal year prior to divestiture announcement and their share price on the day prior to divestiture announcement. The realized values of sales, OIBD,

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[19] Note that our assumption is *not* that firm insiders can perfectly forecast the future earnings of their firm, but rather that they can make better forecasts than outsiders, and that their forecasts will not be systematically biased upwards or downwards.

earnings, and book value of equity for firms divesting through spin-offs are the sum of parent firms' and their spun-off units' sales, OIBD, earnings, and book value of equity, respectively. Only positive values of OIBD, earnings, and book value of equity are used in constructing price multiples.

We select matched firms following Loughran and Ritter's (1997) matching algorithm. Each divesting firm is matched with a firm that has not divested assets through spin-offs or sell-offs during the five years prior to divestiture announcement date. The matching firm is from the same industry (using 2-digit SIC codes), its asset size at the end of the fiscal year prior to divestiture announcement is between 25 to 175% of that of the divesting firm, and has the closest OIBD/Assets ratio to that of the divesting firm. If no matching firm meets these criteria, then the industry requirement is dropped and a matching firm is chosen with asset size within 90 to 110% of that of the divesting firm and with the closest, but higher, OIBD/Assets ratio. If a matching firm does not have accounting data for a particular year, we replace it with the next closest match.

We calculate the per share intrinsic value for divesting firms using price-to-sales multiples as follows:

$$V_{\text{Sales}} = \frac{\text{Divesting firm next fiscal year sales} \times \left(\dfrac{P}{S}\right)_{\text{Match}}}{\text{Divesting firm CRSP shares outstanding}}, \tag{1}$$

where $\left(\dfrac{P}{S}\right)_{\text{Match}} = \dfrac{\text{Match pre - announcement date price} \times \text{Match CRSP shares outstanding}}{\text{Match prior fiscal year sales}}.$

Then, we calculate pre-announcement date price-to-intrinsic value ratio for each divesting firm by dividing its pre-announcement date price by the per share intrinsic value $V$ calculated in (1) above:

$$\left(\frac{P}{V}\right)_{\text{Sales}} = \frac{\text{Divesting firm pre - announcement date price}}{V_{\text{Sales}}}.$$

In the above calculations, *pre-announcement date price* is the share price and *CRSP shares outstanding* is the number of shares outstanding of divesting firms and respective matched firms on the day prior to divestiture announcement as reported by CRSP. Finally, we take the natural logarithm of the above $(P/V)_{Sales}$ ratio and use it as a measure of under- or overvaluation. A negative value of $Ln(P/V)_{Sales}$

indicates undervaluation and a positive value indicates overvaluation. We also calculate natural logarithms of price-to-intrinsic value ratios using price-to-OIBD, price-to-earnings, and price-to-book value multiples by replacing sales in the above expressions with OIBD, earnings, and book value of equity, respectively.

Panel A of Table 3 presents the results of our valuation analysis using the matched-firm price multiple methodology described above and reports the mean and median $Ln(P/V)$ for the two groups of divesting firms. All mean and median $Ln(P/V)$ of firms divesting through spin-offs are negative except for the mean $Ln(P/V)_{OIBD}$. The median $Ln(P/V)_{Book\ Value}$ of firms divesting through spin-offs is -0.081 and significant at the 10% level, suggesting that such firms are undervalued relative to their matched industry peers by approximately 8%. Although most of $Ln(P/V)$ are not statistically significantly different from zero for firms which divest through spin-offs, these results indicate that such firms are somewhat undervalued relative to their intrinsic value.

The mean and median $Ln(P/V)$ of firms divesting through sell-offs are all positive and highly significant, indicating that such firms are significantly overvalued relative to their intrinsic value. This overvaluation ranges between 4 to 15%, depending on the price multiple used. Further, the differences in the means and medians of $Ln(P/V)$ between the two groups of firms are all negative (except for the difference in the means of $Ln(P/V)_{OIBD}$) and significant at customary levels depending on the price multiple used. These findings indicate that the pre-divestiture equity valuations of firms divesting through sell-offs are significantly greater than those of firms divesting through spin-offs.

The second valuation methodology we use is based on the residual income model (RIM) and the Ohlson (2005) model (OHL). We implement the RIM described in Ohlson (1990) following the set-up used by D'Mello and Shroff (2000), according to which firm value is given by:

$$V_0 = B_0 + \frac{EPS_1 - r \times B_0}{1 + r} + \frac{EPS_2 - r \times B_1}{(1 + r)^2} + TV, \tag{2}$$

where $B$ is book value of equity (Compustat item 60) divided by the number of shares outstanding (item 25); $EPS$ is income before extraordinary items (item 237) divided by the number of shares outstanding;

and $r$ is required rate of return on divesting firm's equity. Subscript 0 refers to the end of the fiscal year prior to divestiture announcement. According to equation (2), firm value is determined as the sum of its book value and discounted residual (or abnormal) future earnings in excess of the required return on book value. Thus, firm value depends on the stock variable (book value) and the flow variables that relate to the wealth that the firm may generate in the future. We estimate $r$ from the market model with beta calculated over 250 trading days ending on the 46th trading day before the divestiture announcement. In the calculation of beta, we require at least 100 observations. The risk-free rate is the annualized rate of return on one-month Treasury bills in the month preceding divestiture announcement, while the market risk premium is the annualized average difference between the return on the CRSP value-weighted index and the one-month T-bill rate between January 1945 and the month preceding divestiture announcement.

We calculate the terminal value, *TV*, in (2) as follows:

$$TV = \frac{(EPS_2 - r \times B_1) + (EPS_3 - r \times B_2)}{2 \times (1+r)^2 \times r}. \tag{3}$$

To avoid the effect of a possible unusual performance in year 3, the terminal value is calculated as an average of residual earnings in years 2 and 3. If the terminal value is negative, we set it equal to zero because managers are unlikely to continue negative NPV investments forever. Further, we exclude firms with negative book values of equity and those with negative estimated fair values of shares. We also implement the RIM by calculating the terminal value, *TV*, assuming a 5% perpetual growth in earnings after year 2. For firms divesting through spin-offs, the realized values of post-divestiture earnings and book values are the sum of parent firms' and their spun-off units' earnings and book values, respectively.

As an alternative to the RIM, we also use the OHL model suggested by Ohlson (2005). The OHL model uses dividend-adjusted earnings per share as the starting point in the calculation of intrinsic values. We implement the model as follows:

$$V_0 = \frac{EPS_1}{r} + \frac{\frac{EPS_2}{r} - \left[(1+r) \times \frac{EPS_1}{r} - DPS_2\right]}{1+r} + \frac{\frac{EPS_3}{r} - \left[(1+r) \times \frac{EPS_2}{r} - DPS_3\right]}{(1+r)^2} + TV, \tag{4}$$

where *EPS* is earnings per share; *DPS* is dividends per share (item 21 divided by item 25); *r* is required return on divesting firm's equity, and

$$TV = \frac{\left(\dfrac{EPS_3}{r} - \left[(1+r) \times \dfrac{EPS_2}{r} - DPS_3\right]\right) + \left(\dfrac{EPS_4}{r} - \left[(1+r) \times \dfrac{EPS_3}{r} - DPS_4\right]\right)}{2 \times (1+r)^2 \times r} \, . \tag{5}$$

We exclude firms with negative *EPS* in any of the four years used in the estimation. As in the case of the RIM, if the estimated terminal value is negative, we set *TV* above equal to zero. We estimate *r* for this model as described above for the RIM. We also implement the Ohlson (2005) model by calculating the terminal value, *TV*, assuming a 5% perpetual growth in earnings after year 2.

Divesting firms' under- or overvaluation is measured using a ratio of their closing share price on the day before the divestiture announcement over their intrinsic value conditional on insiders' private information at the time of divestiture as estimated by the RIM or the OHL model above. We call this ratio the valuation error. To account for a possible bias inherent in the valuation models used to calculate the intrinsic value of divesting firms' shares, we compute *Ln(P/V)* for each divesting firm as the natural logarithm of the ratio of its valuation error over matched firm's valuation error, where matched firms are selected using Loughran and Ritter's (1997) algorithm described above.[20] If *Ln(P/V)* is negative, it means the divesting firm is undervalued, and if it is positive, it means the divesting firm is overvalued.[21]

Panel B of Table 3 presents the results of our valuation analysis using the RIM and the OHL models and reports the means and medians of *Ln(P/V)* for the two groups of divesting firms. Similar to our matched firm multiple valuation analysis, the means and medians of *Ln(P/V)* for firms divesting through spin-offs are negative indicating that such firms tend to have somewhat undervalued equity; however these means and medians are not statistically significantly different from zero. On the other hand, the means and medians of *Ln(P/V)* for firms divesting through sell-offs are all positive and highly

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[20] Ritter and Warr (2001), Lee, Myers, and Swaminathan (1999), and D'Mello and Shroff (2000) show that the residual income model tends to consistently undervalue stocks (i.e., that there is a positive valuation error).
[21] The comparison of the valuation errors of divesting firms with those of matched firms *in the same year* also allows us to differentiate between aggregate stock market misvaluation and the misvaluation due to firm-level asymmetric information.

significant, indicating that such firms are significantly overvalued relative to their intrinsic value. Such overvaluation ranges between 10 to 16%. Finally, the differences in means and medians of $Ln(P/V)$ between the two groups of firms are all negative and significant at customary levels, except for the difference in means of $Ln(P/V)$ using the OHL model with 0% growth.

