
MASSACHUSETTS
INSTITUTE of TECHNOLOGY

EARNINGS AND RISK CHANGES SURROUNDING PRIMARY STOCK OFFERS

Paul M. Healy
School of Management, M.I.T.

January 1989

EARNINGS AND RISK CHANGES SURROUNDING PRIMARY STOCK OFFERS

Paul M. Healy
School of Management, M.I.T.

Krishna G. Palepu
Harvard Business School

January 1989

Forthcoming: *Journal of Accounting Research*

We wish to thank Andrew Christie, Bob Kaplan, Richard Leftwich, Maureen McNichols, Stewart Myers, Pat O'Brien, Richard Ruback, and the participants of workshops at Carnegie-Mellon University, Columbia University, Cornell University, M.I.T., University of Minnesota, and NBER for comments on the paper. We owe special thanks to Jim Patell, the referee, for his valuable suggestions which significantly improved the paper. We also thank Paul Asquith and David Mullins for making their sample available for this paper and Eileen Pike for research assistance. The paper has been funded by the Division of Research, Harvard Business School.

ABSTRACT

This paper investigates the nature of the information conveyed by primary equity offer decisions. The results are as follows. (1) Offer announcements appear to convey information about future risk changes since they are accompanied by increases in asset betas, and decreases in financial leverage, the net effect of which is to increase equity betas. On average the increase in equity betas is consistent with the average stock price reaction to the offer announcement. (2) The risk information conveyed by equity offers is firm-specific since other firms in the offer firms' industries do not experience similar risk and leverage changes. (3) Equity offers do not convey new information about offer firms' future earnings levels. These results are consistent with managers deciding to issue equity and reduce financial leverage when they foresee an increase in volatility of their firms' earnings due to an increased business risk. Firms' stated reasons for equity offers, and post-offer earnings volatility support this interpretation. Investors, recognizing that managers have superior information on their firms' prospects, interpret offer announcements accordingly and revise the offer firms' asset and equity betas upward, resulting in a negative market reaction.

1. INTRODUCTION

Several recent studies, including Asquith and Mullins [1986], Masulis and Korwar [1986], Mikkleson and Partch [1986], and Schipper and Smith [1986], document stock price declines at seasoned equity offer announcements. One explanation proposed for these price declines is that managers' equity offer decisions convey new information to investors on firms' prospects.[1] Our paper examines this hypothesis and provides evidence on the nature of the information revealed by equity offers by analyzing post-offer changes in asset and equity betas, financial leverage, unsystematic risk, earnings levels, and analysts' earnings forecasts.

We find that our sample of equity offer firms experiences a significant increase in asset betas subsequent to the offers. The sample firms also show a decrease in their financial leverage following the offer. The net effect of these changes is to increase offer firms' equity betas. On average the equity beta increase is consistent with the average stock price reaction to the offer announcement. The offer firms do not have a decline in earnings following the offers and financial analysts do not lower their post-offer earnings forecasts for these firms.

These results indicate that equity offers do convey new information to investors, and that the information is about changes in the riskiness rather than changes in the level of future cash flows. One interpretation of these findings is that managers decide to issue equity and reduce financial leverage when they foresee an unexpected increase in their firms' business risk. Investors, recognizing that managers have superior information on the firms' prospects, interpret equity offer decisions accordingly and revise the offer firms' asset and equity betas upward.

Section 2 of the paper discusses prior theoretical work on equity offers and develops the

hypotheses tested in the paper. The sample and data collected for the tests are described in section 3. Section 4 examines changes in analysts' earnings forecasts, as well as actual earnings changes following equity offers. Section 5 presents tests and results of asset and financial risk changes subsequent to equity offerings. Discussion and interpretation of the results are presented in section 6, and section 7 summarizes the conclusions.

2. NATURE OF INFORMATION CONVEYED BY EQUITY OFFERS

2.1 Review of Prior Work

In this section we discuss three prominent models of equity issues to motivate the hypotheses tested in the paper. The models assume that managers act in the interests of their shareholders, and argue that an equity offer announcement provides information to the capital market only if managers are better informed than investors. The three models analyze the nature of the information revealed by equity offer announcements by making different assumptions about how the offer proceeds are used - to retire existing debt, to finance new investments, or to fund shortfalls in operating cash flows.

When the proceeds are used to retire debt, equity offers reveal information to investors about changes in firms' capital structure. Donaldson (1961), and DeAngelo and Masulis [1980] argue that, allowing for taxes and positive costs of financial distress, the optimal capital structure decision for a firm involves balancing the potential tax benefits from increased leverage against financial distress costs.[2] Firms which expect high and stable profits are likely to borrow more because they can use the interest tax shields. Conversely, firms with high business risk, and hence more volatile profits, are likely to borrow less because additional borrowing increases expected financial distress costs more than the expected benefits. Thus, a firm's capital structure is determined by its managers' expectations of the level and riskiness

of its future earnings. Masulis [1983] extends this analysis and argues that, if there is information asymmetry between managers and investors regarding the firm's future prospects, and managers choose capital structure to maximize shareholders' wealth, a decision to change leverage indicates to investors a change in managers' expectations.[3] Hence, a leverage-decreasing equity issue announcement will indicate that managers expect the firm's future earnings to be either lower or more volatile than previously anticipated.

If the proceeds of equity offers are used to fund capital expenditures, Myers and Majluf (1984) show that offer announcements convey information about the value of firms' assets-in-place. In their model, a seasoned equity offering is a claim on the firm's assets-in-place and on a new project.[4] Managers are assumed to have information superior to investors' on the value of the firm, and to act in the interests of existing shareholders. In deciding whether to issue equity and undertake the new project, managers trade-off the value of the new project against potential wealth transfers between existing and new stockholders given managers' superior information on whether the firm is over- or undervalued. Myers and Majluf show that investors then interpret an equity offering as bad news, since managers are more likely to sell new equity when they expect the cash flows generated by existing assets to be lower, or riskier than anticipated by the market.

The third use of equity offer proceeds is the financing of shortfalls in operating cash flows. Miller and Rock [1985] examine this situation, assuming the firm's financing and investment policies are fixed, and managers have superior information to investors on the current period's operating cash flows. Given the identity between cash sources and uses, an equity offer is interpreted by investors as indicating that managers have revised downward their forecast of the firm's earnings.

To conclude, Masulis [1983] and Myers and Majluf [1985] predict that offer announcements convey information to investors about either the level or riskiness of future earnings. Miller and Rock's [1985] prediction is more specific, that the information is about the level of earnings. Two empirical studies (Mikkleson and Partch [1986], and Masulis and Korwar [1986]) attempt to provide evidence on these predictions. Since it is difficult to observe directly the information revealed by managers when they announce an equity offer, these studies examine the cross-sectional relation between stock price effects at the offer announcement and proxies for managers' private information. Their findings are inconclusive, possibly because the variables used in the cross-sectional analysis are weak proxies for managers' private information.[5]

2.2 Research Design and Hypotheses

Our research design differs from those of previous empirical studies. We examine realized earnings and risk changes subsequent to equity offerings as proxies for the information inferred by the market at the time of the offer announcement. If the price revision at an offer announcement is based on an unbiased estimate of future earnings and/or risk changes, subsequent realizations of these variables provide direct evidence on the nature of the information inferred by the market. The observed stock price decline at the offer announcement therefore can be attributed to either an expected decrease in post-offer earnings, or an expected increase in total equity risk. Our empirical tests are designed to distinguish between these two alternatives.

