Cash Flow and Capital Spending: Evidence from Capital Expenditure Announcements

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I analyze the role cash flow plays in explaining both capital-spending decisions and the price response to announcements of those decisions. The level of announced capital spending is strongly and positively related to the level of cash flow, and cash flow's influence on capital spending increases as firm size decreases and as insider ownership increases. Positive, abnormal returns around capital-spending announcements are associated with firms having low cash-flow coverage, and small asset size, and marginally with firms with both high and low insider-ownership levels. Abnormal returns increase for small firms as cash flow financed spending increases.

■ The influence of internally generated cash flow on financing capital investment spending is well documented.[1] Less well understood is the cause behind this influence. Modigliani and Miller's (1958) irrelevance proposition asserts that firms undertake all positive net present value (NPV) investments regardless of the financing source. Consequently, their proposition provides little insight into cash-flow-financed spending. Myers' (1984) pecking-order (PO) hypothesis suggests that cash flow is preferred over other financing sources because it enables firms to avoid raising funds externally with underpriced securities, which dilute existing shareholder value. The PO hypothesis implies that cash-flow-financed spending creates value because it enables firms to forgo more costly financing sources. The free-cash-flow (FCF) hypothesis introduced by Jensen (1986) argues that excess cash flow is wasted on value-destroying spending because managers have a personal incentive to grow the asset base of the firm rather than distribute cash to shareholders.

These two leading explanations have important implications for efficient financial management. The former recommends cash-flow hoarding to minimize the cost (and increase the level) of financing value-maximizing investments. The latter suggests a policy of encouraging cash-flow payout to minimize inefficient investment spending.

Research analyzing the motivation behind cash-flow-financed investment spending has yielded mixed results. Several studies find evidence supporting the PO hypothesis. Whited (1992) finds that financially distressed firms exhibit greater dependence on cash flow to finance capital spending than do nonfinancially distressed firms, suggesting that distressed firms suffer financing constraints which give rise to pecking-order behavior. Fazzari, Hubbard, and Petersen (1988) show that low-dividend-paying firms rely more heavily on cash flow. Fazzari and Petersen (1993) find that these same firms smooth their cash-flow fluctuations by using working-capital adjustments rather than external

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[1]Donaldson (1961) represents an early study. Fazzari, Hubbard, and Petersen (1988), Pinegar and Wilbricht (1989), Strong and Meyer (1990), Whited (1992), Fazzari and Petersen (1993), Vogt (1994), and Carpenter (1995) are representative examples of more recent studies. See also Brealey and Myers (1994) for a standard textbook treatment of the issue.

financing to maintain desired capital spending. Consistent with the pecking-order hypothesis, these authors argue that firms choose a low-dividend-payout policy to conserve cash flow, thereby minimizing the need to finance capital spending with external funds.

Calomiris and Hubbard (1995) find similar results when studying dividend and capital-spending behavior by firms around the Undistributed Profits Tax of 1936. They show that the firms that pay the highest taxes associated with undistributed profits also exhibit the heaviest dependence on cash flow to finance capital spending. This evidence suggests that these firms have substantial, untapped investment opportunities and are willing to incur high costs (taxes) to retain funds internally.

Other researchers have presented evidence supporting free-cash-flow behavior. Lang, Stulz, and Walkling (1991) find that stock returns in corporate acquisition transactions are negatively related to free cash flow for bidder firms with poor investment opportunities. Similarly, McConnell and Muscarella (1985) show that announcements of capital expenditure increases by oil and gas exploration firms between 1975 and 1981 met with negative stock price reactions. Their results provide indirect evidence that these cash-flow-rich companies overinvested in unprofitable investments. Devereux and Schiantarelli (1990) find that large manufacturing firms in the United Kingdom rely more heavily on cash flow financing than do smaller firms. They attribute this tendency to greater agency costs in large firms due to a generally lower proportion of managerial ownership, and greater costs associated with monitoring mechanisms. Finally, Christie and Nanda (1994) also study the Undistributed Profits Tax of 1936 and find evidence that the stock market reaction to the announcement of the tax was largest for low-dividend-paying firms. Contrary to Calomiris and Hubbard (1995), this evidence supports the free-cash-flow hypothesis.

By studying firms with capital expenditure announcements on the Dow Jones News Service, this paper provides further evidence on cash flow's role in capital spending. I use excess returns around capital spending announcements to measure the market reaction to such spending plans. I find that the impact cash-flow-financed capital spending has on firm value depends on the characteristics of the firm making the expenditures. Overall, firms exhibit a strong positive relation between the level of undistributed cash flow and the level of announced spending. However, small firms and firms with high managerial (insider) ownership depend more heavily on cash flow than do larger firms. Moreover, these firms and firms with low levels of undistributed cash flow relative to spending exhibit significantly positive excess returns around the announcement.

Finally, cross-sectional regression results suggest excess returns in small firms rise with their ability to finance spending with cash-flow increases. I find that after controlling for investment opportunities, large firms and firms with low insider ownership exhibit a negative relation between excess returns and cash flow.

Section I presents the background information that motivates subsequent empirical tests. Section II discusses the data used in the tests, and Section III presents results. Section IV concludes the paper and discusses some lessons for corporate financial policy.

I. Empirical Predictions of the Free-Cash-Flow and Pecking-Order Hypotheses

Early empirical work by McConnell and Muscarella (1985) on market reactions to capital-spending announcements focuses on the information provided to the market by capital-expenditure announcements. If these announcements convey information about the expected level of investment spending, then excess returns will be positively related to revisions in expected spending if we assume that the expected return on such spending is positive. Therefore, positive excess returns on unexpected capital spending increases support the hypothesis that managers make capital-spending decisions to maximize firm value.