Overall, the findings in Table 3 indicate that the pre-divestiture equity valuations of firms divesting through sell-offs are significantly greater than those of firms divesting through spin-offs. Further, the findings suggest that firms divesting through spin-offs are somewhat undervalued, while firms divesting through sell-offs are significantly overvalued relative to their intrinsic value, and provide support for our hypothesis **H1**.

*4.3. The Announcement Effects of Spin-Offs and Sell-Offs*

In this section we study the effect of spin-off and sell-off announcements on divesting firms' equity and test hypotheses **H2** and **H5**. Hypothesis **H2** predicts that the announcement effects of spin-offs will be positive and those of sell-offs will be negative; and hypothesis **H5** predicts that spin-offs will be associated with no announcement effects while sell-offs will be associated with positive announcement effects. The announcement dates of sell-offs are obtained from the SDC/Mergers and Acquisitions database, whereas those of spin-offs are obtained by searching Factiva and Bloomberg databases.

The announcement effect for each divesting firm is computed as the cumulative abnormal return (CAR) for a particular event window around the announcement date. Daily abnormal returns are computed using the market model (with value- and equal-weighted CRSP indices). Market model parameters are estimated over 255 trading days ending 46 trading days before the announcement date with at least 100 daily returns in the estimation period. Announcement effects are calculated for six different event windows for each market index ranging from three days before to three days after the announcement date.

The announcement effects of spin-offs and sell-offs are presented in Table 4. The results show that both groups of firms realize significantly positive announcement effects. The mean (median)

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announcement effects of spin-offs range between 2.88 (0.98) to 4.48% (2.33%) and the mean (median) announcement effects of sell-offs range between 1.03 (0.21) to 1.58% (0.46%) depending on the event window. All means and medians are significantly different from zero at the 1% level for both groups of divesting firms. Further, the findings in Table 4 also demonstrate that spin-offs have significantly larger announcement effects compared to sell-offs. The differences in the mean (median) announcement effects of spin-offs and sell-offs range between 1.86 (0.58) to 2.93% (1.88%) and are statistically significantly different from zero at the 1% level.

These findings are not consistent with either of our hypotheses **H2** or **H5** if considered separately. Combined, however, these two hypotheses predict positive announcement effects for spin-offs, and either positive or negative announcement effects for sell-offs, depending on the relative magnitudes of the overvaluation effect versus the effect of divesting underperforming assets. If we interpret the positive announcement effects of sell-offs in Table 4 as an indication that the positive effect of divesting underperforming assets dominates the negative effect of overvaluation, then, combined with the positive announcement effects of spin-offs, our findings provide support for the joint hypotheses **H2** and **H5**.

*4.4. Post-Divesture Operating Performance of Firms Divesting through Spin-Offs and Sell-Offs*

In this section we study the post-divestiture operating performance of the two groups of divesting firms. According to Hypothesis **H4**, firms selling off assets are expected to realize greater improvements in their post-divestiture operating performance compared to firms spinning off assets.

We use four measures of operating performance: *OIBD/Assets*, *ROA*, *OIBD/Sales*, and *Profit Margin*, where *OIBD* is operating income before depreciation plus interest income (Compustat items 13 and 15), *Assets* are the book value of total assets (item 6), *ROA* is net income (item 172) over *Assets*, *Sales* are total sales (item 12), and *Profit Margin* is net income over *Sales*. We adjust these measures for the performance of industry-, size-, and performance-matched firms by subtracting the contemporaneous performance measures of matched firms from those of the divesting firms in our sample. We select matched firms following Loughran and Ritter's (1997) algorithm described in section 4.2.

Panel A of Table 5 reports the levels of matched-firm-adjusted operating performance of both groups of firms in the fiscal year prior to divestiture (year -1), the fiscal year of divestiture (year 0), and the three fiscal years after divestiture (years 1 through 3). The post-divesture matched-firm-adjusted operating performance ratios of firms divesting through spin-offs are in general significantly negative indicating that such firms lag behind their industry peers in the post-divesture years. On the other hand, the post-divesture matched-firm-adjusted operating performance ratios of firms divesting through sell-offs are mostly in line with those of their industry peers; most post-divesture matched-firm-adjusted *OIBD*/*Assets* and *Profit Margin* ratios of such firms are not significantly different from zero, whereas most *ROA* ratios are significantly positive and most *OIBD/Sales* ratios are significantly negative. Finally, Panel A of Table 5 shows that firms divesting through spin-offs have significantly lower post-divesture matched-firm-adjusted operating performance ratios compared to firms divesting through sell-offs; the differences in medians are significantly negative for all performance measures in years 2 and 3, and they are significantly negative in year 1 for *OIBD*/*Assets* and *OIBD*/*Sales*.

Panel B of Table 5 reports the changes in post-divesture matched-firm-adjusted operating performance ratios from year -1 to years 0, 1, 2, and 3. Firms divesting through spin-offs realize significant improvements in their *ROA* and *Profit Margin* in years 0 and 1 relative to year -1;[22] however, they realize significant deterioration in their *OIBD*/*Assets* and *OIBD*/*Sales* in all post-divestiture years relative to year -1. Firms divesting through spin-offs also realize significant deterioration in their *ROA* and *Profit Margin* in year 2 relative to year -1. On the other hand, firms divesting through sell-offs realize improvements in all performance measures in all post-divesture years. The changes in post-divesture matched-firm-adjusted *ROA*, *OIBD*/*Sales*, and *Profit Margin* of these firms are significantly positive in all post-divesture years relative to year -1, while the change in *OIBD*/*Assets* is significantly positive in year 3 relative to year -1. Further, Panel B of Table 5 shows that the changes in post-divesture matched-firm-

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[22] Using a sample of spin-offs in 1975-1991, Daley, Mehrotra, and Sivakumar (1997) also find that firms divesting through spin-offs realize improvement in their ROA from year 0 to year 1 after the spin-off. Similarly, using a sample of spin-offs in 1986-1988, John and Ofek (1995) find that firms divesting through spin-offs realize an increase in their ROA from year 0 to three years after the spin-off.

adjusted operating performance ratios of firms divesting through spin-offs are significantly smaller compared to those of firms divesting through sell-offs. The differences in medians are significantly negative for all performance measures in years 2 and 3 relative to year -1, and they are significantly negative in year 1 relative to year -1 for *OIBD/Assets* and *OIBD/Sales*.

Our findings in Table 5 indicate that firms divesting through sell-offs realize unequivocally significant improvements in their post-divesture operating performance, whereas the post-divesture operating performance of firms divesting through spin-offs either improves or deteriorates depending on the performance measure used. Further, our findings indicate that the changes in post-divesture operating performance of firms divesting through sell-offs are significantly larger than those of firms divesting through spin-offs according to all performance measures. All these findings provide support for our hypothesis **H4**.

*4.5. Post-Divesture Stock Return Performance of Firms Divesting through Spin-Offs and Sell-Offs*

In this section we study the post-divesture stock return performance of firms divesting through spin-offs and sell-offs. Hypothesis **H6** predicts that firms divesting through sell-offs will realize a greater improvement in their post-divestiture stock return performance than firms divesting through spin-offs.

We study divesting firms' stock return performance relative to three benchmarks: the value- and equal-weighted CRSP indices, and the S&P 500 index. We calculate average holding period returns for divesting firms and the corresponding benchmarks for year -1 before divestiture (months -12 to -1), year 1 after divestiture (months 1 to 12), year 2 after divestiture (months 13 to 24), and year 3 after divestiture (months 25 to 36). Month 0 is the month when transaction becomes effective for sell-offs and the issue month for spin-offs. We calculate holding period returns for each divesting firm and the corresponding benchmark as $[\prod_{t=1}^{T_i}(1+R_{it})-1]\times 100\%$, where $R_{it}$ is the return on the stock of divesting firm *i* or the corresponding benchmark in the *t*-th month of an event window and $T_i$ is the number of months in that event window. $T_i$ is equal to 12 if a divesting firm survives for all twelve months in a one-year event

window. For firms that are delisted before the end of a twelve-month window, holding period returns are calculated until the delisting month, and the corresponding benchmarks' returns are calculated over the same truncated period. Finally, we calculate abnormal (benchmark-adjusted) holding period return for each divesting firm by subtracting the holding period return of the corresponding benchmarks from that of the divesting firm.

In Panel A of Table 6 we report the median pre- and post-divestiture abnormal holding period returns for the two groups of divesting firms. In the pre-divestiture year and depending on the benchmark used, firms divesting through spin-offs realize significantly positive abnormal holding period returns ranging between 6.06 to 9.59%, whereas firms divesting through sell-offs realize significantly negative abnormal holding period returns ranging between -5.26 to -7.54%. In the post-divestiture years, both groups of firms realize significantly negative abnormal holding period returns, except for firms divesting through sell-offs using the S&P 500 index as a benchmark.[23] However, depending on the benchmark used and the post-divestiture year, the abnormal holding period returns of firms divesting through spin-offs are significantly more negative than those of firms divesting through sell-offs; the differences in median abnormal holding period returns between the two groups of firms range between -1.56 to -8.10% and are highly significant.

