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EQUITY ISSUES"

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ABSTRACT

The paper shows the relevance of the degree of information asymmetry between the managers of the firm and the market for the equity issue process. It solves in the joint problem of finding measures of information asymmetry and of testing empirically their importance for equity issues. The paper introduces four proxies for the degree of information asymmetry. It 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 behaviour observed during the equity issue process.

1. INTRODUCTION AND LITERATURE REVIEW

The theory of finance was first developed under the assumption of symmetric information for all market participants. New theories and empirical results, however, have indicated the need to consider the different quality of information available to specific groups in the market. The objective of this paper is to study the importance of information asymmetry for the behavior of the firm during the process of issuing new equity, with information asymmetry defined as the difference in information between the managers of the firm and the market.

The managers normally have an advantage over the market in predicting firm-specific elements: this creates an information asymmetry between the managers of the firm and the market of particular importance in corporate finance. It is the topic of the research described here. It can be more or less important at different times in the life of the firm. It will be important every time the market is afraid that the managers can gain substantially at the expense of the market by hiding information. Ross (1977), Myers and Majluf (1984), Miller and Rock (1985) and Viswanathan (1986) develop models in which the existence of information asymmetry leads to a rational response of market prices to changes in the capital structure of the firm. In particular, the announcement of a new equity issue releases negative information about the firm and creates, all other things equal, a drop in the market value of the firm. Overall, the evidence is consistent with 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. Several studies test cross-sectionally the impact of information-related variables on the drop observed in the stock prices. Masulis and Korwar (1986) find that the variance of the stock prices (measured over the sixty days before the announcement) is positively, but not significantly, related to the drop in stock price for industrial firms. 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. Other papers study the relationship between information-related variables and other facts related to the financial structure of the firms. Bhagat and Frost (1986) study the underwriting of public utility offerings. They measure the issue costs by the sum of underwriting commissions plus issuer expenses plus underpricing (the last measured with respect to the day of the issue itself) and find that the issue costs are positively related to the beta of the firm, its standard deviation, and the standard deviation of the market. All the studies above are consistent with information effects being one of the determinants of the stock price reactions observed around the issue of equity. Furthermore, they show that the concept of degree of information asymmetry is observable through variables such as variances of the stock prices.

This study innovates in several directions. First, it presents a dynamic framework for the information asymmetry of the firm and introduces the empirical proxies for the DIA in that framework. Then the proxies can be linked to (at least) one very specific model of equity issues in a world of information asymmetry, namely Myers and Majluf's model (1984).

Finally, the interactions between information asymmetry and the equity issue process are studied by three groups of tests: cross-sectional analysis of the abnormal return at the equity issue announcement, time-series comparisons of the DIA before and after the announcement, and analysis of the timing behavior for the equity issues. Section 2 introduces the dynamic framework for the information asymmetry of the firm and the empirical proxies. Section 3 presents the data. Section 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.

2. A DYNAMIC FRAMEWORK FOR THE INFORMATION ASYMMETRY AND INTRODUCTION OF THE PROXIES

2.1 Dynamic framework for the information asymmetry

The dynamic framework presented here develops the intuition about the determinants of the information asymmetry of the firm through time. It also helps to distinguish between the total uncertainty of the firm and the information asymmetry of the firm.

The paper analyzes a world of information asymmetry, where the managers of the firm know more than the market. The market and the managers are assumed to be equally well informed about market-wide (or non manager-specific) information. The managers get some private information (the manager-specific information) before the market. The degree of information asymmetry of the firm is high (low) when managers of the firm have a relatively large (small) amount of manager-specific information. The manager-specific information can eventually be transferred to the market after some time or through some information releasing event. All other things equal, the information asymmetry of the firm is lower just after an information-releasing event than just before the event.

Figure 1 represents a world where the manager-specific information can reach the market by one of two means: (1) automatically and costlessly, after a lag of L days, where L is known and constant, or (2) through information releasing events (at t_e). If V is the value of the firm as perceived by the managers, and P the value of the firm as perceived by the market, $(P-V)$ can fluctuate in time as a function of the transfer of manager-specific information from the managers to the market. Figure 1 represents the standard deviation of $P-V$, σ_{P-V} , as a function of time. σ_{P-V} is decreased by each information releasing events, at t_e , then increases at a constant rate (in this example, the manager-specific information is assumed to come to the managers at a constant rate through time) until some new manager-specific information reaches the market, for example after a lag of L days. Some examples of information releasing events could be earnings announcements, dividends announcements, or equity issue announcements.

In a world of symmetric information, by definition, both $P-V$ and σ_{P-V} would be identically zero. Similarly, in a world of certainty, both the uncertainty of the firm and the degree of information asymmetry of the firm would be zero at any point in time. In a world of uncertainty and of asymmetric information, there will exist some uncertainty about the value of the firm and some information asymmetry between the managers of the firm and the market. 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 the situation of the market in general, or other macro variables such as the exchange rates, or maybe even the condition of the industry or impending new regulations influencing the value of the firm.

Because the total uncertainty of the firm is so often summarized by the standard deviation (or the variance) of the distribution of the values

of the firm, the thesis also discusses the degree of information asymmetry of the firm under the form of a standard deviation. Additionally, the standard deviation is made independent of the size of the assets of the firm by dividing the standard deviation by the mean of the distribution of values of the assets, corresponding to the coefficient of variation in the statistics literature, but the paper uses the expression "relative standard deviation" considered to be more intuitive².

The paper proposes four measures of information asymmetry: 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 about the firm and the trading intensity. All measures of DIA rely on the assumption that the information asymmetry had been constant during the period of estimation, and for each measure I had to balance the advantage of a longer period and more precise estimation against the possibility of instability in information asymmetry.

2.2 Stock market reaction to earnings announcements

Assume that earnings announcements are the only way managers release their private information to the market. Assume also that all managers reveal the same proportion of their private information through the earnings announcements³. Then, 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 and that the degree of information asymmetry is high for that firm. I measure the surprise of the market at the earnings announcement by DIAAn, the standard deviation of the market-adjusted, three-day abnormal return on the announcement of the quarterly earnings computed over all the quarterly

earnings announcements available during the five years preceding the equity issue announcement⁴. Usually the date listed on quarterly Compustat is one trading day earlier than the date given in the WSJI), so I choose a three-day period to adjust for the non overlap of the two sources for the earnings announcements dates.

DIAan matches especially well the concept of DIA in the Myers and Majluf issue and invest model if the value of the firm is the sum of the value of the earnings stream plus the value of the growth financed by equity issue (where the earnings correspond to all the cash flows expected to be generated from the assets in place of the firm) and if the earnings announcements release information only about the assets of the firm not influenced by the forthcoming decision to issue equity or not, as Dierkens (1988) has shown that only the uncertainty of the assets in place of the firm creates problems during the equity issue process. (Only the uncertainty of the assets in place systematically increases the drop at the equity issue and is systematically decreased by the announcement)

2.3 Residual variance of stock returns

I use the residual volatility of the market value of the equity of the firm as another measure of the DIA of the firm. Unlike the earnings-based measure DIAan, the residual volatility can be measured with reasonable precision over short periods of time. σ_{ϵ}^2 (σ_{ϵ}) is the relative market-adjusted residual variance (standard deviation) of the daily stock price returns for the year preceding the equity issue announcement⁵.

σ_{ϵ}^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 DIA. For example, the uncertainty about industry developments may be included, but is likely to be shared by the managers of the firm and by the market^{6,7}. σ_{ϵ}^2 is a good measure of DIA in the context of Myers and Majluf when the volatility of the assets in place is close to the volatility of the firm or when the growth opportunity of the firm is small (see Dierkens 1988).

2.4 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. The DIA 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. Similarly, 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. Of course these two variables, the number of public announcements and the intensity of trading can themselves be influenced by the characteristics of the firm. It is, for example, possible that managers and analysts release information more frequently when the intrinsic information asymmetry of the assets of the firm is higher. Similarly, informed traders may benefit more from trading in the shares of firms with a high level of information asymmetry, or a high level of trading can reveal information and decrease the DIA of the firm. Optimally, of course, the DIA of the firm and the

actions of the managers and of the market should be determined endogeneously as a function of the characteristics of the firm. I do not present here a full model of information releases and trading. I only consider whether these two variables influence the observed DIA 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.