To test whether the information conveyed by equity offers is about future earnings levels, we examine realizations of offer firms' earnings relative to both their own pre-offer earnings, and the post-offer earnings of their industries. We also analyze post-offer revisions

in analysts' forecasts. The following hypotheses are tested for the offer firms:

H1A: There is a decrease in earnings subsequent to equity offer announcements, either relative to pre-offer earnings, or relative to post-offer industry earnings.

H1B: There is a downward revision in analysts' earnings forecasts subsequent to equity offer announcements.

To investigate whether offer announcements convey information about risk, we use stock returns to examine changes in the riskiness of equity cash flows. A change in total equity variance can be due to either a firm-specific change, or a change in the variability of market returns. Since the excess returns that follow equity offer announcements are firm-specific, they cannot be attributed to changes in market variance. Our tests therefore focus only on changes in firm-specific risk, measured using the two-parameter market model:

$$R_e = \alpha + \beta_e R_m + \varepsilon \qquad (1)$$

where, R_e and R_m are the returns on a firm's stock and the market portfolio respectively; α, β_e (equity beta) are firm-specific parameters; and ε is the component of stock returns that is uncorrelated with the market, and is normally distributed with zero mean and variance σ^2. The variance of equity returns, Var (R_e), can then be decomposed as follows:

$$\text{Var } (Re) = \beta_\varepsilon{}^2 \text{ Var } (R_m) + \sigma^2 \qquad (2)$$

where Var (R_m) is the variance of market returns. β_e and σ^2 are measures of systematic and unsystematic equity risk respectively. The following hypotheses regarding the firm-specific components of equity risk are tested for the offer firms:

H2A: There is an increase in equity betas subsequent to equity offer announcements.

H2B: There is an increase in the residual variance of stock returns subsequent to equity offer announcements.

Increases in equity beta can arise from increases in either asset beta or financial leverage. It is unlikely that equity offers signal an increase in financial leverage since the immediate effect of the offer is to reduce a firm's leverage. It is possible, however, that investors expect an equity offer to be accompanied by subsequent borrowing which will actually increase the firm's leverage and equity beta. However, if managers make financing decisions in the interest of stockholders, expectations of an increase in financial leverage cannot explain the negative stock price reaction at the offer announcement. Post-offer equity beta increases, if any, are therefore expected to be due to asset beta increases.

To analyze post-offer asset betas, we use the framework of Hamada [1972] who notes that if a firm's debt is riskless, its equity beta can be written as:

$$\beta_e = \beta_a (V/E) \qquad (3)$$

where V and E are the market values of assets and equity respectively. β_a represents the systematic risk of the firm's assets (business risk), and V/E reflects its financial risk. The following hypothesis is tested for the offer firms:

H3: Any increase in post-offer equity betas is due to an increase in asset betas rather than an increase in financial leverage.

In addition to testing hypotheses H1- H3, we perform two further tests. First, changes in the volatility of post-offer earnings are analyzed to corroborate tests of changes in stock

return risk. Second, the stated and actual uses of offer proceeds are examined to understand the reasons why firms issue equity.

3. DATA

Our equity issue sample comprises the industrial firms used by Asquith and Mullins [1986] in their study of the stock price effects of primary equity offerings.[6] Asquith and Mullins examined Moody's Industrial Manuals for the years 1963 to 1981 to select their initial sample of stock offerings. Primary offers, for which the proceeds are received by the issuing firm, are included in the final sample of 128 firms if they meet the following requirements: (1) the firm is listed on the ASE or NYSE at the time of the offering; (2) the offering is public, underwritten and registered with the SEC; (3) the offering is for common stock alone; (4) the firm has only one class of voting stock; and (5) the offering announcement is reported in the *Wall Street Journal*. Asquith and Mullins report that for their sample the average ratio of offer proceeds to the pre-offer equity value of the firm is 12.5%.

Since our tests examine earnings data for five years before and after a stock issue, we use only the first offer if there are multiple offers within five years. This restriction eliminates 35 of the 128 offers examined by Asquith and Mullins.[7] We collect the following additional data for each of the 93 sample firms: (1) stock return data for days -850 to +600 relative to the offer announcement date (day 0); (2) the annual earnings announcement immediately preceding the offer announcement; (3) earnings per share before extraordinary items and discontinued operations for the six annual earnings announcements prior to the offer announcement (years -6 to -1) and the five subsequent annual announcements (years 0 to 4); (4) analysts' quarterly earnings forecasts reported immediately before and after the equity

offer announcement; (5) intended uses of the issue's proceeds at the offer announcement; (6) capital expenditures and acquisitions, net changes in short- and long-term debt, and common stock issues net of repurchases in years -5 to 4; and (7) the book value of debt (short-term debt plus long-term debt), and the market values of shareholders' equity at the end of years -3 to 2.

The stock return data are collected from CRSP files, and are used to estimate risk measures in year -3 (days -850 to -601), year -2 (days -600 to -351), year -1 (days -350 to -101), year 1 (days 101 to 350) and year 2 (days 351 to 600) relative to the offer year. The earnings announcement dates, used to align the earnings announcements relative to the equity offer dates, are obtained from the *Wall Street Journal Index*. Earnings and other financial data are taken from Compustat Industrial and Research Files. Analysts' earnings forecasts are collected from Value Line Investment Survey. Intended uses of the offerings' proceeds are taken from the *Wall Street Journal* and offering prospectuses.

Table 1 presents the distribution of the 93 sample primary offerings by year. The most frequent years of offerings are 1980 (23%), 1981 (14%) and 1976 (11%). The mean and median risk-adjusted announcement returns for the sample are -3.1% and -2.0% respectively, both significant at the 1% level.[8] On average, this reduction in equity value is approximately 25% of the magnitude of the offer. Eighty-five per cent of the sample firms have negative announcement returns, indicating that the mean return is not driven by a few large negative outliers. These results are similar to those of earlier studies summarized in Smith [1986]. The tests reported in the following sections provide evidence on the nature of the information implied by this price decline.

4. INFORMATION CONVEYED BY EQUITY OFFERS ON EARNINGS CHANGES

4.1 Evidence on Time-Series of Actual Earnings Changes

To test whether equity offers convey information about subsequent earnings declines, we examine earnings changes surrounding the offer announcements. Annual earnings changes are computed for sample firms in years -5 to 4.[9] Changes in earnings per share for each firm in these years are expressed as a percentage of its stock price two days before the announcement of the common stock offering, P_j, so that results can be aggregated across firms. The standardized earnings change for firm j in year t , ΔE_{jt}, is defined as:

$$\Delta E_{jt} = (E_{jt} - E_{j,t-1})/P_j, \qquad t=-5,\ldots,4 \qquad (4)$$

To assess the effect of clustering of equity offers over time, we also estimate median earnings changes for the offer firms' industries for these same fiscal years. For each offer firm, standardized earnings changes, as defined above, are computed for years -5 to 4 for all other firms in the same four digit SIC code on the 1986 Compustat Industrial and Research files. Industry median standardized earnings are estimated for each offer firm and year, where industry-adjusted standardized earnings changes for a firm are computed as the difference between its standardized earnings changes and its industry medians.