In Panel B of Table 6 we report the changes in median abnormal holding period returns from year -1 to post-divestiture years 1, 2, and 3 for the two groups of divesting firms. Depending on the benchmark used and the post-divestiture year, the changes in abnormal holding period returns of firms divesting through spin-offs range between -10.99 to -23.55% and are significant at the 1% level. The changes in abnormal holding period returns of firms divesting through sell-offs are significantly positive ranging between 1.08 and 3.60%. Finally, the changes in post-divestiture abnormal holding period returns of firms divesting through sell-offs are significantly greater than those of firms divesting through spin-offs; the differences in median changes in abnormal holding period returns are all negative, ranging from -13.60 to

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[23] Cusatis, Miles, and Woolridge (1993) show that in 1965-1988 firms divesting through spin-offs realize positive matched-firm-adjusted holding period returns in the three-year period after the spin-off.

-24.63%, and highly significant. These findings indicate that firms divesting through sell-offs realize significant improvement in their post-divestiture stock return performance, whereas firms divesting through spin-offs realize significant deterioration.

We also study stock return performance using the calendar time portfolio approach with the Fama and French (1993) three-factor model augmented by Carhart's (1997) momentum factor.[24] This multi-factor model serves as a benchmark for expected returns (see, e.g., Ritter and Welch, 2002), with the estimate of its intercept measuring monthly abnormal returns; a negative intercept indicates underperformance and a positive one indicates overperformance. Specifically, to estimate whether divesting firms realize an improvement in their post-divestiture stock return performance relative to their pre-divestiture performance, we run the following regression separately for firms divesting through spin-offs and for firms divesting through sell-offs:

$$(R_{pt} - R_{ft}) = \alpha + \gamma \, After + \beta_1(R_{mt} - R_{ft}) + \beta_2(R_{mt} - R_{ft}) \, After + s_1 \, SMB_t$$

$$+ \, s_2 \, SMB_t \, After + h_1 \, HML_t + h_2 \, HML_t \, After + u_1 \, UMD_t + u_2 \, UMD_t \, After + \varepsilon_t, \tag{6}$$

where the dependent variable for each calendar month $t$ of the estimation period is calculated as the average return on a portfolio of either spin-off or sell-off parent firms whose spin-off issue date or sell-off effective date falls within the past 36 months or within the next 12 months (36 months after divestiture and 12 months before divestiture) minus the risk-free rate;[25] $R_{mt}$ is the return on the CRSP value-weighted index in month $t$; $R_{ft}$ is the 1-month T-bill yield in month $t$; $SMB_t$ is the return on a portfolio of small stocks minus the return on a portfolio of large stocks in month $t$; $HML_t$ is the return on a portfolio of high book-to-market stocks minus the return on a portfolio of low book-to-market stocks in month $t$; and $UMD_t$ is the return on a portfolio of high prior return stocks minus the return on a portfolio of low prior

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[24] Jagadeesh and Titman (1993) and Carhart (1997), among others, have shown that momentum in stock returns is an important factor in explaining stock return performance.
[25] In this analysis we compare the abnormal monthly returns realized by divesting firms in the three-year post-divestiture period to those realized in the one-year pre-divestiture period. For robustness, we also compare the abnormal monthly returns realized by divesting firms in the one- and two-year periods after divestiture to those realized in the one-year period prior to divestiture. Unreported results of these alternative tests are similar to those reported here; namely, firms divesting through spin-offs realize significant deterioration in their post-divestiture performance whereas firms divesting through sell-offs realize significant improvement.

return stocks in month $t$. In equation (6), we test the differences in the pre- and post-divestiture stock return performance by using a dummy variable *After* equal to one for the post-divestiture period (months 1 to 36 after divestiture), and zero for the pre-divestiture period (months -12 to -1 before divestiture), and interacting it with the Fama and French (1993) and Carhart (1997) risk factors. Thus the estimate of $\alpha$ in equation (6) represents the monthly abnormal returns in the pre-divestiture period and the estimate of $\gamma$ represents the difference between the monthly abnormal returns in the post-divestiture period over those in the pre-divestiture period. The estimate of $\gamma$ is expected to be positive if divesting firms realize improvements in their post-divestiture stock return performance relative to the pre-divestiture period.

Panel A of Table 7 presents the results of our estimation of equation (6) for firms divesting through spin-offs using ordinary least squares (OLS) and weighted least squares (WLS) regressions.[26] The coefficient estimates of $\alpha$ are positive in both specifications and significant at the 1% level indicating that firms divesting through spin-offs realize positive abnormal monthly returns between 1.3 to 1.6% in the one-year pre-divestiture period. The coefficient estimates of *After* dummy ($\gamma$) are negative and highly significant, which suggests that the stock return performance of firms divesting through spin-offs deteriorates after divestiture as their abnormal monthly returns in the three-year post-divestiture period are significantly smaller by 1.1 to 1.8% than those in the pre-divestiture period.

Panel B of Table 7 presents the results of our estimation of equation (6) for firms divesting through sell-offs. The coefficient estimates of $\alpha$ are negative but not statistically significant. The coefficient estimates of $\gamma$ are positive and significant at the 5 and 10% levels, which implies that firms divesting through sell-offs realize significant improvement in their post-divestiture stock return performance as their abnormal monthly returns in the three-year post-divestiture period are significantly larger by 0.3 to 0.4% than those in the pre-divestiture period. Consistent with our holding period return analysis in Table 6, our calendar time portfolio analysis in Table 7 also indicates that firms divesting through sell-offs tend to realize significant improvement in their post-divestiture stock return

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[26] For WLS regressions the weights are determined by the number of divesting firms in the monthly portfolio.

performance, whereas the performance of firms divesting through spin-offs deteriorates. These findings provide support for our hypothesis **H6**.

### 4.6. The Choice between Spin-Offs and Sell-offs

In this section we study the choice between spin-offs and sell-offs in a multivariate setting. We run a set of logit regressions with the dependent variable equal to one if the divestiture is a spin-off and zero if it is a sell-off. The independent variables which relate to our hypotheses along with expected signs of their coefficients in parentheses are: the equity valuation variables $Ln(P/V)_{Sales}$ or $Ln(P/V)_{Book\ Value}$ (-), *Marginal Tax Rate* (+), *Relatedness* (+), and *Investor Sentiment Index* (+). Further, we control for divesting firm's size by using $Ln(Assets)$ or $Ln(MVE)$, divested unit's size $Ln(Unit\ Size)$, divesting firm's operating performance in the previous fiscal year measured by *ROA*, divesting firm's financial constraints measured by *Cash*/*Assets*, *KZ Index*, or (*CapEx + R&D*)/*Assets*, and the extent of asymmetric information faced by divesting firm measured by $Ln(Number\ of\ Analysts)$, *StDev of Analyst Forecasts*, or *Dispersion*. The results of various specifications of our logit regressions are presented in Table 8.

The coefficient estimates of $Ln(P/V)_{Sales}$ and $Ln(P/V)_{Book\ Value}$ are all negative and significant in seven out of ten specifications at the 5 or 10% levels. This suggests that the firms which have higher equity valuation relative to their intrinsic value (relatively overvalued firms) are more likely to divest their assets through a sell-off, while those with lower equity valuation relative to their intrinsic value (relatively undervalued firms) are more likely to divest their assets through a spin-off. This provides support for hypothesis **H1**. Further, the coefficient estimates of *Marginal Tax Rate* are all positive and highly significant at the 1% level. This indicates that firms with higher marginal tax rates are more likely to divest their assets through a spin-off rather than a sell-off and supports our hypothesis **H3**. Also, the coefficient estimates of *Investor Sentiment Index* are positives in all specifications and highly significant at the 1% level. This implies that firms are more likely to divest their assets through spin-offs during periods of relatively high investor sentiment and through sell-offs during periods of relatively low investor sentiment, providing support for our hypothesis **H7**. Finally, the coefficient estimates of

*Relatedness* are all positive and significant at the 1% level as well, implying that firms whose business is more related to that of their units are more likely to divest such units through spin-offs rather than sell-offs. Assuming that the units which are less related to their parent firm's business have lower productivity (underperforming units), the positive coefficient estimates of *Relatedness* indicate that underperforming units are more likely to be sold off and better-performing units are more likely to be spun off.

Our logit regressions also show that larger firms (measured by the size of their assets or the market value of their equity) are more likely to sell off their assets. Also, units which are relatively larger in size are more likely to be spun off. In addition, firms with better operating performance (*ROA*) in the pre-divestiture year are more likely to sell off their assets; however, this finding is not significant in most of the specifications. Further, firms which are more financially constrained (i.e., firms which have less cash relative to their assets, higher values of *KZ Index*, or invest more in capital expenditures and R&D) are more likely to sell off their assets, indicating perhaps that cash generated through a sell-off may be used to relieve such financial constraints. The coefficient estimates of *Cash/Assets* are all positive and highly significant at the 1 or 5% levels, whereas those of *KZ Index* are mostly negative and significant at the 10% level in three specifications only. The coefficient estimates of (*CapEx + R&D*)/*Assets* are all negative but not statistically significant. Finally, firms which face more information asymmetry in the financial market are more likely to divest their assets through a spin-off rather than a sell-off. Namely, firms which are followed by fewer analysts and those which have higher standard deviation of analyst forecasts or greater dispersion in such forecasts are more likely to divest their assets through a spin-off.[27] The coefficient estimates of *Ln*(*Number of Analysts*) are negative and significant at the 1% level, and those of *StDev of Analyst Forecasts* and *Dispersion* are positive and significant at the 5 and 10% levels.[28]

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[27] We exclude *Ln*(*Assets*) and *Ln*(*MVE*) from regression specifications where *Ln*(*Number of Analysts*) is used as an independent variable because these two firm size variables are highly correlated with *Ln*(*Number of Analysts*). The correlation coefficient between *Ln*(*Number of Analysts*) and *Ln*(*Assets*) [*Ln*(*MVE*)] is 0.73 [0.76].