2.4.1 Intensity of public announcements

Figure 2 shows how the 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 DIA, $Dnban$, is a dummy variable set equal to one when the firm has 16 or fewer announcements listed in the WSJI for the year of the equity issue announcement^{8,9}.

2.4.2 Intensity of trading

Although many models of trading volume (or trading intensity) exist, no single theory is generally accepted as summarizing equilibrium trading¹⁰. Two links between trading and the DIA can be represented in the framework introduced earlier. If the level of information asymmetry determines the volume (or intensity) of trading, trading will fluctuate

with the degree of information asymmetry through time. On the other hand, trading could decrease the DIA of the firm independently of its lag and of the information-revealing events. My conclusion from the literature on trading is that the intensity of trading may be correlated to the DIA of the firm but I am not sure of the direction of its influence¹¹. I will then content myself with using this measure without any a priori sign attached to it.

My measure of DIA, RTRADE, is 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 announcement¹².

3. DATA

The sample includes 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. Only primary issues are considered, contrary to other studies that include secondary or mixed offerings 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 must fulfill additional requirements in order to be kept in the sample. 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 Wall Street Journal Index. That date plays the central role in this study as this study analyzes the price behavior around the announcement of the issue^{13,14}. 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 Wall Street Journal Index, 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. I also exclude firms with several classes of common stock traded on the exchange, and exclude issues of ADR (American Depository Receipts).

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. I use two sources for the dates of the quarterly earnings announcements: the quarterly Compustat data base and the WSJI. When a firm is not listed on quarterly Compustat, or when a quarterly earnings announcement is missing on the tape, I search the WJSI for the missing announcements. 151 firms listed on quarterly Compustat and 46 firms not listed on quarterly Compustat fulfill these requirements, providing a total sample size of 197.

I do present results separately for the subsample of firms listed on quarterly Compustat and for the subsample of firms not listed on quarterly Compustat. The two subsamples have different characteristics and behave differently with respect to equity issues. A test of differences in means shows that σ_e , DIAan and RMEBE are significantly higher for the subsample of firms off quarterly Compustat¹⁵. Additionally, F-statistics have shown that their behaviour differ significantly in some tests, especially cross-sectional tests with multiple regressions.

The size of the issue is taken from the Wall Street Journal Index, on the announcement day of the issue. It includes the total number of shares to be issued in the US and abroad¹⁶. The relative size of the issue is computed as the number of shares 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.

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 method¹⁷ over a two-day period, i.e. the day the announcement is published in the Wall Street Journal (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^{18 19}:

$$-\text{Drop}_i = \text{AR}_{it} = R_{it} - R_{Mt} \quad (1)$$

where . i represents firm i

. AR_{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 (measured by the CRSP value-weighted market index)

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. The market value of equity is the number of shares outstanding multiplied by price of the share, obtained from the annual Compustat²⁰. I estimate the importance of growth opportunities of the firm by the traditional market-to-book ratio RMEBE. A high market-to-book ratio means that a high percentage of the value of a 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 1.776²¹.

Table 1, gives the cross-correlations between the variables. It also gives the significance of the linear correlation between two variables, measured by t-statistics. The residual variance and the average reaction at the earnings announcements are very significantly positively correlated in the three samples (the t-statistics are respectively 8.10, 6.98 and 4.21 for the total sample, the subsample of firms listed on quarterly Compustat and the subsample of firms off quarterly Compustat). The intensity of trading and the relative size of the issue tend to be significantly positively related to the residual standard deviation and to the average reaction at the earnings announcements. Other variables do not show significant cross-correlations.

The industry and time clustering of the sample is standard in the literature²². The sample includes 24 shelf registrations. Their

characteristics are consistent with the previous literature on shelf registrations (see Bhagat, Marr and Thompson (1985) and Moore and Peterson (1986)). The firms using shelf registrations have a tendency to have a lower σ_{ϵ} , a lower DIAan, and the shelf issues have a smaller relative size (the t-statistics on the difference between the characteristics for the shelf issues and the other issues are respectively -1.60, -1.57 and -1.79). The other characteristics are not significantly different. It confirms the idea that shelf registrations are used for equity issues mostly by the better known and most stable firms. In my framework, it can be interpreted as a sign that shelf issues are used when the information asymmetry is relatively low²³.

4. CROSS-SECTIONAL TESTS

If models of information asymmetry hold, then all other things equal, an increase in the level of the degree of information asymmetry of a firm increases the drop observed at the equity issue announcement. The major objective of this test is to explore whether, all other things equal, the cross-sectional variation in the degree of information asymmetry explains the cross-sectional variation in the drop observed at the equity issue announcement. The results of the tests will also show whether other characteristics of the equity issue and of the issuing firm influence the drop in stock price at the equity issue announcement. For example, simulations of the Myers and Majluf model have shown that the drop in stock price observed at the equity issue announcement is an increasing function of the degree of information asymmetry of the firm and of the relative size of the issue, and a decreasing function of the ratio of the growth opportunity to the assets in place of the firm (see Dierkens (1988)). Multiple regressions are run between the market adjusted two-day

abnormal return observed at the equity issue announcement and empirical proxies for DIA, the relative size of the issue, and the ratio of the growth opportunity to the assets in place of the firm.

The theoretical concept of information asymmetry can only be imperfectly represented by the empirical proxies. Although the correlation among the four variables σ_{ϵ}^2 , DIAan, Dnban and RTRADE is high (see Table 1), each of them captures only some elements of DIA, so, multiple regressions are run with several measures of DIA used jointly in order to capture better the cross-sectional differences in the true level of information asymmetry across firms. Regression 2 especially emphasizes the combination of a measure of the characteristics of the assets of the firm, σ_{ϵ}^2 or DIAan, with a measure of the informational environment of the firm, Dnban or RTRADE:

$$\text{AREI}_i = a_0 + a_1 \text{DIA}_{i1} + a_2 \text{DIA}_{i2} + a_3 \text{RSIZE}_i + a_4 \text{RMEBE}_i + \epsilon_i \quad (2)$$

where i represents the issuing firm i , DIA_1 is σ_{ϵ}^2 or DIAan, DIA_2 is Dnban or 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 DIA and the relative size of the issue and decrease with the ratio of the growth opportunity to the assets in place. The influence of each variable has a well defined direction, with the exception of RTRADE, as the correlation of the variable RTRADE to the true measure of the degree of information asymmetry of the firm is not clear a priori. The significance of RTRADE is listed with two-tailed tests and the significance of all the other variables with one-tailed tests.

Table 2 shows the results of the regressions (2) for the total sample, the subsample of firms on quarterly Compustat and the subsample of firms off quarterly Compustat. 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 in the total sample and in the subsample of firms off quarterly Compustat; it is not significant in the sample of firms on quarterly Compustat. The result for RMEBE is encouraging considering how difficult it is to capture empirically the asset structure of the firm²⁴. 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)²⁵. The measures of information asymmetry significantly influence the drop in the sample of firms listed on quarterly Compustat and to a lesser degree in the total sample. In these two samples, the coefficients for σ_{ϵ}^2 and Dnban are significant at the five percent level. No measure of DIA has any impact at all for the sample of firms off quarterly Compustat. For the subsample of firms listed on quarterly Compustat, all measures of information asymmetry reach the ten percent significance level, σ_{ϵ}^2 reaches the one percent significance level and even RTRADE reaches the five percent significance level in two-tailed tests²⁶. These results show that

σ_{ϵ}^2 , DIAan, Dnban and RTRADE each capture different components of the true level of the degree of information asymmetry of the firm²⁷.

Overall, the evidence is weakly consistent with the Myers and Majluf issue and invest model and with models of information asymmetry in general. More specifically, the degree of information asymmetry of the firm significantly increases the drop in stock price observed at the equity issue announcement. The residual variance of the stock price gives the strongest results but all measures of DIA become significant when used in pairwise combination.

