"INFORMATION ASYMMETRY AND EQUITY ISSUES"

by

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INFORMATION ASYMMETRY AND EQUITY ISSUES

ABSTRACT

The paper shows the relevance of information asymmetry between the managers of the firm and the market for the equity issue process. It introduces four proxies for information asymmetry and presents three groups of tests: cross-sectional regressions of the reaction at equity issue announcements, comparisons of the information asymmetry before and after the announcements and analyses of the timing behavior observed during the equity issue process. The results show that information asymmetry is a significant variable for equity issues.

I INTRODUCTION

This paper studies the importance of information asymmetry for the firm behavior during the process of issuing new equity. The managers normally have an advantage over the market in predicting firm-specific events which creates an information asymmetry between the managers of the firm and the market. The size of the asymmetry can vary over the life of the firm. Its importance increases every time the firm accesses the market and thus managers can gain substantially at the expense of the market by hiding information. Ross (1977), Myers and Majluf (1984), Miller and Rock (1985) introduced information asymmetry models which lead market prices responses to changes in the capital structure of the firm. In particular, the models predict that the announcement of a new equity issue releases negative information about the firm, and it will create, all other things equal, a drop in the market value of the firm. Overall, the empirical evidence is supportive of theories of information asymmetry. An average drop in the stock price of approximately three percent is observed at the announcement of a new issue (see for example Asquith and
Mullins (1986), Masulis and Korwar (1986) or Mikkelson and Partch (1986))^1. In addition, several studies test cross-sectionally the impact of information-related variables on the drop observed in the stock prices. Bhagat, Marr and Thompson (1985) find that the unsystematic risk of the stock is positively related to the drop in stock price. Bower and Hansen (1985) present a direct test of the information asymmetry for equity issues. They measure the information asymmetry of a firm by insiders' trading and find that it significantly explains cross-sectional variations in the drop in stock price observed at the equity issue announcement. The studies above, as well as many others\(^2\), are consistent with information asymmetry being determinant of the stock price reactions observed around the issue of equity.

This study expands upon previous research by 1) explicitly relating the measures of information asymmetry to the information environment of the firm and 2) by testing for information asymmetry and its interactions with equity issues by several groups of tests. The interactions between information asymmetry (IA) and the equity issue process are studied using four proxies for IA and three groups of tests: cross-sectional analysis of the abnormal return at the equity issue announcement, time-series comparisons of the information asymmetry before and after the announcement, and analysis of the timing behavior for the equity issues. The next section introduces a dynamic framework for the information asymmetry of the firm and describes the empirical proxies. Section 3 presents the data. Sections 4, 5 and 6 describe the three groups of tests and their results. Section 7 concludes the paper and indicates some potential directions for future research.
II INFORMATION ENVIRONMENT OF THE FIRM AND INTRODUCTION OF THE MEASURES OF INFORMATION ASYMMETRY

A. Information environment of the firm

The paper is interested in measuring the information asymmetry and in studying its impact on the equity issue process. This section describes a dynamic framework for information arrival that explains the measures of information asymmetry used in the paper: the section first introduces the information environment of the firm, then represents the concept of IA and of total uncertainty by variances, as illustrated in figures 1 and 2. It especially insists on the difference between the total uncertainty of the firm and the information asymmetry of the firm, as the distinction is important for the choice of measures of information asymmetry and the tests.

The paper analyzes a world of information asymmetry, where the managers of the firm know more about the firm than the market. The manager and the market are assumed to be equally well informed about market-wide, or non firm-specific, information. So both the managers and the market bear the market-wide uncertainty. Additionaly the market bears some firm-specific uncertainty. Managers know more about the firm because they get some private information, the firm-specific information, before the market. The information asymmetry of the firm is considered high (low) when managers of the firm have a relatively large (small) amount of firm-specific information. The firm-specific information known by the managers will eventually be transferred to the market, either through the passage of time or through some information-releasing event. The information asymmetry will correspond to only a subset of the total uncertainty of the firm as the managers of the firm and the market are
likely to be equally well informed about market-wide variables influencing the value of the firm, whose uncertainty is summarized by $\sigma_v^2$.

Consider $V$, the value of the firm as perceived by the managers, and $P$ the value of the firm as perceived by the market. The market faces a given uncertainty about $P$ that can be summarised by the variance of $P$, $\sigma_P^2$, whereas the managers only face the uncertainty of $V$, $\sigma_v^2$, the variance of the firm, with $\sigma_v^2$ lower or equal to $\sigma_P^2$. $(P-V)$ fluctuates in time as a function of the transfer of firm-specific information from the managers to the market. The variance of $P-V$, $\sigma_{(P-V)}^2$, measures the fluctuations of $P-V$ and captures the information asymmetry between the managers of the firm and the market. As investors are rational, $\sigma_{(P-V)}^2$ equal $\sigma_P^2$ minus $\sigma_v^2$.