Summary statistics on standardized earnings changes for the offering firms are reported in Panel A of Table 2. Student t and Wilcoxon Signed Rank tests are used to assess the statistical significance of the mean and median values respectively. The mean and median standardized earnings changes for the equity issue sample are generally positive and significant at conventional levels in years -5 to -1. This earnings growth is consistent with the pre-offer stock price increase for offering firms documented in earlier studies. There is, however, no

evidence that offering firms have systematic earnings declines subsequent to the offers. In fact, the mean earnings changes are positive in years 0 and 2, and are at least as large as the means in the pre-offer years. Similarly, the median earnings growth is positive in years 0, 2 and 3.

Summary statistics on industry-adjusted earnings changes are reported in Panel B of Table 2. The mean industry-adjusted earnings changes are insignificant at the 5% level for all years. The test firms have significantly higher (at the 5% level or better) median earnings changes than their industries in years 0, 2 and 3, inconsistent with the hypothesis that equity offers convey to investors the information that post-offer earnings will decline.[10]

There is a potential bias from using earnings per share rather than total earnings to compute standardized earnings changes. If the cash proceeds of the stock issue are invested in projects with earnings payoffs beyond five years, earnings per share in years 0 to 4 are likely to decline, since the increase in the number of shares may not be offset by a corresponding increase in earnings. We check the sensitivity of our results to this bias by repeating the analysis using restated earnings per share data for years 0 to 4 based on the pre-offer number of shares. The conclusions are unchanged.

4.2 Evidence on Revisions in Analysts' Earnings Forecasts

Value Line Investment Survey's quarterly earnings forecast revisions are examined as an alternative test of the hypothesis that equity offer announcements convey negative earnings information.[11] Depending on the fiscal quarter in which the report is issued, the number of quarters for which forecasts are made varies from two to six. Value Line revises these forecasts each quarter to incorporate new information, including the most recent earnings announcement.

From Value Line reports issued immediately before the equity offer announcement, we collect earnings forecasts for quarter 0 (the quarter of the announcement) and for quarters 1 to 5, depending on data availability. Actual earnings for quarter 0 and revised forecasts for quarters 1 to 5 are collected from the subsequent Value Line report.[12] For each firm, the standardized forecast error for quarter 0 is the difference between actual and forecasted earnings, deflated by the firm's stock price two days prior to the equity offer announcement; standardized forecast revisions in quarters 1 to 5 are differences between pre- and post-offer earnings forecasts deflated by the same stock price.

Summary statistics on standardized forecast errors for quarter 0 and revisions for quarters 1 to 5 are reported in Table 3. Data for computing forecast errors are available for 71 of the sample firms.[13] The mean standardized forecast error in quarter 0 is 0.21% and is significant at less than the 1% level. The mean forecast revisions in quarters 1, 2, 4 and 5 are insignificant at conventional levels. The revision for quarter 3 is -0.16% and is significant at less than the 1% level. Thus, except for quarter 3, there is no evidence of a downward revision in analysts' earnings forecasts following the equity offering.

These forecast revisions incorporate information not only from equity offer announcements, but also from the earnings announcements for quarter 0. To test whether analysts revise earnings forecasts in response to equity offer announcements, we regress standardized earnings forecast revisions in each quarter on the equity offer announcement return and the standardized forecast error in quarter 0. The coefficient on the equity offer announcement return reflects the earnings information provided by the offer, after controlling for information from the forecast error in quarter 0. The equity offer announcement coefficient is insignificant at the 5% level in each of the cross-sectional regressions for quarters 1 to 5.[14]

4.3 Summary

These findings indicate that equity offer firms do not have systematic earnings declines subsequent to the offer announcement, relative either to prior years' earnings or to the firms' industry earnings. Further, there is no evidence that analysts respond to offer announcements by reducing earnings forecasts for quarters subsequent to the offer. Therefore, we conclude that equity offer announcements do not convey information about declines in future earnings.

5. RISK INFORMATION CONVEYED BY EQUITY OFFERS

Tests of risk information conveyed by equity offers are presented in three stages. First, changes in the systematic and unsystematic components of firm-specific equity risk are examined. Next, the components of equity systematic risk, i.e., asset and financial risks, are analyzed. Finally, changes in cross-sectional earnings volatility are investigated.

5.1 Evidence on Changes in Equity Beta and Residual Return Variance

As discussed in section 2, an increase in post-offer firm-specific stock return variance can be due to an increase in either equity beta or residual return variance. To examine changes in these components, we estimate the equity beta and unsystematic risk (β_e and σ^2) for each sample firm using the market model in equation (1). This model is estimated for three years prior (years -3 to -1) and two years subsequent (years 1 and 2) to the offer announcement using daily stock returns for the firm and the CRSP equally-weighted market portfolio.[15]

We also evaluate whether there are changes in systematic and unsystematic risk for the offer firms' industries. For each test firm, equity betas and residual variances are computed for years -3 to 2 for other firms in the same four digit SIC code on the 1986 Compustat

Industrial and Research files. Industry means of these variables are then estimated for each offer firm and year.

To test whether there are changes in offer firms' systematic equity risk, we compute changes in their betas in years -2 to 2. For each offer firm we compute t statistics to test whether the estimated beta changes in these years are significantly different from zero. A Z statistic is computed for each year using the sample distribution of estimated t statistics. The Z statistics are computed as follows:

$$Z = (1/\sqrt{N}) \sum_{j=1}^{N} t_j / \sqrt{k_j/(k_j-2)} \qquad (5)$$

where,

t_j = t statistic for estimates of the change in equity beta for firm j in years -2 to 2;

k_j = degrees of freedom for firm j; and

N = number of firms in the sample.

The t statistic for firm j is distributed Student t with variance $k_j/(k_j-2)$. Under the Central Limit Theorem, the sum of the standardized t statistics is distributed normally with a variance of N. The Z statistic is a standard normal variate under the null hypothesis that the change in beta for year t (t = -2 to 2) is zero.[16] Wilcoxon Signed Rank statistics are used to test whether the median beta changes are significantly different from zero. The same test statistics are used to evaluate whether the mean and median beta changes for the offer firms' industries are different from zero in years -2 to 2.

To test whether there is a significant change in market model residual variances, an F statistic is computed for each firm in years -2 to 2. The significance of the sample distribution

of these statistics in each year is tested using the following Chi-Squared statistic:

$$X^2 = -2 \sum_{j=1}^{N} \ln p_j \qquad (6)$$

where p_j is the probability associated with the F statistic for firm j, and N is the number of firms in the sample. Under the null hypothesis that the sample distribution of the F statistics is no different from that expected by chance, this statistic is distributed Chi-Squared with 2N degrees of freedom. The same procedure is used to test the significance of the changes in residual variances of the offer firms' industries in years -2 to 2.

Summary statistics for estimates of equity betas and changes in betas of the offer firms are reported in Panel A of Table 4. The mean equity beta of the offer firms increases from 1.23 in year -1 to 1.33 in year 1, significant at the 1% level. There is a similar increase in the median value of beta in these years, also significant at the 1% level. Thus, consistent with hypothesis H2A, there is evidence that the systematic equity risk of the offering firms increases in the year subsequent to the equity offer. This change is not due to non-stationarity of the beta estimates since the mean changes in estimates for years -2 and -1 are not significant at the 10% level. The beta change also does not appear to be temporary since the mean change in estimates from year 1 to 2 is not significant at the 5% level.[17]

Mean and median equity betas and changes in betas for the offer firms' industries are also reported in Panel A of Table 4. Equity offer firms in general have larger betas than their industries, both in the pre- and post-offer periods.[18] The mean beta change for the industries in year 1 is 0.06 which is significant at the 5% level. However, the median beta change in this

year is only 0.01, insignificant at the 10% level, indicating that the mean change is influenced by a few extreme observations. The mean and median changes in all other years are insignificant at the 10% level. These results indicate that the post-offer beta increases for the offer firms cannot be explained entirely by industry factors.