The tests give somewhat disappointing results concerning the empirical importance of the structure of the assets of the firm for the measure of the degree of information asymmetry. The empirical proxy of the DIA most closely related to the separation of the total assets of the firm into assets in place and growth opportunity done in Myers and Majluf, i.e. the average market reaction at the quarterly earnings announcements, provides relatively poorer results than for example the residual standard deviation of the stock price. Of course, this could be explained by several factors: (1) the average market reaction at the quarterly earnings announcements is measured over a much longer period of time (five years) than the other proxies (measured over one year). The fluctuations in time over the four extra years could be too important to justify the use of this measure of information asymmetry; (2) the earnings announcements may not correctly separate the assets of the firm into the assets in place and the growth opportunity; (3) there could exist interdependent relations between the DIA and the policy of information releases of managers. For example the managers of a firm with a high level of manager-specific information could choose to make their earnings announcements as uninformative as possible (for example, for fear of disclosing valuable

information to their competitors). Then the average market reactions of earnings announcements of the firm would be lower, although its DIA is high.

The intensity of trading and the intensity of public announcements are less directly related to the characteristics of the firm but perhaps more directly related to the actions of the managers and of the market. These more "indirect" measures give good results, although never quite as good as the residual standard deviation of the stock.

5. 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 degree of information asymmetry. This effect is represented on figure 2, where the first earnings announcement after the equity issue announcement decreases less the DIA than did the last earnings announcement before the equity issue announcement²⁸. This section tests whether there is evidence that, all other things equal, the degree of information asymmetry is significantly lower after the announcement than before the announcement.

The tests are conducted for three measures of information asymmetry available after the equity issue announcement: the average market-adjusted three-day abnormal return at the earnings announcement, the residual variance of the daily stock returns and the intensity of trade.

Relatively short periods of time are chosen for measuring the DIA 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 (for example during a three month period)²⁹.

(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 DIA 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 degree of 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 degree of information asymmetry faced by the stockholders of the firm: even when the DIA per unit of asset remains constant, this information asymmetry is shared over a larger equity base and each individual stockholder bears a smaller DIA.

5.1 Reaction at the earnings announcements

Table 3 reports the tests results for the comparison of the market-adjusted three-day 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 market-adjusted three-day abnormal return at the first quarterly earning announcement after the equity issue announcement is computed for each firm. Table 3, part a, compares, on average across firms, the absolute value of this **abnormal** return to the average standard deviation of the market-adjusted three-day abnormal returns for the five years preceding the issue^{30,31}. T-statistics and Wilcoxon statistics indicate the significance level of the differences. For the total sample, the t-statistic is 3.22 and the Wilcoxon statistic is 4.03, both significant at the one percent level.

Table 3, part b, checks that the observed change in DIA 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 computed³².

The results become less pronounced but are still present with the leverage correction. For the total sample, 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 degree of information asymmetry: the quarterly earnings announcement directly following the announcement of the issue is on average less informative than past quarterly earnings announcements.

5.2 Residual Variance

Table 47 compares the level of the residual variance of the daily stock return before and after the equity issue announcement. Table 14, part a, 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 4, part b, shows that the result remains, although at a lower level of significance, when the residual variances are unlevered (with the same correction as before).

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 announcement³³.

The general result is a decrease in the residual variance, although the amount of the decrease depends on the estimation period.

5.3 Intensity of trading

This section compares the intensity of trading in the shares of the firm before and after the equity issue announcement. If a high DIA implies a high intensity of trade, the decrease in DIA induced by the equity issue announcement should be reflected in a decrease of the trading intensity. If, however, there exists a negative correlation between the DIA and the intensity of trading because the DIA of a firm is decreased by the information released through trading, there is no reason for the decrease in DIA created independent of trading by the equity issue announcement to be reflected by any change in trading. Once more, the

results for RTRADE are harder to interpret, and two-tailed tests are reported.

Table 5, part a, compares the intensity of trading for the month preceding the equity issue announcement (more precisely the four week period ending before the week of the equity issue announcement) to the intensity of trading of the month (more precisely, the four week period) starting two weeks after the success of the equity issue. For this test, the data are hand-collected from the New York Stock Exchange Price Record and from the American Stock Exchange Price Record. The week of the issue and the week following the issue are excluded from the estimation period as investment bankers report that many investors resell their shares just after having acquired them at a new equity issue. If this happens in the sample, and if the volume of trading after the equity issue announcement is measured by including the issue day itself, the post intensity of trading could be significantly overestimated³⁴. Table 5 shows that there is no significant change in the intensity of trading. The change in the intensity of trading is even so weak that, for the total sample, the parametric and the non-parametric tests have different signs. The tests have also been done for yearly intervals. Table 5, part b, shows a very significant decrease in the intensity of trading for the subsample of firms off Compustat: the intensity of trading drops from .81 to .41, with t-statistic on the difference of 3.64 and a Wilcoxon statistic of 4.53 both significant at the 1% level in two tailed tests. No significant change is observed for the firms on Compustat.

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 degree of 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.

6. TIMING TESTS

The timing of equity issues is a useless, and perhaps costly, activity in markets with symmetric information. However, Black (1982), says that underwriters offer valuable advice on the timing of issues and quotes this as one of the reasons why firms want to use underwriters. Empirical studies show that equity issues are not distributed uniformly through time but that they have a tendency to follow a general increase in the level of the market and more particularly an increase in the level of the stock of the firm itself (see Marsh (1982), Asquith and Mullins (1986), Kalay and Shimrat (1987) and Masulis and Korwar (1986)). This section studies the pattern of equity issues from a new approach, testing for timing behavior consistent with the theory 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).

If the level of DIA 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 by making more voluntary press releases. Also, if the degree of 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. Once more earnings announcements are taken to be the major (repetitive) channel for the release of private information to the market ³⁵.

The fluctuations in the level of information asymmetry are predicted in the context of the dynamic framework described in section 2. The tests will be joint tests of the timing behavior of the firms and of the dynamic structure of information asymmetry. Then, as shown on figure 2, the DIA at the time of the equity issue announcement is an increasing function of the time since the last quarterly earning announcement.

6.1 General pattern for equity issue announcements

The paper tests whether the firms have a tendency to time their equity issue announcement soon after the last quarterly earnings announcement. For each firm, the variable LAGc (LAGtr) measures the number of calendar (trading) days between the day of the announcement of the issue and the day of the last prior quarterly earnings³⁶. 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 the LAGc and LAGtr³⁷. Table 6 shows that the medians of the distributions of the lags are significantly different from the uniform distribution: the Wilcoxon statistics, -4.59 and -5.45, are 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 paper³⁸. 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 DIA but also what are the expected future levels of DIA in order to compute the costs implied by those DIA 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 DIA, and it is impossible to know what the level of DIA would have been at a later date had the firm delayed the issue.

6.2 Firm-specific patterns of equity issue announcements

All other things equal, if the cost of the equity issue increases with the DIA of the firm and if the DIA of the firm fluctuates in time, firms should time their equity issue announcements when their DIA is relatively low. Moreover, timing the equity issue announcement when the DIA is relatively low is more important for firms with a higher DIA or with more pronounced fluctuations in time of their DIA. I therefore test whether the observed lags between the last quarterly announcement before

the equity issue announcement and the equity issue announcement are significantly shorter when the DIA of the firm is higher. Table 7 shows that LAGc and LAGtr are significantly negatively related to the residual standard deviation of the daily stock return as the t-statistics of -2.53 and -2.20 are significant at the one percent level. (The lags are not significantly correlated to the other measures of DIA).

6.3 Additional timing patterns

The results are consistent with of 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. I have checked that it is not derived by the wish of investors to announce their equity issue after good earnings announcements. Table 8 shows that there are as many bad news as goon news preceding the equity issue announcement. Bad news(good news) is defined here to be a positive(negative) market-adjusted three day abnormal return observed to the equity issue announcements. Furthermore the lags are not shorter after the good news than after the bad news³⁹.

Maybe managers manage the whole issuing process in order to minimize the negative consequences of the existence of information asymmetry. The firms in my sample exhibit some further characteristics consistent with this idea. The firms with the highest σ_{ε}^2 tend to make additional announcements concerning the equity issue⁴⁰. Also the firms with the highest DIA and issuing the largest amounts of equity wait the most time between the announcement and the realization of the equity issue⁴¹. These results are consistent with the concern to offer more

timely information and a larger investigation period to the investors when the DIA of the firm is highest.

7. CONCLUSION AND IMPLICATIONS FOR FUTURE RESEARCH

The objective of the paper is the study of the relevance of the degree of information asymmetry between the managers of the firm and the market for the equity issue process. It consists of the joint problem of finding good measures of the degree of information asymmetry and of testing empirically their importance for equity issues.

