

"A DISCUSSION OF EXACT MEASURES OF  
INFORMATION ASYMMETRY: THE EXAMPLE OF  
MYERS AND MAJLUF MODEL OR THE  
IMPORTANCE OF THE ASSET STRUCTURE  
OF THE FIRM"

Nathalie DIERKENS\*

N° 88 / 66

\* Nathalie DIERKENS, Assistant Professor of Finance, INSEAD,  
Fontainebleau, France

Director of Publication :

Charles WYPLOSZ, Associate Dean  
for Research and Development

Printed at INSEAD,  
Fontainebleau, France

A DISCUSSION OF EXACT MEASURES OF INFORMATION ASYMMETRY:  
THE EXAMPLE OF MYERS AND MAJLUF MODEL  
OR THE IMPORTANCE OF THE ASSET STRUCTURE OF THE FIRM

by

NATHALIE DIERKENS

INSEAD, Boulevard de Constance, 77305 Fontainebleau Cedex, France  
33-1-60724227

Preliminary  
December 1988

Comments welcome

This paper is based on part of my PhD dissertation at the Massachusetts Institute of Technology. I would like to thank Stewart Myers, my chairman, and the other members of my committee, Paul Asquith and Patricia O'Brien, for their help. I thank Richard Ruback and Robyn McLaughlin for the use of their programs Superday and variations. All remaining errors are mine.

#### ABSTRACT

This paper finds a correct measure of information asymmetry for the study of the equity issue process in the context of the Myers and Majluf model. It shows that the obvious candidate, the volatility (or the residual volatility) of the firm does not qualify. A correct measure of information asymmetry is a function of the asset structure of the firm, and captures the volatility of the assets in place of the firm only. The evidence suggests that the distinction can matter empirically. This result shows that measures of information asymmetry ought to be event-specific and model-specific in order to design precise tests of alternative models of information asymmetry.

## I. INTRODUCTION

In the last years, the differences in information among several groups have received increased attention in the finance literature. In corporate finance, the asymmetry in information between the managers of the firm and the market is especially important. Ross (1977) and Miller and Rock (1985) point out the influence of information asymmetry on the financial policy of the firm. Myers and Majluf (1984) model the importance of information asymmetry on the equity issue process. A major characteristic of Myers and Majluf model is the importance of the asset structure<sup>1</sup>. As the concept of information asymmetry becomes more and more determinant in the finance literature, it becomes more important to be able to measure it. As usual, we are faced by the double problem first of knowing how it should theoretically be measured, and then of analyzing how it can be captured empirically with the data available. Many people have used the volatility of the stock or residual volatility of the stock as a measure of the degree of information asymmetry of the firm, sometimes quoting Myers and Majluf model explicitly, without justifying the use of the volatility of the stock by a direct link to a precise model. This paper shows that the volatility, or even the residual volatility, of the stock price is not automatically a good variable for empirical test of the relevance of information asymmetry for the equity issue process, as has been claimed in the literature. For example, Masulis and Korwar (1986, p.114) use the volatility or Bhagat, Marr and Thompson (1985) use the residual volatility without discussing the potential problems created by the asset structure of the firm.<sup>2</sup> The paper suggests an alternative

measure of information asymmetry, the volatility of the assets in place of the firm, and discusses its relevance for empirical work.

Section II checks whether several variables are or are not theoretically correct measures of information asymmetry. Section III discusses the relevance of the theoretical caveats for empirical work. It also presents some empirical results consistent with the analysis. Section IV concludes the paper.

## II. MEASURES OF INFORMATION ASYMMETRY IN MYERS AND MAJLUF MODEL

### 1) Required characteristics for a measure of information asymmetry

The behavior of a firm in a world of information asymmetry can differ from the behavior of an otherwise identical firm in a world of symmetric information: it can have a different value, follow a different stochastic process and take different investment, financing and reporting decisions. Similarly, if all firms are not subject to the same level of information asymmetry, the behavior of a given firm can be a function of its level of information asymmetry. It would be useful to find one or several variable(s) summarizing the degree of information asymmetry faced by a given firm at a given point in time to predict the magnitude of the effects created by its level of information asymmetry. Possibly, some variable could capture the concept of information asymmetry satisfactorily for some applications, but

not for some others. In this sense one needs to specify the intended uses of the chosen measures.

This paper finds a correct measure of information asymmetry (noted IAE) for the empirical analysis of the equity issue process from the perspective of Myers and Majluf model. More specifically, the measures of information asymmetry are to be related to two observable events in the equity issue process: 1) the (market-adjusted) abnormal return of the firm observed at the equity issue announcement and 2) the magnitude of the information released by the announcement. These two events are traditional in the financial economics literature and have been the topics of numerous studies, for equity issues, but also for dividends, repurchases or any corporate restructurations.<sup>3</sup> Everything else constant, the existence and magnitude of these two events are considered driven by the existence and magnitude of information asymmetry. When the decision to issue equity reflects some of the managers-specific information as in the Myers and Majluf model, a correct measure of information asymmetry should be monotonically negatively related to the magnitude of the abnormal return at the equity issue announcement. It should also, all other things equal, be decreased by the transfer to the market of some of the managers-specific information created at the equity issue announcement.