Summary statistics for estimates of the market model residual variances for the sample firms and their industries in years -3 to 2 are reported in Panel B of Table 4. The mean (median) residual variance is about 0.05% (0.04%) in all five years. There is no statistically reliable difference between the sample distribution of residual variance across year. Industry residual variances also remain generally unchanged during this period. The evidence therefore indicates that the equity offering firms do not experience changes in their unsystematic risk subsequent to an equity offer, inconsistent with H2B. There is also no evidence that there is an increase in the unsystematic risk of the offer firms' industries in these years.

The economic significance of the magnitude of the equity beta increases for the offer firms documented above can be assessed using a simple valuation model. Assuming that cash flows are constant in perpetuity, the discount rate is determined by the two-parameter capital-asset-pricing model, and the risk-free rate (R_f) and expected risk premium ($E(R_m) - R_f$) are constant, the percentage decline in stock price given a change in equity beta ($R|\Delta\beta_e$) will be as follows:

$$R|\Delta\beta_e = \frac{-\Delta\beta_e(E(R_m) - R_f)}{R_f + \beta_{ep}(E(R_m) - R_f)} \qquad (7)$$

where, $E(R_m)$ is the expected return on the market, $\Delta\beta_e$ is the change in equity beta, and β_{ep} is

the post-offer equity beta. Between years -1 and 1 the mean β_e for our sample of equity offering firms increases from 1.23 to 1.33. Consider a firm with these pre- and post-offer betas. If the market risk premium is 8%, and the risk-free rate is 5%, expression (7) implies that this beta increase leads to a 5.6% stock price decline.[19] The stock price decline is predicted to range from 4% to 7.8% as the assumed risk-free rate varies from 10% to 0%. Thus, on average, the observed change in the betas of our sample firms is approximately consistent with the magnitude of the stock price reaction to equity offerings.[20]

To see whether the observed risk changes are related to the information conveyed to investors by the equity offer announcement, we examine Pearson and Spearman correlations between the valuation effect of the risk change, computed for each firm using equation (7), and the equity offer announcement return.[21] The correlations are not significantly different from zero at the 5% level. These results could be due to measurement errors, since the valuation effects of equity beta changes are computed using a simple model, and betas themselves are estimated with error.[22] An alternative explanation is that the beta change is contemporaneous but unrelated to the equity offer announcement. To provide additional evidence on these interpretations, we examine managers' stated motivations for the offers in section 6 of the paper.

5.2 Changes in Asset Betas and Financial Leverage

Increases in equity betas can arise from increases in either asset risk or financial leverage. However, as noted in hypothesis H3, the post-offer equity beta increase documented above is expected to be due to an increase in asset risk and not an increase in financial leverage. To provide evidence on this hypothesis, we decompose offer firms' equity betas into asset betas

and financial leverage.

Financial leverage, the ratio of a firm's total value to the value of its equity, is computed for each sample firm for years -3 to 2. The value of equity is measured using the market value of common stock plus the book value of preferred stock at the end of the year. The value of the firm is the sum of the value of equity and the book values of short-term and long-term debt. Asset betas are computed by unlevering equity betas using equation (3) in section 2.

We also evaluate whether there are changes in financial leverage and asset risk for the offer firms' industries. For each test firm asset betas and leverage are computed in years -3 to 2 for other firms in the same four digit SIC code on the 1986 Standard and Poor's Compustat Industrial and Research Files. Industry means of these variables are then computed for each offer firm and year.

Mean and median asset betas and changes in asset betas for the test firms and their industries are reported in Panel A of Table 5 for years -3 to 2. The mean asset betas are stable in years -3 to -1, ranging from 0.73 to 0.78. Consistent with hypothesis H3, the mean asset beta for the offer firms increases by 19% to 0.94 in year 1. This increase is statistically significant at the 1% level, and appears to be permanent since the mean beta for year 2 is also 0.94. The mean and median asset betas for the offer firms are similar to those for their industries in years -3 to -1. The increase in asset betas for the offer firms in year 1 is not matched by the other firms in their industries. While there is an increase in industry asset betas in year 2, significant at the 1% level, the offer firms still have higher asset betas.

Mean and median financial leverage and change in leverage for the equity offer firms and their industries are presented in Panel B of Table 5 for years -3 to 2. There are some differences between the mean and median results, due a few extreme observations. The following discussion focuses on medians, which we consider to be more representative of the sample patterns. The median leverage changes for the offer firms are not significantly different from zero in years -2 and -1 at the 5% level. In year 1, the median leverage of the offer firms decreases from 1.50 to 1.36, significant at the 1% level. Thus, consistent with H3, there is no evidence that the increase in equity beta in year 1 can be attributed to an increase in test firms' financial leverage. In year 2 the median leverage of the offer firms increases to 1.41, still lower than the pre-offer level. The decrease in the offer firms' leverage in year 1 is not matched by their industries. The median industry leverage remains about 1.55 during the years -3 to 2 and the median changes in years -2 to 2 are insignificant at the 10% level.[23]

5.3 Evidence on Post-Offer Earnings Volatility

To corroborate the increase in asset betas documented above, we examine the volatility of standardized earnings changes (as defined in equation (4) in section 4.1) surrounding the equity offer announcements. Since we examine a relatively recent sample of equity offers, the number of time-series observations per firm is limited. Therefore, we use cross-sectional rather than time-series data.[24] Cross-sectional variances and interquartile ranges for the standardized variables are computed in years -5 to 4 and an F test is used to evaluate the significance of year-to-year changes in variances. The results are reported in Table 6.

The variances and interquartile ranges subsequent to the offer are generally larger than the pre-offer values. The variance, which is 0.07% in year -1, increases threefold to 0.20% in the year of the equity offer announcement, and this increase persists till year 5. An F test

indicates that the variances in years 0 to 5 are significantly greater than the variance in year -1 at the 1% level. Further, the earnings variance in each of the post-offer years is greater than the maximum pre-offer variance (in year -4). The findings from interquartile ranges are consistent with the variance results, suggesting that the above results are not due to a few extreme observations. The increased earnings volatility corroborates the increase in asset and equity betas documented above.

To evaluate whether this increase in cross-sectional earnings volatility is experienced by other firms in the same industry, we examine the cross-sectional variance of industry median earnings patterns. For each test firm, earnings changes are estimated for other firms that have the same four digit SIC code on the 1986 Standard and Poor's Compustat Industrial and Research Files. The earnings changes for each comparison firm are standardized by its stock price two days prior to the test firm's offer announcement and industry median standardized earnings changes are constructed for years -5 to 4.

Estimates of the cross-sectional variance and interquartile range of standardized earnings changes for the industry medians in years surrounding test firms' equity offers are reported in Panel B of Table 6. There is no significant increase in the cross-sectional variance of industry median earnings in years 0 to 4. The post-offer increase in earnings volatility experienced by the equity offering firms is therefore not due to an industry-wide increase in earnings volatility.