I interpret the tests as evidence in favor of models of information asymmetry in general and in favor of the Myers and Majluf model in particular. 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 general impression that information asymmetry exists and matters, and justifies managers concern about it. The paper also provides evidence in favor of a dynamic approach to the capital structure problem.

First it introduced a dynamic framework for the informational environment of the firm where the private information of the managers can be revealed either after a lag or through some news-releasing event. Then it presents four major proxies for the degree of information asymmetry for the equity issue process of the firm: the average intensity of the market reaction at quarterly earnings announcement, the residual variance of the stock price, the number of public announcements about the firm made in the WSJI and the intensity of trading.

The cross-sectional tests show that the degree of information asymmetry significantly increases the drop in price observed at the equity

issue announcement. The time-series tests show that the information asymmetry is significantly decreased by the equity issue announcement. The timing tests show that firms time their equity issue announcement when their information asymmetry is relatively low.

Most importantly, the tests give an overall indication that the dynamics of the variables are important. Information asymmetry is shown to fluctuate significantly through time. The fluctuations are best measured over relatively short periods of time. The times series tests and the timing tests give direct evidence of the importance of the fluctuations of the information asymmetry with respect to equity issue announcements and earnings announcements. The general superiority of the residual standard deviation, over for example the average market reaction of earnings announcements as a measure of DIA in the cross-sectional tests, can also be interpreted as a sign of the instability of the information asymmetry through the life of the firm. The implications for future research are that proxies of DIA taking explicit account of time or measurable over relatively shorter periods of time should be preferred⁴².

The tests also indicate that many variables and the decisions of the managers interact with each other. Ideally, one would need a measure of DIA determined at each point in time in function of the actions of the firm, in order to treat the DIA, information releasing events (such as earnings announcements) and characteristics of the equity issue as jointly determined variables once the nature of the assets of the firm are specified. There are two examples of cases where this behavior has already been noticed. Officer and Smith (1986) also defend the idea of an optimizing behavior of the firm with respect to its information asymmetry. They present empirical validation that firms adapt the certification service they buy from investment bankers for their equity issues in

function of their degree of information asymmetry. It is also implicitly shown in the choice made by firm between shelf issues and traditional underwriting: shelf issues are mostly used by low DIA firms and for low risk securities.

The paper has given evidence of the existence and the relevance of information asymmetry for the equity issue process. Several empirical proxies have been shown to capture the concept adequately. It ends, however, by suggesting that a potentially fruitful line of research is to formulate a dynamic framework for the information asymmetry and for the actions of the firm, where the information asymmetry can be modeled as varying through time, with time defined with respect to information-releasing events such as earnings and equity issues.

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ENDNOTES

1. This reaction has been interpreted in many ways, for example as evidence of the optimality of a high debt-equity ratio (maybe for tax reasons) or of the evidence of a downward sloping demand curve for the stock of any particular firm, or it could reflect a wealth transfer from the bondholders to the stockholders. But it can also be interpreted as a signal of unfavorable information about the true value of the assets of the firm. This study focuses on this last interpretation. I summarize here only the studies related to asymmetric information. (See Smith (1986) for a synthesis of the alternative theories and empirical tests related to equity issues.) Additionally, the studies of Kalay and Shimrat (1987) (they show that bond prices drop when a new equity issue is announced), Dann and Mikkelson (1984), Eckbo (1986), Mikkelson and Partch (1986) (they show a weak tendency for the magnitude of the drop observed at the announcement of the issue of securities to increase as the securities become more risky), Mikkelson and Partch (1986) (they show that the stock price drops less when the proceeds of the issue will be used for capital expenditure than when they are used for other purposes) provide evidence in favor of information theories in general and Myers and Majluf model in particular.
2. The choice between the standard deviation and the variance is arbitrary. The simulations of the Myers and Majluf model indicate that the standard deviation performs marginally better than the variance in the sense of providing a more linear relationship between the DIA and the observed drop in the market value of the firm at the equity issue announcement over most of the parameter space (see Dierkens (1988)). On the other hand, the empirical results are sometimes better for the standard deviation and sometimes better for the variance.
3. There are reasons to disagree with this. It may be optimal for different firms to release a different quantity of information, for example, for fear of revealing too much valuable information to its competitors. Some firms may also be required to reveal more information than others, e.g. regulated utilities.
4. I have also used DIAan2, the mean absolute deviation of the market-adjusted three-day abnormal return on the announcement of the quarterly earnings. I get similar results with DIAan2 as with DIAan, and I present only the latter.
5. The daily returns available on CRSP are also used to compute the total standard deviation (σ) of the returns, as well as the beta (β) and the standard deviation of the market return (σ_M) over the year preceding the announcement of the issue for each firm. The statistics of these values are in the same ranges as others studies in the literature, as for example Bhushan (1987). I ran the empirical tests presented in later sections also for those measures of uncertainty and they did not

provide the same results as the residual standard deviation. This emphasizes that the DIA and not the uncertainty per se creates all the effects reported.

6. The measure could be improved by excluding fluctuations caused by factors observed at the same time by the managers of the firm and the market. For example, a 'new' residual standard deviation could be computed net of industry factors.
7. Note that σ_{ϵ}^2 would still correctly rank the true DIA if it includes for all firms the same percentage of uncertainty shared by the managers of the firm and by the market.
8. 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, e.g. 20 announcements, or when I subdivide the sample in more than two groups.
9. The distribution of the number of announcements listed in the WSJI is very skewed to the right: a well known firm can have several columns, even pages, of announcements. The incremental impact of one announcement for a firm intensively followed by the market should be much lower than for a firm with only a small number of announcement. The choice of a dummy variable instead of a continuous variable for DIA corrects for this effect.
10. Also, the models focus on the difference in information among different groups of investors and not on the difference in information between the market in general and the managers of the firm. Intuitively, however, it seems fair to say the the DIA is higher when investors' levels of information vary extensively from one group to another.
11. Usually, models separate traders into liquidity/portfolio rebalancing traders and information traders. When the informed traders have more information relative to the liquidity traders i.e. when the DIA is high, they can expect to make more money per transaction, at the liquidity traders' expenses, so they trade more. In equilibrium, however, the liquidity traders may decrease their amount of trading extensively, and trade instead in low DIA firms, making trading less lucrative in high DIA firms, or useless, for the information traders. So, a high level of trading can be taken to represent a high level of information trading created by a high DIA, or it can represent liquidity trading and a low DIA. Additionally trading itself, whether induced or not, can reduce the equilibrium level of DIA.

For example, Tirole (1982) shows that speculative trading can only exist under certain conditions, for example when agents have different prior beliefs. Tauschen and Pitts (1983) show that the volume of trading is an increasing function, among others, of the disagreement among traders (measured by the difference in precision in traders' information). But in Pfeiderer (1982), the volume of trading is negatively related to the disagreement among investors.

12. 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. (The results were similar for total trading).
13. Although the literature (e.g. Mikkelson and Partch (1986)) have shown that abnormal behavior can be observed throughout the issuing process, most of the effect comes at the announcement day. In my sample too, t is only $-.82$ on the issue day for example).
14. The announcement day responds to the day of the issue in 53 cases otherwise fulfilling all the other requirements. The 53 cases include some shelf registrations and some issues of very small amount for which no registration with the SEC is required. They also include a large number of firms that have filed a registration with the SEC, but where no filing date is announced through the WSJI. These 53 firms have been excluded from the sample to be sure to get a clean signal about the announcement of the equity issue. For this subsample of 53 firms, the average two-day market adjusted abnormal return is $-.0095$ ($t = -1.67$). 73 percent and 70 percent of the observations are negative on day-1 and day0 respectively. These results are different from both the reaction at the equity issue announcement and the reaction at the realization of the value for the total sample.
15. The t -statistics are respectively -3.02 , -3.18 and -3 .
16. The foreign issues happened only in Canada in the final sample.
17. I thank Richard Ruback and Robyn McLaughlin for the use of their programs (Superday and variations).
18. These results are comparable to others in the literature. For example, Asquith and Mullins (1986), (Masulis and Korwar (1986)) found an average abnormal return of -3 percent, (-3.25 percent) with t -statistics of -12.5 percent (-11.3 percent).
19. Also, I have obtained very similar results for AR_{it} computed with other methodologies.
20. Similar conclusions obtain when the market value of the equity is obtained from CRSP, one month before the equity issue announcement.
21. I have also used the ratio of the market value of the equity plus the book value of the debt divided by the book value of the assets of the firm to estimate the growth opportunities and obtained similar results, although somewhat less significant. This makes sense, because the estimation of the market value of the debt by the book value of the debt can be fairly poor.
22. A subsample of seven industries in the oil and gas extraction (SIC number 13) in 1980 and 1981 is of special interest. McConnell and Muscarella (1985) had found this industry to behave differently from the rest of the market during the period 1975-1981. Also Jensen (1986) quotes this industry as a case where the market seemed to have had especially good information about the potential value of the firm. That subsample could also behave differently in my work. It did but

only in some cases. I only get a significantly different result for the regression of Table 2 with $DIA = DIA_{an}$, where for the subsample of oil and gas mining firms, the coefficient for DIA_{an} is -1.46, with $t = -2.1$ and the coefficients for $RSIZE$ is +.35 with $t = +2.15$.