## 2) Application to Myers and Majluf model

Myers and Majluf show that the existence of information asymmetry between the managers of the firm and the market can create an economic loss in the value of the firm. Their model can also be used to study several observable (then empirically testable) differences between the behavior of the firm in a world of information asymmetry and the behavior of the firm in a world of information symmetry. It can be used to predict the magnitude of the proportional drop in price observed at the equity issue announcement and of the change in uncertainty in the assets of the firm before and after the announcement, as a function of several input variables. This is shown below. This section shows by simulated examples how the structure of the assets of the firm fundamentally influences the process of issuing equity under asymmetric information and how as a consequence the structure of the assets of the firm determines the correct measures for IAE. The Myers and Majluf issue and invest model separates the total assets of the firm ( $V$ ) into two groups: the assets in place of the firm ( $A$ ), not influenced by the decision to issue and invest, and the growth opportunity ( $B$ ), only available to the firm if the firm issues an amount  $I$ . The conclusion of the simulations is that the volatility of the assets in place is a correct measure of IAE but that the total volatility of the firm is not. First, some intuition is provided by highlighting the different roles of the assets in place and of the growth opportunity in the dynamics of the equity issue process. Then simulated results are discussed.

- a) Intuitive justification for  $\sigma_A/\bar{A}$  as a measure of IA for equity issues in Myers and Majluf issue and invest model.

In Myers and Majluf model, the managers use their superior information about the assets of the firm to maximize the value of the firm to the old stockholders. Managers know  $a$  and  $b$ , the realized values of  $A$  and  $B$  respectively, when they decide to issue, but the market only knows the bivariate distribution of  $A$  and  $B$  at that time. When new shares are issued, a part of the issue (and thus a part of  $A$  and  $B$ ) goes to new shareholders. New shareholders are afraid that the managers issue equity not only because they need to finance the new project  $B$ , but because they want to enrich the old shareholders at the expense of the new shareholders by selling overpriced securities before the bad news about  $A$  leaks out. As a result of this, the new shareholders will rationally protect themselves by discounting all new issues. All other things equal, the more  $a$  is worth, the less likely the firm is to issue, since the old shareholders can keep  $a$  to themselves instead of sharing it with the new shareholders. On the other hand, the more  $b$  is worth, the more likely the firm is to issue, since the old shareholders can share  $b$  instead of losing it.<sup>4</sup> When a firm announces a new issue, the market knows that this decision is created by a mixture of "unfavorable" news for  $a$  and "favorable" news for  $b$ . All other things equal, the market will impose a higher discount on the shares of the firm when the bad news concerning  $a$  is likely to be greater. This happens when the distribution for  $A$  is less centralized, i.e. when the volatility of  $A$  is higher. In the extreme case where  $A$  is constant, i.e. when its standard deviation is zero, no bad news

about A could be hidden and the market will impose no discount on the shares of the firm. In this case, the firm will always issue, and both the ex-ante loss in the value of the firm and the drop in the value at the equity issue announcement are zero. The issue announcement brings no information in this case. No similar result, however, holds for the volatility of B: there can still exist an ex-ante loss in value and a drop in price at the announcement of the equity issue even if B is a constant (see Myers-Majluf (1984), p. 201 for a proof of this for the loss). This shows that A and B, and their respective volatilities, play different roles in the issue and invest decision. Therefore, intuitively, the volatility of A and the volatility of B should not be aggregated into the total volatility of the firm when measuring the IAE.

#### b) Simulated Results

As no closed-form solution exists for commonly assumed distributions in finance, I simulate the dynamics of the Myers and Majluf model for the case where the assets of the firm have initially a bivariate lognormal distribution in a world of symmetric information (indicated by the superscript <sup>S</sup>). The algorithm I use is an extension of the algorithm used by Majluf (1981, p.163). The inputs to each simulation are  $\bar{A}^S$ ,  $\sigma_A^S$ ,  $\bar{B}^S$ ,  $\sigma_B^S$ ,  $\rho^S$ , and I, i.e. the mean and standard deviation of the assets in place, the mean and standard deviation of the growth opportunity, the correlation between A and B and the required amount of new equity. The algorithm computes the issue/non issue region, the new dynamics of A, B and V under asymmetric

information, before and after the issue decision, and the proportional drop at the equity issue announcement. The simulations have been performed over a wide set of parameter values. The parameter set has been chosen in order to include all realistic cases.<sup>5</sup>

Over the whole parameter space, all other things equal, an increase in the volatility of the assets in place implies an increase in the proportional drop at the equity issue announcement and a decrease in the probability of the issue. Table 1 represents the proportional drop versus the volatility of the assets in place for several series. It can be seen that the drop at the issue announcement is negligible for low values of  $\sigma_A/\bar{A}$  (e.g.  $\sigma_A/\bar{A} = .10$ ).

As  $\sigma_A/\bar{A}$  increases, the drop increases. In the simulations, no other volatility is unambiguously related to the size of the proportional drop at the equity issue announcement. I chose to emphasize the fact that the total volatility of the market value of the firm does not qualify, i.e., does not necessarily increase the drop, because this measure is readily available from trading data, and is used in several papers.<sup>6</sup> Table 2 gives two examples where an increase in the total volatility of the market value of the firm implies a decrease in the proportional drop at the equity issue ( $.22 < .29$  but  $.04 > .01$  and  $.32 < .36$  but  $.02 > .01$ ). This typically happens when  $\bar{B}/\bar{A}$  is high.<sup>7,8.</sup>

Over the whole parameter space, the volatility of the assets in place conditional on the firm deciding to issue is lower than the volatility of the assets in place before the decision. Table 3 gives several representative examples. On the other hand, the volatility of the market value of the firm does not necessarily decrease after the announcement. Intuitively this happens because the growth opportunity is undertaken once the firm issues equity; the standard deviation of the growth opportunity can be fairly high and can increase the total uncertainty of the firm. Table 4 provides two examples where the announcement of the decision to issue increases the volatility of the market value of the firm (.25 > .24, .31 > .29).<sup>10,11,12</sup>

### III. IMPLICATIONS FOR EMPIRICAL ANALYSES

#### 1) Required characteristics of proxies for IAE

There is only manager-specific uncertainty in Myers and Majluf model. The empirical tests, however, will be run with data for which there exists also another type of uncertainty, the uncertainty shared by the managers of the firm and the market, for example uncertainties related to the general economy or to exchange rates, or to specific industries. The empiricist is confronted to a double requirement for its proxies of IAE: they should only concern the assets in place and they should not incorporate any of the uncertainty shared by the managers of the firm and the market.