In a world of certainty, $\sigma_v^2$, $\sigma_P^2$ and $\sigma_{(P-V)}^2$ are zero at any point in time. In a world of symmetric information, by definition, both $P-V$ and $\sigma_{(P-V)}^2$ are identically zero even if $\sigma_v^2$ is strictly positive. In a world of uncertainty and of asymmetric information, $\sigma_v^2$ and $\sigma_{(P-V)}^2$ are strictly positive as there exist some uncertainty about the value of the firm and some information asymmetry between the managers of the firm and the market. Then the total uncertainty faced by the market, $\sigma_P^2$ can be expressed as the sum of $\sigma_{(P-V)}^2$ and $\sigma_v^2$, or as the sum of $\sigma_{(P-V)}^2$ and $\sigma_v^2$ if market-wide variables are the only source of uncertainty for the managers of the firm.
Figure 1 represents the framework described above where the firm-specific information can reach the market by one of two means: (1) automatically and costlessly, after a lag of \( L \) days, where \( L \) is constant, or (2) through information releasing events, at \( t_e \). Figure 1 represents \( \sigma^2_p \) and \( \sigma^2_{(P-V)} \), as a function of time. \( \sigma^2_{(P-V)} \) (the bottom line) is decreased by each information releasing events, at \( t_e \), then increases at a constant rate (in this example, the firm-specific information is assumed to come to the managers at a constant rate through time) until some new firm-specific information reaches the market, after a lag of \( L \) days. Some examples of information releasing events are earnings announcements or dividends announcements. The figure also shows that the total uncertainty of the firm (the top line) is always higher than the information asymmetry of the firm (a constant difference is assumed for the figure) by the magnitude of the common information or market-wide fluctuations, \( \sigma^2_w \).

The information asymmetry of the firm decreases at an information-revealing event, then decreases with time. Figure 2 shows the impact on IA of adding another type of information-revealing event. The evenly-spaced information-revealing events are for example earnings announcements and the additional information-revealing events is for example an equity issue announcement.

The simple framework and its characteristics are used at several points in the paper: first to choose appropriate measures of information asymmetry, then to understand the impact of the equity issue announcement as an additional information-revealing event. The remainder of this section introduces four measures: the stock market reaction to earnings announcements, the residual variance of stock returns and two variables describing the information environment of the firm, the number of public
announcements per period about the firm and the trading intensity. They will be related to equity issues in the following sections.

B. Stock market reaction to earnings announcements

This first measure of information asymmetry focuses on the behavior of the firm at information-revealing events, i.e. at the $t_e$ of figure 1. Assume that the managers follow the strategy of only releasing their firm-specific information to the market through earnings announcements, so that earnings announcements are the only relevant information-releasing events to be considered on the framework represented in figure 1. If the market reacts, on average, strongly to the earnings announcements of a given firm, it means that the managers of that firm have substantial private information to release and that the information asymmetry is high for that firm. In figure 1, this corresponds to a big drop of IA at $t_e$. I measure the market's reaction at the earnings announcement by $\text{IA}_{an}$, the standard deviation of the market-adjusted, three-day abnormal return at the announcement of the quarterly earnings, computed over all the quarterly earnings announcements available during the five years preceding the equity issue announcement. Usually the date listed on quarterly Compustat is one trading day earlier than the date given in the Wall Street Journal Index (WSJI), so a three-day period is chosen to adjust for the non overlap of the two sources for the earnings announcements dates, i.e. one extra day with respect to the two-day period usually considered to account for the timing of the news announcement with respect to the close of the exchange.
C. Residual variance of stock returns

This measure of IA starts from the total uncertainty of the firm, $\sigma_p^2$, and corrects for information uncertainty shared by the managers and the market $\sigma_w^2$. I use the residual volatility of the equity of the firm: $\sigma_e^2$ (or $\sigma_c^2$), the market-adjusted residual variance (standard deviation) of the daily stock price abnormal returns for the year preceding the equity issue announcement. In figure 1, a high $\sigma_e^2$ corresponds to a level of IA very different from zero. $\sigma_e^2$ assumes that the fluctuations in the market are the only information shared by the managers of the firm and the market. In fact, it includes a higher percentage of the total uncertainty of the firm than wished for the perfect measure of IA. For example, the uncertainty about industry developments may be included in $\sigma_e^2$, but is likely to be shared by the managers of the firm and by the market.

D. Information environment: intensity of public announcements and intensity of trading

I add to the measures defined above two measures describing the information environment of the firm. I expect these variables to be most valuable when used jointly with the residual variance of the stock price and with the average reaction at earnings announcement as they capture different characteristics of information asymmetry. The IA of a firm is of course determined by the characteristics of the assets of the firm, but it can also be influenced by the behavior of the managers, or of the market. For example, when many public announcements are made about the firm, all other things constant, the market may be more knowledgeable
about the true state of the firm, and the information asymmetry may be lower. In figure 1, many public announcements would imply many dates $t_e$ for a given period and many drops of $\sigma^2_{P-V}$. Similarly, the correlation between IA and trading volume can be discussed in the framework introduced previously. For example, when there is a higher trading intensity for the firm, all other things constant, more information about the firm may be included in its market value and the information asymmetry may again be lower for example through a smaller lag.

Intensity of public announcements

Figure 2 shows how an equity issue announcement decreases the information asymmetry and the impact of the next information revealing event in the dynamic framework introduced earlier. Similarly, when the firm has many announcements before the equity issue announcement, the information asymmetry is lower at the equity issue announcement and does not create as big a reaction as it would have without those previous announcements. I measure the intensity of public announcements made about the firm by the number of public announcements published in the Wall Street Journal. The measure of IA, Dnban, is a dummy variable set equal to one when the firm has 16 or fewer announcements listed in the WSJI for the year prior to the equity issue announcement$^3$.