5.4 Summary

Results of the risk tests reported in this section are summarized in Figure 1, and show that the sample firms experience a significant increase in asset risk and a decrease in financial

leverage subsequent to equity offers. The net effect of these changes is to increase post-offer equity betas. The changes in asset betas, equity betas, and financial leverage of the offer firms are not matched by other firms in their industries. The average increase in equity betas is consistent with the magnitude of the average stock price decline at the offer announcement. Increases in the cross-sectional volatility of earnings changes subsequent to the offering corroborate the findings on asset and equity betas. These findings indicate that primary equity offers convey information to investors on changes in offer firms' business risk.

6. DISCUSSION

The increase in asset risk and decrease in financial leverage documented above are consistent with the implications of the capital structure models of Donaldson (1961), and DeAngelo and Masulis [1980]. They predict that capital structure decisions reflect a trade-off between costs of financial distress and the interest tax shields from debt. Managers therefore are likely to issue common stock to reduce their firm's financial leverage when they perceive that there has been an increase in the probability of financial distress, due to an increase in the firm's business risk. Managers' decisions to issue new equity therefore convey information about their firms' asset risk increase and leverage decrease to the market.[25]

To validate this interpretation, we examine the stated and actual uses of the offer proceeds. The stated uses of equity offer proceeds, reported in the *Wall Street Journal* and the offer prospectuses, indicate that a majority of firms intend to use the proceeds to retire debt. Fifty-six percent of the sample state that the primary use of the funds generated by the offer is to retire debt (48 firms) or to increase the equity base (four firms). In contrast, only 27% of the sample firms state that the funds are to be used primarily to finance new capital projects, and 8% of the firms report that the intended uses are for working capital (two firms) or

general business purposes (five firms).[26] The remaining 9% of the sample firms do not disclose the intended uses of the funds.[27]

Several sample firms explicitly mention that the proposed equity offering is part of a plan to reduce leverage. For example, Gould Inc. states in its annual report for the offer year, that:

> ...we are placing special emphasis this year on strengthening our balance sheet. We plan to reduce the level of total debt to capitalization from the current 39.7% to below the 34% level. ...We (also) just filed with the SEC a registration statement to sell one million shares of common stock. Dependent on market conditions, we will probably proceed with this plan in late September or early October. Proceeds from the proposed financing will be used to increase the company's equity base through the retirement of medium term bank loans and short-term debt. (Chairman's letter to shareholders, Annual Report for the period ending June 30, 1976).

Value Line analysts also discuss the implications of equity offers for the sample firms. The most frequently mentioned effect is the reduction in leverage and increase in financial flexibility. For example, the Value Line report on Tenneco, Inc. subsequent to the equity offer announcement states that:

> Tenneco financed with equity this year. The company recently completed an offering of 3 million common shares. These were issued in the place of bonds to keep the debt ratio under the 60% ceiling. ... the proceeds will be used to retire short term debt (Value Line Report, May 1, 1970).

Evidence on actual uses of the offer proceeds is consistent with managers' stated intentions. Figure 2 reports sample medians of net debt issues, net equity issue proceeds, and capital expenditures for the offering firms in years surrounding the offers. For each firm these variables are standardized by its year-end total assets. Net proceeds of equity issues (the value of issues less treasury stock acquisitions) are close to zero in years -5 to -1 and 1 to 4.[28] In contrast, the median proceeds from equity issues as a percent of assets in year 0 is 6.3%. Net debt issues (short- and long-term debt issues less retirements) increase from 2% of assets in

year -5 to 5% in year -1. In year 0 there is a sharp decline in the offering firms' borrowing, the magnitude of which is comparable to the increase in funds from equity issues, indicating that sample firms switch from debt to equity financing in this year. Subsequent to the equity offer, net annual borrowing is stable at about 2% of assets.[29] There is no evidence of a change in capital expenditures in the equity offer year.

7. SUMMARY

This paper investigates the nature of the information conveyed by primary equity offer announcements. We find that: (1) Offer announcements convey information about future risk changes since they are accompanied by increases in asset betas, and decreases in financial leverage, the net effect of which is to increase equity betas. On average the increase in equity betas is consistent with the average stock price reaction to the offer announcement. (2) The risk information conveyed by equity offers is firm-specific since other firms in the offer firms' industries do not experience similar risk and leverage changes. (3) Equity offer announcements do not convey new information about offer firms' future earnings levels.

These results indicate that managers decide to issue equity and reduce financial leverage when they foresee an increase in volatility of their firms' earnings due to an increase in business risk. The firms' stated reasons for equity offers and their post-offer earnings volatility support this interpretation. Investors, recognizing that managers have superior information on their firms' prospects, interpret offer announcements accordingly and revise the offer firms' asset and equity betas upward, resulting in a negative market reaction.

The findings of this paper have implications for future theoretical work on the information conveyed by firms' capital structure decisions. Miller and Rock [1985] use a

single model to analyze capital structure and dividend decisions and predict that both convey information on future earnings levels. While the findings of Ofer and Siegel [1987], and Healy and Palepu [1988] confirm the prediction that dividend decisions convey information on future earnings levels, this paper finds that the information conveyed by equity offers is about future risk. This suggests that separate models are necessary to analyze dividend and capital structure decisions. The models of Donaldson (1961), DeAngelo and Masulis [1980], and Myers and Majluf [1984] are broadly consistent with this paper's findings. However, our results suggest that there is scope for refining these models by explicitly considering the role of systematic asset risk changes in equity offer decisions.

REFERENCES

Asquith, Paul and David Mullins, Equity issues and offering dilution, Journal of Financial Economics (1986): 61-89.

Brealey, R. and S. Myers, Principles of corporate finance, McGraw-Hill, New York, 1984.

DeAngelo, H. and R. Masulis, Optimal capital structure under corporate and personal taxation, Journal of Financial Economics (1980): 3-29.

Donaldson, Gordon, Corporate debt capacity, Boston, Division of Research, Harvard Business School, 1961.

Hamada, Robert S., The effect the firm's capital structure on the systematic risk of common stocks, Journal of Finance (1972):13-31.

Healy, Paul M. and Krishna G. Palepu, Earnings information conveyed by dividend initiations and omissions, Journal of Financial Economics (1988): 149- 175.

Ibbotson, R.G. and R.A. Sinquefield, Stocks, bonds, bills and inflation: The past and the future, Financial Analysts Research Foundation, Charlottesville, Virginia, 1982.

Jain, Prem C., Equity issues and changes in expectations of earnings by financial analysts, Unpublished paper, Wharton School, University of Pennsylvania, 1988.

Jensen, M., Agency costs of free cash flow, corporate finance and takeovers, American Economic Review (1986): 323-329.

Masulis, Ronald and Ashok Korwar, Seasoned equity offerings: An empirical investigation, Journal of Financial Economics (1986): 91-188.

Masulis, Ronald, 1983, The impact of capital structure change on firm value: Some estimates, Journal of Finance (1983): 107-126.

Mikkleson, Wayne, and Megan Partch, Valuation effects of security offerings and the issuance process, Journal of Financial Economics (1986): 31-60.

Miller, Merton and Kevin Rock, Dividend policy under asymmetric information, Journal of Finance (1985): 1031-1051.

Myers, Stewart and Nicholas Majluf, Corporate financing and investment decisions when firms have information that investors do not have, Journal of Financial Economics (1984): 187-221.

Offer, A. and D. Siegel, Tests of signalling models using expectations data: An application to dividend signalling, Journal of Finance (1987): 889-911.

Schipper, Katherine and Abbie Smith, A comparison of equity carveouts and seasoned equity offerings: Share price effects and corporate restructuring, Journal of Financial Economics (1986): 153-186.