Market responses to unexpected capital spending also provide insights into both the FCF and PO hypotheses as explanations for the strong relation between cash flow and capital spending. Both hypotheses suggest that the expected return on investment opportunities probably varies among firms. I argue that the market response to capital-expenditure announcements depends on the level of undistributed cash flow relative to total capital spending, firm size, the percentage of insider ownership, and the firm's ex ante investment opportunities, as measured by Tobin's q. Each of these four factors provides information about the extent to which firms use cash flow to fund capital expenditures and also on its motivation for doing so.

Jensen (1986) suggests that firms with large levels of free cash flow are prone to waste it on unprofitable investments. Consequently, undistributed cash flow should play a significant role in explaining capital spending by these firms. Moreover, certain firms are likely to be more susceptible to these agency problems. Large firms could be more prone to agency problems of free cash flow because they generally have a more diverse ownership structure (Devereux and Schiantarelli, 1990) and have more costly internal control mechanisms (Jensen, 1993). Similarly, Jensen and Meckling (1976)

show that managers of firms with low levels of insider ownership have greater incentives to invest in unprofitable projects that stretch the firm beyond its optimal size. For these firms, the expected return on new capital spending can be negative. The expected return on capital spending is also likely to be negative for firms with poor ex ante investment opportunities, as measured by Tobin's q. Therefore, if free-cash-flow behavior is present, large firms, firms with low insider ownership, and firms with low levels of Tobin's q should show a significant influence of cash flow on capital spending, negative share price responses around capital spending announcements, and price responses that are negatively related to the level of free cash flow.

Myers and Majluf (1984) and Myers (1984) also show that cash flow is related to the expected return from new investment. Firms with shortages of cash flow and liquid assets might actually forgo profitable investment spending rather than issue mispriced securities to fund the investment. Consequently, these firms might have untapped investment opportunities that would increase firm value if sufficient cash flow could be generated to fund them. Fazzari, Hubbard, and Petersen (1988) show that these firms exhibit levels of Tobin's q exceeding unity because they cannot pursue all positive-NPV investments which, under normal circumstances, would drive the value of q to unity.

Small firms especially are prone to suffer from cash-flow constraints, because they have limited access to external capital markets due to information problems and higher transaction costs of public security issues (Jalilvand and Harris, 1984). Thus, small firms and high-q firms tend to have profitable, but untapped, investment opportunities. Capital spending by these firms should depend heavily on available cash flow. Their announcements of capital spending should be associated with positive stock price reactions, especially if such spending is funded with cash flow.

The proportion of shares held by managers (insiders) also provides a measure of information asymmetry and subsequent cash constraints faced by the firm. Leland and Pyle (1977) suggest that high levels of insider ownership help signal firm quality when information asymmetries exist between current owners/managers and the capital market. Thus, the proportion of insider ownership acts as a proxy for firms most likely to suffer from asymmetric information problems that create the cash constraints described above. Accordingly, capital spending of high-ownership firms should exhibit a dependence on cash flow, and positive excess returns should be observed for these firms when they announce new capital spending. However, high levels of insider ownership also can be associated with high levels of cash-flow-financed capital spending because of managerial-entrenchment issues described by Morck, Shleifer, and Vishny (1988). Firms with high insider-ownership levels might choose to finance spending with cash flow solely to avoid loss of control associated with diluting their ownership position or restrictions imposed by creditors.

Table 1 summarizes predictions of the value-maximization, pecking-order, and free-cash-flow hypotheses. Although the predictions made by each hypothesis are not mutually exclusive, there are several explicit differences. Both the value-maximization and PO hypotheses suggest that the capital market should react favorably, on average, to announced increases in capital spending. Further, the PO hypothesis predicts that undistributed cash flow will be positively related to capital spending, and that cash flow's importance should vary inversely with firm size and positively with insider ownership. Since financing constraints primarily affect small firms, low-cash-flow firms, and those with high levels of insider ownership, such firms should have more untapped profitable investment opportunities. These firms should also exhibit the largest positive share price responses when capital spending is announced.

The FCF hypothesis predicts that the capital market will react unfavorably to announced spending. The FCF hypothesis also predicts that undistributed cash flow will be positively related to capital spending, but the importance of cash flow to capital spending will be positively related to firm size and negatively related to insider ownership. The FCF hypothesis also predicts that large firms, firms with substantial amounts of undistributed cash flow, and low-ownership firms should exhibit negative share price responses. These responses should also be less than those observed for small, high-ownership, and low-q firms.

II. Data

I obtained a sample of capital expenditure announcements from the Dow Jones News Retrieval Service (DJNRS) for the years January 1979 through June 1993. A keyword search for "capital expenditures," "capital budget," and "capital spending" generated 5,338 news items containing these terms. These news items were read and checked for relevance to planned capital-spending decisions, clarity about the amount of planned spending, and simultaneous announcements regarding earnings, and dividends, as well as other important news. These screens resulted in a considerable number of sample observations being dropped from consideration. I dropped approximately 62% of the total eliminated items because the news was not directly relevant to planned capital

Table 1. Stock Return Predictions of the Value-Maximization, Pecking-Order, and Free-Cash-Flow Hypotheses to Announced Increases in Capital Expenditure

This table presents the predictions of three capital spending hypotheses: value-maximization, pecking-order, and free cash flow on the stock price response to capital spending announcements and cash flow's influence on capital spending. Predictions concerning these variables are also given based on the following firm attributes: Tobin's q, asset size, degree of insider ownership, and level of undistributed cash flow. Tobin's q (Q) is a measure of the profitability of the firm's investment opportunities and is calculated as the ratio of the market value of the firm's assets to their replacement cost.