23. This is also in line with the observed fact that less risky securities like bonds tend to be more often issued by shelf registrations than riskier securities like equity or complex convertible bonds.
24. One could interpret this result to be favorable to the Myers and Majluf model in the sense that the model works best when the variable is important: the firms off Compustat have a higher proportion of their assets in the growth opportunity. Note that this represents evidence directly in favor of the Myers and Majluf model, but not for asymmetric information models in general, as the market-to-book ratio is not an important variable in other information-based models.
25. However, it is in line with previous empirical studies, which have found mixed results. 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.
26. All the proxies come closest to the theoretically correct measure of DIA for equity issues in the Myers and Majluf model (see Dierkens, 1988) for the firms on quarterly Compustat (because $RMEBE$ is lower). Additional tests have shown that R^2 and t increase(decrease) for the subsample of firms with the lowest(highest) level of $RMEBE$.
27. I have checked the robustness of my results to several changes. I ran simple regressions between the drop and each measure of DIA , and get similar, although somewhat less significant, results compared to the regression (2). Multiple regression with other combinations of DIA (including only one measure of DIA), with or without $RSIZE$ and $RMEBE$, give similar results to the regressions (2), except that the significance of DIA_{an} and $RTRADE$ decrease when σ_{ϵ}^2 and $Dnban$ are included in the equation. I made a correction for heteroscedasticity for DIA_{an} , 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 2 except for a slightly less significant coefficient for DIA_{an} . An analysis of the residuals of the regressions does not warrant any obvious alternative functional form for the regressions. No outliers influence the results, except for two high values for $RMEBE$ in the subsample of firms off quarterly Compustat. Excluding the outliers increases the significance of the coefficient for $RMEBE$ and the R^2 of the regression for the subsample of firms not listed on quarterly Compustat, without changing the significance of the coefficients for DIA .

Additional variables were checked and found not significantly related to the market-adjusted two-day 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 (I checked this variable because it was found very significantly positively correlated to underwriters' compensation by Booth and Smith (1986)), 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 DIA.

28. (See also Dierkens (1988) for simulated evidence that the DIA decreases after the equity issue announcement in the Myers and Majluf model). Again, the effect is stronger for the uncertainty related to the assets in place of the firm only.
29. 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).
30. Similar conclusions are obtained for the absolute value of the abnormal return to the average absolute value of the market-adjusted three-day abnormal returns for the five years preceding the issue.
31. I take the absolute value of the abnormal return and not the signed value of the abnormal returns because I want to measure the information content of the announcement. The analysis of the signed-values has shown that the expected value of the abnormal return is not significantly different from zero, as expected in an efficient market.
32. The correction assumes that all the money raised by the equity issue is immediately invested in assets with the same DIA per asset unit as the existing assets of the firm. So, in the absence of any information transfer from the equity issue announcement,

$$\frac{DIA^-_{\text{assets}}}{E + D} = \frac{DIA^+_{\text{assets}}}{E + D + I} \quad (3)$$

where

- . DIA_{assets} is the total degree of information asymmetry for the assets in place of the firm. (It is given in \$).
- . The superscripts - and + indicate that the variable is taken respectively before the equity issue announcement and after the issue has been made.
- . E is the amount of equity outstanding before the equity issue announcement.
- . D is the amount of debt outstanding.
- . I is the amount of new equity raised.

If the debt is assumed to be riskless, all the information asymmetry is borne by the shareholders of the firm, and

$$DIA^- \cdot E = DIA^-_{\text{assets}} \text{ and} \tag{4}$$

$$DIA^+ \cdot (E+I) = DIA^+_{\text{assets}} \tag{5}$$

where DIA is the degree of information asymmetry per unit of equity (i.e. the usual measure in the thesis).

Then from (3), (4) and (5)

$$\frac{DIA^- \cdot E}{E + D} = \frac{DIA^+ \cdot (E+I)}{E + D + I} \tag{6}$$

This chapter tests equation (6): if the equity issue announcement provides some transfer of manager-specific information to the market,

$$(DIA^+ \cdot \frac{(E + I)}{E + D + I}) \text{ will be lower than } (DIA^- \cdot \frac{E}{E + D}).$$

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.

33. I also observed that 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). I also replicate Healy and Palepu (1987) puzzling finding of an increase in β after the equity issue: β is 1.06 for the month preceding the equity issue announcement, 1.14 for the month following the equity issue, 1.20 for the year following the equity issue.
34. An examination of the daily trading volume in the sample has shown that many firms effectively exhibit huge increase in the trading volume around the issue day.
35. Patell and Wolfson (1979) show that earnings announcements release information and that the implied volatility of the stock prices fluctuates with respect to earnings announcements.
36. The information arrival could be a function of calendar time or of trading time.
37. In this section, I do not present the results for the two subsamples because the subsamples behave identically.
38. 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 my sample, 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. Also the timing of primary equity issues can be compared to the timing of other securities. For example the Myers and Majluf model predicts that, given that the firms know which security

they want to issue, they should be more concerned about the timing of equity issues than about the timing of less risky securities such as debt.

39. The results also hold when **bad(good) news** is defined as a market-adjusted three day 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.
40. The t-statistic on the difference is $t = 1.92$ for σ_{ϵ}^2 .
41. The correlations between the time from the equity issue announcement to its realization and σ_{ϵ}^2 , DIAan, Dnban, and RSIZE are significantly positive, with t-statistics of respectively 3.89, 3.3, 3.21, and 5.64
42. For example, the magnitude of the Bid-Ask Spread could provide an additional measure of information asymmetry (see Venkatesh and Chiang (1986) or Glosten and Harris (1988) for example for a justification of this use). Its availability on a daily basis for firms traded on the OTC could provide a more precise estimation of the fluctuations of information asymmetry through time.

Table 1

Correlations among the measures of the degree of information asymmetry, the relative size of the issue and the market to book to equity ratio of the firm

(t-statistics in parentheses)

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

	σ_{ϵ}^2	DIAAn	RTRADE	RSIZE	RMEBE
σ_{ϵ}^2	1.000				
DIAAn	0.502 (8.102)	1.000			
RTRADE	0.188 (2.680)	0.239 (3.436)	1.000		
RSIZE	0.342 (5.076)	0.311 (4.567)	-0.041 (-.578)	1.000	
RMEBE	0.046 (0.638)	0.173 (-0.578)	0.000 (0.000)	-0.083 (-0.576)	1.000

for 151 primary seasoned equity issues offered between 1980 and 1983 for firms listed on quarterly Compustat.

	σ_{ϵ}^2	DIAAn	RTRADE	RSIZE	RMEBE
σ_{ϵ}^2	1.000				
DIAAn	0.496 (6.980)	1.000			
RTRADE	0.225 (2.813)	0.204 (2.542)	1.000		
RSIZE	0.351 (4.569)	0.291 (3.709)	-0.031 (-.378)	1.000	
RMEBE	0.063 (0.775)	0.226 (2.828)	0.026 (0.312)	-0.083 (-1.012)	1.000

for 46 primary seasoned equity issues offered between 1980 and 1983 for firms off quarterly Compustat

	σ_{ϵ}^2	DIAan	RTRADE	RSIZE	RMEBE
σ_{ϵ}^2	1.000				
DIAan	0.539 (4.241)	1.000			
RTRADE	0.023 (0.153)	0.262 (1.799)	1.000		
RSIZE	0.283 (1.954)	0.343 (2.421)	-0.106 (-0.707)	1.000	
RMEBE	-0.011 (-0.074)	0.126 (0.841)	-0.072 (-0.481)	-0.074 (-0.493)	1.000

σ_{ϵ} is the residual standard deviation of the stock returns for the year preceding the equity issue announcement.