2) Importance of the distinction between assets in place and total assets

Section II has shown that the volatility for the total assets of the firm is not theoretically correct for the analysis of the equity issue process, in the context of the Myers and Majluf model. However, the approximation may be more acceptable in some cases than in some others. One would then expect empirical results to be better in these cases. The Myers and Majluf model makes a distinction between the assets in place and the growth opportunity. That distinction has proved to be important for the measure of IAE. In the context of their model, the growth opportunity represents a project with a positive net present value that is completely lost if the firm does not issue equity at this point in time. The magnitude and the nature of the project can vary widely.<sup>13</sup> When B is defined as the value lost if the firm does not issue new equity now, B can be fairly small in many cases. Then the value of the firm is approximately equal to the value of the assets in place, and the volatility of the firm can be approximately equal to the volatility of the assets in place,

More formally:

$$\left(\frac{\sigma_V}{\bar{V}}\right)^2 = \left(\frac{\sigma_A}{\bar{A}}\right)^2 \left(\frac{\bar{A}}{\bar{V}}\right)^2 + 2\rho \frac{\sigma_A}{\bar{A}} \frac{\sigma_B}{\bar{B}} \frac{\bar{A}}{\bar{V}} \frac{\bar{B}}{\bar{V}} + \left(\frac{\sigma_B}{\bar{B}}\right)^2 \left(\frac{\bar{B}}{\bar{V}}\right)^2, \quad (1)$$

$$\text{or } \left(\frac{\sigma_V}{\bar{V}}\right)^2 - \left(\frac{\sigma_A}{\bar{A}}\right)^2 = 2\rho \frac{\sigma_A}{\bar{A}} \frac{\sigma_B}{\bar{B}} \frac{\bar{A}}{\bar{V}} \frac{\bar{B}}{\bar{V}} + \left(\frac{\sigma_B}{\bar{B}}\right)^2 \left(\frac{\bar{B}}{\bar{V}}\right)^2 - \left(\frac{\sigma_A}{\bar{A}}\right)^2 \left(\frac{2\bar{A}\bar{B} + \bar{B}^2}{\bar{V}^2}\right), \quad (2)$$

so,  $\sigma_V/\bar{V}$  is a perfect measure for  $\sigma_A/\bar{A}$  when  $\rho = 1$  and  $\sigma_B/\bar{B} = \sigma_A/\bar{A}$ . Other combinations of the parameters can also justify the equivalence between  $\sigma_V/\bar{V}$  and  $\sigma_A/\bar{A}$ , as for example a low ratio  $\bar{B}/\bar{V}$ . All other things equal, equation (2) goes to zero when  $\frac{\bar{B}}{\bar{V}}$  goes to zero. The case of  $\rho$  equal to zero and  $\sigma_A/\bar{A}$  equal to  $\sigma_B/\bar{B}$  could be hard to find and hard to prove.<sup>14</sup> The case of  $\bar{B}/\bar{V}$  small can at least be checked, even if only with a small level of precision. So in the case of  $\bar{B}/\bar{V}$  small, the empiricist might prefer proxies that are easy to estimate over short periods of time and easy to estimate with precision, and that handle well the separation between total uncertainty of the firm and information asymmetry, over proxies that focus on the separation between assets in place and growth opportunities but are much harder to estimate. This justifies the use of "traditional" proxies of information asymmetry used or suggested in the literature like the residual volatility of the stock, the intensity of trading, the magnitude of the bid-ask spread, the intensity of insiders trading, the dispersion of analysts forecasts or the (lack of) intensity of public announcements.

The relevance of the distinction between the total information asymmetry and the information asymmetry for the assets in place only can be tested empirically. Two types of tests are possible. The first type of test consists in finding proxies for IAE respecting the assets in place/growth opportunity distinction and comparing the results obtained with more

traditional proxies. Unfortunately, such proxies are very hard to find.<sup>15</sup> The second type of test uses traditional proxies and compare their behavior in several subsamples: if Myers and Majluf model is true and if the ratio  $\bar{B}/\bar{V}$  can be adequately measured, the proxies should capture the consequences of the existence of information asymmetry much better when  $\bar{B}/\bar{V}$  is low than when it is high. The results of such a test are provided below.