	Hypothesis		
	Value-Maximization	Pecking-Order	Free-Cash-Flow
Stock Price Response	+	+	-
Cash Flow's Effect on Capital Spending	n.p.[a]	+	+
Effect of Key Variables on the Sensitivity of Capital Spending to Cash Flow Changes			
High q	n.p.	+	0
Low q	n.p.	0/+	+
Large Firms	n.p.	0	+
Small Firms	n.p.	+	0/+
High-Insider Ownership	n.p.	+	-
Low-Insider Ownership	n.p.	0/+	+
Effect of Key Variables on Capital Spending Announcement Excess Returns			
High-q Firms	+	+	0/+
Low-q Firms	+	0/+	-
Large Firms	n.p.	0/+	-
Small Firms	n.p.	+	0/-
High-Insider Ownership	n.p.	+	+
Low-Insider Ownership	n.p.	0/+	-
High Undistributed Cash Flow	n.p.	n.p.	-
Low Undistributed Cash Flow	n.p.	+	n.p.

[a]n.p. refers to no prediction made by the hypothesis.

spending and roughly 20% because the spending announcement was vague as to the level of next year's planned spending. I eliminated 10% because they were announcements by US subsidiaries of foreign corporations, and an additional 8% were eliminated because they contained simultaneous announcements of other important information. After eliminating these firms, 610 sample observations remained. Of the 610 remaining observations, 561 were associated with firms having usable returns data on the Center for Research in Stock Prices (CRSP) returns file and sufficient data on the Compustat database to calculate the cash-flow-coverage ratio, book value of assets, market capitalization, and Tobin's q.[2] Of the 561 items that passed these screens, 421 announced capital-spending increases (i.e., capital-spending levels above the previous year's level), and 140 announced spending decreases.

[2]The final sample size of 561 firms is smaller than the sample of 658 firms obtained by McConnell and Muscarella (1985) over a smaller time period. This difference is due to tighter sample selection criteria and a more limited news search. McConnell and Muscarella did not eliminate contemporaneous news announcements from their sample and also augmented their Wall Street Journal Index search with the *Predicast F&S Index* to increase the sample size. Since sample size is not an issue with 561 qualifying firms, the sample used here is not augmented.

In addition to capturing the event dates from the DJNRS news items, I also recorded the announced size of the capital expenditure. All but 30 of the news announcements indicated at least two of the following pieces of information: the current size of the firm's capital budget, the proposed new budget, or the percent increase in the budget. Thus, given any two of these values, the third is easily calculated.

Of the items, 30 provided only the percentage increase in capital expenditures. In these cases, the announced size of the new capital budget was calculated by multiplying the previous year's dollar amount of capital expenditures recorded on Compustat (data item #128) by one plus the announced percentage increase in capital spending.

The relative magnitude of the new capital spending is measured by

$$\text{inv} = \frac{I_{t+1}}{P_t S_t} \quad (1)$$

and the magnitude of unexpected spending by

$$\text{uinv} = \frac{I_{t+1} - I_t}{P_t S_t} \quad (2)$$

where I_{t+1} is the level of announced capital spending for next period, I_t is the current level of capital spending obtained from the announcements, and P_t and S_t are a firm's market price (Compustat data item #24) and shares outstanding (data item #25), respectively, at the fiscal year-end prior to the announcement date. According to both the FCF and PO hypotheses, inv should be positively associated with cash flow produced by the firm. Applying McConnell and Muscarella's (1985) assumption that the market forecasts no increase in spending over the previous period, uinv measures the magnitude of unexpected capital spending per unit of market capitalization.[3] The value-maximization and PO hypotheses predict a positive relation between uinv and excess returns around capital spending announcements, and the FCF hypothesis predicts a negative reaction.

I calculate the cumulative excess returns (RET01) that measure the capital market's response to the spending announcements for a two-day (0,+1) event window and estimate the market model using the NYSE/AMEX value-weighted index and a 200-day estimation period (days -210 through -11). To proxy the effects of free-cash-flow and pecking-order behavior on the expected return on new investment, I calculate firm size (Size), Tobin's q (Q), the proportion of insider ownership (Inown), a cash-flow ratio (CF), and a cash-flow-coverage ratio (CFCover).

Size is the book value of the firm's assets (Compustat data item #6). I use book value instead of market value because I am interested in proxying for monitoring costs and informational asymmetries net of growth opportunities. Using market value could blur this distinction. For example, a firm could have a high market value either because it has a high share price due to market expectations of profitable future growth, or because it is extremely large (in the book-value sense) and has many shares outstanding. Agency theory suggests that the latter firm is likely to be associated with large monitoring costs and agency problems of free cash flow. Similarly, asymmetric information problems are better proxied by book value than market value. Firms whose valuable assets are intangible (human capital, R&D, etc.) can suffer asymmetric information problems even though their market value may be higher than larger firms (in the book-value sense) whose market value may be low due to reasonable expectations of poor growth opportunities.

Inown is the number of shares beneficially held by managers, directors, and shareholders owning greater than 5% of the shares outstanding divided by shares outstanding. The beneficial ownership number is taken from the November issues of *CDA/Spectrum's Insider Holdings Directory* prior to the capital-spending announcement date.