DIAan is the standard deviation of the market-adjusted three-day abnormal return on the announcement of the quarterly earnings, computed over all the quarterly earnings announcements available during the five years preceding the equity issue announcement.

RTRADE is 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 year before the equity issue announcement.

RSIZE is the number of shares to be issued based on the first announcement of the equity issue divided by the number of shares outstanding at the time of the annual earnings before the equity issue announcement.

RMEBE is the ratio of the market value of the equity divided by the book value of the equity at the last annual earnings announcement before the equity issue announcement.

Table 2

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

$$\text{AREI}_i = a_0 + a_1 \text{DIA}_{i1} + a_2 \text{DIA}_{i2} + a_3 \text{RSIZE}_i + a_4 \text{RMEBE}_i + \epsilon_i$$

(t-statistics are given in parentheses)

for 197 primary seasoned equity issues
offered between 1980 and 1983. (1)

Measures of DIA		CONSTANT	DIA1	DIA2	RSIZE	RMEBE	R ²
DIA1	DIA2						
σ_ϵ^2	Dnban	-.025 (-4.40)***	-8.498 (-1.61)*	-.009 (-1.67)**	.038 (1.35)	.002 (2.06)**	3.0%
DIAAn	Dnban	-.024 (-3.29)***	-.102 (-.67)	-.010 (-1.81)**	.030 (1.07)	.003 (2.06)**	1.9%
σ_ϵ^2	RTRADE	-.034 (-4.53)***	-11.816 (-2.22)**	0.010 (1.50)* ⁽²⁾	.029 (1.09)	0.002 (2.01)**	2.7%
DIAAn	RTRADE	-.030 (-3.57)***	-.210 (-1.39)*	.009 (1.37)* ⁽²⁾	.021 (.77)	.003 (2.10)**	1.2%

for 151 primary seasoned equity issues offered between 1980 and 1983,
for the firms listed on quarterly Compustat.

Measures of DIA		CONSTANT	DIA1	DIA2	RSIZE	RMEBE	R ²
DIA1	DIA2						
σ_ϵ^2	Dnban	-.015 (-1.91)**	-11.506 (-2.06)**	-.011 (-1.89)**	.048 (1.53)	-.002 (-.76)	4.1%
DIAAn	Dnban	-.010 (-1.11)	-.251 (-1.34)*	-.011 (-1.88)**	.039 (1.25)	-.002 (-.58)	2.5%
σ_ϵ^2	RTRADE	-.029 (-2.03)**	-16.054 (-2.82)***	0.018 (2.27)++	.039 (1.3)	-0.003 (-.94)	5.1%
DIAAn	RTRADE	-.025 (-1.89)**	-.390 (-2.11)**	.016 (2.02)++	.028 (.95)	-.002 (-.60)	2.8%

for 46 primary seasoned equity issues offered between 1980 and 1983,
for the firms off quarterly Compustat. (1)

Measures of DIA		CONSTANT	DIA1	DIA2	RSIZE	RMEBE	R ²
DIA1	DIA2						
σ_{ϵ}^2	Dnban	-.035 (-2.43)***	9.718 (.62)	-.003 (-.26)	-.008 (.14)	.003 (2.25)**	3.2%
DIAAn	Dnban	-.039 (-2.53)***	.266 (.95)	-.002 (-.23)	-.019 (-.31)	.003 (2.08)**	4%
σ_{ϵ}^2	RTRADE	-.031 (-1.64)**	8.339 (.58)	-0.004 (-.34)	-.015 (-.26)	.003 (2.21)**	3.3%
DIAAn	RTRADE	-.033 (-1.82)**	.310 (1.10)	-.009 (-.66)	-.030 (-.53)	.003 (1.97)**	5.3%

(1) Similar results are obtained when two outliers for RMEBE are excluded from the sample

(2) Not significant in two-tailed test.

R² 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 two-day abnormal return at the equity issue announcement DIA1 and DIA2 are measures of the degree of information asymmetry

σ_{ϵ} is the residual standard deviation of the daily stock returns estimated by the market model for the year preceding the equity issue announcement.

DIAAn is the standard deviation of the market-adjusted three-day abnormal return on the announcement of the quarterly earnings computed over all the quarterly earnings announcements available during the five years preceding the equity issue announcement.

Dnban is a dummy variable set equal to 1 when the firm has 16 or less announcements listed in the WSJI for the year of the equity issue announcement.

RTRADE is 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 year before the equity issue announcement.

RSIZE is the number of shares to be issued based on the first announcement of the equity issue divided by the number of shares outstanding at the time of the annual earnings before the equity issue announcement.

RMEBE is the ratio of the market value of the equity divided by the book value of the equity at the last annual earnings announcement before the equity issue announcement.

Table 3

Comparison of the market-adjusted three-day abnormal return for 197 primary seasoned equity issues offered between 1980 and 1983: the reaction at the first quarterly earnings announcement after the equity issue announcement versus the average reaction at the quarterly earnings before the equity issue announcement.

a) for levered market-adjusted return

SAMPLE (N)	PREDIA	ARPOST	DIF	t-stat on DIF	MEDIAN (%+)	Wilcoxon
Total Sample (197)	.046	.037	.009	3.22(***)	.012 (65)	4.03(***)
on quarterly Compustat (151)	.044	.033	.008	4.22(***)	.011 (67)	3.59(***)
off quarterly Compustat (46)	.051	.043	.008	2.33(***)	.012 (58)	1.69

b) for unlevered market-adjusted return

Total Sample (197)	.032	.027	.004	2.08(**)	.005 (63)	3.22(***)
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N is the number of observations in the sample considered

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

PREDIA is the average estimated degree of information asymmetry of the firm before the equity issue announcement. It is measured by the average DIAan of each sample. DIAan is the standard deviation of the market-adjusted three-day abnormal return on the announcement of the quarterly earnings, computed over all the quarterly earnings announcements available during the five years preceding the equity issue announcement.

ARPOST is the absolute value of the market-adjusted three-day abnormal return measured on the first quarterly earnings announcement directly following the equity issue announcement computed for the whole sample.

UPREDIA is the unlevered average estimated degree of information asymmetry of the firm before the equity issue announcement. It is measured by the average DIAan of each sample.

UARPOST is the unlevered absolute value of the market-adjusted three-day abnormal return measured on the first quarterly earnings announcement

directly following the equity issue announcement computed for the whole sample.

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 is the average difference between PREDIA (UPREDIA) and ARPOST (UARPOST). (**) and (***) indicate that the difference is significant at the 5% or 1% level for one tailed tests.

MEDIAN is the median difference between PREDIA (UPREDIA) and ARPOST (UARPOST). (**) and (***) indicate that the statistics is significant at the 5% or 1% level.

Table 4

Comparison of the residual variance of the firms before and after the equity issue announcement for 197 primary seasoned equity issues offered between 1980 and 1983

a) for levered residual variance

SAMPLE (N)	PREDIA	POSTDIA	DIF	t-stat on DIF	MEDIAN (%+)	Wilcoxon
Total(1) sample (197)	.000618	.000514	.000104	1.86(*)	.000106 (68)	5.10(***)
on quarterly Compustat (151)	.000583	.000508	.00007	1.20	.000169 (67)	2.57(***)
off quarterly Compustat (46)	.000735	.000533	.000202	2.09(*)	.000251 (74)	3.66(***)

b) for unlevered residual variance

	UPREDIA	UPOSTDIA	DIF	t-stat on DIF	MEDIAN (%+)	Wilcoxon
Total Sample (197)	.000434	.000368	.000060	1.64	.000055 (67)	4.08(***)

N is the number of observations in the sample considered.

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

PREDIA is the degree of information asymmetry of the firm before the equity issue announcement. It is estimated by the residual variance of the daily stock return estimated by the market model for the month following the equity issue announcement.

