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HOW WELL DO MARKET TIMING, CATERING, AND CLASSICAL THEORIES EXPLAIN CORPORATE DECISIONS?

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Abstract

An important debate in corporate finance is whether chief executive officers (CEOs) exploit equity mispricing. In this article I construct a measure of the unexplained change in the CEO's stockholdings of the firm to empirically test the contrasting predictions of market timing, catering, and classical theories of corporate decisions. Consistent with the predictions of classical theories, I find that the firm increases its investments and even uses expensive capital to finance investments when there is an unexplained increase in the CEO's stockholdings. However, I find no empirical support for catering predictions and weak empirical support for market timing predictions.

JEL Classification: D03, G30, G31, G32

I. Introduction

What do chief executive officers (CEOs) do when their firm's equity is misvalued by the stock market? Three classes of theories offer an answer to this question. The first view is that of market timing, in which the CEO exploits the misvaluation by issuing stocks when the firm is overvalued and repurchasing stocks when it is undervalued. In the second view, the CEO actively encourages misvaluation by making corporate decisions that cater to the current fads and fancies of the market (catering). In contrast, the classical view argues that the CEO generally ignores equity market misvaluation and makes investment decisions that maximize the fundamental value of the firm. Despite the importance of the question, no consensus exists on what the CEO actually does (Blanchard, Rhee, and Summers 1993; Gilchrist, Himmelberg, and Huberman 2005). This article contributes to the literature by creating a measure of the CEO's perception of firm value and using it to empirically test the predictions of the three theories.

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The market timing and catering theories predict that the CEO will exploit the market by investing in projects she perceives are unprofitable (see Polk and Sapienza 2006). The source of capital for these investments is different for both of these theories. Polk and Sapienza (2006) argue that the CEO caters to the market by using internal funds to finance investments. Thus, the relation between perceived profitable investments and internal cash flows is negative. Conversely, market timing theory (Baker and Wurgler 2002) predicts that the firm will issue stock when it is overvalued, which results in a negative relation between the CEO's perceived value of the firm and equity issuance.

The classical view predicts that the CEO will invest only when she believes the firm has profitable investments. After using internal funds to finance these investments, the choice before the firm is whether to use external capital. The classical view states the firm will use external capital only if its higher cost does not make the investments unprofitable. An implication is that larger and more profitable investments may require a greater use of external capital, and therefore the investment's sensitivity to internal cash flows declines with the CEO's perception about the profitability of the investments.

In this article I study corporate decisions when the CEO perceives that the firm is misvalued by the market. Hence, I construct a measure for the CEO's perception of the firm's misvaluation using the unexplained change in the stockholdings of the CEO. This unexplained change directly measures CEO's perception, as the CEO can profit only if the market is wrong. This measure is employed to test the different predictions about corporate actions.

Using compensation and firm-level data, I present evidence that favors the classical view's explanation of corporate investment and financing decisions. I find a positive relation between an unexplained increase in the CEO's shareholdings and investments, and a decrease in investment cash-flow sensitivity when the CEO unexplainably increases her shareholdings. These results imply that the CEO's corporate decisions match her perception of the firm's value, as she increases corporate investments when she is increasing her shareholdings of the firm.

I perform direct tests for the market timing and catering predictions. I find that the relation between equity issuance and unexplained increase in shareholdings is positive. If an increase in shareholdings implies that the CEO perceives her firm to be undervalued, this suggests that undervalued firms issue equity, contradicting market timing predictions. Catering theories predict that firms prefer debt over equity to finance value-destroying investments, implying that the overvalued firm should issue more debt. However, I find that the firm issues more debt when the CEO perceives the firm to be undervalued. These results suggest that the average CEO may not be timing or catering to the market.

Market timing should be more pronounced for firms that depend on equity markets for capital because misvaluation in equity is the cause of these actions (Baker, Stein, and Wurgler 2003). I find that investment cash-flow sensitivity

TABLE 1. Predicted Relations between Dependent Variables and Independent Variables.

Dependent Variable (1)	Independent Variable (2)	Classical View (3)	Market Timing (4)	Catering (5)
Investment	*Perception*	+	—	—
	*Perception * Cash Flow*	—	+	—
Conditioning on equity dependence				
Investment	*Perception*	+	—	
	*Perception * Cash Flow*	—	+	
Equity	*Perception*	+	—	
Conditioning on nonequity dependence				
Debt	*Perception*	+	+	—

Note: The sign of the predicted relation between the dependent variables in column (1) and the independent variables in column (2) is presented in columns (3) through (5). *Perception* refers to the CEO's belief that his or her firm is mispriced by the equity market. *Perception * Cash Flow* refers to the interaction between the CEO's perception and the cash flows of the firm.

decreases more sharply for equity-dependent firms when CEOs increase their shareholdings. These results contradict the market timing predictions, as the CEO increases the use of external capital to finance profitable investments even when external capital is expensive.

II. Related Literature and Testable Predictions

There is an active debate in the literature about the effect of equity market misvaluation on corporate decisions. The literature on corporate decisions can be separated into three strands: classical, market timing, and catering. The current article contributes to the literature by studying the effect of the CEO's perception about misvaluation of her firm on corporate decisions. This is important as it is the CEO who makes the decision whether to exploit the misvaluation. In the following subsections, differing predictions are offered to suggest how the CEO will act based on her perception of the market's misvaluation of her firm (see also Table 1).

Classical View

The CEO's primary objective is to maximize the firm's fundamental value. The CEO can do this by investing in projects she perceives are profitable (Morck, Shleifer, and Vishny 1990; Blanchard, Rhee, and Summers 1993) and finance these investments by using either internal or external funds. Internal funds are preferred source of funding because they are relatively cheaper. On the other hand, if the CEO perceives a need for a large investment, as internal funds are limited, she may turn to external funds. I argue that if the CEO perceives she has more profitable investment opportunities, she invests more and uses more external capital. Increased external financing should lead to a decline in the sensitivity of investments to internal cash flow.

When the CEO turns to external finance, she chooses between debt and equity. Her decision is based on the source of capital that is available to the firm. She should choose debt if the firm has access to debt and should otherwise choose equity. So, for equity-dependent firms, as her perception increases, the CEO invests more, leading to the increased issuance of equity.

Market Timing

Shleifer and Vishny (2003) and Gilchrist, Himmelberg, and Huberman (2005) show that the firm exploits the equity market's mispricing by issuing overvalued equity and using the proceeds to finance investments. This argument suggests the following logic. The CEO knows her firm is overvalued but invests more. Hence, the relation between investments and perception should be negative. As the CEO's perception becomes more negative, she invests more and uses more external capital, suggesting the relation between perception and sensitivity of investments to internal cash flows is positive. Conditioning on equity dependence makes the relation sharper, as firms use equity for financing the exploitation of this misvaluation.