The ratio of the market value of the firm's assets to their estimated replacement cost is represented by q. It is calculated in a manner consistent with Lindenberg and Ross (1981).[4] Here, q is used to approximate the ex ante investment opportunities of the firm. Firms with q values exceeding one have profitable growth opportunities because the market value placed on existing assets exceeds their replacement cost. A dummy variable (Qdum) is also constructed to take a value of one if a firm's q value is equal to or greater than unity and zero otherwise. qdum is subsequently interacted with cash flow (CF)(Qdum) to test the PO hypothesis that firms with high-q ratios depend more heavily on cash flow to fund capital spending.[5]

Finally, I use two cash-flow measures to capture the effect that cash flow has on explaining capital spending and the market's reaction to spending announcements.

[3] I constructed an alternative measure of uinv from a time-series forecast of expected capital spending, using the Compustat data item #128. Several autoregressive (AR) models were fit and ranked based on their forecast error variance and parsimony with respect to the number of lags. An AR(1) model with a time trend performed as well as more complicated and less parsimonious models. Results using uinv based on the AR(1) model with trend are similar, but slightly weaker, than those reported in the text.

[4] See the data appendix in Vogt (1994) for an exact description of how Q is calculated.

[5] I wish to thank an anonymous referee for suggesting this test of the relation between high-q firms and cash-flow-financed capital spending.

CF is the level of free cash flow per unit of market capitalization. Free cash flow, defined by Lehn and Poulsen (1989) and McLaughlin, Safieddine, and Vasudevan (1996), is operating income before depreciation (Compustat data item #13), less interest expense on debt (data item #15), less income taxes (data item #16), less preferred and common dividends (data items #19 and #21). CFCover is a coverage ratio indicating the extent to which current-period-generated cash flow (defined above) is sufficient to cover next period's announced capital expenditures.

To control for managerial decisions affecting the level of undistributed cash flow, both cash-flow measures are calculated net of interest expense and dividends. Ignoring these other decision variables might create a bias in the observed relation among cash flow, capital spending, and market returns. For example, a firm with high levels of cash flow that does not exploit the agency problem will minimize undistributed cash flow by choosing high interest and/or dividend levels. This firm might pursue profitable investment spending and is unlikely to rely heavily on cash flow for financing. Such a firm should be associated with positive market responses around spending announcements. Using a cash-flow figure gross of interest expense and dividends would incorrectly associate positive market returns to firms with high cash flow rather than the correct low level of cash flow that it actually retains.[6]

III. Results

I first check the data for consistency with previous studies by testing the overall impact of capital spending announcements on stock returns. Table 2 presents the two-day cumulative average excess returns for 421 firms announcing capital spending increases and 140 firms announcing capital spending decreases. Consistent with the value-maximization hypothesis and results reported by McConnell and Muscarella (1985), firms announcing spending increases are associated with positive and statistically significant two-day average excess returns of 0.446%. Firms announcing spending decreases have negative (but not statistically significant) average excess returns.

Table 2 also presents mean excess returns when firms are split by their level of Tobin's q. As predicted by both the value-maximization and the PO hypothesis, high-q ($Q > 1$) firms exhibit significantly positive excess returns, while low-q firms do not. Low-q firms are associated with mean excess returns that are not significantly different from zero. These results are similar to those reported by Mitra, Biswas, and Owers (1991) for capital spending announcements and Szewczyk, Tsetsekos, and Zantout (1996) for R&D announcements.

A. Cash Flow, Capital Spending, Size, and Excess Returns

Table 3 presents evidence that cash flow plays a significant role in explaining firm investment spending. Panel A of Table 3 reports ordinary-least-squares (OLS) estimates for cross-sectional regressions that relate announced capital spending (inv) to cash flow (CF), Tobin's q, and the interaction term (CF)(Qdum). Not surprisingly, cash flow has a positive and highly significant impact on the level of announced spending.[7] Similar findings using pooled cross-sectional time-series data have been documented by Fazzari, Hubbard, and Petersen (1988) and others. The parameter estimate on the interaction term also is positive and highly significant, indicating that high-q firms rely more heavily on cash flow to fund capital spending.

Panel B, Table 3 shows that firm size is important for explaining the cash-flow impact on announced spending levels. The sample firms are classified into three equal groups, based on the book value of assets (Size). Firms with asset size greater than $2.46 billion are classified as large. Medium firms have asset size between $2.46 billion and $385 million, while firms below $385 million are classified as small.[8]

Regression results are reported for the 421 firms that announced spending increases. These results show that the parameter estimate on cash flow rises significantly as asset size falls. Each additional unit of cash flow generated increases small-firm capital spending by more than twice as much as large firms. F-tests of the hypothesis that the parameter estimates on cash flow are equal across size groups are rejected at the 0.01 level. However, only medium-sized firms exhibit a significantly higher dependence on cash flow when q exceeds unity.

Panel C, Table 3 reports regression results when firms are split by the proportion of insider ownership. Following McConnell and Servaes (1990), I classify firms as having high insider ownership if the proportion of shares beneficially held by managers, directors, and large shareholders expressed as a percentage of the

[6]Tests performed in the following section were repeated with common dividends included in the cash flow number. Similar, and slightly stronger, results occurred. Consequently, slight changes in the measurement of cash flow do not appear to affect my conclusions.

[7]Similar findings arise when unexpected investment (uinv) is used as the dependent variable.

[8]The size categories were chosen to divide the sample into three equally sized subsamples based on the 561 capital expenditure announcements.