### 3) Some empirical evidence

This section tests whether, all other things equal, an increase in IAE increases the drop observed at the equity issue announcement for two "traditional" measures of information asymmetry,  $\sigma_{\epsilon}^2$  and Dnban.  $\sigma_{\epsilon}^2$  is the variance of the stock return. It recognizes that the information asymmetry is a subset of the total uncertainty of the firm, from which it deducts all the market uncertainty, obviously shared by the managers of the firm and by the market. Dnban is a dummy variable describing the informational environment of the firm. It is set equal to one (zero) when the firm has on average relatively few (many) announcements made to the market. It captures the idea that, all other things equal, the information asymmetry is high (low) when there exists few (many) announcements made about a firm. Both measures have no reason to be related to the assets in place of the firm only, so they will perform better in the low  $\bar{B}/\bar{V}$  subsample if Myers and Majluf model holds and if the distinction assets in place and total assets matters. Table 5 presents the results of the cross-sectional regression of

the market-adjusted two-day abnormal return at the equity issue announcement by IAE, the relative size of the equity issue (RSIZE) and two control variables, the relative importance of the growth opportunity (RMEBE), for the subsamples for high and low RMEBE for a total sample of 197 industrial firms. The relative importance of the growth opportunity for a firm is approximated by the ratio of the market value of the equity of the firm to the book value of the firm, in the spirit of Tobin's Q-ratio.<sup>16,17</sup> Table 5 shows that in the case of a low RMEBE, i.e. in the case where the empirical proxies come closest to the theoretically correct measure of IAE, the cross-sectional variations in IAE explain very well the cross-sectional variations in the reaction at the equity issue announcement. IAE is the best explanatory variable and the t-statistics for two measures of IAE,  $\sigma_{\varepsilon}$ , and DNBAN are negative and significant respectively at the 1% and the 5% level in one-tailed tests. The constant is even not significant, which is an unusual result for this type of study.<sup>18</sup> On the other hand, only the constant is significant for the subsample of firms with high RMEBE and the proxies for IAE explain absolutely nothing in this case. Also, the abnormal return at the equity issue announcement is significantly higher (i.e. the drop is lower), at the 5% level, for firm with high RMEBE.<sup>19</sup> Overall, the results show that the distinction between information asymmetry for the assets in place only and for the total value of the firm matters in some cases.<sup>20,21</sup> The evidence is especially compelling when one considers how hard it is to capture empirically the concept of growth opportunity and the ratio  $\bar{B}/\bar{V}$ .<sup>22</sup>

#### IV. CONCLUSION

This paper offers a correct measure of information asymmetry for the study of the equity issue process in the context of the Myers and Majluf model. It shows by simulations that a correct measure of information asymmetry is a function of the volatility of the assets in place of the firm only. Its dependence on the assets structure of the firm reflects the importance of the asset structure throughout Myers and Majluf model.<sup>23</sup> The simulations also show that an "obvious" candidate, the volatility (or the residual volatility) of the firm does not qualify as an unambiguously correct measure of information asymmetry in this context. Furthermore, both theoretical and empirical evidence show that the distinction matters. The results of this paper should be used to understand better the limitations of traditional proxies and use them better. In this case, the tests can be improved either by finding more correct proxies for IAE, i.e. more directly related to the assets in place of the firm only, or by limiting the use of more the traditional proxies to the cases where the approximation is the most valid, i.e. when  $\bar{B}/\bar{V}$  is low.

The paper discusses a very precise problem: it specifies the event (equity issue announcement), the model (Myers and Majluf model) and even the tests (cross-sectional variation in the reaction at equity issue and pre-post comparisons of the level of information asymmetry). However this result indicates that in general measures of information asymmetry ought to be event-specific and model-specific in order to design correct and precise

tests of alternative models of information asymmetry. Now, with the expansion of theoretical and empirical work, the case for the relevance of information asymmetry in general, especially for the equity issue process, need not be defended any more, but we need to know which modelling approach is the most productive in specific cases.<sup>24</sup> Up to now the difference among different models based on information asymmetry was done through other implications of the models not by a specific measure of the information asymmetry relevant in that model.<sup>25</sup> The time has come to design more precise tests to differentiate among alternative modelling approach. This paper shows a direction for future tests.

REFERENCES

- Ambarish, Ramasastry, John, Kose and Williams, Joseph : "Efficient Signalling with Dividends and Investments", Journal of Finance, Vol. 42, No. 2, June 1987, 321-373
- Asquith, Paul and Mullins, David : "Equity Issues and Offering Dilution", Journal of Financial Economics, Vol. 15, No.1/2, January/February 1986, 61-90
- Bhagat, Sanjay, Marr, Wayne and Thompson, Rodney : "The Rule 415 Experiment: Equity Markets", Journal of Finance, Vol. 40, No. 5, December 1985, 1385-1401
- Bradford, William : "The Issue Decision of Manager-Owners under Information Asymmetry" The Journal of Finance Vol XLII, No. 5, December 1987, 1245-1260
- Bruner, Robert : "The Use of Excess Cash and Debt Capacity as a Motive for Merger" Journal of Financial and Qualitative Analysis, Vol. 23, No.2, June 1988
- Dierkens, Nathalie : "Information Asymmetry and Equity Issues", Unpublished Ph.D. Dissertation, Sloan School of Management, M.I.T., March 1988
- Gertner, Robert, Gibbons, Robert and Scharfstein, David : "Simultaneous Signalling to the Capital and Product Markets" The Rand Journal of Economics Vol.19, No.2, Summer 1988
- Healy, Paul, and Palepu, Krishna : "Earnings Information Conveyed by Dividend Initiations and Omissions" Journal of Financial Economics, Vol.21, No.2, September 1988, 149-175
- John, Kox and Williams, Joseph : "Dividends, dilution and Taxes: A Signalling Equilibrium" Journal of Finance Vol.40, No.4, September 1985, 1053-1070
- Korajczyk, Robert, Lucas, Deborah and McDonald, Robert : "The Effect of Information Releases on the Pricing and Timing of Equity Issues: Theory and Evidence" Northwestern University, July 1988
- Krasker, William : "Stock Price Movements in Response to Stock Issues and Aymmetric Information" Journal of Finance March 1986, Vol.41, No.1, 93-105