In terms of capital, Baker and Wurgler (2002) and Marciukaityte, Szewczyk, and Varma (2005) suggest that firms issue more equity when they are overvalued. Hence, there should be a negative relation between equity issuance and perception for equity-dependent firms. The market timing models suggest that firms that are undervalued prefer to issue more debt if possible. Firms that have access to debt and spare debt capacity are most likely to issue debt. These firms typically are not equity dependent. Therefore, debt issuance increases as perceived undervaluation increases for non-equity-dependent firms.

Catering

Polk and Sapienza (2006) argue that CEOs may boost the short-term price of stock by investing in current fads, or "catering." As this activity is value destroying, the CEO's perception about her firm should be lower than the market's perception. Hence, as her perception declines, she may temporarily increase the stock price by investing more. Polk and Sapienza further argue that firms that indulge in catering do so using internal cash flows or debt. As firms are more likely to use the cheaper internal cash flows instead of debt to finance value-destroying investments, the relation between perception and sensitivity of investments to cash flows should be negative. An implication of Polk and Sapienza is that firms may not issue equity to finance the investment. Thus, the relations for equity-dependent firms are indeterminate.

Although a firm is more likely to use internal financing when catering, it may use debt to finance some of its value-destroying investments. An implication of this argument is that debt issuance should increase as the CEO's perception about her firm decreases. This relation should be true especially for firms that have debt capacity and thus are not equity dependent.

TABLE 2. Some Characteristics of the Firms.

Variable	Mean	Std. Dev.	Min.	Max.
Investment	0.24	0.17	0.01	0.99
Debt Issuance	0.03	0.11	−0.16	0.62
Equity Issuance	0.00	0.08	−0.22	0.47
Cash Flow	0.64	0.47	−0.51	2.65
Q	1.24	0.35	0.58	2.29
Ownership	0.02	0.04	0.00	0.25
Vested Options	662.32	1,023.10	12.50	6,675.00
Size	7.45	1.74	3.91	12.16
KZ Index	0.84	43.85	−69.39	1,078.58
Book/Total Assets	0.41	0.22	−0.08	0.90
Current Liabilities/Total Assets	0.23	0.11	0.05	0.64
Dividend Yield	0.84	0.36	0.00	1.94
Δ*Working Capital*	0.15	1.14	−0.43	19.84
Δ*Sales*	13.94	28.27	−48.13	157.34
Δ*Tangibility*	0.00	0.04	−0.16	0.13

Note: This table provides summary statistics for the data employed in the analysis. The data set is composed of 16,167 observations from 1993 to 2006. Only those observations are included that have nonmissing values for the measure of *Perception* and more than one year of CEO-firm data in ExecuComp database. The variables are defined in the Appendix. Both tails of the data are winsorized at the 1% level.

III. Data

I use compensation data to construct the measure of the CEO's perception about her firm. The data are from the ExecuComp database, which is distributed by Standard & Poor's as a supplement to Compustat. ExecuComp reports information for firms in the S&P 500, S&P MidCap 400, and S&P SmallCap 600. ExecuComp data for 1993 onward are virtually complete. Therefore, I use data starting in 1993 and ending in 2006.

The data used to construct variables describing firm characteristics are taken from two sources. The first source is ExecuComp, which contains precalculated variables such as the percentage change in sales and the market value of the firm. The second source is Compustat. As is customary, financial firms (Standard Industrial Classification [SIC] codes 6000–6999) and regulated utility firms (SIC codes 4900–4999) are eliminated. Firms whose stock price is below 50 cents at end of year are deleted to minimize the effect of microstructure-related return volatility. Observations with missing shareholdings, negative shareholdings, negative options, or stock grants are also deleted. A potential problem with the data from Compustat is that there may be misreported data. A solution is to winsorize the data (1% of either tail of the data is winsorized). An additional benefit of winsorization of the data is that it reduces the effect of extreme outliers.

The variables are described in the Appendix. Summary statistics are reported in Table 2. The first three rows report statistics for the dependent variables; the remaining rows report statistics for the independent variables. The mean of

investment is 0.24, and on average, stock issuance is 0. The summary statistics reported for these variables are consistent with those reported in the literature.

IV. Measure of Managerial Perception

The measure presented in this section reflects the CEO's perception of the firm. This measure is developed by quantifying the abnormal portfolio stockholdings of the CEO and consists of two parts: the observed and the expected change in the stock holdings of the CEO (Jenter 2005; Aggarwal and Samwick 1999).

Expected change in CEO's stockholdings captures variations that are not related to equity misvaluation, representing the increase or decrease in stocks that should occur if the CEO's stockholdings are ex ante optimal. Expected change in stockholdings comes from two sources: (1) compensation packages consisting of stocks and options and (2) delta hedging of existing portfolio of options.

The compensation package may consist of restricted stocks granted to the CEO. These are stocks the CEO cannot sell in that year and thus increase the expected stockholdings of the CEO. The compensation package may also include options granted to the CEO. The last two decades have seen a significant rise in the use of stock options in CEO compensation packages (Hall and Liebman 1998). The amount of stocks the CEO should sell in a risk-neutral world is given by the Black–Scholes delta of the option (Yermack 1995):

$$\Delta = e^{-dT}\Phi\left(\frac{\ln\left(\frac{P}{E}\right) + T\left(r - d + \left(\frac{\sigma^2}{2}\right)\right)}{\sigma\sqrt{T}}\right),$$

where

P = price of underlying stock at time of award;
E = exercise price;
d = ln(1 + dividend rate/100);
r = ln(1 + interest rate/100) (interest rate is yield on 10-year Treasury);
T = time to expiration; and
σ = annualized volatility.

Table 3 reports that the mean of the delta is 0.7041, which is consistent with other estimated deltas in the literature. This result suggests that the average CEO should sell 0.7041 shares for every option granted to her. The next step is to remove changes in stockholdings resulting from changes in the portfolio of options that the CEO already holds. There are two sources for the changes in the CEO's

TABLE 3. Summary Statistics of Perception.

	Delta	*Unexplained Change*	*Unscaled Perception*
Mean	0.7041	545.4012	6.8299
Median	0.7330	100.6388	2.3702
St. dev.	0.1668	14,572.0000	31.7759
Kurtosis	0.0831	4,985.2169	2.2388
Skewness	−0.7232	61.1273	8.3968

Note: This table provides the summary statistics for some of the variables used in the construction of the *Perception* measure. There are 16,167 observations from 1993 to 2006. *Delta* refers to the delta hedge of stock options calculated through the Black–Scholes option pricing formula. *Unexplained Change* is the difference between the observed change and the expected change in the number of shares held by the CEO. *Unscaled Perception = Unexplained Change * Stock Price/Total Cash Compensation*.

stockholdings in relation to the portfolio of options: (1) the dynamic delta hedging of the existing options portfolio and (2) the additional stocks gained through the exercise of options.