[28] These findings complement those by Krishnaswami and Subramaniam (1999) who show that firms divesting through spin-offs face a greater extent of information asymmetry relative to peer non-divesting firms. Our findings demonstrate that the firms which divest their assets through spin-offs face more asymmetric information also relative to the firms which divest their assets through sell-offs.

In summary, our multivariate logit analysis provides further support for several of our hypotheses and confirms the results of our univariate tests. It shows that firms which have lower equity valuations relative to their intrinsic value or higher marginal tax rates, divest more related units, and are less financially constrained or subject to more information asymmetry are more likely to divest their assets through a spin-off rather than a sell-off.

## 5. Conclusion

This paper studies the determinants of the choice between two forms of corporate divestitures—spin-offs versus sell-offs. We develop empirical predictions by hypothesizing that this choice is driven by the characteristics of divesting firms (such as their valuation in the market relative to their intrinsic value and their marginal tax rate), by the characteristics of the assets being divested (their current performance under parent firm's management relative to their full potential), and by the prevailing market conditions at the time of divestiture (such as the degree of investor optimism or pessimism).

Consistent with our hypotheses, we find the following. First, firms which spin off their assets have significantly lower pre-divestiture valuations (relative to their intrinsic value) than firms which sell off their assets. Second, firms which divest their assets through sell-offs realize significantly larger improvements in their long-term post-divestiture operating performance compared to firms which divest their assets through spin-offs. Third, firms which divest their assets through sell-offs realize significantly larger improvements in their long-term post-divestiture stock return performance compared to firms which divest their assets through spin-offs. Fourth, the announcement effects of both spin-offs and sell-offs are significantly positive and those of spin-offs are significantly larger than those of sell-offs. Fifth, firms are more likely to spin off their assets during periods of investor optimism and sell off their assets during periods of investor pessimism. Finally, firms with higher marginal tax rates are more likely to spin off their assets and firms with lower marginal tax rates are more likely to sell off their assets.

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**Table 1**
Number of spin-offs and sell-offs announced in 1980-2006 by calendar year.

| Year | Spin-offs | Sell-offs |
|------|-----------|-----------|
| 1980 | 4 | 0 |
| 1981 | 10 | 3 |
| 1982 | 8 | 8 |
| 1983 | 25 | 64 |
| 1984 | 13 | 67 |
| 1985 | 21 | 105 |
| 1986 | 22 | 139 |
| 1987 | 18 | 97 |
| 1988 | 11 | 86 |
| 1989 | 10 | 109 |
| 1990 | 4 | 106 |
| 1991 | 23 | 100 |
| 1992 | 18 | 129 |
| 1993 | 23 | 154 |
| 1994 | 8 | 166 |
| 1995 | 15 | 195 |
| 1996 | 18 | 230 |
| 1997 | 6 | 236 |
| 1998 | 17 | 229 |
| 1999 | 18 | 202 |
| 2000 | 14 | 186 |
| 2001 | 5 | 153 |
| 2002 | 3 | 129 |
| 2003 | 2 | 113 |
| 2004 | 0 | 112 |
| 2005 | 5 | 92 |
| 2006 | 1 | 70 |
| | | |
| Total | 322 | 3,280 |

**Table 2**
Summary statistics and univariate tests for the sample of spin-offs and sell-offs announced in 1980-2006.
*Marginal Tax Rate* is divesting firm's non-parametric marginal tax rate developed in Blouin, Core, and Guay (2010) and reported in Compustat. *Relatedness* measures the degree of relatedness between divesting firm and its divested unit; it takes values between 0 and 4, equal to the number of digit matches between the SIC codes of the divesting firm and its unit. *Investor Sentiment Index* is the first principal component of orthogonolized values of the value-weighted average closed-end fund discount, the natural logarithm of NYSE share turnover detrended using five year moving average, the number of IPOs and their average first day returns, the equity share in new issues of equity and long-term debt, and the dividend premium defined as the log difference between average value-weighted market-to-book ratios of dividend payers and non-dividend payers. *Investor Sentiment Index* is measured at the beginning of divestiture announcement month. *Ln(Assets)* is the natural logarithm of the book value of divesting firm's assets at the end of the fiscal year prior to divestiture announcement. *Ln(MVE)* is the natural logarithm of divesting firm's number of shares outstanding multiplied by share price at the end of the fiscal year prior to divestiture announcement. *Ln(Unit Size)* is the natural logarithm of the number of shares outstanding multiplied by closing share price on the first day of trading for spun-off units, and it is the transaction value reported in SDC for sold-off units. *Cash/Assets* is the ratio of divesting firm's cash and equivalents over the book value of assets at the end of the fiscal year prior to divestiture announcement. *KZ Index* is the modified version of Kaplan-Zingales (1997) index constructed for divesting firms at the end of the fiscal year prior to divestiture announcement following Lamont, Polk, and Saa-Requejo (2001). *(CapEx + R&D)/Assets* is the ratio of divesting firm's sum of capital expenditures and R&D expenses over the book value of assets at the end of the fiscal year prior to divestiture announcement. *Number of Analysts* is the number of analysts following divesting firm at the end of the fiscal year prior to divestiture announcement. *StDev of Forecasts* is the standard deviation of analyst forecasts at the end of the fiscal year prior to divestiture announcement winsorized at the 95$^{th}$ percentile. *Dispersion* is the standard deviation of analyst forecasts normalized by share price at the end of the fiscal year prior to divestiture announcement and winsorized at the 95$^{th}$ percentile. *ROA* is divesting firm's return on assets at the end of the fiscal year prior to divestiture announcement. *Long-Term Debt/Assets* is the ratio of divesting firm's long-term debt over the book value of assets at the end of the fiscal year prior to divestiture announcement. The results of *t*-tests for the difference in means and non-parametric Wilcoxon rank-sum tests for the difference in medians are reported in parentheses. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent significance, respectively.

| | Firms Divesting through Spin-Offs | | | | | | Firms Divesting through Sell-Offs | | | | | | Difference in Means (t-stat.) | Difference in Medians (z-stat.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | Min | Mean | Median | Max | StDev | N | Min | Mean | Median | Max | StDev | | |
| *Marginal Tax Rate* | 310 | 0.020 | 0.353 | 0.348 | 0.480 | 0.100 | 3,179 | 0 | 0.327 | 0.343 | 0.480 | 0.092 | 0.026 (4.628)*** | 0.005 (4.080)*** |
| *Relatedness* | 322 | 0 | 2.046 | 2 | 4 | 1.774 | 3,280 | 0 | 1.396 | 1 | 4 | 1.548 | 0.650 (7.095)*** | 1 (6.262)*** |
| *Investor Sentiment Index* | 322 | -1.935 | 0.340 | 0.190 | 2.927 | 1.021 | 3,280 | -1.935 | -0.023 | -0.088 | 2.768 | 0.908 | 0.362 (6.750)*** | 0.278 (6.181)*** |
| *Ln(Assets)* | 322 | 13.830 | 20.102 | 20.074 | 27.078 | 2.326 | 3,280 | 12.315 | 20.930 | 21.138 | 27.344 | 2.350 | -0.828 (-6.035)*** | -1.064 (-6.187)*** |
| *Ln(MVE)* | 311 | 7.773 | 19.747 | 19.780 | 26.313 | 2.439 | 3,238 | 11.924 | 20.579 | 20.825 | 26.954 | 2.513 | -0.832 (-5.593)*** | -1.045 (-5.974)*** |
| *Ln(Unit Size)* | 322 | 13.816 | 17.516 | 17.504 | 23.086 | 1.636 | 1,965 | 9.680 | 17.439 | 17.399 | 23.533 | 1.776 | 0.077 (0.730) | 0.105 (0.084) |
| *Cash/Assets* | 322 | 0 | 0.116 | 0.053 | 0.933 | 0.147 | 3,280 | 0 | 0.092 | 0.039 | 0.917 | 0.132 | 0.024 (3.035)*** | 0.014 (3.845)*** |
| *KZ Index* | 310 | -2484.5 | -11.386 | -0.298 | 15.100 | 141.583 | 3,226 | -1122.8 | -2.869 | -0.721 | 306.593 | 25.759 | -8.517 (-2.950)*** | 0.423 (1.218) |
| *(CapEx + R&D)/Assets* | 322 | 0 | 0.097 | 0.069 | 1.516 | 0.124 | 3,280 | 0 | 0.104 | 0.076 | 6.096 | 0.175 | -0.007 (-0.712) | -0.007 (-1.690)* |
| *Number of Analysts* | 322 | 0 | 8.441 | 5 | 40 | 9.464 | 3,280 | 0 | 10.920 | 9 | 46 | 10.172 | -2.479 (-2.672)*** | -4 (-2.731)*** |
| *StDev of Forecasts* | 212 | 0 | 0.139 | 0.060 | 1.820 | 0.258 | 2,476 | 0 | 0.094 | 0.040 | 1.950 | 0.185 | 0.045 (3.310)*** | 0.020 (4.193)*** |
| *Dispersion* | 211 | 0 | 0.009 | 0.003 | 0.114 | 0.016 | 2,468 | 0 | 0.007 | 0.002 | 0.154 | 0.015 | 0.002 (1.799)* | 0.001 (4.161)*** |
| *ROA* | 322 | -3.056 | -0.015 | 0.030 | 0.356 | 0.232 | 3,279 | -8.208 | -0.050 | 0.028 | 2.437 | 0.449 | 0.035 (1.389) | 0.002 (0.176) |
| *Long-Term Debt/Assets* | 322 | 0 | 0.263 | 0.237 | 1.221 | 0.199 | 3,275 | 0 | 0.226 | 0.205 | 3.323 | 0.194 | 0.037 (3.257)*** | 0.032 (3.434)*** |