Intensity of trading

The volume of trade in the shares of the firm is another potential measure of IA often suggested in the literature$^4$. I use RTRADE, the ratio of number of shares traded during the last year ending before the equity
issue announcement divided by the number of shares outstanding at the end of the fiscal year before the equity issue announcement\(^5\). Two links between trading and the IA can be represented in the framework introduced earlier. If the level of information asymmetry determines the volume (and intensity) of trading, trading will fluctuate with the information asymmetry through time. On the other hand, trading could decrease the IA of the firm. My conclusion from the literature on trading is that trading may be correlated to the IA of the firm but I am not sure of the direction of its influence. I will be content with using trading without any a priori sign attached to it.

The four measures of IA are computed for a sample of firms issuing equity and used in several groups of tests. The next session describes the sample used in the paper.

III. DATA

The sample is seasoned primary equity issues made between 1980 and 1983 by industrial firms and reported in the Investment Dealer Digest Report of Corporate Financing for 1980-1984. Secondary or mixed offerings are eliminated because the objective here is to study the very specific signal of an equity issue announcement when managers have more information than the market. The firms kept in the sample must fulfill additional requirements. First, they must be represented in the Center for Research in Security Prices (CRSP) daily return files for at least two years before the equity issue announcement. Second, the announcement of the issue must be reported in the WSJ\(\text{I}\). A two-day window is used for the event studies, to account for announcements made before or after the close of trading. Information released the day of the equity issue announcement is checked
in the WSJI, in order to capture a price signal about the announcement of the equity issue only. All firms with joint announcements on the day of the first announcement of the issue, or on the day before, of merger and acquisition, of other changes in the capital structure of the firm, or of earnings and dividends, are excluded from the sample. Firms with several classes of common stock traded on the exchange, or with issues of ADR (American Depository Receipts) are also excluded.

I require the announcement day of at least ten quarterly earnings during the period of five years preceding the equity issue announcement. The firm must be listed on the CRSP at the time of the announcements. The dates of the quarterly earnings announcements come from the quarterly Compustat or when a firm is not listed on quarterly Compustat, or when a quarterly earnings announcement is missing on the tape, from the WJSI. The requirements provide a total sample size of 197 (151 firms listed on Compustat).

For each firm, the relative drop in the stock price at the announcement of the equity issue is measured by the abnormal return computed by the market-adjusted returns method over a two-day period, i.e. the day the announcement is published in the WSJI (day0) and the day before (day-1). The average abnormal return for the total sample is -2.4 percent with a t-statistic of -9.36; 80 percent of the abnormal returns are negative:

\[
\text{AREI}_{it} = R_{it} - R_{Mt}
\]

where
- \(i\) represents firm \(i\)
- \(\text{AREI}_{it}\) = the abnormal return for firm \(i\) for period \(t\)
- \(R_{it}\) = the realized return for firm \(i\) for period \(t\)
. \( R_{Mt} \) = the realized return for the market for period \( t \)

The size of the issue is taken from the WSJI, on the announcement day of the issue. It includes the total number of shares to be issued in the US and abroad. The relative size of the issue is computed as the number of share announced to be issued divided by the number of shares outstanding before the announcement of the issue. The average relative size of the issue is 15.8 percent for the total sample.

The book value of the debt, the book value of equity, the book value of the total assets and the market value of the equity are obtained from the annual Compustat, for the last fiscal year before the equity issue announcement. When the firm is not listed on annual Compustat, the equivalent data are obtained from the Moody's manuals. I estimate the importance of growth opportunities of the firm by the traditional market-to-book ratio RMEBE. A high market-to-book ratio occurs in firms where a high percentage of the value of the firm lies in intangible assets, and then the firm is likely to have more valuable projects. I measure the market-to-book ratio by the ratio of the market value of the equity divided by the book value of the equity. The average RMEBE for the total sample is 1.776.

The data is used to test the importance of information asymmetry for the equity issue process by three groups of tests: section IV tests if the level of information asymmetry influences the abnormal return at the equity issue announcement, section V tests if the equity issue announcement decreases the information asymmetry and section VI studies the timing of equity issues from the angle of minimizing IA.
If information asymmetry is important, then an increase in the level of information asymmetry should increase the price drop observed at a firm equity issue announcement. The first test explores whether, all other things equal, the cross-sectional variation in the information asymmetry explains the cross-sectional variation in the stock price drop at an equity issue announcement. Other characteristics of the equity issue and of the issuing firm are also tested against the drop in stock price. Multiple regressions are run between the abnormal return observed at the equity issue announcement and empirical proxies for IA, the relative size of the issue, and the ratio of the growth opportunity to the assets in place of the firm:

\[
\text{AREI}_i = \alpha_0 + \alpha_1 \text{IA}_i + \alpha_2 \text{RSIZE} + \alpha_3 \text{RMEBE} + \epsilon_i,
\]

where \(i\) represents the issuing firm with IA equal to \(\sigma^2 \text{IA}_\text{an}\), Dnban or RTRADE.