The delta of the portfolio is defined as the average delta of the individual options (weights are the number of options held in the portfolio). ExecuComp does not provide the constituents of the unexercised options. Hence, a proxy for the delta of the portfolio of options (Δp) is:

$$\Delta p = \frac{\text{Change in price of options portfolio}}{\text{Change in price of stock}} \cong \frac{\text{Change in price of unexercised exercisable options}}{\text{Change in price of stock}}.$$

Thus, the dynamic delta hedging (m_t) of the CEO's existing portfolio is given by:

$$m_t = \Delta p_t {}^{*} NUEO_t - \Delta p_{t-1} {}^{*} NUEO_{t-1}, \tag{1}$$

where *NUEO* is the number of unexercised exercisable options. The expected change in the number of shares of the CEO is given by:

$$Expected\ Change_t = RS_t - m_t - \Delta_t {}^{*} OG_t + SO_t, \tag{2}$$

where *RS* are the restricted stocks granted, *OG* are the options granted, and *SO* is the stock gained through the exercise of options. Equation (2) assumes the CEO's portfolio stockholdings are ex ante optimal. However, ex ante optimality may not hold for the following reasons:

1. Inside information: A CEO may increase her stockholdings and options if she has private information she can exploit for personal profit. Inside information is not a problem for two reasons. First, trading on private

inside information is illegal. Second, the extant literature has tried to link the portfolio trades of the CEO to future stock returns and has largely failed.

2. Signaling: It is conceivable that the CEO may send a signal to the investors by increasing her stockholdings and options. However, this action may be costly to the CEO, as she must internalize any losses because of the trade. Therefore, it is most likely that the CEO signals based on her perception.
3. Trading costs/busy CEO: The effect of trading costs or the CEO being busy is to reduce the frequency of trades, suggesting the CEO will trade only if she strongly perceives a trade to be profitable. The implication here is that trading costs and the CEO's busyness will strengthen the results by reducing noise.
4. Liquidity trades: The CEO may have an urgent need for cash and therefore may liquidate a portion of her portfolio. This action undoubtedly occurs in practice. The consequence of liquidity trades is that these trades do not reflect the CEO's perception of her firm and therefore bias the results toward zero. Similarly, if the CEO receives a cash windfall from winning a lottery, she may invest the money in the firm's stock and bias the results toward statistical insignificance.
5. Uninformed CEO: If the CEO is ignorant about the majority of the investment decisions taken by other executives of the firm, her trades will lack information about her perception of the firm's investments and will bias the results toward zero.
6. Trading windows: The firm may prohibit the CEO from trading during certain periods as the CEO may have nonpublic information she can exploit for personal gain. These periods usually occur around quarterly and annual earnings announcements. However, the existence of trading windows may not materially affect the results, as annual data are used and thus there are enough unrestricted days for the CEO to execute her trades. Additionally, if these trades are part of a prearranged plan, the CEO can trade even during these prohibited windows.

Next, observed change is considered. This change in the CEO's stockholdings is the first difference (yearly) of the portfolio holdings of the CEO that is reported in the data. The observed change in the number of shares is given by:

$$Actual\ Change_t = Shares\ Owned_t - Shares\ Owned_{t-1}. \tag{3}$$

This is the amount by which the CEO increases (decreases) her stockholdings. The CEO changes her stockholdings because she perceives that her firm will do well. Taking the first difference of the number of shares owned implies the loss of one

year of data. Thus, to be included in the analysis, the CEO needs two consecutive years of data. In (3), the shares owned exclude options.[1] The unexplained increase (decrease) in the number of shares is given by:

$$Unexplained\ Change_t = Actual\ Change_t - Expected\ Change_t. \tag{4}$$

The intuition is that the CEO is expected to change her shareholdings by a certain amount (expected change) every year. However, if the CEO changes her shareholdings above (below) this level, it suggests that the CEO is increasing (decreasing) her exposure to the firm. If the CEO increases her exposure to the firm and the firm's price declines, then her personal wealth is destroyed.

One concern is that explicit or implicit firm policies might require the CEO to hold a minimum number of stocks. This concern would be a problem if the measure I use in this study depended solely on the level of stockholdings. However, my measure uses the change in stockholdings. Taking the difference between the current stockholdings of the CEO and her previous stockholdings should remove these effects.

The results reported in Table 3 suggest that unexplained change has a mean of 545 shares and a standard deviation of 14,572 shares. This measure does not give the full magnitude of the risk being taken by the CEO. For instance, owning a few shares of Berkshire Hathaway has a larger magnitude in nominal terms than owning many more shares in a firm trading at $1. Thus, the magnitude of the exposure is given by *Unexplained Change* * *Stock Price*.

Furthermore, the compensation package is a portfolio of stocks, options, and cash. Cash, being a risk-free asset, reduces portfolio risk. To obtain comparable levels of exposure to the firm, *Unexplained Change* * *Stock Price* is normalized by total cash compensation.[2]

$$Unscaled\ Perception_t = \frac{Unexplained\ Change_t\ ^{*}Stock\ Price_t}{Total\ Cash\ Compensation_t}. \tag{5}$$

The results reported in Table 3 show that *Unscaled Perception* has significant skewness and kurtosis. There are two ways to deal with these problems: (1) winsorizing and (2) trimming *Unscaled Perception*. In this article I report the

[1] All share quantities and prices are adjusted for stock splits and stock dividends.

[2] Total cash compensation is the sum of total current compensation and all other paid compensation. Total current compensation consists of cash and noncash base salary and bonus. Examples of noncash compensation are all-expenses-paid vacations or free parking. Noncash compensation does not include restricted stocks or options granted. As the types of noncash compensation are only limited by the imagination of the employers, it is not possible to give a detailed decomposition of its components. I assume these can be consumed by the CEO whenever she desires and thus reduce the exposure of the CEO to the firm.

results of winsorized *Unscaled Perception* (1% of both tails is winsorized). The results are similar with trimmed *Unscaled Perception*. Finally, this measure is scaled by dividing it by 100,000. Henceforth, *Perception* refers to this scaled, winsorized measure.

Perception is most closely related to Jenter's (2005) measure. The major difference between Jenter's and my measure is that I directly control for the options granted to the CEO and the dynamic delta hedging of the CEO's options portfolio. As options are one of the largest components of the CEO's compensation, this measure is more accurate because it includes options. Another related measure by Malmendier and Tate (2005) exploits the timing of options exercised to identify overconfidence, whereas my measure exploits change in the stockholdings of the CEO. The major advantage of my measure is that it is replicable from standard data sources, whereas Malmendier and Tate's measure cannot be replicated from these data sources.

V. Investments and Perception

This section tests the predictions of the models (see Table 1) regarding the relation between investment and perception. Market timing and catering models predict a negative relation between investment and perception, whereas classical view predicts a positive relation. Additionally, the market timing model predicts that the interaction term of perception and cash flows has a positive relation, whereas the other two models predict a negative relation. To test these contrasting predictions, the following equation is estimated:

$$\begin{aligned} Investment_{it} = {} & \alpha + \beta_1 Perception_{it-1} + \beta_2 CashFlow_{it-1} \\ & + \beta_3 Perception_{it-1} {}^{*} CashFlow_{it-1} + \beta_4 X_{it-1} + \varepsilon_{it}, \end{aligned} \tag{6}$$

where t stands for time, i stands for the firm, and X represents two sets of controls. The first set deals with the CEO-specific controls. As suggested by Murphy (1999), the beginning-of-the-fiscal-year total compensation and lagged stock ownership as a percentage of total shares outstanding are included as independent variables. The incentives to invest might be distorted because of the options held by the CEO. Thus, the dollar value of vested options of the CEO at the beginning of the fiscal year is included as a control variable. In addition, the percentage of shareholdings and the dollar value of vested options are interacted with cash flows (Malmendier and Tate 2005).