Scholes, Myron, Market for securities: Substitution versus price pressure and the effects of information on share prices, Journal of Business (1972): 179-211.

Smith, Clifford, Jr., Investment banking and the capital acquisition process, Journal of Financial Economics (1986): 3-29.

FOOTNOTES

1. Two other explanations have also been proposed. Jensen (1986) suggests an agency cost explanation for the negative market reaction to equity offer announcements. Assuming that there is a conflict of interest between managers and stockholders, he argues that the negative market reaction is due to investors' expectations that the increased free cash flows from an equity issue will be used by managers for value-reducing activities. This paper assumes that managers act in the interest of shareholders and therefore does not test this explanation. Another view is that selling equity causes a firm's stock price to fall because the demand curve for its shares is downward sloping. However, theorists reject this view by arguing that the price of a security is determined solely by the expected level and riskiness of its cash flow.

2. DeAngelo and Masulis point out that in the absence of financial distress costs, capital structure is determined by a trade-off between interest tax shields and other tax shields, such as depreciation and investment tax credit.

3. Masulis (1983) provides evidence on this hypothesis for a sample of exchange offers.

4. While Myers and Majluf's model assumes that the proceeds are used for a new investment project, their analysis is also applicable to debt retirement, provided this has a positive net present value for shareholders.

5. Mikkleson and Partch (1986) use the following proxies: (1) the net amount of new financing provided by the offer, (2) the size of the offering, and (3) the stated reasons for the offering. They conclude that their results do not support the hypothesis that stock issues convey information about a firm's earnings prospects, assets-in-place or investment opportunities. Masulis and Korwar (1986) examine the relation between equity offer announcement returns and (1) the proportional change in outstanding shares of common stock, (2) the offering-induced leverage change, (3) the pre-offer-announcement price run-up, and (4) the pre-offer-announcement stock return variance. The only variable found to be related to the offer announcement return is the pre-offer price run-up.

6. Asquith and Mullins also examine secondary equity offers. This paper focuses on primary offerings since it is possible that the nature of information provided by the two is different. To investigate this issue, we also analyze earnings and risk information conveyed by secondary offers. Results of these tests are discussed briefly in footnote 25.

7. This restriction eliminates observations for repeat offer firms. If there is a systematic difference between these observations and those in the sample, our results may not be generalized to all equity offers. There is no current theory that distinguishes between repeat and infrequent equity offerors.

8. Risk-adjusted announcement returns are market model prediction errors for one day prior to and the day of the *Wall Street Journal* report on the offering. The market model parameters are estimated using returns for the firm and the CRSP equal-weighted market portfolio in days 101 to 350.

9. Since equity offers occur throughout the fiscal year, the fiscal year earnings in the offer year include earnings for some quarters announced before the offer and some quarters after the offer. To separate earnings before and after the equity issue announcement, the earnings tests also are performed using annual earnings constructed from quarterly data collected from Compustat Quarterly Files. We construct annual earnings for year 0 using earnings from the four quarterly announcements

subsequent to the offer (quarters 1 to 4); year -1 earnings are constructed from the four quarterly earnings prior to the offer date (quarters -4 to -1). Similarly, earnings for years -6 to -2 and 1 to 4 are constructed using earnings from quarters -24 to -5, and 5 to 20 respectively. The results using earnings defined this way are not materially different from those reported in the paper for fiscal year earnings.

10. We examine the cross-sectional relation between standardized earnings changes in years 0 to 4, and the equity offer announcement returns. The correlations are insignificant at the 10% level in all years.

11. Another source of earnings forecasts, commonly used by accounting researchers, is the IBES database. We do not use this source because IBES forecasts are not available for many of our sample years. Jain (1988) analyzes revisions in IBES forecasts for a recent sample of equity offers.

12. We find that the Value Line reports discuss the offer and its financial implications for each of the sample firms, indicating that their post-offer forecasts are likely to incorporate information from the equity offers.

13. To ensure that all available forecasts are included in the analysis, reports are collected directly from the Value Line library. Value Line reports are unavailable for 22 sample firms. The number of quarters with forecasts available varies from firm to firm. Seventy and 60 observations are available in quarters 1 and 2 respectively; the number of observations declines markedly in subsequent quarters. Thus, the results are not directly comparable across quarters.

14. The coefficient of the quarter 0 forecast error is insignificant at the 10% level in regressions for all quarters other than quarter 3. The coefficient for that quarter, which is significant at the 5% level, suggests that the negative forecast revision in that quarter reflects information conveyed by the forecast error in quarter 0, and not equity offer information.

15. The tests have been replicated using value-weighted market returns and also Scholes-Williams estimates of betas. Our conclusions are unchanged.

16. The test is based on the sample distribution of the parameter differences. It assumes that the parameter differences are independent across firms in the sample. The reported test statistics will be overstated if this assumption is violated.

17. The mean estimate of α for the equity offer firms in year -1 is 0.0004 and statistically significant at the 1% level. This finding is consistent with the results of Asquith and Mullins, who report that equity offering firms experience significant positive excess returns prior to the offer announcement. The mean estimates of α for the other years are not significantly different from zero at the 5% level. These positive pre-offer excess returns may cause the estimate of offering firms' equity betas in year -1 to be biased downward. However, this bias, if any, does not appear to explain the reported increase in beta in year 1. This is because the mean equity beta in year 1 is also significantly larger (at the 5% level) than the values in years -3 and -2, even though estimates of α are not significant (at the 5% level) in these years. The Z statistic for the mean increase in β is 3.14 for years 1 and -2, and 1.85 for years 1 and -3.

18. We perform appropriate statistical tests, not reported in Table 5, to verify this statement.

19. Ibbotson and Sinquefield (1982) report that the average annual risk premium (the return on

common stocks minus the return on treasury bills) during the period 1926 to 1981 was 8.3%. The average annual return on treasury bills during this period was 3.1%.

20. We also estimate the valuation effect of risk changes for each of the sample firms separately using the above model. The mean and median implied price declines are comparable to those reported above.

21. The valuation effect of the risk change is computed using firm changes in equity beta between years 1 and -1, a market risk premium of 8%, and three alternative risk-free rate assumptions, 0%, 5% and 10%. Equity offer announcement returns are risk-adjusted returns for the day before and the day of the *Wall Street Journal* report of the event. Two measures of risk-adjusted returns are computed, using pre- and post-offer market model parameters. The results are similar for these different variable definitions.

22. To examine the effect of using the simple valuation model, we re-estimate the correlations using ß changes themselves rather than their valuation effects. The results remain insignificant.

23. The mean results do not change the primary conclusion of the leverage analysis, namely, that there is a significant decline in offer firms' leverage in year 1. However, in contrast to the median results, mean results indicate a leverage decrease in year -1 and no increase in year 2. For offer firms' industries, the only difference in the mean and median result is in year 1. While the median leverage change in that year is insignificant, the mean leverage change is positive and significant at the 5% level.

24. This procedure assumes that the distribution of standardized earnings changes is the same for all sample firms, and does not discriminate between changes in firm-specific and market-wide risk changes. Because of these limitations we view these tests as secondary to the return-based tests.

25. Asquith and Mullins (1986) find that secondary equity offer announcements, which do not change firms' capital structures, also produce a negative market reaction similar to that for primary offerings. Since the capital structure interpretation of primary equity offers cannot be applied to secondary offers, we expect the information conveyed by the two events to be different. To test this, we briefly examine risk and earnings changes surrounding 85 registered secondary offers from the period 1963-81. The sample comprises all secondary offers examined by Asquith and Mullins which satisfy the same criteria used to select primary offers in our study. In contrast to the findings for primary offers, we find that secondary offer firms have lower earnings, but no changes in risk in the post-offer period, confirming that the information conveyed by these two events is different.