Information asymmetry can only be imperfectly measured by the empirical proxies. The four proxies \(\sigma^2 \text{IA}_\text{an}\), Dnban and RTRADE could, each capture only some elements of IA, so multiple regressions are also run with several measures of IA. However, there exist a positive correlation among the measures of IA which can create problems of multicollinearity. There exist an especially high correlation between \(\sigma^2 \text{IA}_\text{an}\) and IAan (correlation of .502, with a t-statistic of 8.102) while the correlation between the other variables is much lower (correlation around 2, with t-statistics around 2.5). Furthermore \(\sigma^2 \text{IA}_\text{an}\) and IAan are based on price fluctuations whereas RTRADE and Dnban are based on the informational environment of the firm and the two approaches to measure of IA can be
expected to complement each other, so I also run regression 2. Regression 2 uses a combination of the firm's characteristics, $\sigma^2_e$ or $\text{IAan}$, with two measures of the information environment of the firm, $\text{Dnban}$ or $\text{RTRADE}$:

\begin{equation}
\text{AREI}_i = b_0 + b_1 \text{IA}_1 + b_2 \text{IA}_2 + b_3 \text{RSIZE}_i + b_4 \text{RMEBE}_i + \epsilon_i
\end{equation}

where $i$ represents the issuing firm $i$, $\text{IA}_1$ is $\sigma^2_e$ or $\text{IAan}$, $\text{IA}_2$ is $\text{Dnban}$ or $\text{RTRADE}$.

If information asymmetry explains stock price behavior at the equity issue announcement, then the drop observed at the equity issue announcement should increase with the $\text{IA}$. As the correlation of the variable $\text{RTRADE}$ to the true measure of the information asymmetry of the firm is not clear a priori, the significance of $\text{RTRADE}$ is listed with both one-tailed and two-tailed tests.

Table 1 shows the results of the regressions (1) and (2). $\text{RMEBE}$, representing the ratio of the growth opportunity plus the assets in place to the assets in place of the firm, decreases the drop in price observed at the equity issue announcement. Its coefficient is significant at the five percent level. $\text{RSIZE}$, the relative size of the issue, never significantly influences the drop in price observed at the equity issue announcement. This is surprising in the sense that not only theories of information asymmetry, but also the alternative models based on the optimal capital structure theory or the demand curve effect, predict that an increase in the relative size of the issue will increase the drop (see Smith (1986) for a description of these theories). However, it is in line with previous empirical studies, which have found mixed results. The measures of information asymmetry significantly influence the drop. Table
1 shows that $\sigma^2$ and Dnban are significant at the 5% level in a multiple regression with only one measure of IA. In the multiple regression with two measures of IA, the coefficients for $\sigma^2$ and Dnban are significant at the five percent level, the coefficient for IAan is significant at the ten percent level and RTRADE reaches the five percent level in one-tailed test. These results show that $\sigma^2$, IAan, Dnban and RTRADE each capture different components of the true level of the information asymmetry of the firm.

Overall, the evidence is consistent with models of information asymmetry as the information asymmetry of the firm significantly increases the drop in stock price observed at the equity issue announcement.

V TIME SERIES TESTS

If models of information asymmetry explain the stock price behavior around the equity issue announcement, the announcement of the new equity issue will decrease the information asymmetry. This effect is represented on figure 2, where the first earnings announcement after the equity issue announcement decreases the IA less than did the last earnings announcement before the equity issue announcement. This section tests whether there is evidence that, all other things equal, the information asymmetry is significantly lower after the announcement than before the announcement. The tests are conducted for two measures of information asymmetry available after the equity issue announcement: the average abnormal return at the earnings announcement, and the residual variance of the daily stock returns.
Relatively short periods of time are chosen for measuring the IA after the equity issue for several reasons: (a) The equity issue announcement is not likely to have long-lasting effects on the level of information asymmetry of the firm if the amount of manager-specific information revealed by the equity issue announcement is relatively small compared to the amount of manager-specific information continuously revealed to the market in the absence of any equity issue announcement\(^{10}\). (b) Once the equity issue has been realized, the firm will change both its asset structure and its capital structure, and this may change the IA of the firm. With time, the new projects get to be implemented. These new assets may have different characteristics from the existing assets of the firm and the information asymmetry associated with the new assets can be higher or lower than for the existing assets. Also, the decrease in leverage created by the new equity issue will decrease the information asymmetry faced by the stockholders of the firm: even when the IA per unit of asset remains constant, this information asymmetry is shared over a larger equity base and each individual stockholder bears a smaller IA.

A. Reaction at the earnings announcements

Table 2 reports the tests results for the comparison of the abnormal return at the earnings announcements before and after the equity issue announcement. If the announcement of the new equity issue releases manager-specific information, the next quarterly earnings announcement following the announcement of the issue should bring less new information than it would have without the issue announcement. Thus, the new earning announcement can be expected to bring less information than did earnings announcements, on average, in the past five years.
The abnormal return at the first quarterly earning announcement after the equity issue announcement is computed for each firm. Table 2, part 1, compares, on average across firms, the absolute value of this abnormal return to the average standard deviation of the abnormal returns for the five years preceding the issue. The t-statistic on the difference is 3.22 and the Wilcoxon statistic is 4.03, both significant at the one percent level.

Table 2, part 2, checks that the observed change in IA is not due uniquely to a decrease in leverage, but also to the information release created by the equity issue announcement. The measures of information asymmetry are unlevered and then the same statistics are computed. The results become less pronounced but are still present with the leverage correction: the t-statistic of 2.08 is still significant at the five percent level and the Wilcoxon statistic of 3.22 is significant at the one percent level.