POSTDIA is the degree of information asymmetry of the firm after the equity issue announcement. It is estimated by the residual variance of the daily stock return estimated by the market model for the month following the equity issue announcement.

UPREDIA, is the degree of information asymmetry of the firm before the equity issue announcement. It is estimated by the residual variance of the daily stock return estimated by the market model for the year preceding the equity issue announcement. It is corrected for leverage.

UPOSTDIA is the degree of information asymmetry of the firm after the equity issue announcement. It is estimated by the residual variance of

the daily stock return for the month following the equity issue announcement. It is corrected for leverage.

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 is the average difference between PREDIA (UPREDIA) and POSTDIA (UPOSTDIA). (*), (**) and (***) indicate that the difference is significant at the 10%, 5%, 1% level for one tailed tests.

MEDIAN is the median difference between PREDIA (UPREDIA) and POSTDIA (UPOSTDIA). (**) and (***) indicate that the statistics is significant at the 5% or 1% level in one tailed tests.

(1) the β for the same periods are respectively 1.06 and .95 (t-stat on the difference is 1.65) for the total sample, 1.11 and .91 for the subsample of firms not listed on quarterly Compustat.

Table 5

Comparison of the monthly (yearly) intensity of trading for the shares of the firms before and after the equity issue announcement for 197 primary seasoned equity issues offered between 1980 and 1983

MONTHLY RTRADE

SAMPLE (N)	PRERTRADE	POSTRTRADE	DIF	t-stat on DIF	MEDIAN (%+)	Wilcoxon
total sample (197)	.069	.070	-.001	-.10	0 (56)	1.07
on quarterly Compustat (151)	.070	.070	0	0	+.002 (59)	1.40
off quarterly Compustat (46)	.064	.071	-.007	-.77	-.005 (46)	-.55

YEARLY RTRADE

SAMPLE (N)	PRERTRADE	POSTRTRADE	DIF	t-stat on DIF	MEDIAN (%+)	Wilcoxon
total sample (193)	.75	.64	.11	1.64	.10 (61)	3.47(***)
on quarterly Compustat (151)	.73	.71	.02	.32	.03 (52)	1.23
off quarterly Compustat (42)(1)	.81	.41	.40	3.64(***)	.35 (93)	4.53(***)

N is the number of observations in the sample.

(1) Four firms were delisted from the exchanges during the year following the equity issue.

PRERTRADE is the ratio of number of shares traded during the last month (year) before the equity issue announcement divided by the number of shares outstanding before the equity issue announcement.

POSTRTRADE is the ratio of number of shares traded during the month (year) starting after the equity issue announcement, divided by the number of shares outstanding after the success of the issue.

DIF is the difference between PRERTRADE and POSTRTRADE. (**) and (***) indicate that the difference is **significant** at the 5% or 1% level for two tailed tests.

MEDIAN is the median difference between PRERTRADE and POSTRTRADE. (**) and (***) indicate that the statistics is significant at the 5% or 1% level.

Table 6

Comparison of the median of the distribution of the number of calendar days (trading days) between the equity issue announcement and the last final quarterly earnings announcement to the median of a uniform distribution over (1,90), ((1,66))for 197 primary seasoned equity issues offered between 1980 and 1983.

a) calendar days (1)

	mean	median	%observations higher than 45
Uniform	45	45	50
Sample	36	31	30

b)trading days (1)

	mean	median	%observations higher than 33
Uniform	33	33	50
Sample	25	21	29

(1) Wilcoxon statistic = - 4.59 (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 7

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

$$LAGc_i = a_0 + a_1 DIA_i + \epsilon_i$$

$$LAGtr_i = a_0 + a_1 DIA_i + \epsilon_i$$

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

(t-statistics are given in parentheses)

	CONSTANT	DIA = σ_ϵ	R ²
a) LAGc :	51.91 (8.22)	-644.25 (-2.53)***	2.7%
b) LAGtr :	35.07 (7.85)	-395.72 (-2.20)**	1.9%

R² is adjusted for the number of degrees of freedom

LAGc(LAGtr) is the number of calendar(trading) days between the last quarterly earnings announcement before the equity issue announcement and the equity issue announcement.

DIA is the degree of information asymmetry.

σ_ϵ is the market-adjusted 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.

a) For σ_ϵ^2 , R² is 1.2% and t=-1.87

The other proxies for DIA (Dnban,RTRADE,DIAan), as well as RSIZE and RMEBE are not significant; LAGc is not significantly related to the abnormal return observed at the equity issue announcement.

b) For σ_ϵ^2 , R² is .7% and t=-1.59

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

Table 8

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.

a) calendar days

	Mean	Median	# observations
LAGc after good news	37	30	103
LAGc after bad news	36	31	94

b) trading days

	Mean	Median	# observations
LAGtr after good news	25	23	103
LAGtr after bad news	26	20	94

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

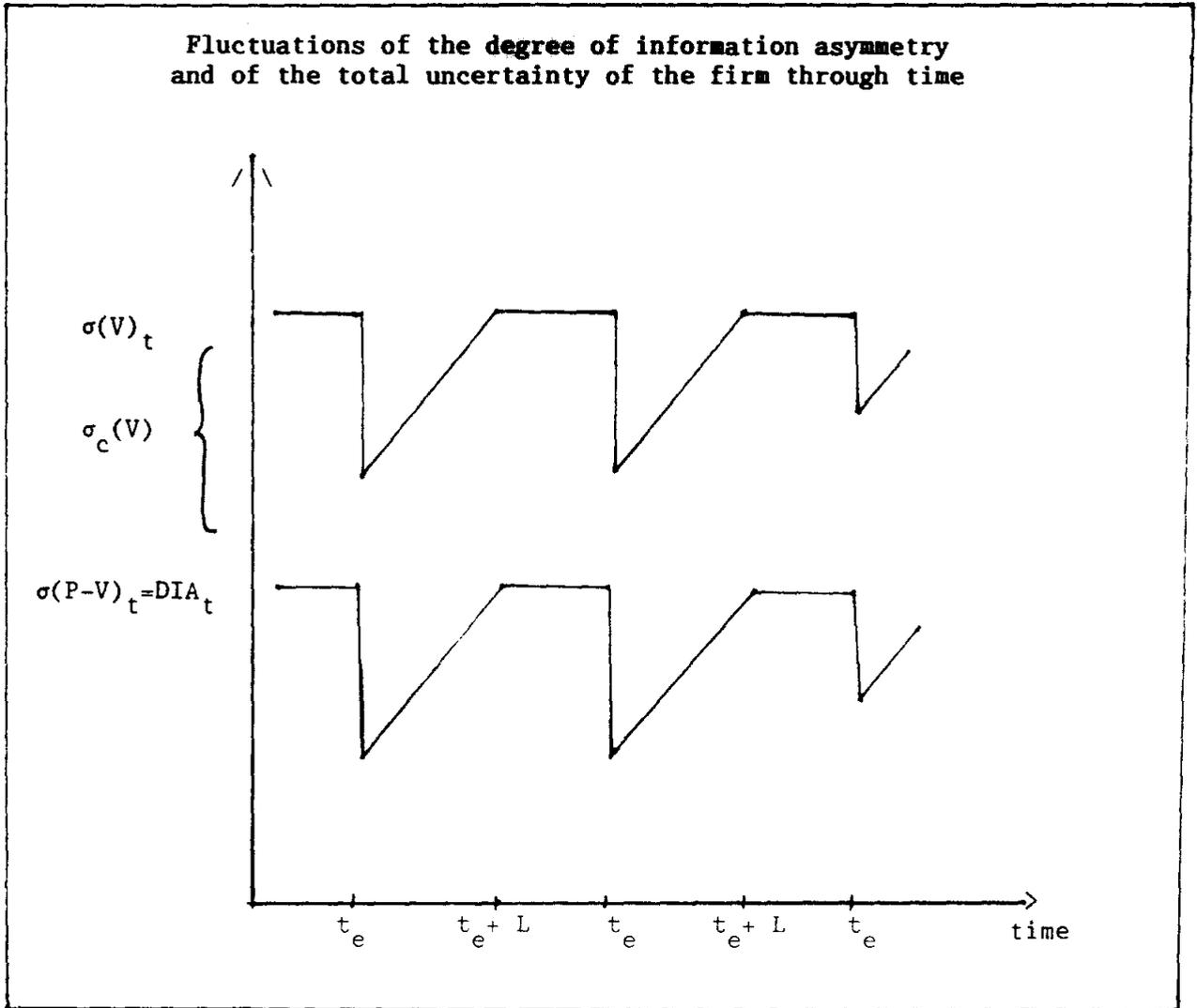
LAGc(LAGtr) is the number of calendar(trading) days between the last quarterly earnings announcement before the equity issue announcement and the equity issue announcement.