26. Twenty-one of the firms that state they plan to use the proceeds for new capital expenditures indicate that the new projects are expansions of current businesses, whereas only four firms indicate that they plan to use the proceeds for unrelated business expenditures.

27. We separately examine post-offer asset beta changes for firms that state that they intend using the proceeds to finance new investments, and to retire debt. The post-offer beta changes for the two groups are not significantly different at the 10% level.

28. The sample selection requires firms to have no equity offers in years -5 to -1.

29. Industry net borrowing ranges from one to two percent of assets in years -5 to 4 and there is no sharp decline in year 0. Net equity offers for the sample firms' industries are zero throughout the ten year period.

Table 1

Distribution of primary stock offerings by year in the period 1966 to 1981 for 93 sample firms[a]

Year	Number of firms	Percent of total sample
1966	2	2.1
1967	1	1.1
1968	3	3.2
1969	3	3.2
1970	7	7.5
1971	8	8.6
1972	3	3.2
1973	1	1.1
1974	1	1.1
1975	8	8.6
1976	10	10.8
1977	1	1.1
1978	5	5.4
1979	6	6.4
1980	21	22.6
1981	13	14.0
Total	93	100.0

[a] To be included in the sample, a firm has to: (1)make a public offering of new shares that is underwritten and registered with the SEC; (2) be listed on the ASE or NYSE at the time of the offering; (3) have only one class of voting stock; (4) have no other primary offerings in the previous five years; (5) have the primary offering announcement date available in the *Wall Street Journal*; (6) have stock price and return data available for the announcement date and two days prior to the event; (7) have a *Wall Street Journal* earnings announcement date for the year preceding the event; and (8) have annual earnings per share before extraordinary items and discontinued operations available on Compustat for at least two of the six years before, and the five years after the event date.

Summary statistics on changes in earnings per share as a percentage of initial equity price for years surrounding primary equity offer announcements[a,b]

Period relative to equity offer		Number of firms	Mean[c]	First quartile	Median[c]	Third quartile
Panel A: Raw earnings changes						
Year	-5	91	0.83%[d]	-0.12%	0.66%[d]	1.86%
	-4	92	0.21	0.08	0.57[d]	1.35
	-3	92	0.73[e]	0.05	0.73[d]	1.57
	-2	92	1.09[d]	0.41	0.92[d]	2.01
	-1	92	1.18[d]	0.37	0.96[d]	2.07
	0	93	1.69[d]	0.27	1.45[d]	2.70
	1	93	-0.09	-1.59	0.79	2.41
	2	93	1.20[d]	0.09	1.03[d]	3.19
	3	91	-0.79	-1.37	1.30[e]	3.33
	4	88	-1.37	-1.57	1.13	3.98
Panel B: Industry-adjusted earnings changes[d]						
Year	-5	83	-0.12%	-1.25%	0.01%	1.37%
	-4	86	0.11	-0.91	0.19	1.28
	-3	88	-0.88	-0.12	0.20	1.05
	-2	89	0.18	-1.00	0.27	1.82
	-1	90	0.64	-0.82	0.30	1.58
	0	91	0.87	-1.01	0.60[e]	2.49
	1	92	0.44	-1.67	0.29	2.57
	2	92	1.07	-1.01	0.63[e]	3.63
	3	88	0.47	-0.62	1.50[d]	4.74
	4	66	-1.29	-1.44	1.07	4.96

[a] The equity offer sample comprises 93 firms that announce primary offerings in the period 1966-1981. Changes in earnings per share before extraordinary items and discontinued operations are standardized by the firm's stock price two days prior to the announcement of the stock issue.

[b] Industry-adjusted earnings changes for each test firm are the difference between the standardized earnings changes for the offer firm and the median standardized earnings changes for other firms in the same four-digit industry in the same years. Industry earnings changes are available for 92 of the 93 test firms.

[c] Student t and Wilcoxon Signed Rank statistics test the hypotheses that the mean and median earnings changes are different from zero respectively.

[d] Significant at the one percent level using a two-tailed test.

[e] Significant at the five percent level using a two-tailed test.

Table 3

Summary statistics on analysts' earnings forecast errors and forecast revisions as a percentage of initial equity price for quarters following primary equity offer announcements[a]

Period relative to equity offer		Number of firms	Mean[b]	First quartile	Median[b]	Third quartile
Analysts' forecast error:						
Quarter	0	71	0.21%[c]	-0.03%	0.10%[c]	0.41%
Analysts' forecast revisions:						
Quarter	1	70	0.06%	-0.05%	0.00%	0.34%
	2	60	-0.10	-0.19	-0.02	0.05
	3	42	-0.16[c]	-0.25	0.11[c]	0.00
	4	27	-0.05	-0.17	0.00	0.30
	5	9	-0.27	-0.30	0.09	0.24

[a] The complete equity offer sample comprises 93 firms that announce primary offerings in the period 1966-1981. Analysts' forecast errors in quarter 0 are the difference between actual earnings per share before extraordinary items and discontinued operations announced following the equity offer announcement, and Value Line forecasts made prior to the equity offer announcement. Analysts' forecast revisions in quarters 1 to 5 are differences between Value Line forecasts made following and prior to the equity offer announcement. Forecast errors and revisions for each firm are standardized by its stock price two days prior to the announcement of the stock issue.

[b] Student t and Wilcoxon Signed Rank statistics test the hypotheses that the mean and median earnings forecast errors/revisions are different from zero respectively.

[c] Significant at the one percent level using a two-tailed test.

Table 4

Summary statistics on market model risk parameters for firms announcing primary equity offerings and their industries in years surrounding the offers[a,b]

	Year relative to offer announcement				
	-3	-2	-1	1	2
Panel A: Estimates of equity beta (β_e)[c]					
Equity offer firms:					
Mean β_e	1.25	1.23	1.23	1.33	1.35
Median β_e	1.21	1.11	1.15	1.32	1.28
Mean $\Delta\beta_e$		-0.02	0.00	0.10[d]	0.02
Median $\Delta\beta_e$		-0.03	-0.01	0.15[d]	0.02
Industry comparison firms:					
Mean β_e	1.09	1.09	1.08	1.13	1.17
Median β_e	1.07	1.08	1.05	1.10	1.13
Mean $\Delta\beta_e$		0.00	-0.01	0.06[e]	0.03
Median $\Delta\beta_e$		0.00	-0.01	0.01	0.04
Panel B: Estimates of residual variance (σ^2)					
Equity offer firms:					
Mean σ^2	0.051%	0.053%	0.051%	0.051%	0.055%
Median σ^2	0.039	0.039	0.040	0.035	0.041
Industry comparison firms:					
Mean σ^2	0.035%	0.035	0.035	0.039	0.042
Median σ^2	0.023	0.024	0.024	0.020	0.027

[a] Market model parameters are estimated using daily stock returns and equal-weighted market returns for days -850 to -601 (year -3), -600 to -351 (year -2), -350 to -101 (year -1), +101 to +350 (year 1), and +351 to +600 (year 2), where day 0 is the offer announcement date.