I conclude that the equity issue announcement decreases the information asymmetry: the quarterly earnings announcement directly following the announcement of the issue is on average less informative than past quarterly earnings announcements.

B. Residual Variance

Table 2, parts 3 and 4, compares the level of the residual variance of the daily stock return before and after the equity issue announcement. Table 2, part 3, shows that the residual variance of the daily stock return for the month following the equity issue announcement is significantly lower than the residual variance of the daily stock return for the year preceding the equity issue announcement: the t-statistic is 1.86, significant at the ten percent level and the Wilcoxon statistic is
5.10, significant at the one percent level. Table 2, part 4, shows that the result remains, although at a lower level of significance, when the residual variances are unlevered.

I have also computed the residual variance for several periods after the equity issue has been made. For example for the residual variance of the daily stock returns for the month following the equity issue (not the equity issue announcement): the residual variance after the issue has been made, .000578, is lower than the residual variance preceding the equity issue announcement. However, the difference is less significant ($t = .45$, Wilcoxon = 3.8) than for the residual variance measured directly after the equity issue announcement\textsuperscript{13}. The general result is a decrease in the residual variance, although the amount of the decrease depends on the estimation period.

Overall, the time-series tests are consistent with theories of information asymmetry. They show a decrease in the level of information asymmetry after a stock issue: the market-adjusted three-day abnormal return at the earnings announcement and the residual variance of the daily stock price are significantly lower after the equity issue announcement than before, and lower than would be implied by the decrease in leverage alone. Furthermore, the data indicate that the decrease in the information asymmetry is short-lived. The results for the residual variance are stronger for the shorter periods of time. Similarly, I get significant results for the quarterly earning announcement directly following the equity issue announcement whereas Healy and Palepu (1987) do not find any effect by looking at the annual earnings announcements.
VI TIMING TESTS

This section studies the pattern of equity issues from a new approach, testing for timing behavior consistent with the existence of asymmetric information. It focuses on the timing in the short run (approximately three months) and with respect to specific information releasing events (earnings announcements). It tests whether the firms have a tendency to time their equity issue announcement soon after the last quarterly earnings announcement, and if firms characterized by a high level of information asymmetry are especially anxious to time their equity issue announcements.

If the level of IA can have costly implications for the firm, one would expect the firm to manage its level of information asymmetry as much as possible. For example, managers can try to decrease it or, if the information asymmetry fluctuates through time and if a higher level of information asymmetry at the equity issue announcement implies more negative consequences for the firms, the managers of the issuing firm should try to time the equity issue announcement when the level of information asymmetry is relatively low for that firm. They should especially time the announcement when the IA of the firm fluctuates substantially.

The fluctuations in the level of information asymmetry are predicted in the context of the dynamic framework described in section II. Once more, earnings announcements are taken to be the major (repetitive) channel for the release of private information to the market. Then, as shown on figure 2, the IA at the time of the equity issue announcement is an increasing function of the time since the last quarterly earning announcement.
The following subsections test the existence of significant timing behavior of the total sample of firms issuing equity and significant differences in the timing behaviors among the same firms.

A. General pattern for equity issue announcements

For each firm, the variable LAGI measures the number trading days between the day of the announcement of the issue and the day of the last prior quarterly earnings\textsuperscript{14}. The information arrival could be a function of calendar time or of trading time. If there is no timing behavior, at least not with respect to quarterly earnings announcements, the lags can be expected to be distributed uniformly over the three month interval between two earnings announcements. Figure 3 gives the distribution of LAGI. Table 6 shows that the median of the distribution of LAGI is significantly different from the uniform distribution: the Wilcoxon statistic, -5.45, is significant at one percent. This shows that the firms have a significant tendency to time their equity issue announcement soon after the preceding quarterly earnings announcement. This evidence is consistent with theories of information asymmetry being important in the process of issuing equity.

Taken to the extreme, the argument developed above suggests that firms should time their equity issue announcement immediately after the earnings announcement. Firms are clearly not doing this. But earnings announcements are not the only information releasing events, and firms could be timing their equity issue announcement with respect to the other announcements as well, such as dividend announcements, or voluntary earnings or sales forecasts, that are not considered in the simple dynamic model for the information asymmetry proposed in this paper\textsuperscript{15}. A full model describing the timing behavior of the firms would need to specify at
any given point not only what is the current level of IA but also what are the expected future levels of IA in order to compute the costs implied by those IA and to compare them to the (dis)advantages of anticipating or postponing the issue. Also, as seen in the time-series tests, the announcement of the issue itself changes (decreases) the level of IA, and it is impossible to know what the level of IA would have been at a later date had the firm delayed the issue.

B. Firm-specific patterns of equity issue announcements

All other things equal, if the cost of the equity issue increases with the IA of the firm and if the IA of the firm fluctuates in time, firms should time their equity issue announcements when their IA is relatively low. Moreover, timing the equity issue announcement when the IA is relatively low is more important for firms with a higher IA or with more pronounced fluctuations in time of their IA. I therefore test whether the observed lags between the equity issue announcement and the last quarterly earnings announcement before the equity issue announcement are significantly shorter when the IA of the firm is higher. Table 4 shows that LAGI is significantly negatively related to the residual standard deviation of the daily stock return as the t-statistic of is significant at the one percent level. (LAGI is not significantly correlated to the other measures of IA).