Table 2. Two-Day Excess Returns Around Capital Spending Announcements

This table presents two-day (0,1), cumulative, average excess returns around the announcement of capital expenditure increases and decreases appearing over the *Dow Jones News Service*. The market model was estimated using the NYSE/AMEX value-weighted index over a 200-day estimation period (-210, -11). RET01 indicates the two-day cumulative excess return. Tobin's q (Q) is calculated as the market value of the firm's assets divided by an estimate of its replacement cost. The t-statistics are in parentheses.

	Firms Announcing Spending Increases (N = 421)				Firms Announcing Spending Decreases (N = 140)			
	Mean	Median	Range	Pct Pos	Mean	Median	Range	Pct Pos
RET 01	0.0045*** (2.66)	0.0029	0.3520	54.63	-0.0024 (-0.70)	-0.0036	0.3659	45.71
	Q ≥ 1 (N = 103)				Q ≥ 1 (N = 40)			
RET 01	0.0097*** (2.82)	0.0048	0.2000	57.28	-0.0062 (-0.75)	-0.0090	0.2173	42.50
	Q < 1 (N = 318)				Q < 1 (N = 100)			
RET 01	0.0028 (1.45)	0.0022	0.3520	53.77	-0.0011 (-0.27)	-0.0023	0.3659	46.00

***Significant at the 0.01 level.

Table 3. OLS Estimates of Announced New Capital Spending on Cash Flow and Tobin's q

This table presents the results of ordinary-least-squares (OLS) regression estimation. The dependent variable is the ratio of announced capital spending to market capitalization (inv). Large, medium, and small firms have book value of assets greater than $2.46 billion, between $2.46 billion and $385 million, and less than $385 million, respectively. High-, medium-, and low-ownership groups include firms with proportions of beneficial ownership (Inown) of greater than 0.25, between 0.25 and 0.05, and less than 0.05, respectively. Explanatory variables are undistributed cash flow divided by market capitalization (CF), Tobin's q (Q), and an interaction variable (CF)(Qdum) where Qdum = 1 when Q > 1. The t-statistics are in parentheses.

Panel A. Announced Increases in Capital Spending

Variable	Intercept	CF	Q	(CF)(Qdum)	Adj. R^2	F-Statistic
inv[a]	0.142* (1.82)	2.310*** (15.05)	-0.026 (-0.36)	——— ———	0.353	115.60
inv	0.279*** (3.31)	2.111*** (13.26)	-0.195** (-2.36)	1.519*** (3.90)	0.374	84.95

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.
[a]The F-statistic for the null hypothesis that the parameter estimates on CF are equal across size groups is a statistically significant 11.09.

total number of shares outstanding (Inown) exceeds 25%. I classify medium-ownership firms as those with insider ownership between 5% and 25%, and low-ownership firms as those with insider ownership of less than 5%.

Parameter estimates on cash flow vary among ownership groups in a manner similar to that of firm size. The announced capital spending of high-ownership firms exhibits almost twice the sensitivity to cash flow as low-ownership firms. F-tests also indicate statistically significant differences (at the 0.01 level) between group parameter estimates for these regressions. Interestingly, the parameter estimates on the interaction term is negative for high-ownership firms, indicating that such firms with poor investment opportunities use cash flow more heavily than do those with more valuable opportunities. This result is consistent with free-cash-flow behavior in the presence of entrenched management.

Results from Table 3 support the argument that the sensitivity of capital spending to cash flow varies with the type of firm. Consistent with the PO hypothesis,

Table 3. OLS Estimates of Announced New Capital Spending on Cash Flow and Tobin's q (*Continued*)

Panel B. Announced Increases in Captial Spending by Size Groups[a]

Variable	Intercept	CF	Q	(CF)(Qdum)	Adj. R^2	F-Statistic
			Large Firms			
inv	0.310***	1.518***	-0.126	———	0.323	31.94
	(2.85)	(7.83)	(-1.09)	———		
inv	0.413***	1.423***	-0.265*	0.822*	0.332	22.68
	(3.33)	(7.12)	(-1.88)	(1.67)		
			Medium Firms			
inv	0.274	2.304***	-0.091	———	0.266	28.83
	(1.67)	(7.55)	(-0.59)	———		
inv	0.586***	1.865***	-0.470***	2.821***	0.330	26.24
	(3.34)	(5.98)	(-2.66)	(3.94)		
			Small Firms			
inv	-0.193**	3.869***	0.125*	———	0.718	171.76
	(-2.30)	(18.47)	(1.83)	———		
inv	-0.175**	3.850***	0.098	0.430	0.717	114.06
	(-1.97)	(18.11)	(1.19)	(0.59)		

Panel C. Announced Increases in Capital Spending by Ownership Groups[b]

Variable	Intercept	CF	Q	(CF)(Qdum)	Adj. R^2	F-Statistic
			High Ownership			
inv	-0.013	3.946***	-0.146	———	0.756	143.64
	(-0.16)	(16.82)	(-1.41)	———		
inv	-0.236	4.667***	0.143	-2.137**	0.766	101.27
	(1.56)	(17.19)	(0.17)	(-2.17)		
			Medium Ownership			
inv	-0.066	2.357***	0.092	———	0.644	111.99
	(-0.80)	(14.72)	(1.24)	———		
inv	-0.099	2.384***	0.140*	-0.572	0.644	75.19
	(-1.13)	(14.72)	(1.63)	(-1.10)		
			Low Ownership			
inv	0.298**	1.664***	-0.022	———	0.175	22.70
	(2.32)	(6.68)	(-0.19)	———		
inv	0.549***	1.170***	-0.324**	2.728***	0.269	25.97
	(4.21)	(4.62)	(-2.58)	(5.17)		

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

[a]The F-statistic for the null hypothesis that the parameter estimates on CF are equal across size groups is a statistically significant 11.09.