The second set of controls is firm-specific controls. Cleary, Povel, and Raith (2007) show that the investment–cash flow curve is U-shaped; therefore, along with cash flows, the squared term of cash flows is included in X. Investments might have been made because of growth opportunities; hence, lagged q

and the interaction between lagged q and cash flows is included. Because the profitability of current cash flows might determine investments, a one-year percentage change in sales is included. To control for financial constraints, book equity divided by total assets, current liabilities divided by total assets, and change in the tangibility of assets are included. Finally, industry and year dummies are included.

Regression results are reported in Table 4. Column (1) excludes the measure of perception, and column (2) includes the measure of perception. The R^2 increases from column (1) to column (2), suggesting *Perception* explains a significant part of investments. The estimates of the coefficient of *Perception* are positive and significant at the 1% confidence level. The results suggest that as *Perception* increases, investments increase. CEOs who believe they have more profitable investments invest more, and those who doubt the profitability of their investments invest less.

These results do not support the catering or market timing models. If the CEO caters to the market, she should invest when the firm is overvalued and decrease investments when the firm is undervalued. The results suggest that CEOs ignore the market's misvaluation when they make investment decisions. Morck, Shleifer, and Vishny (1990) and Blanchard, Rhee, and Summers (1993) use Q as a measure of mispricing and find that the incremental effect of mispricing on investment is weak. They conclude that the equity markets are a sideshow with regard to the investment decisions. In contrast, Polk and Sapienza (2006) and Gilchrist, Himmelberg, and Huberman (2005) use Q as a measure of mispricing and find that investment is sensitive to equity mispricing. I use a direct measure of equity mispricing and show that managers do not cater or time the market.

The classical view predicts a negative effect of perception on the sensitivity between investment and cash flows; in contrast, market timing predicts a positive relation. To test these predictions about the investment cash-flow sensitivity and the effect of perception on this sensitivity, I estimate the coefficient of the interaction term of *Perception* and cash flow. Table 4 reports that the estimate is negative and significant at the 5% confidence level. The results suggest that CEOs who perceive their firm's equity to be undervalued use less internal cash flow for their investments than do CEOs who perceive their firm's equity to be overvalued. These results support the prediction of the classical view that the estimated coefficients of *Perception* and cash flow are negative.

If market timing determines the investment decision, overpriced firms should use more external financing for their investments than underpriced firms. An implication of this argument is that overpriced firms should be less dependent on internal cash flows than underpriced firms. The estimated coefficient of the interaction term of *Perception* and cash flow is negative and does not support the prediction that market timing is used to exploit mispricing.

TABLE 4. Estimated Effect of CEO's Perception on Corporate Investments.

Investment	(1)	(2)	(3)	(4)
Perception		15.6325	29.1146	25.2749
		4.26***	4.92***	4.69***
*Perception*Cash Flow*			−18.8015	−14.7209
			2.92***	2.45**
Cash Flow	0.1681	0.1650	0.1666	0.1174
	27.05***	27.45***	27.62***	9.20***
Cash Flow^2	0.0525	0.0518	0.0514	0.0309
	18.57***	17.13***	17.14***	8.29***
Ownership				0.1567
				1.15
Vested Options				0.0002
				1.19
*Ownership * Cash Flow*				−0.2263
				2.27**
*Vested Options * Cash Flow*				−0.0000
				2.56**
Q	−0.0109	−0.0124	−0.0117	−0.0141
	1.32	1.54	1.43	1.35
*Cash Flow*Q*				−0.0022
				0.25
Size	−0.0487	−0.0423	−0.0420	−0.0513
	10.09***	8.85***	8.80***	10.97***
Change in Tangibility				0.7796
				28.10***
Change in Sales				0.0008
				14.43***
Total Compensation Including Options ($million)				0.7373
				3.92***
Book/Total Assets				0.0562
				3.60***
Current Liabilities/Total Assets	0.0408	0.0120	0.0124	0.0341
	1.51	0.46	0.47	1.33
Constant	0.2888	0.3279	0.3225	0.3898
	2.01	2.63***	2.59***	3.36***
Adj. R^2	0.11	0.29	0.29	0.32

Note: This table reports the estimated coefficients of the determinants of investment. The variables of highest interest are *Perception* and its interaction with *Cash Flow.* The rest of the independent variables are standard controls from the literature. The dependent and the independent variables are defined in the Appendix. Fixed-effects panel data regression methodology is employed. The sample is from 1993 to 2006. There are 16,167 CEO-years and 3,827 CEOs used in the analysis. Additionally, year dummies were used but are not reported. Robust standard errors are used, and *t*-statistics are reported below the coefficient estimates.

***Significant at the 1% confidence level.

**Significant at the 5% confidence level.

Reverse Causality

It is reasonable to expect that a change in the firm's investment policy may induce the CEO to change her stockholdings of the firm. If reverse causation is true, it would imply that *Perception* is a function of investment; thus, the empirical

specification should be as follows:

$$Perception_{it} = \alpha + \beta_1 Investment_{it-1} + \beta_2 Controls_{it-1} + \varepsilon_{it}. \quad (7)$$

Column (1) in Table 5 reports the results of the estimation of the above empirical specification. All of the independent variables reported in the table are lagged. The estimated coefficient of lagged investment is not statistically significant at any reasonable confidence level, implying that investment may not be a determinant of *Perception*. Despite controlling for other compensation variables, the table reports that the statistically strongest relation is between lagged *Perception* and *Perception*. Among the firm characteristics, it seems that firms with low cash flows but high Tobin's *Q* have CEOs with higher *Perception*.

Another empirical method for removing concerns about reverse causality is instrumental variables. An instrument for *Perception* is lagged *Perception.* It meets the criteria of an instrument for the following reasons. First, there is a strong correlation, as can be observed from the estimates of column (1) in Table 5, between *Perception* and lagged *Perception*. Second, there is no theoretical reason (except persistence) for any relation between the second lag of *Perception* and investment. Empirically, the correlation between the second lag of *Perception* and investment is low, at about 2%. Additionally, in an unreported regression, the estimate of the second lag of *Perception* is statistically insignificant when the dependent variable is investment. Third, the underidentification test (Anderson Canon test), the weak identification test (Cragg-Donald statistics), and the Hausman test support lagged *Perception* as an instrument for *Perception* in their regression on investment. The estimated coefficient in column (2) of Table 5 shows a positive and statistically significant relation between instrumented *Perception* and investment. This estimated relation is consistent with those of the previous tables and thus implies that the results may not be affected by reverse causality.