- Linn, Scott and Pinegar, Michael** : "The Effects of Issuing Preferred Stock on Common and Preferred Stockholder Wealth" The Journal of Financial Economics Vol.22, No.1, October 1988, 155-184
- Long, Michael and Malitz, Ileen** : "Investment Patterns and Financial Leverage", NBER working paper, #1145, June 1983
- Majluf, Nicolas** : "Study on Mergers: A Rationale for Conglomerate Mergers", Unpublished Ph.D. dissertation, Sloan School of Management, M.I.T., October 1978
- Masulis, Ronald, and Korwar, Ashok** : "Seasoned Equity Offerings: An Empirical Investigation", Journal of Financial Economics, Vol. 15, No. 1/2, January/February 1986, 91-118
- Mikkelson, Wayne and Partch, Megan** : "Valuation Effects of Security Offerings and the Issuance Process", Journal of Financial Economics, Vol. 15, No. 1/2, January/February 1986, 31-60
- Miller, Merton and Rock, Kevin** : "Dividend Policy Under Asymmetric Information", Journal of Finance, Vol. 40, No. 4, September 1985, 1031-1050
- Myers, Stewart and Majluf, Nicolas** : "Corporate Financing and Investment Decision When Firms Have Information Investors Do Not Have", Journal of Financial Economics, Vol. 13, No. 2, July 1984, 187-221
- Narayanan, M.** : "Debt versus Equity and Asymmetric Information" Journal of Financial and Quantitative Analysis Vol.23, No.1, March 1988, 39-51
- Ross, Stephen** : "The Determination of Financial Structure: The Incentive Signalling Approach", Bell Journal of Economics, Vol. 8, No. 1, Spring 1977, 23-40
- Smith, Clifford** : "Investment Banking and the Capital Acquisition Process", Journal of Financial Economics, Vol. 15, No. 1/2, January/February 1986, 3-29
- Viswanathan, S.** : "A Multiple Signalling Model of Corporate Financial Policy", December 1986, Duke University
- Williamson, Stewart** : "The Moral Hazard Theory of Corporate Financial Structure : Empirical Tests", Unpublished PhD Dissertation, Sloan School of Management, M.I.T., 1981

FOOTNOTES

1. Since then more complex models have been suggested. The models of Krasker(1985), John and Williams (1985), Viswanathan (1986), Bradford (1987), Ambarish, John and Williams(1987), Gertner, Gibbons and Scharfstein (1988), Narayanan (1988), Korajczyk, Lucas and McDonald (1988) extend Myers and Majluf framework in several directions.
2. Masulis and Korwar find non-significant results, Bhagat, Marr and Thompson find significant results (with the correct signs).
3. The studies analyze the abnormal return at the announcements, the changes in abnormal returns of future announcements, the relationship to ex post changes in earnings (see for example Healy and Palepu (1988)).
4. This can easily be seen in the figure 1, page 199, of Myers and Majluf article.
5. Here are the elements of the parameter set: The assets in place are used as a reference point; they always have a mean  $\bar{A} = 100$ . The amount of new equity needed to finance the new project,  $I$ , varies between 1 and 100 (i.e. between 1 percent and 100 percent of the mean value of the assets in place), in increments of 10. the expected value of the growth opportunity,  $\bar{B}^S$ , varies between .01 and 50 (i.e. between 1 percent and 50 percent of  $I$  or between .01 percent to 50 percent of  $\bar{A}$ ), in increments of 5.  $\sigma_A/\bar{A}$  varies between 5 percent and 50 percent, in increments of 10 percent.  $\sigma_B^S/\bar{B}^S$  is chosen so that, once the project has been implemented (i.e. once  $I$  has been invested), it varies between .25 and 4 times  $\sigma_A/\bar{A}$ . The correlation between  $A$  and  $B$  varies between 0 and .9, in increments of .1 .
6. I also replicate Myers and Majluf results that  $\sigma_A$  is the only volatility systematically (positively) related to the loss in the value of the firm created by the existence of information asymmetry (and not  $\sigma_V/\bar{V}$  or  $\sigma_B/\bar{B}$ ).
7. The same results obtain for  $\sigma_A$ ,  $\sigma_A/\bar{A}$ , or any positive function of these variables. I present the result for the coefficient of variation  $\sigma_A/A$  and  $\sigma_V/V$  (called here "volatility of  $A$  and  $V$ ") to be independent of the size of the firm.