[b]The F-statistic for the null hypothesis that the parameter estimates on CF are equal across ownership groups is a statistically significant 18.18.

Table 4. Mean and Median Two-Day Abnormal Returns for Announced Spending Increases

This table presents two-day (0,1) cumulative average excess returns around the announcement of capital expenditure increases appearing over the *Dow Jones News Service*. The market model was estimated using the NYSE/Amex value-weighted index over a 200-day estimation period (-210, -11). RET01 indicates the two-day cumulative excess return. High-, medium-, and low-coverage groups include firms that have cash-flow coverage ratios (CFCover) greater than 0.62, between 0.62 and 0.34, and less than 0.34, respectively. Large, medium, and small firms have book value of assets greater than $2.46 billion, between $2.46 billion and $385 million, and less than $385 million, respectively. High-, medium-, and low-ownership groups include firms with proportions of beneficial ownership (Inown) of greater than 0.25, between 0.25 and 0.05, and less than 0.05, respectively. The t-statistics are in parentheses.

Panel A. Mean and Median Two-Day Abnormal Returns by Cash Flow Coverage, Asset, and Ownership Groups

	High Coverage (N = 123)	Medium Coverage (N = 146)	Low Coverage (N = 152)
Mean	-0.0023	0.0078***	0.0068**
t-Statistic	(-0.81)	(2.87)	(2.23)
Median	0.000	0.0045	0.0033
	Large Firms (N = 131)	**Medium Firms (N = 155)**	**Small Firms (N = 135)**
Mean	0.0028	0.0011	0.0100***
t-Statistic	(1.17)	(0.46)	(2.61)
Median	0.0037	0.0003	0.0047
	High Ownership (N = 93)	**Medium Ownership (N = 123)**	**Low Ownership (N = 205)**
Mean	0.0091*	0.0020	0.0038*
t-Statistic	(1.89)	(0.73)	(1.90)
Median	0.0030	0.0006	0.0031

Panel B. Mean and Median Two-Day Abnormal Returns by Asset Size/Coverage Groups

	Large Size/Low Coverage (N = 41)	Large Size/Medium Coverage (N = 42)	Large Size/High Coverage (N = 48)
Mean	0.0018	0.0111**	-0.0036
t-Statistic	(0.52)	(2.43)	(-0.90)
Median	0.0030	0.0080	-0.0004
	Medium Size/Low Coverage (N = 54)	**Medium Size/Medium Coverage (N = 58)**	**Medium Size/High Coverage (N = 43)**
Mean	0.0033	0.0051	-0.0071
t-Statistic	(0.92)	(1.31)	(-1.46)
Median	0.0020	0.0010	-0.0054
	Small Size/Low Coverage (N = 57)	**Small Size/Medium Coverage (N = 46)**	**Small Size/High Coverage (N = 32)**
Mean	0.0137**	0.0081	0.0061
t-Statistic	(2.00)	(1.42)	(0.93)
Median	0.0067	0.0024	0.0011

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

Table 4. Mean and Median Two-Day Abnormal Returns for Announced Spending Increases (*Continued*)

Panel C. Mean Two-Day Abnormal Returns by Ownership/Coverage Groups

	High Own./Low Coverage (N = 38)	High Own./Med. Coverage (N = 32)	High Own./High Coverage (N = 23)
Mean	0.0149	0.0078	-0.0011
t-Statistic	(1.61)	(1.12)	(0.16)
Median	0.0064	0.0028	0.0010
	Med. Own./Low Coverage (N = 39)	**Med. Own./Med. Coverage (N = 46)**	**Med. Own./High Coverage (N = 38)**
Mean	0.0087*	0.0020	-0.0042
t-Statistic	(1.65)	(0.46)	(-0.70)
Median	0.0047	-0.0004	-0.0028
	Low Own./Low Coverage (N = 75)	**Low Own./Med. Coverage (N = 68)**	**Low Own./High Coverage (N = 62)**
Mean	0.0017	0.0117***	-0.0024
t-Statistic	(0.58)	(3.17)	(-0.68)
Median	-0.0009	0.0082	-0.0004

***Significant at the 0.01 level.
*Significant at the 0.10 level.

small firms appear to be the most dependent on cash flow to finance spending, and high-q firms depend on cash flow more than do low-q firms. However, large firms and high-ownership firms with low-q values also rely heavily on cash flow, which is consistent with the FCF hypothesis.

Table 4 reports two-day cumulative average excess returns for the 421 firms that announce spending increases by cash-flow coverage (CFCover) groups, size groups, and insider ownership groups. Firms are classified as having high-cash-flow coverage if CFCover is larger than 0.62, medium-coverage firms are identified as those with CFCover less than 0.62 but greater than 0.34, and low-coverage firms are defined as those having CFCover less than 0.34.[9]

Panel A of Table 4 shows that both medium- and low-coverage firms exhibit positive, statistically significant two-day excess returns, while firms with large levels of cash-flow coverage exhibit negative excess returns not significantly different from zero. When firms are split by asset size, only small firms exhibit positive, statistically significant excess returns. Thus, small firms rely most heavily on cash flow to finance capital spending, and they also enjoy the positive excess returns associated with announced spending increases. Finally, both high- and low-insider-ownership firms display only marginally significant positive excess returns.[10]

Panel B, Table 4, reports mean excess returns when firms are split by both asset size and cash-flow coverage groups, and Panel C reports means when firms are split by ownership and cash-flow-coverage groups. Small, low-coverage firms exhibit positive, statistically significant excess returns when they announce capital expenditure increases. However, only low-ownership, medium-coverage firms exhibit highly significant mean excess returns.