The results are consistent with the existence of information asymmetry and of its influence on the issuing process: firms time their equity issue announcements soon after the last quarterly earning announcement, especially when their daily stock returns have a high residual standard deviation. Of course, this timing pattern could also be consistent with other theories. The section checks that it is not derived
by the wish of investors to announce their equity issue after good earnings announcements. Table 5 shows that there are as many bad news as good news announcements immediately preceding the equity issue announcement. Bad news (good news) is defined here to be a positive (negative) abnormal return observed to the equity issue announcements. Furthermore the lags are not shorter after the good news than after the bad news.16

VII CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

The paper gives evidence of the existence and the relevance of information asymmetry for the equity issue process.

Cross-sectional tests show that increases in the information asymmetry significantly increases the drop in price observed at the equity issue announcement. Time-series tests show that information asymmetry is significantly decreased by the equity issue announcement. Timing tests show that firms time their equity issue announcement when their information asymmetry is relatively low.

Information asymmetry is shown to fluctuate significantly through time. The fluctuations are best measured over relatively short periods of time. The time series tests and the timing tests give direct evidence of the importance of the fluctuations of the information asymmetry with respect to information releases such as equity issue announcements and earnings announcements. The implications for future research are that proxies of information asymmetry taking explicit account of time or measurable over relatively shorter periods of time should be preferred. Ideally, one would need a measure of IA determined at each point on time in function of the actions of the firm, such as information releases.
The tests provide evidence in favor of models of information asymmetry in general. The effects are especially strong when taken together: the results are right in direction, usually significant, and there is no contrary significant result. This evidence is especially encouraging because information effects may be relatively small compared, for example, to uncertainty about market or industry conditions. So the study adds up to the knowledge that information asymmetry exists and matters, and it recommends continuing research in this area.
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Table 1

OLS estimates of the coefficients from the cross-sectional regressions:

\[ AREI_i = a_0 + a_1 IA_{1i} + a_2 IA_{2i} + a_3 RSIZE_i + a_4 RMEBE_i + \epsilon_i \]

(t-statistics are given in parentheses)

for 197 primary seasoned equity issues offered between 1980 and 1983.

<table>
<thead>
<tr>
<th>Measures of IA</th>
<th>CONSTANT</th>
<th>IA1</th>
<th>IA2</th>
<th>RSIZE</th>
<th>RMEBE</th>
<th>R²</th>
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<td>IA1 IA2</td>
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<td>(\sigma_\epsilon^2)</td>
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<td>0.020</td>
<td>0.001</td>
<td>2.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IAan</td>
<td>-0.024 (-3.31)***</td>
<td>-0.150 (-1.05)</td>
<td>0.011</td>
<td>0.002</td>
<td>0.7%</td>
<td></td>
</tr>
<tr>
<td>Dnban</td>
<td>-0.027 (-4.53)***</td>
<td>-0.010 (-1.99)***</td>
<td>0.020</td>
<td>0.001</td>
<td>2.2%</td>
<td></td>
</tr>
<tr>
<td>RTRADE</td>
<td>-0.035 (-4.62)***</td>
<td>0.006 (1.03)</td>
<td>0.007</td>
<td>0.002</td>
<td>0.7%</td>
<td></td>
</tr>
<tr>
<td>(\sigma_\epsilon^2)</td>
<td>Dnban -0.025 (-4.40)***</td>
<td>-8.498 (-1.61)*</td>
<td>-0.009</td>
<td>0.038</td>
<td>0.002</td>
<td>3.0%</td>
</tr>
<tr>
<td>IAan Dnban</td>
<td>-0.024 (-3.29)***</td>
<td>-0.102 (-0.67)</td>
<td>-0.010</td>
<td>0.030</td>
<td>0.003</td>
<td>1.9%</td>
</tr>
<tr>
<td>RTRADE</td>
<td>-0.034 (-4.53)***</td>
<td>-11.816 (-2.22)**</td>
<td>0.010</td>
<td>0.029</td>
<td>0.002</td>
<td>2.7%</td>
</tr>
<tr>
<td>IAan RTRADE</td>
<td>-0.030 (-3.57)***</td>
<td>-1.39* (1.37)*(1)</td>
<td>0.009</td>
<td>0.021</td>
<td>0.003</td>
<td>1.2%</td>
</tr>
</tbody>
</table>

(1) Not significant in two-tailed test.

\(R^2\) is adjusted for the number of degrees of freedom.

*, ** and *** indicate that the t-statistic is significant at the 10%, 5% and at the 1% level respectively in one-tailed tests.

AREI is the market-adjusted abnormal return at the equity issue announcement.

IA1 and IA2 are measures of the information asymmetry.

\(\sigma_\epsilon\) is the residual standard deviation of the daily stock returns.
IAan is the standard deviation of the abnormal return on the announcement of the quarterly earnings.

Dnban is a dummy variable set equal to 1 when the firm has 16 or less announcements listed in the WSJI.

RTRADE is the relative number of shares traded.

RSIZE is the relative number of shares to be issued.