**Table 3**
Pre-divestiture equity valuation of divesting firms that announced spin-offs and sell-offs in 1980-2006.
Matched firms are chosen following Loughran and Ritter's (1997) matching algorithm. Each divesting firm is matched with a firm that has not spun off or sold off assets during the five year period prior to divestiture announcement date. The matching firm is from the same industry (using 2-digit SIC codes), its asset size at the end of the fiscal year prior to divestiture announcement is between 25 to 175% of that of the divesting firm, and has the closest OIBD/Assets ratio to that of the divesting firm. If no matching firm meets these criteria then the industry requirement is dropped and a matching firm is chosen with asset size within 90 and 110% of that of the divesting firm and with closest, but higher, OIBD/Assets ratio. Significance levels are based on the parametric $t$-test for means and the difference in means, and the Wilcoxon signed-rank (rank-sum) test for medians (the difference in medians). ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: Pre-divestiture equity valuation of divesting firms based on matched firm price multiples
$Ln(P/V)_{Sales}$ is the natural logarithm of divesting firm's price-to-sales ratio over matched firm's price-to-sales ratio. $Ln(P/V)_{OIBD}$ is the natural logarithm of divesting firm's price-to-operating income before depreciation (OIBD) ratio over matched firm's price-to-OIBD ratio. $Ln(P/V)_{Earnings}$ is the natural logarithm of divesting firm's price-to-earnings ratio over matched firm's price-to-earnings ratio. $Ln(P/V)_{Book\ Value}$ is the natural logarithm of divesting firm's price-to-book value ratio over matched firm's price-to-book value ratio. Price-to-sales, price-to-OIBD, price-to-earnings, and price-to book value ratios for divesting firms are calculated using the realized values of sales (Compustat item 12), OIBD (item 13), income before extraordinary items (item 18), and book value of equity (item 60), respectively, in the fiscal year after divestiture announcement and the market value of equity (item 25 × item 199) at the end of the fiscal year prior to divestiture announcement. The realized values of post-divestiture sales, OIBD, earnings, and book value of equity of firms divesting through spin-offs are the sum of divesting firm's and spun-off unit's sales, OIBD, earnings, and book value of equity, respectively. Price-to-sales, price-to-OIBD, price-to-earnings, and price-to book value ratios for matched firms are calculated using the realized values of sales, OIBD, income before extraordinary items, and book value of equity, respectively, as well as the market value of equity at the end of the fiscal year prior to divestiture announcement. Only positive values of OIBD, earnings, and book value of equity are used in constructing price multiples.

| | Firms Divesting through Spin-Offs | | | Firms Divesting through Sell-Offs | | | Difference in | Difference in |
|---|---|---|---|---|---|---|---|---|
| | N | Mean (*t*-statistic) | Median (*z*-statistic) | N | Mean (*t*-statistic) | Median (*z*-statistic) | Means (*t*-statistic) | Medians (*z*-statistic) |
| $Ln(P/V)_{Sales}$ | 298 | -0.119 (-1.333) | -0.051 (-1.267) | 2,833 | 0.054 (2.160)** | 0.067 (3.145)*** | -0.172 (-2.106)** | -0.118 (-2.224)** |
| $Ln(P/V)_{OIBD}$ | 204 | 0.132 (1.213) | -0.075 (0.110) | 2,212 | 0.077 (3.084)*** | 0.043 (3.162)*** | 0.055 (0.622) | -0.119 (-0.948) |
| $Ln(P/V)_{Earnings}$ | 162 | -0.124 (-1.030) | -0.060 (-0.683) | 1,813 | 0.130 (4.267)*** | 0.056 (4.274)*** | -0.254 (-2.345)** | -0.116 (-1.862)* |
| $Ln(P/V)_{Book\ Value}$ | 276 | -0.073 (-1.070) | -0.081 (-1.684)* | 2,592 | 0.163 (7.527)*** | 0.153 (8.610)*** | -0.236 (-3.368)*** | -0.234 (-4.267)*** |

Panel B: Pre-divestiture equity valuation of divesting firms based on the residual income model (RIM) and the Ohlson (2005) model (OHL)
$Ln(P/V)_{RIM0}$ is the natural logarithm of divesting firm's price-to-value ratio over matched firm's price-to-value ratio, where the value both for divesting firm and matched firm is estimated using the residual income model with zero growth. $Ln(P/V)_{RIM5}$ is the natural logarithm of divesting firm's price-to-value ratio over matched firm's price-to-value ratio, where the value both for divesting and matched firm is estimated using the residual income model with 5% growth. $Ln(P/V)_{OHL0}$ is the natural logarithm of divesting firm's price-to-value ratio over matched firm's price-to-value ratio, where the value both for divesting and matched firm is estimated using the Ohlson (2005) model with zero growth. $Ln(P/V)_{OHL5}$ is the natural logarithm of divesting firm's price-to-value ratio over matched firm's price-to-value ratio, where the value both for divesting and matched firm is estimated using the Ohlson (2005) model with 5% growth. The realized values of post-divestiture earnings, book values, and dividends for firms divesting through spin-offs are the sum of divesting firm's and spun-off unit's earnings, book values, and dividends, respectively.

| | Firms Divesting through Spin-Offs | | | Firms Divesting through Sell-Offs | | | Difference in | Difference in |
|---|---|---|---|---|---|---|---|---|
| | N | Mean (*t*-statistic) | Median (*z*-statistic) | N | Mean (*t*-statistic) | Median (*z*-statistic) | Means (*t*-statistic) | Medians (*z*-statistic) |
| $Ln(P/V)_{RIM0}$ | 248 | -0.027 (-0.376) | -0.041 (-0.584) | 2,615 | 0.152 (6.906)*** | 0.162 (8.513)*** | -0.180 (-2.394)** | -0.203 (-2.927)*** |
| $Ln(P/V)_{RIM5}$ | 249 | -0.057 (-0.623) | -0.036 (-0.403) | 2,635 | 0.138 (4.666)*** | 0.164 (6.594)*** | -0.195 (-1.944)* | -0.200 (-2.293)** |
| $Ln(P/V)_{OHL0}$ | 215 | -0.093 (-0.652) | -0.086 (-0.895) | 2,359 | 0.097 (2.398)** | 0.121 (3.385)*** | -0.189 (-1.350) | -0.206 (-1.849)* |
| $Ln(P/V)_{OHL5}$ | 222 | -0.197 (-1.208) | -0.247 (-1.337) | 2,381 | 0.139 (2.924)*** | 0.162 (3.368)*** | -0.336 (-2.054)** | -0.409 (-2.286)** |

**Table 4**

Announcement-period cumulative abnormal returns (CARs) to equity of divesting firms that announced spin-offs and sell-offs in 1980-2006.