In general, Table 4 provides evidence supporting the pecking-order hypothesis, since those firms most likely to suffer cash constraints appear to be most closely associated with positive, excess returns. Table 4 also provides some evidence that is consistent with the FCF hypothesis. High-coverage firms, large firms,

[9]Again, these ranges were chosen to create three equally sized cash-flow-coverage groups based on the 561 capital expenditure announcements.

[10]An alternative grouping criterion using 2.5% and 15% ownership levels as cut-offs produced significant excess returns for high-ownership firms at the 0.05 level. Medium- and low-ownership firms had excess returns not significantly different from zero.

and low-ownership firms exhibit means that are less than the means associated with low-coverage, small, and high-ownership firms. Though these differences are not statistically significant, the ordering is consistent with both the FCF and PO hypotheses.[11]

Finally, results for the large-size, medium-coverage, and low-ownership, medium-coverage groups do not conform to any hypothesis considered here. These exceptions appear to be driven by the strong results posted by the medium-coverage group in Panel A of Table 4.

B. Regression Analysis

As a final test, I use a cross-sectional regression to explain variation in excess returns. Table 5 reports OLS-estimation results for the regression of two-day excess returns on CFCover, uinv, Tobin's q, and an interaction term (CFCover)(uinv) to test the impact that unexpected capital spending has on excess returns.

$$RET01_i = \alpha + \beta_1 Inown_i + \beta_2 CFCover_i + \beta_3 univ_i + \beta_4 CFCover_i univ_i + \beta_5 Q_i + \varepsilon_i \quad (3)$$

I choose this empirical model for the following theoretical reasons. The value-maximization and PO hypotheses argue that excess returns should be positively related to the level of unexpected spending and investment opportunities. The increase in spending over the previous year (uinv) is used as a proxy for unexpected spending. The PO hypothesis argues that excess returns for firms that announce spending increases should also be positively related to the firm's ability to finance announced spending with undistributed cash flow (CFCover). The FCF hypothesis predicts CFCover will be negatively related to excess returns. The PO hypothesis also suggests that the positive relation between capital spending and excess returns should increase with a firm's dependence on undistributed cash flow for financing. The opposite holds for the FCF hypothesis. The parameter estimate on the interaction term (CFCover)(uinv) captures this effect. If β_3 is greater than zero, the PO hypothesis is supported because the positive impact of unexpected spending on returns increases as cash-flow coverage increases. Alternatively, if β_3 is negative, the impact of unexpected spending on returns decreases as cash-flow coverage increases, thus supporting the FCF hypothesis. As before, Tobin's q is used to proxy the firm's ex ante investment opportunities.

Panel A of Table 5 reports OLS estimates for the entire sample of 421 firms that announce spending increases. Very little information is provided in Panel A regarding any of the hypotheses considered above. None of the parameter estimates is statistically significant, and the adjusted R^2 for the regressions is extremely small. This lack of fit should not be surprising, given that firms in the sample are likely to be following different behavior patterns.

Grouping firms into size groups, as in Panel B, Table 5, provides a clearer picture of what factors influence the dependence on cash flow. Panel B shows that excess returns for large firms are positively related to their investment opportunities as proxied by q, and negatively related to the level of their cash-flow coverage. Finally, the negative sign of the parameter estimate on uinv, while not significantly different from zero, is consistent with the sign predicted by the FCF hypothesis. These results for large firms provide some support to the notion that they are more susceptible to the agency costs of free cash flow.

Alternatively, small firms indicate a marginally significant influence of unexpected spending (uinv) on excess returns, and a generally positive and statistically significant parameter estimate on the interaction term. This result suggests that excess returns rise with the magnitude of capital spending for the smallest firms in the sample, and the impact of capital spending on excess returns increases as more of that spending can be financed with undistributed cash flow. Again, these results provide support for the pecking-order hypothesis in small firms, and some support for the free-cash-flow hypothesis in large firms.

The positive and significant parameter estimate on uinv in medium-sized firms suggests behavior generally consistent with the value-maximization hypothesis. The lack of cash flow or interaction effects in medium-sized firms indicates no evidence of either PO or FCF behavior.

Finally, Panel C of Table 5 reports regression results when firms are split by insider ownership. While the signs of the parameter estimates on CFCover, uinv, and (CFCover)(uinv) are generally consistent with those found by splitting on asset size, none are statistically significant.[12]

IV. Conclusion

The strong influence that cash flow has on capital spending in US corporations is well documented. However, the reason for this dependence is not well understood. This study analyzes 561 capital expenditure announcements from 1979 through 1993 to shed

[11] Alternatively, these results might reflect that spending is better anticipated by investors in high-coverage, large, or low-ownership firms, possibly because their size increases the extent to which these firms are followed by the market.

[12] Equation (3) was also estimated by entering insider ownership as a continuous explanatory variable. The parameter estimate was not significantly different from zero in either the full sample or in regressions on firms split by asset size.