RMEBE is the ratio of the market value of the equity divided by the book value of the equity.
Table 2
Comparison of the average information asymmetry before and after the equity issue announcement

<table>
<thead>
<tr>
<th>PREIA</th>
<th>POSTIA</th>
<th>DIF</th>
<th>t-stat on DIF</th>
<th>MEDIAN (%+)</th>
<th>Wilcoxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) .046</td>
<td>.037</td>
<td>.009</td>
<td>3.22(***), .012</td>
<td>4.03(***), (65)</td>
<td></td>
</tr>
<tr>
<td>2) .032</td>
<td>.027</td>
<td>.004</td>
<td>2.08(**), .005</td>
<td>3.22(***), (63)</td>
<td></td>
</tr>
<tr>
<td>3) .000618</td>
<td>.000514</td>
<td>.000104</td>
<td>1.86(*), .000106</td>
<td>5.10(***), (68)</td>
<td></td>
</tr>
<tr>
<td>4) .000434</td>
<td>.000368</td>
<td>.000060</td>
<td>1.64, .000055</td>
<td>4.08(***), (67)</td>
<td></td>
</tr>
</tbody>
</table>

%+ is the percentage of positive differences in the sample.

PREIA is the average information asymmetry before the equity issue announcement. It is measured by 1) the average IAan of the sample before the equity issue announcement 2) the same, unlevered 3) the residual variance of the daily stock returns for the year before the equity issue announcement 4) the same unlevered.

POSTIA is the average information asymmetry after the equity issue announcement. It is measured by 1) the average absolute value of the abnormal return of the first earnings announcement after the equity issue announcement 2) the same unlevered 3) the residual variance of the daily stock returns for the month following the equity issue 4) the same unlevered.

Prior to the equity issue announcement, the unlevering ratio for each firm is computed as the market value of the equity divided by the sum of the market value of the equity plus the book value of the debt. After the issue, the unlevering ratio is computed in the same way by adding the value of the new issue to the market value of the equity.

DIF (MEDIAN) is the average (MEDIAN) difference between PREIA and POSTIA. (*), (**) and (***) indicate that the difference is significant at the 10%, 5%, 1% level for one tailed tests.
Table 3

Comparison of the median of the distribution of the number of trading days between the equity issue announcement and the last final quarterly earnings announcement to the median of a uniform distribution over (1,66) for 197 primary seasoned equity issues offered between 1980 and 1983. (1)

<table>
<thead>
<tr>
<th></th>
<th>mean</th>
<th>median</th>
<th>%observations higher than 33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uniform</td>
<td>33</td>
<td>33</td>
<td>50</td>
</tr>
<tr>
<td>Sample</td>
<td>25</td>
<td>21</td>
<td>29</td>
</tr>
</tbody>
</table>

(1) Wilcoxon statistic = - 5.25, shows that the median of the sample distribution is statistically different at the 1% level from the median of the uniform distribution.
Table 4

OLS estimates of the coefficients from the cross-sectional regression:

\[ \text{LAGI}_i = \alpha_0 + \alpha_1 \sigma_{\varepsilon} + \varepsilon_i \]

for 197 primary seasoned equity issues offered between 1980 and 1983.

(t-statistics are given in parentheses)

<table>
<thead>
<tr>
<th>CONSTANT</th>
<th>( \sigma_{\varepsilon} )</th>
<th>( R^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.07</td>
<td>-395.72</td>
<td>1.9%</td>
</tr>
<tr>
<td>(7.85)**</td>
<td>(-2.20)**</td>
<td></td>
</tr>
</tbody>
</table>

\( R^2 \) is adjusted for the number of degrees of freedom.

LAGI is the number of trading days between the last quarterly earnings announcement before the equity issue announcement and the equity issue announcement.

\( \sigma_{\varepsilon} \) is the residual standard deviation of the daily stock returns for the year preceding the announcement of the equity issue.

** and *** indicate that the t-statistic is significant at the 5\% level in one-tailed test respectively.

1) For \( \sigma_{\varepsilon}^2 \) instead of \( \sigma_{\varepsilon} \), \( R^2 \) is 0.7\% and \( t=-1.59 \)
Table 5

Distribution of the number of calendar and trading days between the equity issue announcement and the previous quarterly earnings announcement, conditional on the direction of the abnormal return at the previous quarterly earnings announcement for 197 primary equity issues offered between 1980 and 1983.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th># observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAGI after good news</td>
<td>25</td>
<td>23</td>
<td>103</td>
</tr>
<tr>
<td>LAGI after bad news</td>
<td>26</td>
<td>20</td>
<td>94</td>
</tr>
</tbody>
</table>

The last quarterly earnings announcement before the issue is defined to represent good (bad) news when the abnormal return at the announcement of the quarterly earnings is positive (negative).

LAGI is the number of trading days between the last quarterly earnings announcement before the equity issue announcement and the equity issue announcement.