Comparison of LAGc after good news to LAGc after bad news: the Wilcoxon statistic is $-.48$ and the t-statistic of the difference is $.24$

Comparison of LAGtr after good news to LAGtr after bad news: the Wilcoxon statistic is $-.69$ and the t-statistic of the difference is $.36$

(a positive sign signifies for both statistics that LAGc(LAGtr) after good news is higher)

Figure 1



t_e is a date when manager-specific information is revealed to the market.

L is the time the manager-specific information takes to reach the market in the absence of any information-revealing event.

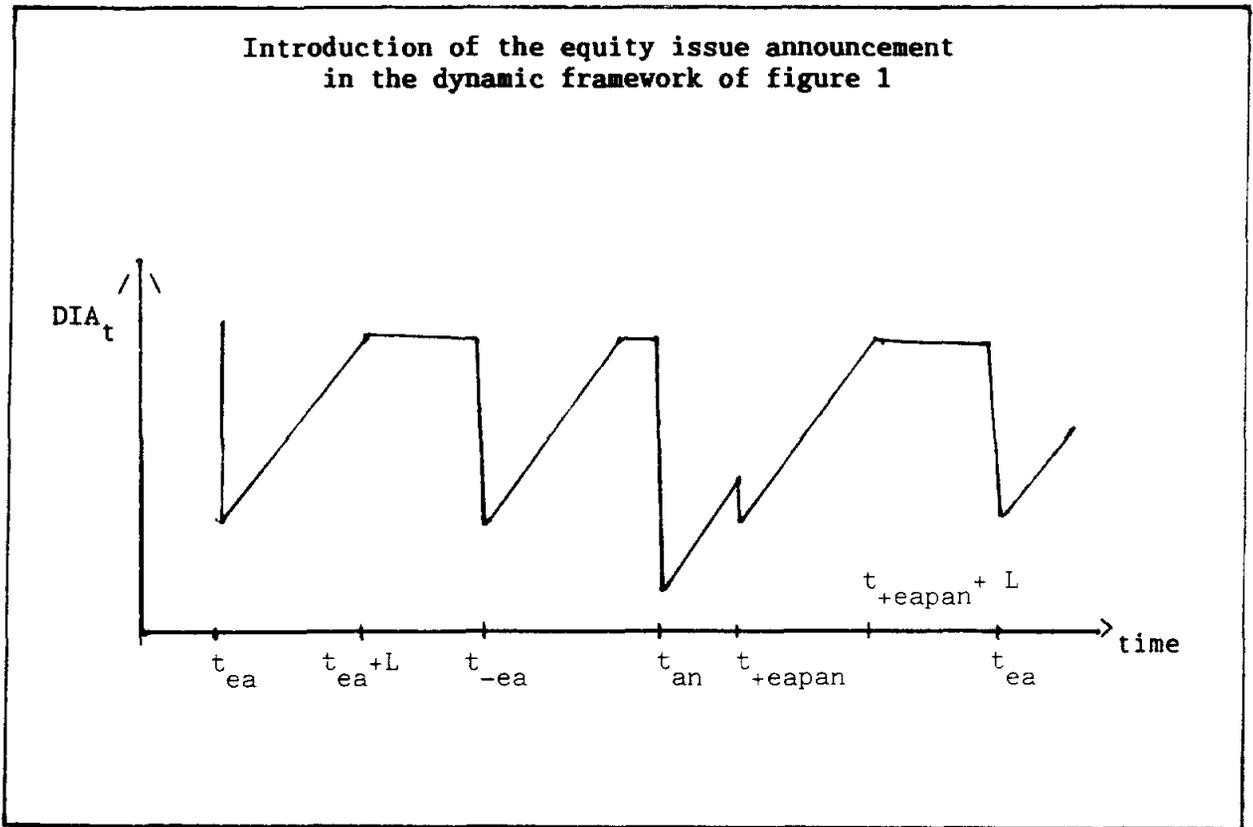
V is the value of the firm known to the managers of the firm.

P is the market value of the firm.

$\sigma(X)_t$ is the standard deviation at time t of the distribution of values for X , X in (V, P) .

$\sigma_c(V)$ represents the uncertainty about the firm shared by the managers of the firm and the market. σ_c is assumed constant for the graph.

Figure 2



DIA_t is the degree of information asymmetry at time t .

t_{an} is the day of the equity issue announcement.

t_{ea} is the day of the quarterly earnings announcement.

t_{-ea} is the day of the last quarterly earnings announcement prior to the issue.

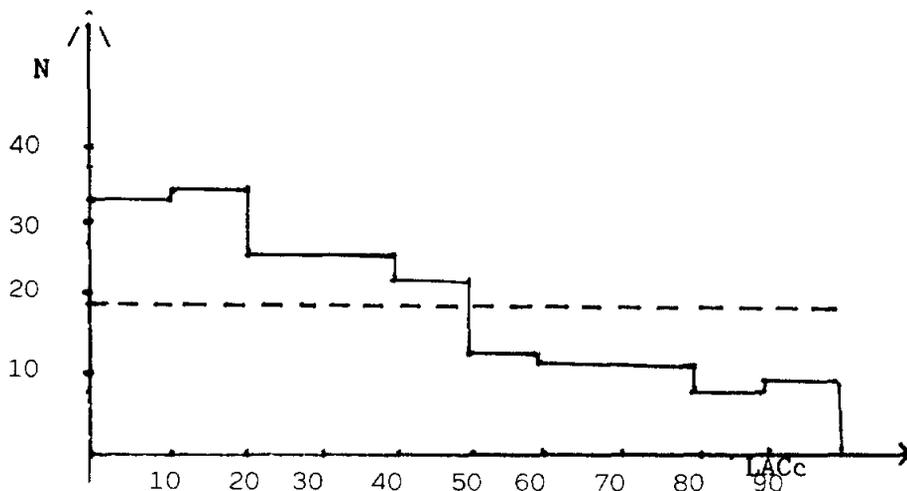
t_{+eapan} is the day of the first quarterly earnings announcement after the issue has been made.

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

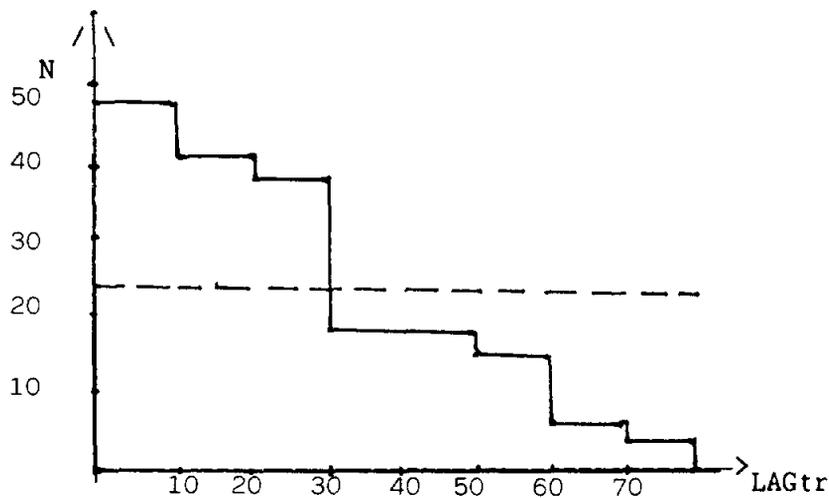
Figure 3

Distribution of the number of calendar days (LAGc) and trading days (LAGtr) 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.

a) calendar days (1)



b) trading days (1)



N is the number of observations with a lag higher or equal to (LAGc-10) (or (LAGtr-10) and lower than LACc (or LAGtr).

(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 LAGtr (or LAGc) 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

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