Table 5. Cross-Sectional Regressions of Two-Day Abnormal Returns

This table presents the results of ordinary-least-squares (OLS) regression estimation. The dependent variable is the two-day average excess return (RET01). Explanatory variables are the cash-flow coverage ratio (CFCover), the difference between announced and the previous year's capital spending divided by market capitalization (uinv), an interaction variable (CFCover)(uinv), and Tobin's q (Q). Large, medium and small firms have book value of assets greater than $2.46 billion, between $2.46 billion and $385 million, and less than $385 million, respectively. High-, medium-, and low-ownership groups include firms with proportions of beneficial ownership (Inown) of greater than 0.25, between 0.25 and 0.05, and less than 0.05, respectively. The t-statistics are in parentheses.

Panel A. OLS Estimates for All Firms Announcing Capital Spending Increases[a]

Intercept	CFCover	uinv	(CFCover)(uinv)	Q	Adj. R^2
0.0052	-0.0062	0.0048	-0.0146	0.0029	0.0002
(1.10)	(-1.54)	(0.57)	(-0.48)	(0.72)	

Panel B. OLS Estimates for Firms Announcing Capital Spending Increases by Asset Group

Intercept	CFCover	uinv	(CFCover)(uinv)	Q	Adj. R^2
		Large Firms			
0.0030	-0.0149***	-0.0348	0.0032	0.0163**	0.0694
(0.42)	(-2.62)	(-1.32)	(0.07)	(2.34)	
		Medium Firms			
0.0062	-0.0037	0.0168**	-0.0435	-0.0045	0.0171
(1.02)	(-0.69)	(2.06)	(-0.97)	(-0.84)	
		Small Firms			
0.0045	0.0073	0.0704*	0.2167**	0.0070	0.0071
(0.35)	(0.68)	(1.94)	(2.13)	(1.04)	

Panel C. OLS Estimates for Firms Announcing Capital Spending Increases by Ownership Group

Intercept	CFCover	uinv	(CFCover)(uinv)	Q	Adj. R^2
		High Ownership			
0.0110	0.0057	0.0317	0.1294	-0.0038	0.0090
(0.79)	(0.36)	(0.76)	(0.76)	(-0.35)	
		Medium Ownership			
-0.0122	-0.0139	-0.0014	0.0491	0.0222***	0.0552
(-1.12)	(-1.38)	(-0.03)	(0.35)	(2.67)	
		Low Ownership			
0.0082	-0.0042	0.0034	-0.0191	-0.0021	0.0095
(1.59)	(-1.04)	(0.45)	(-0.69)	(-0.46)	

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.
[a]Results using an AR(1) process with time trend to measure uinv are similiar for large firms, but parameter estimates become insignificant for small firms.

additional light on the free-cash-flow hypothesis of Jensen (1986) and the pecking order hypothesis of Myers and Majluf (1984) as explanations for the importance of cash flow.

Initial results reveal relations similar to those uncovered in previous studies. Consistent with McConnell and Muscarella (1985), capital expenditure announcements are associated with positive and statistically significant two-day excess share price returns. Similar to Mitra, Biswas, and Owers (1991),

firms with favorable ex ante investment opportunities are responsible for much of the positive, excess returns. Also, for 421 firms announcing spending increases, the level of announced capital spending is positively and strongly related to the level of cash flow. The strength of this relation increases for firms with profitable ex ante investment opportunities, as firm size declines, and as the proportion of insider ownership increases.

Further analysis suggests that considerable heterogeneity exists in the capital market's response to cash-flow-financed capital spending. The positive and statistically significant excess returns found in the sample of firms announcing increases is concentrated in the smallest of the sample firms, in firms with low cash flow relative to capital spending, and, to a lesser extent, in firms with high levels of insider stock ownership.

Tests explaining the cross-sectional variation in returns reveal that excess returns for medium and small firms in the sample are positively associated with unexpected increases in planned spending. These tests also suggest that the capital market reacts more favorably to announced spending by small firms when the planned spending is more dependent on cash flow. Conversely, excess returns for the largest firms in the sample are negative, though not statistically significant. Cross-sectional regressions indicate that for these large firms, excess returns are negatively related to the extent that undistributed cash flow is available to finance planned spending, and positively related to their ex ante investment opportunities.

These results are consistent with the hypothesis that small firms follow a pecking-order model like that described by Myers (1984) and Myers and Majluf (1984). Because small firms and high-ownership firms are the most likely to face the liquidity constraints associated with asymmetric information, they are also the most likely to forgo profitable investment spending in times of cash-flow shortages. As cash flow rises, the set of profitable capital investment projects the firm can undertake also increases. Consequently, capital spending announcements are met with positive shareholder reactions, particularly when spending is dependent on cash flow.

I find some evidence that is consistent with the free-cash-flow hypothesis. Excess returns are negatively related to large firms' ability to cover announced spending with cash flow. Furthermore, high-cash-flow coverage firms, large firms, and firms with low-insider ownership all exhibit lower excess returns than their low-cash-flow coverage, small, and high-insider-ownership counterparts. This is consistent with both the FCF and PO hypotheses.

This apparent heterogeneity in the market's response to capital-spending decisions suggests different capital-spending financing policies for firms that seek to enhance shareholder value. The market values of small firms, firms with substantial insider ownership, and firms that are generally cash-flow-constrained appear to be enhanced, on average, by financing capital spending with cash flow. These firms might consider policies of conserving undistributed cash flow through low payout and leverage policies, thus encouraging new capital spending from internally generated funds. However, all other firms appear to be less dependent on a cash-flow-retention policy to facilitate capital spending. I find no evidence that cash-flow-financed capital spending improves these firms' market values, on average. Further, limited evidence exists that such a financing strategy could reduce market value for large, low-insider-owned, and cash-flow-rich firms. ■

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