8. Similarly, no systematic behavior can be observed for  $\sigma_B$  or  $\sigma_B/\bar{B}$ ,  $\sigma_V$ , or  $\sigma_V/\bar{V}$ .
9. Same comments as in footnotes 7 and 8.
10. The results shown in this section are distribution specific. However, some more extreme examples and counterexamples exist when A and B follow binomial distributions (see Dierkens 1988).
11. The presentation in this section is made for an unlevered firm. The results are easily extended to the case of a firm with riskless debt.
12. It can also be shown that  $\sigma_A/\bar{A}$  is more stable through time than  $\sigma_V/\bar{V}$ : the dynamics of the model in a world of asymmetric information forces any measure of dispersion related to the growth opportunities to be unstable in time (see Dierkens (1988)). This is also an advantage for an empirical proxy when it is estimated by its past behavior over a period of time.
13. B can be a strategic investment, the usual meaning of the term growth opportunity, for example an investment in the development of a new technology, but it can also represent a favorable change in the debt/equity ratio of the firm, or the implementation of some improvements to the existing machines of the firm. If the firm can issue and invest later if it decides not to issue now, b represents the loss of value associated with delaying the project. If the firm can finance the project with sources other than an equity issue, b is the additional cost of that financial source over the equity issue. The "assets in place" include all the assets of the firm that are not influenced by the decision to issue, possibly including some expansion plans that can be financed immediately by internal resources or are planned for later periods.
14. Exceptions could be cases of pure expansion of the firm.
15. Dierkens (1988) discusses some of the problems. She suggests a proxy, more specifically related to the assets in place of the firm, the average surprise at earnings announcements. The empirical results, however, are not better for this proxy, probably because it was estimated over too long a time period (five years).
16. The simulations of Myers and Majluf model have shown that RSIZE and RMEBE should decrease (increase) AREI.
17. The sample of 197 equity issue announcements has been constructed in a traditional way, e.g. with no joint announcement of mergers, earnings, dividends, or other financial changes on the days of the equity issue announcements. It only considers industrial firms and has a standard time and industry clustering. The total sample reaction at the equity issue announcement (average market-adjusted two-day abnormal return of -2.4, 80% negative) is fully consistent with the existing literature (see Bhagat, Marr

and Thompson (1985), Asquith and Mullins(1986), Masulis and Korwar (1986), Mikkelson and Partch (1986)). Even the non-significance of the relative size of the issue has been noted before. (The sample is described in further details elsewhere).

18. The sign for RMEBE is not consistent with Myers and Majluf theory in the subsample of firms with low RMEBE.

19. This result is also consistent with the model of Ambarish, John, and Williams (1987)

20. The effect is not observable continuously: I have not found a continuously decreasing t-statistics for decreasing levels of RMEBE by separating the subsample in 5 or 10 subsamples.

21.  $\sigma_{\epsilon}^2$  is significantly decreased by the equity issue announcement, however, at the same level (i.e. with no significant difference at usual level of significance) for high RMEBE and for low RMEBE firms.

22. Further tests could try to approximate the growth opportunity with more precision. See for example Williamson (1981) or Long and Malitz(1983) for a discussion of the problem and for some alternative estimations of B/V.

23. The importance of the asset structure is even more extreme in some other models, such has Ambarish, John and Williams (1987), where the equity issue announcement implies negative abnormal return when the manager-specific information concerns primarily the assets in place but positive when the manager-specific information concerns primarily the opportunities to invest, whereas the equity issue announcement is always negative in Myers and Majluf model. Such models will of course also have strong implications for the correct measures of information asymmetry.

24. Although several (non mutually exclusive) explanations have been provided for the average negative stock price reaction at the equity issue announcement, theories of information asymmetry seem the most consistent with the evidence (see Smith (1986) for a general overview).

25. For example Myers and Majluf model implies a lower drop in stock price at the issue announcement of securities of lower risks, contrary to Miller and Rock model. There is a general tendency for this to be observed (Compare the reaction at the issue announcement of equity, preferred stocks (Linn and Pinegar (1988)), convertible debt (Mikkelson and Partch,(1986)). Also Bruner (1988) shows that mergers happen in order to prevent the potential loss in the value of the firm for projects-rich but cash-poor firms as predicted by Myers and Majluf model.

Table 1

Simulated series showing that, all other things equal, an increase in the volatility of the assets in place, monotonically increases the proportional drop observed at the announcement of the new equity issue and monotonically decreases the probability of issue.

$\sigma_A/\bar{A}$	$\bar{B}^S=10, I=50$	$\bar{B}^S=20, I=50$	$\bar{B}^S=10, I=75$
	DROP(%) (PROB(%))	DROP(%) (PROB(%))	DROP(%) (PROB(%))
.10	0 (99)	0 (99)	0 (99)
.20	3 (85)	0 (99)	4 (81)
.30	7 (71)	0 (97)	13 (59)
.40	14 (62)	4 (91)	24 (45)
.50	23 (54)	10 (85)	35 (36)
.60	30 (49)	16 (79)	43 (31)
1.00	52 (39)	35 (66)	62 (28)

DROP is proportional drop in the value of the firm, V, at the equity issue announcement.

PROB is the probability of the firm deciding to issue and invest.

$\sigma_A$  is the standard deviation of the assets in place.

I is the amount of new equity required to finance the new project.

$\bar{B}^S$  is the mean of the growth opportunity under symmetric information.

The assets in place,  $A^S$ , and the growth opportunity,  $B^S$ , follow a bivariate lognormal distribution under symmetric information.

The mean of the assets in place is 100.

The standard deviation of the growth opportunity under symmetric information is 1.5.

The correlation between the assets in place and the growth opportunity under symmetric information is 0.

Table 2

Two simulated lognormal examples where an increase in the volatility of the firm implies a decrease in the proportional drop at the equity issue announcement.

	$\bar{B}^S$	$\sigma_A^S/\bar{A}^S$	$\sigma_B^S/\bar{B}^S$	$\rho^S$	$\sigma_V/\bar{V}$	DROP
Example 1	10	.20	4.4	0	.29	1%
	10	.25	1.0	0	.22	4%
Example 2	25	.30	.9	.5	.36	0%
	25	.40	.2	.5	.32	2%

For X in (A,B,V),

$\sigma_X^S/\bar{X}^S$  is the coefficient of variation (volatility) of X under symmetric information.