An additional empirical method for reducing concerns about reverse causation and persistence is the use of the first difference regressions method. In this method, reverse causation and persistence are removed by taking the first difference. Table 6 reports the estimates of regressing the first difference in investment on the first difference in *Perception*. The estimate of this relation is positive and statistically significant at the 1% confidence level. As the sign of the estimate does not change, it implies that reverse causation may not be biasing the interpretation of the results.

Equity Dependence and Investments

Equation (6) is used to estimate the results but is conditioned on equity dependence by separating the sample into two halves. An index is constructed using

TABLE 5. Mitigating Reverse Causality through Reverse Specifications and Instrumental Variables.

	Perception (1)	*Investment* (2)
Lagged Investment	0.0034	
	0.64	
Instrumented Perception		26.2857
		2.68***
Lagged Perception	0.3340	
	10.07***	
Cash Flow	−0.0003	0.1062
	5.23***	6.90***
Cash Flow^2	0.0002	0.0363
	0.94	11.70***
Ownership	0.0023	0.0066
	2.84***	0.03
Vested Options	0.0002	0.0001
	2.02**	1.70
*Ownership * Cash Flow*	0.0041	−0.0629
	6.59***	0.40
*Vested Options * Cash Flow*	0.0000	−0.0001
	3.63***	5.21***
Q	0.0001	−0.0233
	2.25**	1.78
*Cash Flow * Q*	0.0002	−0.0083
	4.97***	0.72
Size	0.0000	−0.0460
	1.45	7.40***
Change in Tangibility	0.0008	0.7901
	0.14	23.96***
Change in Sales	0.0000	0.0008
	1.59	12.11***
Total Compensation Including Options ($million)	0.0056	0.4365
	4.52***	1.81
Book/Total Assets	−0.0001	0.0143
	0.88	0.76
Current Liabilities/Total Assets	−0.0000	0.0035
	1.19	2.30**
Constant	0.0005	0.3875
	1.30	1.85
Adj. R^2	0.11	0.39

Note: The results reported in this table help reduce concerns about reverse causality. The first column uses *Perception* as the dependent variable and estimates the effect of *Lagged Perception* on *Perception*. Fixed-effects panel data regression methodology is employed for the first column. The second column uses *Investment* as the dependent variable and estimates the effect of lagged instrumented *Perception*. The instrument for *Lagged Perception* is the second lag of *Perception*. All the other control variables used in both regressions are lagged and are defined in the Appendix. The *t*-statistics are reported below the coefficient estimates. Robust standard errors are used.

***Significant at the 1% confidence level.

**Significant at the 5% confidence level.

TABLE 6. First Difference Estimation of the Relation between Investment and Perception.

Δ*Investment*	(1)
Δ*Perception*	3.8526
	2.81***
Δ*Cash Flow*	8.4972
	1.71
Δ*Cash Flow*^{2}	0.1523
	11.61***
Δ*Ownership*	0.0467
	19.45***
Δ*Vested Options*	0.0005
	0.00
Δ*Ownership* * *Cash Flow*	−0.1547
	1.05
Δ*Vested Options* * *Cash Flow*	−0.2535
	2.20**
Δ*Q*	−0.0177
	1.76
Δ*Cash Flow* * *Q*	−0.0768
	6.68***
Δ*Size*	−0.0137
	2.37**
Δ*Tangibility*	0.4860
	2.77***
Δ*Total Compensation Including Options* ($million)	0.0647
	3.49***
Δ*Book*/*Total Assets*	0.0130
	1.85
Δ*Current Liabilities*/*Total Assets*	0.6670
	26.95***
Constant	0.0031
	0.31
Adj. R^2	0.37

Note: This table helps reduce concerns about persistence and reverse causality by presenting the difference in difference estimates. The empirical model regresses the first difference (Δ) of investment on the lagged first difference of the independent variables. Fixed-effects panel data regression methodology is employed. There are 13,158 CEO-years and 3,149 CEOs for 1993–2006. The variables are described in the Appendix. The *t*-statistics are reported below the coefficient estimates. Robust standard errors are used.

***Significant at the 1% confidence level.

**Significant at the 5% confidence level.

the same approach as in Kaplan and Zingales (1997) and Lamont, Polk, and Sáa-Requejo (2001). Kaplan and Zingales first classify their firms as constrained or unconstrained and then estimate an ordered logit of this classification on five accounting ratios meant to quantify these financial constraints: cash flow to total capital, *Q*, debt to total capital, dividends to total capital, and cash holdings to capital. I use the estimates of this ordered logit regression in my sample and construct

an index of equity dependence as follows:

$$KZ_{i,t} = -1.0019\frac{CF_{i,t}}{K_{i,t-1}} + 0.2826Q_{i.t} + 3.1392Leverage_{i,t} - 39.3678\frac{Dividend_{i,t}}{K_{i,t-1}} - 1.3148\frac{C_{it}}{K_{i,t-1}}. \quad (8)$$

Based on the *KZ* values, the sample is split into two halves. Higher *KZ* values imply that a firm has higher financial constraint and greater dependence on equity to finance investments. Consequently, the half with the higher *KZ* firm-year values are called equity dependent, and the half with lower firm-year *KZ* values are called not equity dependent. To test the robustness of the results using the *KZ* index, I use three alternate measures of equity dependence: size, property, plant, and equipment (PPE)/sales, and dividend yield.

1. Size: Morck, Shleifer, and Vishny (1990) hypothesize that smaller firms are more dependent than larger firms on equity markets to finance their investments. Smaller firms typically have more restricted access to debt markets and thus must depend to a greater degree on equity markets to finance their investments. One reason for this might be that small firms have fewer assets to pledge as collateral. Also, if these are younger firms, or if these firms are approaching bankruptcy, the quality of their assets might be poor, which in turn decreases their ability to raise debt. Hence, small firms may be classified as equity-dependent firms.
2. PPE/total assets: The PPE/total assets ratio measures the amount of tangible assets. Asset tangibility is identified as affecting debt capacity (Lemmon and Zender, 2010). As tangible assets are easy to collateralize, a higher PPE/total assets ratio implies a higher debt capacity, and a lower PPE/total assets ratio indicates the firm is more likely to be equity dependent.
3. Dividend yield: Firms with a higher dividend yield tend to have more cash and thus are less likely to be equity dependent.

The results are reported in Table 7.[3] The odd-numbered columns present estimates for non-equity-dependent firms and the even-numbered columns present

[3] An alternate specification for the test is to use a dummy variable for equity-dependent firms. The results are robust to the alternate specification. The estimated coefficients of the interaction term of the dummy variable and perception are significant at the 1% confidence level. Using a dummy variable suggests that the effect of equity dependence is experienced only by the terms interacted with the dummy; however, separating the sample into halves has the additional benefit of letting the estimates of all of the independent variables vary in the two halves. Also, in the model, the continuous variable lambda determines equity dependence. Hence, using a discrete dummy variable may not be a strong test of the model.