Announcement effect for each divesting firm is computed as the CAR for a particular window around announcement date. Daily abnormal returns are computed using the market model for two market indices: value- and equal-weighted CRSP indices. Market model parameters are estimated over 255 trading days ending 46 trading days before divestiture announcement date with at least 100 non-missing daily returns in the estimation period. Announcement date is denoted as date 0. Significance levels are based on the parametric *t*-test for means and the difference in means, and Wilcoxon signed-rank (rank-sum) test for medians (the difference in medians). ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

| | Window | Firms Divesting through Spin-Offs | | Firms Divesting through Sell-Offs | | Difference in Means (*t*-stat.) | Difference in Medians (*z*-stat.) |
|---|---|---|---|---|---|---|---|
| | | Mean (*t*-stat.) | Median (*z*-stat.) | Mean (*t*-stat.) | Median (*z*-stat.) | | |
| Value-Weighted | -1 to +1 | 4.20% (6.671)*** | 1.87% (7.309)*** | 1.37% (8.373)*** | 0.32% (6.806)*** | 2.83% (5.075)*** | 1.56% (5.896)*** |
| Equally-Weighted | -1 to +1 | 4.26% (6.793)*** | 2.00% (7.509)*** | 1.36% (8.377)*** | 0.34% (6.870)*** | 2.90% (5.234)*** | 1.66% (6.055)*** |
| Value-Weighted | -1 to 0 | 3.20% (5.787)*** | 1.19% (6.840)*** | 1.29% (9.530)*** | 0.34% (8.248)*** | 1.91% (4.112)*** | 0.85% (4.812)*** |
| Equally-Weighted | -1 to 0 | 3.19% (5.765)*** | 1.24% (6.803)*** | 1.28% (9.492)*** | 0.36% (8.209)*** | 1.91% (4.113)*** | 0.88% (4.704)*** |
| Value-Weighted | 0 to +1 | 3.46% (4.972)*** | 1.35% (5.866)*** | 1.13% (7.318)*** | 0.22% (5.856)*** | 2.33% (4.326)*** | 1.13% (4.555)*** |
| Equally-Weighted | 0 to +1 | 3.48% (5.022)*** | 1.44% (6.005)*** | 1.14% (7.414)*** | 0.25% (5.974)*** | 2.35% (4.389)*** | 1.18% (4.596)*** |
| Value-Weighted | -3 to +3 | 4.31% (5.544)*** | 1.80% (5.333)*** | 1.55% (7.751)*** | 0.46% (6.195)*** | 2.76% (4.036)*** | 1.34% (3.749)*** |
| Equally-Weighted | -3 to +3 | 4.48% (5.853)*** | 2.33% (5.863)*** | 1.56% (7.816)*** | 0.45% (5.998)*** | 2.93% (4.317)*** | 1.88% (4.346)*** |
| Value-Weighted | -3 to 0 | 3.89% (5.583)*** | 0.98% (5.634)*** | 1.58% (9.780)*** | 0.41% (8.166)*** | 2.31% (4.142)*** | 0.58% (3.384)*** |
| Equally-Weighted | -3 to 0 | 3.94% (5.735)*** | 1.13% (6.228)*** | 1.57% (9.803)*** | 0.45% (8.057)*** | 2.37% (4.265)*** | 0.68% (3.984)*** |
| Value-Weighted | 0 to +3 | 2.88% (4.049)*** | 1.03% (4.196)*** | 1.03% (5.716)*** | 0.22% (3.809)*** | 1.86% (3.024)*** | 0.82% (3.193)*** |
| Equally-Weighted | 0 to +3 | 2.95% (4.156)*** | 1.28% (4.179)*** | 1.04% (5.838)*** | 0.21% (3.823)*** | 1.91% (3.146)*** | 1.07% (3.154)*** |
| Number of Firms | | 315 | 315 | 3,201 | 3,201 | | |

**Table 5**
Post-divestiture median levels of and median changes in matched-firm-adjusted operating performance of divesting firms that announced spin-offs and sell-offs in 1980-2006.

*OIBD/Assets* is the ratio of operating income before depreciation plus interest income (Compustat items 13 and 15) to the book value of total assets (item 6). *ROA* is the return on assets measured as the ratio of net income (item 172) to the book value of total assets. *OIBD/Sales* is the ratio of operating income before depreciation plus interest income to total sales (item 12). *Profit Margin* is the ratio of net income to total sales. All performance measures are adjusted for matched firm performance by subtracting respective contemporaneous matched firm performance ratios. Matched firms are chosen following Loughran and Ritter's (1997) matching algorithm. Each divesting firm is matched with a firm that has not spun off or sold off assets during the five years prior to divestiture announcement date. The matching firm is from the same industry (using 2-digit SIC codes), its asset size at the end of the fiscal year prior to divestiture announcement is between 25 to 175% of that of the divesting firm, and has the closest OIBD/Assets ratio to that of the divesting firm. If no matching firm meets these criteria then the industry requirement is dropped and a matching firm is chosen with asset size within 90 and 110% of that of the divesting firm and with closest, but higher, OIBD/Assets ratio. Year 0 is the fiscal year of divestiture announcement. Significance levels are based on the Wilcoxon signed-rank (rank-sum) test for the median levels of performance (the difference in median level performance between two sub-samples). ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

| Performance measures | Firms Divesting through Spin-Offs | | | Firms Divesting through Sell-Offs | | | Difference in Medians | z-statistic |
|---|---|---|---|---|---|---|---|---|
| | N | Value | z-statistic | N | Value | z-statistic | | |
| **Panel A: The median level of matched-firm-adjusted operating performance** | | | | | | | | |
| OIBD/Assets -1 | 320 | 0.00% | (-0.958) | 3,260 | 0.00% | (0.083) | 0.00% | (-0.911) |
| OIBD/Assets 0 | 315 | -0.54% | (-2.050)** | 3,117 | -0.06% | (-1.085) | -0.48% | (-1.635)* |
| OIBD/Assets 1 | 304 | -0.52% | (-2.218)** | 2,947 | 0.03% | (0.594) | -0.55% | (-2.330)** |
| OIBD/Assets 2 | 286 | -1.69% | (-3.915)*** | 2,792 | 0.20% | (1.297) | -1.89% | (-4.233)*** |
| OIBD/Assets 3 | 269 | -1.23% | (-1.961)** | 2,653 | 0.30% | (2.024)** | -1.53% | (-2.518)** |
| | | | | | | | | |
| ROA -1 | 322 | -0.23% | (-1.435) | 3,279 | -0.52% | (-8.086)*** | 0.29% | (1.135) |
| ROA 0 | 317 | 0.29% | (1.598) | 3,129 | 0.20% | (2.435)** | 0.09% | (0.818) |
| ROA 1 | 306 | 0.43% | (1.417) | 2,955 | 0.12% | (1.623) | 0.30% | (0.890) |
| ROA 2 | 288 | -1.28% | (-3.194)*** | 2,797 | 0.27% | (2.022)** | -1.55% | (-3.764)*** |
| ROA 3 | 269 | -0.66% | (-1.362) | 2,664 | 0.31% | (2.384)** | -0.98% | (-2.036)** |
| | | | | | | | | |
| OIBD/Sales -1 | 319 | -0.52% | (-2.273)** | 3,254 | -0.32% | (-5.303)*** | -0.20% | (-0.635) |
| OIBD/Sales 0 | 314 | -0.88% | (-2.231)** | 3,093 | -0.18% | (-4.177)*** | -0.70% | (-0.875) |
| OIBD/Sales 1 | 303 | -1.71% | (-3.119)*** | 2,925 | 0.00% | (-2.184)** | -1.71% | (-2.310)** |
| OIBD/Sales 2 | 284 | -2.19% | (-4.414)*** | 2,777 | 0.00% | (-1.806)* | -2.19% | (-3.833)*** |
| OIBD/Sales 3 | 267 | -1.14% | (-2.433)** | 2,638 | 0.42% | (-0.438) | -1.56% | (-2.180)** |
| | | | | | | | | |
| Profit Margin -1 | 321 | -0.69% | (-2.478)** | 3,273 | -0.66% | (-6.627)*** | -0.03% | (-0.346) |
| Profit Margin 0 | 316 | 0.65% | (1.418) | 3,104 | 0.28% | (1.603) | 0.37% | (0.901) |
| Profit Margin 1 | 305 | 0.00% | (0.491) | 2,934 | 0.14% | (0.466) | -0.14% | (0.340) |
| Profit Margin 2 | 286 | -1.72% | (-3.513)*** | 2,782 | 0.00% | (-0.152) | -1.72% | (-3.507)*** |
| Profit Margin 3 | 267 | -0.72% | (-1.847)* | 2,649 | 0.22% | (0.756) | -0.94% | (-2.101)** |
| **Panel B: The median change in matched-firm-adjusted operating performance** | | | | | | | | |
| ΔOIBD/Assets -1 to 0 | 315 | -0.76% | (-2.335)** | 3,108 | 0.00% | (-0.737) | -0.76% | (-2.032)** |
| ΔOIBD/Assets -1 to 1 | 304 | -0.70% | (-2.332)** | 2,937 | 0.00% | (0.536) | -0.70% | (-2.443)** |
| ΔOIBD/Assets -1 to 2 | 286 | -1.75% | (-3.926)*** | 2,781 | 0.19% | (1.176) | -1.95% | (-4.134)*** |
| ΔOIBD/Assets -1 to 3 | 267 | -1.29% | (-2.060)** | 2,643 | 0.17% | (1.835)* | -1.46% | (-2.521)** |
| | | | | | | | | |
| ΔROA -1 to 0 | 317 | 0.32% | (1.882)* | 3,128 | 0.53% | (5.593)*** | -0.21% | (0.026) |
| ΔROA -1 to 1 | 306 | 0.93% | (2.739)*** | 2,954 | 0.46% | (4.798)*** | 0.47% | (1.083) |
| ΔROA -1 to 2 | 288 | -0.55% | (-2.195)** | 2,796 | 0.64% | (5.175)*** | -1.19% | (-3.655)*** |
| ΔROA -1 to 3 | 269 | -0.06% | (-0.819) | 2,663 | 0.63% | (4.520)*** | -0.69% | (-2.057)** |
| | | | | | | | | |
| ΔOIBD/Sales -1 to 0 | 314 | -0.38% | (-0.963) | 3,081 | 0.15% | (0.532) | -0.52% | (-1.100) |
| ΔOIBD/Sales -1 to 1 | 303 | -0.51% | (-1.749)* | 2,911 | 0.31% | (1.701)* | -0.82% | (-2.236)** |
| ΔOIBD/Sales -1 to 2 | 284 | -1.70% | (-3.635)*** | 2,761 | 0.51% | (2.847)** | -2.21% | (-4.522)*** |
| ΔOIBD/Sales -1 to 3 | 264 | -0.98% | (-2.365)** | 2,623 | 0.73% | (3.349)*** | -1.71% | (-3.257)*** |
| | | | | | | | | |
| ΔProfit Margin -1 to 0 | 316 | 0.99% | (2.988)*** | 3,100 | 0.74% | (5.954)*** | 0.25% | (1.037) |
| ΔProfit Margin -1 to 1 | 305 | 0.58% | (2.080)** | 2,929 | 0.40% | (3.653)*** | 0.18% | (0.949) |
| ΔProfit Margin -1 to 2 | 286 | -1.53% | (-2.872)*** | 2,776 | 0.58% | (2.796)*** | -2.11% | (-3.663)*** |
| ΔProfit Margin -1 to 3 | 266 | -0.07% | (-0.919) | 2,643 | 0.73% | (3.165)*** | -0.80% | (-1.779)* |