Comparison of LAGI after good news to LAGI after bad news: the Wilcoxon statistic is -.69 and the t-statistic of the difference is .36 (a positive sign signifies that LAGI after good news is higher)
Figure 1

Representations of the information asymmetry, IA(t) by \( \sigma_{P-V}^2(t) \)
and of the total uncertainty of the firm by \( \sigma_V^2(t) \)
at a given point in time.

\[\begin{align*}
\sigma_P^2(t) \\
\sigma_W^2(t) \\
IA_t = \sigma_{P-V}^2(t)
\end{align*}\]

t_e is a date when firm-specific information is revealed to the market.
L is the time the firm-specific information takes to reach the market in the absence of any information-revealing event.
V is the value of the firm known to the managers of the firm.
P is the market value of the firm.
\( \sigma_P(t) \) (\( \sigma_{P-V}(t) \)) is the standard deviation at time t of the distribution of values for P (P-V).
\( \sigma_W(t) \) is the standard deviation of P created by market-wide fluctuations. It represents the uncertainty about the firm shared by the managers of the firm and the market.
Figure 2

Introduction of the equity issue announcement in the dynamic framework of figure 1

IA_t is the information asymmetry at time t.

t_e is the day of the equity issue announcement.

t_ea is the day of the quarterly earning announcement.

_t-ea is the day of the last quarterly earnings announcement prior to the issue.

_t+eapan is the day of the first quarterly earnings announcement after the issue has been made.

L is the lag taken by the manager-specific information to reach the market in the absence of information revealing events.
Figure 3

Distribution of the number of trading days (LAGI) between the last quarterly earnings announcement before the equity issue announcement and the equity issue announcement for 197 primary seasoned equity issues offered between 1980 and 1983.

\[
\begin{array}{c}
\text{N is the number of observations with a lag higher or equal to LAGI-10 and lower than LAG.}
\end{array}
\]

(1) I have kept no firms with an equity issue announcement corresponding to trading day -1, day 0 or day +1 of an earnings or of a dividend announcement in the final sample, so there is no LAG equal to -1, 0 or 1. 11 (4) firms have been deleted from the sample because they had an earnings (dividend) announcement too close to the equity issue announcement.

--- represents a uniform distribution over the same period
ENDNOTES

1. This reaction has been interpreted in many ways, for example as evidence of the optimality of a high debt-equity ratio or of the evidence of a downward sloping demand curve for the stock of any particular firm. It has also been interpreted as a signal of unfavorable information about the true value of the assets of the firm. This study focuses on this last interpretation. (See Smith (1986) for a synthesis of the alternative theories and empirical tests related to equity issues.)


3. I choose 16 announcements because that number separates the sample in two subsamples of approximately the same size. I get similar results with other cutoff points, or when I subdivide the sample into more than two groups.

5. I choose to use intensity of trading, not total trading, because I want to exclude the impact of the size of the firm, checked independently.

6. I also ran simple regressions between the drop and each measure of IA, and got similar, although somewhat less significant, results compared to the regression 2. Multiple regression with other combinations of IA with or without RSIZE and RMEBE, give similar results to the regression 2, except that the significance of IAan and RTRADE and the corrected $R^2$ decrease when $\sigma^2_c$ and Dnban are also included in the equation.

7. For example, Asquith and Mullins (1986) find a significant positive relation between the relative size of the issue and the drop but Mikkelson and Partch (1985) and Officer and Smith (1986) find no such relation.

8. I have checked the robustness of my results to several changes. For example, I made a correction for heteroscedasticity for IAan, dividing the variables of each firm by the square root of the number of earnings announcements available for that firm with results similar to those reported in Table 1 except for a slightly less significant coefficient for IAan. An analysis of the residuals of the regressions does not warrant any obvious alternative functional form for the regressions.
Additional variables were checked and found not significantly related to the abnormal return at the equity issue announcement. These include the beta of the stock price of the firm, the variance of the daily stock returns, the ratio of the residual standard deviation of the daily stock returns to the standard deviation of the daily returns, and the number of days between the equity issue announcement and the last earnings announcement preceding the equity issue announcement. The size of the firm (measured by the total value or by the equity value of the firm, or by the log of these variables) was always positively related to AREI but never reached the significance level. Its impact was especially negligible when used with the measures of IA.

9. No special conclusion can be drawn for the comparison in RTRADE before and after the issue. The results are available on request. Note, however, that no effect would be measured if the correlation between IA and RTRADE is created by a unilateral impact of RTRADE on IA.

10. Compare for example the average absolute magnitude of the surprise at the equity issue announcement (3.5 percent) to the average magnitude of the surprise at the earnings announcements (3 percent) or to the daily residual standard deviation of the stock price (2.3 percent). (These figures are all measured for the sample used in this paper).

11. Similar conclusions are obtained for the absolute value of the abnormal return to the average absolute value of the abnormal returns for the five years preceding the issue.
12. The average abnormal return is non significantly different from zero, as expected in efficient markets.

13. The residual variance for the year following the success of the equity issue is .000499 for 193 firms (four firms stopped being listed on CRSP during that period).

14. The tests have also been conducted for the lags measured in calendar days. Similar results are obtained.

15. Additional tests can look for evidence of timing of securities issues with respect to other announcements, such as dividend announcements, or the most recent of dividend and earnings announcements. In the sample of this study, very few dividend announcements were likely to represent an important news release as only 20% announced a change in the dividend policy of the firm.

16. The results also hold when bad(good) news is defined as an abnormal return significantly (at 10% level) negative(positive) or as a decrease(increase) with respect to the previous earnings. There is no timing difference between annual earnings announcements and the other quarterly earnings announcements, consistent with the result that is in my sample quarterly earnings announcements are not significantly different across quarters.

17. The other proxy for IA (Dnban, RTRADE, IAan (t=-1.29)), as well as RSIZE and RMEBE are not significant; LAGI is not significantly related to the abnormal return observed at the equity issue announcement.
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