TABLE 7. Estimated Relation between Investments and Perception When the Firm Is Equity Dependent.

	Sorted on *KZ Index*		Sorted on *Size*		Sorted on *PPE/Total Assets*		Sorted on *Dividend Yield*	
Investment	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Perception	−6.2921	47.9272	14.0034	14.9332	−11.5628	56.8711	7.2228	36.3952
	0.85	5.08***	1.22	3.33***	1.63	5.85***	0.79	6.31***
*Perception * Cash Flow*	26.9730	−34.6854	26.9030	−17.8808	57.7903	−42.1528	9.2089	−47.5791
	2.39**	4.06***	2.36**	3.24***	4.04***	5.06***	0.95	7.06***
Cash Flow	0.2281	0.0450	0.1133	0.2243	0.4284	0.0362	0.1385	0.0830
	8.91***	2.52**	6.04***	9.69***	12.89***	2.15**	7.49***	3.82***
Cash Flow^2	0.0433	0.0165	0.0244	0.1536	0.1089	0.0139	0.0320	0.0451
	7.87***	3.85***	5.97***	14.01***	12.34***	3.62***	7.28***	3.77***
Ownership	0.0556	0.1100	0.2330	−0.2795	−0.0259	0.1687	0.1562	−0.1023
	0.31	0.53	1.19	1.55	0.14	0.84	0.72	0.64
Vested Options	0.0000	0.0000	−0.0000	−0.0000	0.0000	0.0000	0.0000	0.0000
	0.01	2.11**	0.39	2.32**	0.64	0.79	1.15	1.78
*Own * Cash Flow*	−0.0783	−0.2711	−0.2351	−0.5266	−0.8967	−0.0242	−0.2717	0.0540
	0.39	2.14**	1.84	2.00**	3.80***	0.19	1.93	0.37
*Vested Options * Cash Flow*	0.0000	−0.0000	0.0000	0.0000	0.0000	−0.0000	−0.0000	−0.0000
	2.25**	2.78***	0.50	0.58	0.55	1.95	1.78	2.32**
Q	0.0495	−0.0585	0.0415	−0.0295	0.0269	−0.0350	0.0208	−0.1371
	2.91***	3.68***	2.65***	1.94	2.08**	1.93	1.36	7.98***
*Cash Flow * Q*	−0.1052	0.0503	−0.0395	−0.0440	−0.1544	0.0378	−0.0264	0.0911
	5.93***	4.02***	3.16***	2.46**	8.24***	2.91***	2.10**	5.48***
Size	−0.0374	−0.0958	−0.0508	−0.0399	−0.0415	−0.0642	−0.0342	−0.0578
	5.86***	11.56***	5.74***	7.44***	6.89***	8.50***	4.48***	9.38***
Change in Tangibility	0.5607	1.0761	1.1013	0.3993	0.5475	1.3262	1.1072	0.4325
	16.53***	21.72***	24.07***	14.46***	20.37***	20.84***	24.25***	14.08***
Change in Sales	0.0006	0.0007	0.0008	0.0005	0.0003	0.0010	0.0010	0.0003
	9.52***	6.14***	9.84***	8.14***	5.43***	9.26***	12.26***	4.62***
Total Compensation	0.8481	0.6694	0.1165	0.9358	0.6301	0.7783	0.3352	1.3060
	2.97***	2.41**	0.24	6.31***	2.55**	2.82***	1.07	6.24***
Book/Total Assets	0.1224	0.0608	0.0766	0.0439	0.0594	0.0327	0.0740	0.0265
	5.78***	1.67	3.18***	2.49**	3.04***	1.35	3.12***	1.34
Current Liabilities/ Total Assets	0.0592	0.0894	0.0264	0.0552	0.0757	−0.0099	−0.0056	0.0938
	1.68	1.81	0.65	2.04**	2.17*	0.26	0.14	3.12***
Constant	0.3269	0.8442	0.3407	0.3154	0.3523	0.5171	0.2693	0.5564
	5.48***	5.71***	4.57***	4.86***	4.94***	3.67***	2.40*	7.82***
Adj. R^2	0.40	0.28	0.35	0.14	0.37	0.38	0.34	0.26

Note: This table compares the results of the determinants of investments when the data are sorted on equity dependence. The measures of equity dependence are: *KZ Index* (Kaplan and Zingales 1997), *Size, PPE/Total Assets,* and *Dividends*. Odd-numbered columns report estimated coefficients for firms that are not equity dependent, and even-numbered columns report estimated coefficients for equity-dependent firms. Column (3) has small firms, and column (4) has large firms. The sample period is 1993 to 2006. There are 8,083 observations in each column. Fixed-effects panel data regression methodology is employed. The variable definitions are reported in the Appendix. Robust standard errors are used. The *t*-statistics are reported below the coefficient estimates.

***Significant at the 1% confidence level.

**Significant at the 5% confidence level.

estimates for equity-dependent firms. The estimated coefficient of investment is positive and significant at the 1% percent confidence level for equity-dependent firms, suggesting that as *Perception* increases, investment increases for equity-dependent firms. The results imply that CEOs are ready to incur a higher cost of capital to finance their investment decision, which in turn implies that market timing plays a secondary role.

The investments of underpriced firms may be financed through internal cash flows or through external finance. Table 7 reports that the interaction term of *Perception* and cash flows of equity-dependent firms is negative and significant at

the 1% confidence level, suggesting that as *Perception* increases and internal cash flows decrease, there is an increase in investments. The implication of this result is that for equity-dependent firms, CEOs who perceive their firms to be underpriced use a larger amount of external financing for their investments as compared to CEOs who perceive their firms to be overpriced. These results are consistent with those reported in Table 4, except that the results of most of the other independent variables have greater economic and statistical significance.

As a further robustness check on the results, I apply other measures of restricted access to external finance as substitutes for the Kaplan and Zingales (1997) index. I split the sample into halves, each containing an equal number of observations, based on the value of each of the alternative measures. The results are reported in Table 7. The estimates are consistent with those estimated using the Kaplan and Zingales model. Thus, for equity-dependent firms, high-*Perception* CEOs invest more. For non-equity-dependent firms, the estimated coefficient of investments and the interaction term of *Perception* and cash flows are not statistically significant. In general, we can conclude that *Perception* does not affect investments or the interaction term of cash flows and *Perception* for non-equity-dependent firms.

The intuition behind these findings is as follows. When the CEO perceives that she has good investment opportunities, she invests, resulting in a positive relation between investment and *Perception*. To finance these investments, she first uses internal cash flows. If she perceives that the cash flows from the remaining investment are greater than the costs of external financing, she uses external capital to finance the investment. Now, the higher the value of perception, the more profitable her investments are, resulting in more investments and a greater use of external financing. This explains the observed negative relation for the interaction term of *Perception* and cash flows. Additionally, equity-dependent firms are more likely to have lower internal cash flows and so are more likely to need external financing for their investments. Thus, the results are stronger for equity-dependent firms.