**Table 6**

Post-divestiture median levels of and median changes in benchmark-adjusted holding period returns (HPR) of divesting firms that announced spin-offs and sell-offs in 1980-2006.

The three benchmarks are the value- and equal-weighted CRSP indices and the S&P 500 index. For each divesting firm and the corresponding benchmark HPRs are calculated by compounding monthly returns for months -12 to -1 before divestiture (year -1), for months 1 to 12 after divestiture (year 1), for months 13 to 24 after divestiture (year 2), and for months 25 to 36 after divestiture (year 3). Month 0 is the month when transaction becomes effective for sell-offs and the issue month for spin-offs. If divesting firm is delisted before the end of an event window, HPRs for such firm and corresponding benchmarks are compounded until the delisting date. Benchmark-adjusted HPRs for each divesting firm are calculated as the difference between divesting firm's HPR and corresponding benchmark's HPR over the same event window. Significance levels are based on the Wilcoxon signed-rank (rank-sum) test for median levels of benchmark-adjusted HPRs (the difference in median levels of benchmark-adjusted HPRs between the two sub-samples). ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

| Performance measures | Firms Divesting through Spin-Offs | | | Firms Divesting through Sell-Offs | | | Difference in Medians | z-statistic |
|---|---|---|---|---|---|---|---|---|
| | N | Value | z-statistic | N | Value | z-statistic | | |
| **Panel A: The median level of benchmark-adjusted holding period returns (HPR)** | | | | | | | | |
| Year -1 HPR adjusted for CRSP VW Index | 307 | 6.06% | (3.530)*** | 3,193 | -7.54% | (-10.652)*** | 13.60% | (6.181)*** |
| Year 1 HPR adjusted for CRSP VW Index | 307 | -8.51% | (-4.534)*** | 3,101 | -2.11% | (-3.058)*** | -6.40% | (-3.621)*** |
| Year 2 HPR adjusted for CRSP VW Index | 294 | -10.85% | (-4.060)*** | 2,883 | -3.35% | (-4.461)*** | -7.50% | (-3.159)*** |
| Year 3 HPR adjusted for CRSP VW Index | 276 | -7.36% | (-2.688)*** | 2,679 | -2.29% | (-2.933)*** | -5.07% | (-2.239)** |
| Year -1 HPR adjusted for CRSP EW Index | 307 | 6.08% | (2.981)*** | 3,193 | -7.10% | (-10.459)*** | 13.18% | (5.729)*** |
| Year 1 HPR adjusted for CRSP EW Index | 307 | -8.28% | (-4.210)*** | 3,101 | -1.96% | (-2.662)*** | -6.32% | (-3.203)*** |
| Year 2 HPR adjusted for CRSP EW Index | 294 | -10.54% | (-4.332)*** | 2,883 | -3.70% | (-4.889)*** | -6.85% | (-3.249)*** |
| Year 3 HPR adjusted for CRSP EW Index | 276 | -4.29% | (-2.080)** | 2,679 | -2.72% | (-5.053)*** | -1.56% | (-0.810) |
| Year -1 HPR adjusted for S&P 500 Index | 307 | 9.59% | (4.591)*** | 3,193 | -5.26% | (-7.526)*** | 14.85% | (6.545)*** |
| Year 1 HPR adjusted for S&P 500 Index | 307 | -8.24% | (-3.692)*** | 3,101 | -0.15% | (-0.294) | -8.10% | (-3.610)*** |
| Year 2 HPR adjusted for S&P 500 Index | 294 | -6.76% | (-2.981)*** | 2,883 | -1.28% | (-1.377) | -5.47% | (-2.823)*** |
| Year 3 HPR adjusted for S&P 500 Index | 276 | -5.18% | (-1.930)* | 2,679 | -0.43% | (0.421) | -4.75% | (-2.341)** |
| **Panel B: The median change in benchmark-adjusted holding period returns (HPR)** | | | | | | | | |
| ΔHPR from year -1 to year 1 adjusted for CRSP VW Index | 303 | -17.29% | (-5.672)*** | 3,084 | 1.94% | (3.695)*** | -19.23% | (-6.908)*** |
| ΔHPR from year -1 to year 2 adjusted for CRSP VW Index | 290 | -16.58% | (-5.452)*** | 2,856 | 2.14% | (2.192)** | -18.72% | (-6.340)*** |
| ΔHPR from year -1 to year 3 adjusted for CRSP VW Index | 271 | -15.46% | (-4.449)*** | 2,651 | 2.65% | (2.390)** | -18.11% | (-5.347)*** |
| ΔHPR from year -1 to year 1 adjusted for CRSP EW Index | 303 | -13.97% | (-4.838)*** | 3,084 | 2.56% | (4.200)*** | -16.53% | (-6.090)*** |
| ΔHPR from year -1 to year 2 adjusted for CRSP EW Index | 290 | -16.89% | (-4.848)*** | 2,856 | 3.60% | (2.814)*** | -20.49% | (-5.827)*** |
| ΔHPR from year -1 to year 3 adjusted for CRSP EW Index | 271 | -10.99% | (-3.807)*** | 2,651 | 2.61% | (1.856)* | -13.60% | (-4.438)*** |
| ΔHPR from year -1 to year 1 adjusted for S&P 500 Index | 303 | -20.41% | (-6.075)*** | 3,084 | 1.50% | (1.841)* | -21.91% | (-6.832)*** |
| ΔHPR from year -1 to year 2 adjusted for S&P 500 Index | 290 | -23.55% | (-6.253)*** | 2,856 | 1.08% | (-0.178) | -24.63% | (-6.641)*** |
| ΔHPR from year -1 to year 3 adjusted for S&P 500 Index | 271 | -18.57% | (-4.772)*** | 2,651 | 2.16% | (2.093)** | -20.74% | (-5.685)*** |

**Table 7**

Post-divestiture stock return performance of divesting firms that announced spin-offs and sell-offs in 1980-2006 using calendar time portfolio approach.
Abnormal performance is detected by running time-series regressions of pre- and post-divestiture monthly percentage returns using Fama and French's (1993) three-factor model augmented by Carhart's (1997) momentum variable

$$(R_{pt} - R_{ft}) = \alpha + \gamma \, After + \beta_1 (R_{mt} - R_{ft}) + \beta_2 (R_{mt} - R_{ft}) \, After + s_1 \, SMB_t + s_2 \, SMB_t \, After + h_1 \, HML_t + h_2 \, HML_t \, After + u_1 \, UMD_t + u_2 \, UMD_t \, After + \varepsilon_t,$$

where $R_{pt}$ is the return on the portfolio of sample firms in month $t$; $R_{ft}$ is the 1-month T-bill yield in month $t$; *After* is a dummy variable equal to one for post-divestiture returns (from month 1 to month 36 after divestiture), and zero for pre-divestiture returns (from month -12 to month -1 before divestiture); $R_{mt}$ is the return on the value-weighted index of NYSE, AMEX, and NASDAQ stocks in month $t$; $SMB_t$ is the return on small firms minus the return on large firms in month $t$; $HML_t$ is the return on high book-to-market stocks minus the return on low book-to-market stocks in month $t$, and $UMD_t$ is the return on high prior return stocks minus the return on low prior return stocks in month $t$. The estimation period is from July 1979 to July 2010 (373 months) and sample firm returns are included in a particular monthly portfolio if divesting firm's spin-off issue date or sell-off effective date was within the last 36 months or within the next 12 months (36 months after divestiture and 12 months before divestiture). The number of firms in monthly portfolios of firms divesting through spin-offs ranges from 1 to 63 and the number of firms in monthly portfolios of firms divesting through sell-offs ranges from 1 to 587. Specifications (1) are estimated using ordinary least squares (OLS), and specifications (2) are estimated using weighted least squares (WLS) with the weights based on the number of divesting firms in the monthly portfolio. Parameter estimates are presented with $t$-statistics in parentheses. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