$\sigma_X/\bar{X}$  is the coefficient of variation (volatility) of X under asymmetric information.

$\sigma_V/\bar{V}$  is endogeneous.

V is the value of the firm under asymmetric information.

The assets in place, A, and the growth opportunity, B, follow a bivariate lognormal distribution under symmetric information.

The mean of the assets in place is 100.

The amount of new equity required to finance the new project is 50.

$\bar{B}^S$  is the mean of the growth opportunity under symmetric information.

$\rho^S$  is the correlation between the values of the assets in place and the growth opportunity under symmetric information.

DROP is the proportional drop in the market value of the firm at the equity issue announcement.

Table 3

Simulated examples showing that the volatility of the assets in place conditional on the decision of the firm to issue and invest is lower than the volatility of the assets in place before the announcement of the issue.

	$\bar{B}^S$	$\sigma_B^S/\bar{B}^S$	I	$\sigma_A/\bar{A}$	$\sigma_A/\bar{A} I$
Example 1	10	1.2	50	.20	.16
Example 2	4	3	20	.50	.33
Example 3	.2	5	20	.05	.03
Example 4	.1	2	1	.20	.14
Example 5	20	.5	90	.20	.18

For X in (A,B),

$\sigma_X^S$  is the standard deviation of X under symmetric information.

$\sigma_X/\bar{X}|I$  is the coefficient of variation (or volatility) of X conditional on the firm deciding to issue equity, under asymmetric information.

$\sigma_X/\bar{X}|I$  is endogeneous.

The assets in place, A, and the growth opportunity, B, follow a bivariate lognormal distribution under symmetric information.

The mean of the assets in place is 100.

The correlation between the values of the assets in place and the growth opportunity under symmetric information is 0.

$\bar{B}^S$  is the mean of the growth opportunity under symmetric information.

I is the amount of new equity needed to finance the new investment.

Table 4

Two simulated examples where the volatility of the firm conditional on the firm deciding to issue and invest is higher than the volatility of the firm before the announcement of the issue.

	I	$\sigma_B^S/\bar{B}^S$	$\sigma_A/\bar{A}$	$\sigma_V/\bar{V}$	$\sigma_V/\bar{V} I$	$\sigma_A/\bar{A} I$
Example 1	90	2.0	.20	.29	.31	.15
Example 2	50	4.4	.20	.29	.31	.16

For X in (A,B,V),

$\sigma_X^S/\bar{X}^S$  is the coefficient of variation (volatility) of X under symmetric information.

$\sigma_X/X$  is the coefficient of variation (volatility) of X under asymmetric information.

$\sigma_X/\bar{X}|I$  is the coefficient of variation (volatility) of X conditional on the firm deciding to issue equity, under asymmetric information.

$\sigma_V$ , and  $\sigma_V/\bar{V}|I$  are endogeneous variables, but  $\sigma_A$  is equivalent to  $\sigma_A^S$

The assets in place, A, and the growth opportunity, B, follow a bivariate lognormal distribution under symmetric information.

The mean of the assets in place is 100.

The mean of the growth opportunity under symmetric information is 10.

The correlation between the assets in place and the growth opportunity under symmetric information is 0.

V is the value of the firm under asymmetric information.

I is the amount of new equity required to finance the new project.

Table 5

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

$$\text{AREI}_i = a_0 + a_1 \text{DIA}_i + a_2 \text{RSIZE}_i + a_3 \text{RMEBE}_i + \varepsilon_i$$

for 197 primary seasoned equity issues  
offered between 1980 and 1983,  
divided in 2 subsamples of high and low RMEBE (1) (2)

(t-statistics are given in parentheses)

For low RMEBE

Measures of DIA	CONSTANT	IAE	RSIZE	RMEBE	R <sup>2</sup>
$\sigma_\varepsilon^2$ :	-.008 (.58)	-16.350 (-2.85) <sup>***</sup>	.029 (.78)	.010 (-1.22)	6.2%
Dnban	-.013 (.96)	-.010 (-2.17) <sup>**</sup>	.033 (.84)	.011 (-1.92) <sup>**</sup>	3%

For High RMEBE

Measures of DIA	CONSTANT	IAE	RSIZE	RMEBE	R <sup>2</sup>
$\sigma_\varepsilon^2$ :	-.032 (-3.55) <sup>***</sup>	5.780 (0.54)	.007 (.19)	.002 (1.50)	≤0
Dnban:	-.027 (-3.31) <sup>***</sup>	-.005 (-0.62)	.023 (.60)	.002 (1.47)	≤0

- (1) The subsample of low (high) RMEBE has 99 (98) observations.
- (2) The average AREI is  $-.027$  ( $-.020$ ) for the subsample of firms with low (high) RMEBE, with a t-statistics on the difference of the means of  $-2.17^{**}$

$R^2$  is adjusted for the number of degrees of freedom.

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

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

IAE is the degree of information asymmetry.

$\sigma_{\epsilon}$  is the residual standard deviation of the daily stock returns estimated by the market model for the year 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.

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.