VI. External Financing

Equity

For equity-dependent firms, the classical view predicts a positive relation between equity issuance and *Perception*, and the market timing models predict a negative relation between equity issuance and *Perception*, whereas the catering models predict that the relation may not be statistically significant. Therefore, the appropriate way to test the competing models is by regressing equity issuance on *Perception* as follows:

$$Equity\ Issuance_{it} = \alpha + \beta_1 Perception_{ti-1} + \beta_2 X_{it-1} + \varepsilon_{it}. \quad (9)$$

TABLE 8. Estimates of the Effect of CEO's Perception on Equity Issuance When the Firm Is Equity Dependent.

	Sorted on *KZ Index*		Sorted on *Size*		Sorted on *PPE/Total Assets*		Sorted on *Dividend Yield*	
Equity Issuance	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Perception	1.0346	4.3432	4.7350	4.4660	0.7359	4.3162	0.4052	1.3307
	0.11	3.35***	0.38	2.98***	0.21	3.48***	0.09	3.15***
Investment	0.0115	1.3248	0.0254	0.0662	0.3530	1.0354	0.0064	3.4108
	0.04	3.20***	2.11**	2.54**	2.47**	3.33***	0.03	7.65***
Cash Flow	−0.0215	−0.3515	−0.2064	0.0311	0.0668	−0.3005	0.0399	−1.1775
	0.66	7.70***	−9.24***	0.83	3.49***	8.35***	1.85	11.07***
Dividend Yield	0.6112	0.0904	0.2027	−0.0002	0.0317	0.1053	0.1253	0.0620
	8.81***	7.91***	12.19***	0.09	2.44**	9.37***	0.13	4.57***
Change in Working Capital	0.0732	−0.0289	0.0065	0.0143	0.1364	0.0062	0.0701	0.0256
	6.39***	1.59	0.56	1.75	11.82***	0.41	10.67***	0.57
Size	−0.0142	0.0031	0.0153	−0.0132	−0.0122	0.0051	−0.0250	−0.0395
	2.91***	0.17	1.07	3.35***	2.10**	0.30	3.39***	1.74
Constant	0.0652	−0.5933	−0.3096	−0.0601	0.1756	−0.6639	0.1876	−0.1010
	1.57	1.80	−1.61	1.44	2.54**	2.29**	3.10***	0.43
N	3,955	3,956	3,956	3,955	3,956	3,955	3,956	3,955
Groups	1,447	1,463	1,405	1,261	1,293	1,365	1,402	1,236
Adj. R^2	0.0483	0.2049	0.0436	0.0051	0.0029	0.0420	0.0194	0.1352

Note: This table presents the effect of *Perception* on stock issuance. The sample is separated into two equal halves based on different measures of equity dependence. These measures of equity dependence are: *KZ Index* (Kaplan and Zingales 1997), *Size, PPE/Total Assets,* and *Dividends*. Odd-numbered columns report estimated coefficients for firms that are not equity dependent, and even-numbered columns report estimated coefficients for equity-dependent firms. The sample period is 1993 to 2006. There are 8,083 observations in each column. Fixed-effects panel data regression methodology is employed. The variable definitions are reported in the Appendix. Robust standard errors are used. The *t*-statistics are reported below the coefficient estimates.

***Significant at the 1% confidence level.

**Significant at the 5% confidence level.

Equity issuance is defined as the difference between the sale and repurchase of common stock normalized by the total assets at the beginning of the year. I use the standard controls from the literature (Shyam-Sunder and Myers 1999; Frank and Goyal 2003). The independent variables are the components of financial deficit and year dummies. I test the predictions of the model by sorting the sample in terms of equity dependence. The results are reported in Table 8. The odd-numbered columns report the results of non-equity-dependent firms, and the even-numbered columns report the results of equity-dependent firms.

The estimated coefficient of *Perception* is positive and statistically significant at the 1% confidence level for equity-dependent firms. Hence, these results support the predictions of the classical view, implying that an increase in *Perception* leads to a greater issuance of equity. The results imply that undervalued, equity-dependent firms do not shy away from issuing the more costly equity when they have profitable investments. This result also suggests that market timing may not be a motive for equity issuance. Additionally, the statistical significance of the findings provides evidence against catering.

Debt

The market timing and fundamental value maximizing models predict a positive relation between debt issuance and *Perception*. In contrast, the catering model

TABLE 9. Relation between Debt Issuance and Perception When the Firm Is Not Equity Dependent.

	Sorted on *KZ Index*		Sorted on *Size*		Sorted on *PPE/Total Assets*		Sorted on *Dividend Yield*	
Debt Issuance	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Perception	21.7191	2.9482	39.9929	3.6786	23.7803	2.9353	28.4001	2.6714
	2.92***	0.94	3.99***	1.09	3.53***	0.55	3.89***	0.55
Investment	3.2944	−0.2330	0.9884	0.1155	1.5749	0.0611	1.4408	−0.5160
	2.62***	1.57	4.51***	0.45	5.81***	0.31	3.34***	2.18**
Cash Flow	−0.2653	0.0521	−0.0196	0.1091	−0.1141	0.0622	−0.1166	0.3068
	1.96	3.18***	0.90	1.39	3.14***	2.72***	2.79***	5.42***
Dividend Yield	−1.0809	−0.0007	−0.0156	0.0017	−0.0455	−0.0107	1.5914	−0.0060
	3.73***	0.16	0.97	0.32	1.84	1.50	0.83	0.83
Change in Working Capital	0.1114	0.0150	0.1034	0.0460	0.1606	0.0673	0.0898	0.0399
	2.33**	2.30**	9.15***	2.69***	7.33***	6.97***	7.04***	1.68
Size	−0.0235	−0.0021	0.0181	0.0074	−0.0132	0.0018	−0.0089	0.0054
	1.15	0.31	1.30	0.89	1.19	0.16	0.62	0.45
Constant	0.1356	0.4877	0.4793	0.3128	0.0659	0.7143	0.0182	0.4443
	0.78	4.11***	2.56**	3.59***	0.50	3.88***	0.15	3.56***
Adj. R^2	0.0839	0.0145	0.0879	0.0024	0.0926	0.0182	0.0522	0.0073

Note: This table reports the effect of *Perception* on the firm's debt issuance especially when the firm is dependent on equity to fulfill its financing needs. The sample is separated into two equal halves based on different measures of equity dependence: *KZ Index* (Kaplan and Zingales 1997), *Size, PPE/Total Assets,* and *Dividends*. Odd-numbered columns report estimated coefficients for firms that are not equity dependent, and even-numbered columns report estimated coefficients for equity-dependent firms. The sample period is 1993 to 2006.There are 8,083 observations in each column. Fixed-effects panel data regression methodology is employed. The variable definitions are reported in the Appendix. Robust standard errors are used. The *t*-statistics are reported below the coefficient estimates.