| | $\alpha$ | $\gamma$ | $\beta_1$ | $\beta_2$ | $s_1$ | $s_2$ | $h_1$ | $h_2$ | $u_1$ | $u_2$ | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A: Firms Divesting through Spin-Offs** | | | | | | | | | | | |
| (1) OLS | 0.013 | -0.011 | 1.218 | -0.043 | 0.690 | -0.107 | 0.293 | -0.609 | 0.050 | -0.219 | 0.5239 |
| | (3.64)*** | (-2.19)** | (13.72)*** | (-0.36) | (6.08)*** | (-0.67) | (2.20)** | (-3.38)*** | (0.64) | (-2.06)** | |
| (2) WLS | 0.016 | -0.018 | 1.183 | -0.034 | 0.663 | 0.213 | 0.135 | -0.128 | -0.121 | -0.193 | 0.7162 |
| | (4.71)*** | (-4.53)*** | (13.50)*** | (-0.35) | (6.27)*** | (1.74)* | (1.07) | (-0.88) | (-1.60) | (-2.20)** | |
| **Panel B: Firms Divesting through Sell-Offs** | | | | | | | | | | | |
| (1) OLS | -0.002 | 0.003 | 1.161 | -0.073 | 0.473 | -0.037 | 0.080 | 0.157 | -0.308 | 0.123 | 0.8669 |
| | (-1.21) | (1.72)* | (35.02)*** | (-1.69)* | (11.55)*** | (-0.66) | (1.64) | (2.43)** | (-10.69)*** | (3.20)*** | |
| (2) WLS | -0.001 | 0.004 | 1.116 | -0.042 | 0.527 | -0.084 | 0.143 | 0.137 | -0.348 | 0.106 | 0.9158 |
| | (-0.80) | (2.55)** | (34.59)*** | (-1.13) | (14.03)*** | (-1.92)* | (3.07)*** | (2.55)** | (-12.70)*** | (3.38)*** | |

**Table 8**

Logit regression explaining divesting firms' choice between spin-offs and sell-offs in 1980-2006.

Dependent variable is a dummy variable equal to one for firms divesting through spin-offs and zero for firms divesting through sell-offs. $Ln(P/V)_{Sales}$ and $Ln(P/V)_{Book\ value}$ are measures of divesting firm equity over- or undervaluation relative to intrinsic value, computed as the natural logarithm of divesting firm's price-to-sales (price-to-book value) ratio over matched firm's price-to-sales (price-to-book value) ratio, respectively. *Marginal Tax Rate* is divesting firm's non-parametric marginal tax rate developed in Blouin, Core, and Guay (2010) and reported in Compustat. *Investor Sentiment Index* is the first principal component of orthogonolized values of the value-weighted average closed-end fund discount, the natural logarithm of NYSE share turnover detrended using five year moving average, the number of IPOs and their average first day returns, the equity share in new issues of equity and long-term debt, and the dividend premium defined as the log difference between average value-weighted market-to-book ratios of dividend payers and non-dividend payers. *Investor Sentiment Index* is measured at the beginning of divestiture announcement month. *Relatedness* measures the degree of relatedness between divesting firm and its divested unit; it takes values between 0 and 4, equal to the number of digit matches between the SIC codes of the divesting firm and its unit. *Ln(Assets)* is the natural logarithm of the book value of divesting firm's assets. *Ln(MVE)* is the natural logarithm of divesting firm's number of shares outstanding multiplied by share price. *Ln(Unit Size)* is the natural logarithm of the number of shares outstanding multiplied by closing share price on the first day of trading for spun-off units, and it is the transaction value reported in SDC for sold-off units. *ROA* is divesting firm's return on assets. *Cash/Assets* is the ratio of divesting firm's cash and equivalents over the book value of assets. *KZ Index* is the modified version of Kaplan-Zingales (1997) index constructed for divesting firms at the end of the fiscal year prior to divestiture announcement following Lamont, Polk, and Saa-Requejo (2001). *(CapEx + R&D)/Assets* is the ratio of divesting firm's sum of capital expenditures and R&D expenses over the book value of assets. *Ln(Number of Analysts)* is the natural logarithm of the number of analysts following divesting firm. *StDev of Forecasts* is the standard deviation of analyst forecasts winsorized at the 95th percentile. *Dispersion* is the standard deviation of analyst forecasts normalized by share price and winsorized at the 95th percentile. All accounting ratios and asymmetric information variables are computed for the end of the fiscal year prior to divestiture announcement. Parameter estimates are presented with *t*-statistics in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at the 1, 5, and 10 percent significance, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Constant | 0.170 | -0.609 | 0.092 | -1.800 | -4.183 | -0.459 | -0.040 | -4.975 | -2.607 | -0.299 |
| | (0.24) | (-0.96) | (0.12) | (-2.14)** | (-11.87)*** | (-0.41) | (-0.04) | (-6.05)*** | (-3.01)*** | (-0.27) |
| $Ln(P/V)_{Sales}$ | -0.103 | -0.055 | | -0.115 | -0.112 | | | -0.121 | | |
| | (-2.20)** | (-1.17) | | (-2.36)** | (-2.36)** | | | (-2.47)** | | |
| $Ln(P/V)_{Book\ Value}$ | | | -0.151 | | | -0.134 | -0.130 | | -0.121 | -0.108 |
| | | | (-2.39)** | | | (-1.65)* | (-1.59) | | (-1.86)* | (-1.33) |
| Marginal Tax Rate | 5.409 | 5.016 | 5.552 | 5.774 | 4.886 | 6.161 | 5.800 | 4.886 | 5.473 | 5.450 |
| | (6.08)*** | (5.71)*** | (5.81)*** | (6.18)*** | (5.35)*** | (4.59)*** | (4.22)*** | (5.17)*** | (5.47)*** | (3.91)*** |
| Investor Sentiment Index | 0.315 | 0.323 | 0.327 | 0.258 | 0.349 | 0.310 | 0.292 | 0.315 | 0.283 | 0.295 |
| | (4.55)*** | (4.67)*** | (4.57)*** | (3.57)*** | (5.10)*** | (3.57)*** | (3.36)*** | (4.47)*** | (3.83)*** | (3.40)*** |
| Relatedness | 0.235 | 0.242 | 0.220 | 0.230 | 0.251 | 0.257 | 0.263 | 0.251 | 0.223 | 0.268 |
| | (5.95)*** | (6.13)*** | (5.33)*** | (5.58)*** | (6.39)*** | (5.25)*** | (5.34)*** | (6.15)*** | (5.20)*** | (5.45)*** |
| Ln(Assets) | -0.231 | | -0.228 | -0.309 | | -0.219 | -0.233 | | | |
| | (-6.89)*** | | (-6.51)*** | (-7.06)*** | | (-4.62)*** | (-4.88)*** | | | |
| Ln(MVE) | | -0.195 | | | | | | | -0.233 | -0.222 |
| | | (-6.56)*** | | | | | | | (-5.97)*** | (-4.88)*** |
| Ln(Unit Size) | | | | 0.226 | | | | 0.072 | 0.178 | |
| | | | | (4.41)*** | | | | (1.70)* | (3.52)*** | |
| ROA | -0.477 | -0.413 | -0.461 | -0.399 | -0.552 | -0.267 | -0.233 | -0.518 | -0.252 | 0.037 |
| | (-1.86)* | (-1.56) | (-1.42) | (-1.23) | (-2.21)** | (-0.49) | (-0.43) | (-1.69)* | (-0.57) | (0.05) |
| Cash/Assets | 1.477 | 1.871 | 1.428 | 1.484 | 1.960 | 1.571 | 1.584 | 1.846 | 2.204 | 2.044 |
| | (2.98)*** | (3.87)*** | (2.83)*** | (2.80)*** | (4.08)*** | (2.26)** | (2.26)** | (3.61)*** | (4.13)*** | (2.99)*** |
| KZ Index | -0.001 | -0.002 | -0.002 | -0.002 | -0.001 | 0.002 | 0.002 | -0.002 | -0.002 | 0.001 |
| | (-1.65)* | (-1.70)* | (-1.84)* | (-1.31) | (-1.54) | (0.27) | (0.32) | (-1.20) | (-1.23) | (0.20) |
| (CapEx + R&D)/Assets | -1.049 | -0.612 | -0.885 | -1.021 | -0.604 | -0.902 | -1.156 | -0.636 | -0.315 | -0.630 |
| | (-1.56) | (-1.01) | (-1.32) | (-1.52) | (-1.03) | (-0.90) | (-1.17) | (-1.04) | (-0.50) | (-0.64) |
| Ln(Number of Analysts) | | | | | -0.03 | | | -0.028 | | |
| | | | | | (-4.54)*** | | | (-3.53)*** | | |
| StDev of Analyst Forecasts | | | | | | | 0.778 | | | 0.604 |
| | | | | | | | (2.26)** | | | (1.71)* |
| Dispersion | | | | | | 6.661 | | | | |
| | | | | | | (2.00)** | | | | |
| N | 3,045 | 3,045 | 2,790 | 1,917 | 3,045 | 2,225 | 2,223 | 1,917 | 1,752 | 2,223 |
| Pseudo R$^2$ | 0.09 | 0.09 | 0.09 | 0.10 | 0.08 | 0.09 | 0.09 | 0.07 | 0.10 | 0.09 |