[b] The sample comprises 93 firms that announce primary equity offerings in the period 1966-1981. Industry estimates for each test firm are mean market model estimates for other firms in the same four-digit industry in the same years. Industry market model averages are available for 92 of the 93 test firms.

[c] Statistical tests are conducted to test the hypotheses that the mean and median estimates of $\Delta\beta_e$, and the changes in σ^2 for the equity offer firms and their industries are significantly different from zero.

[d] Significant at the one percent level using a two-tailed test.

[e] Significant at the five percent level using a two-tailed test.

Summary statistics on asset betas and financial leverage for firms announcing primary equity offerings and their industries in years surrounding the offers[a,b]

	Year relative to offer announcement				
	-3	-2	-1	1	2
Panel A: Estimates of asset betas (βa[c])					
Equity offer firms:					
Mean β_a	0.75	0.73	0.78	0.94	0.94
Median β_a	0.70	0.68	0.73	0.90	0.94
Mean $\Delta\beta_a$		-0.04	0.04	0.15[d]	0.02
Median $\Delta\beta_a$		-0.02	-0.01	0.15[d]	0.05
Industry comparison firms:					
Mean β_a	0.78	0.71	0.75	0.73	0.81
Median β_a	0.75	0.69	0.71	0.72	0.78
Mean $\Delta\beta_a$		-0.06[d]	0.05	-0.02	0.08[d]
Median $\Delta\beta_a$		-0.06[d]	0.03	-0.02	0.06[d]
Panel B: Financial Leverage (V/E)					
Equity offer firms:					
Mean V/E	2.04	2.01	1.68	1.48	1.65
Median V/E	1.50	1.61	1.50	1.36	1.41
Mean ΔV/E		-0.05	-0.25[e]	-0.30[d]	0.19
Median ΔV/E		0.00	-0.05	-0.16[d]	0.08[e]
Industry comparison firms:					
Mean V/E	1.65	1.70	1.63	1.73	1.71
Median V/E	1.57	1.57	1.54	1.57	1.55
Mean ΔV/E		0.06	-0.07	0.10[e]	-0.01
Median ΔV/E		0.05	-0.05	0.05	-0.05

[a] Asset betas are unlevered equity betas. Equity betas are estimated using daily stock returns and equal-weighted market returns for days -850 to -601 (year -3), -600 to -351 (year -2), -350 to -101 (year -1), +101 to +350 (year 1), and +351 to +600 (year 2), where day 0 is the offer announcement date. Financial leverage is the ratio of the value of the firm to the value of equity, where equity is the market value of common stock plus the book value of preferred stock, and the value of the firm is the value of equity plus the book values of ton-term and short-term debt.

[b] The sample comprises 93 firms that announce primary equity offerings in the period 1966-1981. Industry estimates of asset betas and financial leverage for each test firm are mean values for other firms in the same four-digit industry in the same years. Industry averages are available for 92 of the 93 test firms.

[c] Statistical tests are conducted to test the hypotheses that the mean and median estimates of $\Delta\beta_a$ and ΔV/E for the equity offer firms and their industries are different from zero.

[d] Significant at the one percent level using a two-tailed test.

[e] Significant at the five percent level using a two-tailed test.

Table 6

Summary statistics on cross-sectional variability of changes in earnings per share as a percentage of initial equity price for firms announcing primary equity offerings in years surrounding the offers[a]

Period relative to equity offer	Number of observations	Estimated variance	Interquartile range
Panel A: Raw earnings			
Year -5	91	0.06%	1.98%
-4	92	0.14	1.27
-3	92	0.08	1.52
-2	92	0.08	1.60
-1	92	0.07	1.70
0	93	0.20	2.43
1	93	0.18	4.00
2	93	0.19	3.10
3	91	1.01	4.70
4	88	1.95	5.55
Panel B: Industry earnings[b]			
Year -5	84	0.15%	1.30%
-4	87	0.36	1.14
-3	89	0.58	1.20
-2	90	0.03	1.30
-1	91	0.10	1.31
0	91	0.07	1.41
1	92	0.16	1.65
2	92	0.12	3.77
3	90	0.16	3.77
4	70	0.15	2.66

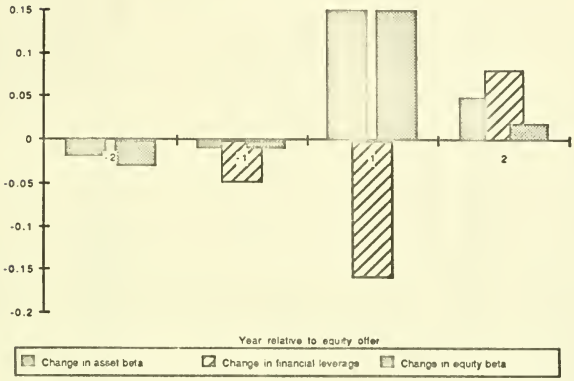
[a] The equity offer sample comprises 93 firms that announce primary offerings in the period 1966-1981. Changes in earnings per share before extraordinary items and discontinued operations are standardized by the firm's stock price two days prior to the announcement of the stock offering.

[b] Industry earnings changes for each test firm are median standardized earnings changes for other firms in the same four-digit industry in the same years. Industry earnings changes are available for 92 of the 93 test firms.

Figure 1

Summary of median changes in asset betas, financial leverage, and equity betas for equity offer firms and their industries in years surrounding offer announcements

Panel A: Equity offer firms



Panel B: Industry comparison firms

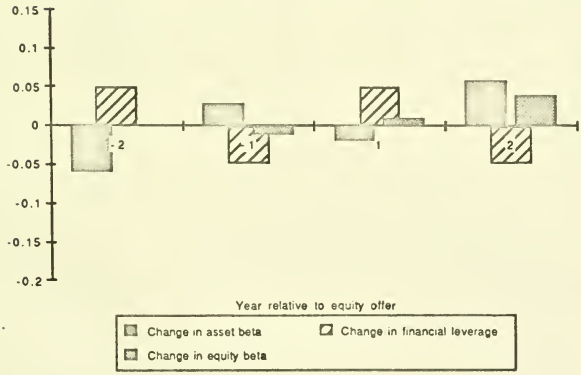
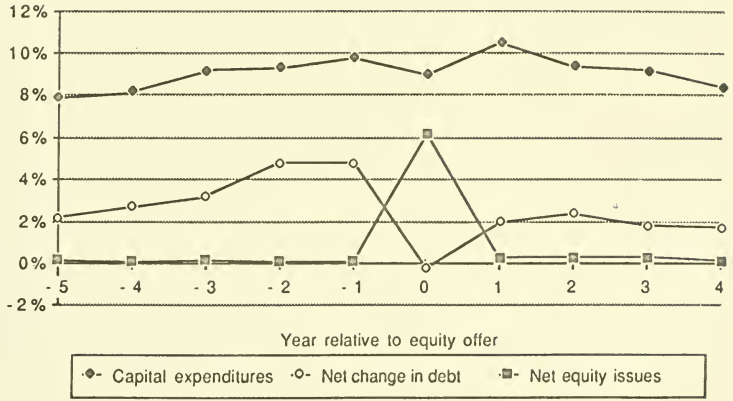


Figure 2

Median cash flow ratios as a percentage of total assets for sample of firms announcing equity offerings in years surrounding the offers[a]



a The equity offer sample comprises 93 firms that announce primary offerings in the period 1966-1981. Capital expenditures include expenditures for acquisitions; the net change in debt is debt issues less retirements; and net equity issues are equity issues less stock repurchases.