***Significant at the 1% confidence level.

**Significant at the 5% confidence level.

predicts a negative relation. To test these contradictory predictions, the same estimation equation used in the previous subsection is employed here, and the sample is again sorted on equity dependence. In the estimation equation, the only difference is the change of the dependent variable to debt issuance. Debt issuance is the difference between long-term debt issuance and long-term debt reduction divided by the beginning-of-year total assets.

The results are reported in Table 9. The coefficient of *Perception* in odd-numbered columns is positive and significant at the 1% confidence level, and supports the predictions of the classical view and market timing models. As perceived undervaluation increases, investment increases, as does the debt issuance. Thus, the results suggest that CEOs of undervalued firms who have access to debt markets finance their investments through debt issuance. These results, however, contradict the predictions of the catering models, as the estimated coefficient is positive.

VII. Conclusion

I investigate the three contrasting models—(1) classical, (2) market timing, and (3) catering—that predict the actions the CEO will take when faced with misvaluation by the equity market. The empirical tests of the models proceed by first developing a measure of the CEO's perception by exploiting the stock trading behavior of the CEO. Consistent with the classical view, I find a positive relation

between investment and perception, and a negative relation between investment and the interaction of perception and cash flow for equity-dependent firms. This result suggests that if the CEO has profitable investment opportunities, she uses external capital to finance the investments despite the perceived higher cost of external financing. In contrast to the market timing and catering models, I find that the CEO of the equity-dependent firm issues equity when she perceives that her firm is undervalued. These results suggest that when the CEO faces misvaluation by the equity market, she ignores this misvaluation and maximizes the fundamental value of the firm. The rejection of the catering and market timing models has important implications for organizational design, executive compensation, and policy decisions.

Appendix: Variable Definitions

Book/Total Assets: The sum of book value of common equity (data item 60) and preferred stock par value (data item 130) divided by lagged total assets (data item 6).

Cash Flow: Income before extraordinary items (data item 123) + depreciation and amortization (data item 124) + extraordinary items and discontinued operations (data item 125) + deferred taxes (data item 126) + equity in net loss earnings (data item 106) + gain loss from sale of PPE and other investments (data item 218). If any variable is missing, it is coded 0. This sum is divided by lagged net PPE (data item 8).

Current Liabilities/Total Assets: The ratio of current liabilities (data item 5) and total assets (data item 6).

Δ*Sales:* The one-year percentage change in sales as provided by ExecuComp.

Δ*Tangibility:* The one-year change (difference) in tangibility.

Δ*Working Capital:* The change in operating working capital (data item 236) + change in cash and cash equivalents (data item 274) + change in current debt (data item 301).

Dividend Yield: The ratio of common dividends (data item 127)/calendar year-end market value of the firm (data item 24 $\times$ data item 25).

Debt Issuance: Long debt issuance (data item 111) – long debt reduction (data114))/lag(total assets (data item 6)).

Expected Change: Please refer to Section IV.

Equity Issuance: Sale of common stock (data item 108) – stock repurchases (data item 115))/lag(total assets).

Investment: Capital expenditure (data item 128) + increase in investments (data item 113) + acquisitions (data item 219) – sale of PPE (data item 107) – sale of investment (data item 109). If an item is missing, that item is coded 0. The number obtained is divided by lagged net PPE (data item 8).

KZ Index: The Kaplan and Zingales (1997) index as constructed in the data section.

Ownership: The percentage of total shares outstanding held by the CEO.

Perception: Defined as the product of *Unexplained Change* * *Stock Price/Total Cash Compensation.*

Q: The ratio of the market value of assets to the book value of assets. The market value of assets is the sum of calendar-year-end market value of stocks and the book value of debt. The book value of assets is the lagged total assets.

Size: The log of lagged total assets (data item 6).

Tangibility: The ratio of net PPE (data item 8) and lagged total assets (data item 6).

Total Compensation Including Options: A dollar value provided by ExecuComp.

Unexplained Change: The difference between *Actual Change* and *Expected Change*. *Actual Change* is the annual difference in the number of stocks held by the CEO.

Vested Options: The dollar value of vested options of the CEO.

References

Aggarwal, R., and A. Samwick, 1999, The other side of the tradeoff: the impact of risk on executive compensation, *Journal of Political Economy* 107, 65–105.

Baker, M., J. Stein, and J. Wurgler, 2003, When does the market matter? Stock prices and the investments of equity-dependent firms, *Quarterly Journal of Economics* 118, 969–1005.

Baker, M., and J. Wurgler, 2002, Market timing and capital structure, *Journal of Finance* 57, 1–32.

Blanchard, O., Rhee, C., and Summers, L., 1993, The stock market, profit, and investment, *Quarterly Journal of Economics* 108, 115–36.

Cleary, S., P. Povel, and M. Raith, 2007, The U-shaped investment curve: Theory and evidence, *Journal of Financial and Quantitative Analysis* 42, 1–39.

Frank, M., and V. Goyal, 2003, Testing the pecking order theory of capital structure, *Journal of Financial Economics* 67, 217–48.

Gilchrist, S., C. Himmelberg, and G. Huberman, 2005, Do stock price bubbles influence corporate investment? *Journal of Monetary Economics* 52, 805–27.

Hall, B., and Liebman, J., 1998, Are CEO's really paid like bureaucrats? *Quarterly Journal of Economics* 113, 653–91.

Jenter, D., 2005, Market timing and managerial portfolio decisions, *Journal of Finance*, 50, 1903–49.

Kaplan, S., and L. Zingales, 1997, Do investment cash-flow sensitivities provide useful measures of financial constraint? *Quarterly Journal of Economics* 112, 169–215.

Lamont, O., C. Polk, and J. Sáa-Requejo, 2001, Financial constraints and stock returns, *Review of Financial Studies* 14, 529–54.

Lemmon, M., and J. Zender, 2010, Debt capacity and tests of capital structure theories, *Journal of Financial and Quantitative Analysis* 45, 1161–87.

Malmendier, U., and G. Tate, 2005, CEO overconfidence and corporate investments, *Journal of Finance* 60, 2661–2700.

Marciukaityte, D., S. Szewczyk, and R. Varma, 2005, Investor overoptimism and private equity placement, *Journal of Financial Research* 28, 591–608.

Morck, R., A. Shleifer, and R. Vishny, 1990, The stock market and investment: Is the market a sideshow? *Brookings Papers on Economic Activities* 2, 157–215.

Murphy, K. J., 1999, Executive compensation, in O. Ashenfelter and D. Card, eds.: *Handbook of Labor Economics*, vol. 3 (Elsevier, Amsterdam), 2485–2563.

Polk, C., and P. Sapienza, 2006, The stock market and investment: A test of catering theory, *Review of Financial Studies* 22, 187–217.

Shleifer, A., and R. Vishny, 2003, Stock market driven acquisitions. *Journal of Financial Economics* 70, 295–312.

Shyam-Sunder, L., and S. Myers, 1999, Testing static tradeoff against the pecking order models of capital structure, *Journal of Financial Economics* 51, 219–44.

Yermack, D., 1995, Do corporations award CEO stock options effectively? *Journal of Financial Economics* 39, 237–69.