INSEAD WORKING PAPERS SERIES

1986

- |       |  |  |       |   |  |
|-------|--|--|-------|---|--|
| 86/01 | Arnoud DE MEYER  | "The R & D/Production interface".  | 86/16 | B. Espen ECKBO and<br>Hervig M. LANGOHR   | "Les primes des offres publiques, la note<br>d'information et le marché des transferts de<br>contrôle des sociétés". |
| 86/02 | Philippe A. NAERT<br>Marcel WEVERBERGH<br>and Guido VERSWIJVEL         | "Subjective estimation in integrating<br>communication budget and allocation<br>decisions: a case study", January 1986.                    | 86/17 | David B. JEMISON  | "Strategic capability transfer in acquisition<br>integration", May 1986.   |
| 86/03 | Michael BRIMM  | "Sponsorship and the diffusion of<br>organizational innovation: a preliminary view".   | 86/18 | James TEBOUL<br>and V. MALLERET   | "Towards an operational definition of<br>services", 1986.  |
| 86/04 | Spyros MAKRIDAKIS<br>and Michèle BIBON                                 | "Confidence intervals: an empirical<br>investigation for the series in the M-<br>Competition" .  | 86/19 | Rob R. WEITZ  | "Nostradamus: a knowledge-based forecasting<br>advisor".   |
| 86/05 | Charles A. WYPLOSZ   | "A note on the reduction of the workweek",<br>July 1985.   | 86/20 | Albert CORHAY,<br>Gabriel HAWAWINI<br>and Pierre A. MICHEL                      | "The pricing of equity on the London stock<br>exchange: seasonality and size premium",<br>June 1986.                 |
| 86/06 | Francesco GIAVAZZI,<br>Jeff R. SHEEN and<br>Charles A. WYPLOSZ         | "The real exchange rate and the fiscal<br>aspects of a natural resource discovery",<br>Revised version: February 1986.                     | 86/21 | Albert CORHAY,<br>Gabriel A. HAWAWINI<br>and Pierre A. MICHEL                   | "Risk-premia seasonality in U.S. and European<br>equity markets", February 1986.                                     |
| 86/07 | Douglas L. MacLACHLAN<br>and Spyros MAKRIDAKIS                         | "Judgmental biases in sales forecasting",<br>February 1986.  | 86/22 | Albert CORHAY,<br>Gabriel A. HAWAWINI<br>and Pierre A. MICHEL                   | "Seasonality in the risk-return relationships<br>some international evidence", July 1986.                            |
| 86/08 | José de la TORRE and<br>David H. NECKAR                                | "Forecasting political risks for<br>international operations", Second Draft:<br>March 3, 1986.   | 86/23 | Arnoud DE MEYER   | "An exploratory study on the integration of<br>information systems in manufacturing",<br>July 1986.                  |
| 86/09 | Philippe C. HASPELAGH  | "Conceptualizing the strategic process in<br>diversified firms: the role and nature of the<br>corporate influence process", February 1986. | 86/24 | David GAUTSCHI<br>and Vithala R. RAO  | "A methodology for specification and<br>aggregation in product concept testing",<br>July 1986.                       |
| 86/10 | R. MOENART,<br>Arnoud DE MEYER,<br>J. BARBE and<br>D. DESCHOOLMEESTER. | "Analysing the issues concerning<br>technological de-maturity".  | 86/25 | H. Peter GRAY<br>and Ingo WALTER  | "Protection", August 1986.   |
| 86/11 | Philippe A. NAERT<br>and Alain BULTEZ                                  | "From "Lydiametry" to "Pinkhamization":<br>misspecifying advertising dynamics rarely<br>affects profitability".                            | 86/26 | Barry EICHENGREEN<br>and Charles WYPLOSZ  | "The economic consequences of the Franc<br>Poincare", September 1986.  |
| 86/12 | Roger BETANCOURT<br>and David GAUTSCHI                                 | "The economics of retail firms", Revised<br>April 1986.  | 86/27 | Karel COOL<br>and Ingemar DIERICKX  | "Negative risk-return relationships in<br>business strategy: paradox or truism?",<br>October 1986.                   |
| 86/13 | S.P. ANDERSON<br>and Damien J. NEVEN                                   | "Spatial competition à la Cournot".  | 86/28 | Manfred KETS DE<br>VRIES and Danny MILLER                                       | "Interpreting organizational texts.  |
| 86/14 | Charles WALDMAN  | "Comparaison internationale des marges brutes<br>du commerce", June 1985.  | 86/29 | Manfred KETS DE VRIES   | "Why follow the leader?".  |
| 86/15 | Mihkel TOMBAK and<br>Arnoud DE MEYER                                   | "How the managerial attitudes of firms with<br>FMS differ from other manufacturing firms:<br>survey results". June 1986.                   | 86/30 | Manfred KETS DE VRIES   | "The succession game: the real story.  |
|       |  |  | 86/31 | Arnoud DE MEYER   | "Flexibility: the next competitive battle",<br>October 1986.   |
|       |  |  | 86/31 | Arnoud DE MEYER,<br>Jinichiro NAKANE,<br>Jeffrey G. MILLER<br>and Kasra FERDOWS | "Flexibility: the next competitive battle",<br>Revised Version: March 1987   |
|       |  |  | 86/32 | Karel COOL<br>and Dan SCHENDEL  | Performance differences among strategic group<br>members", October 1986.   |

- 86/33 Ernst BALTENSPERGER and Jean DERMINE "The role of public policy in insuring financial stability: a cross-country, comparative perspective", August 1986, Revised November 1986.
- 86/34 Philippe HASPELAGH and David JEMISON "Acquisitions: myths and reality", July 1986.
- 86/35 Jean DERMINE "Measuring the market value of a bank, a primer", November 1986.
- 86/36 Albert CORHAY and Gabriel HAWAVINI "Seasonality in the risk-return relationship: some international evidence", July 1986.
- 86/37 David GAUTSCHI and Roger BETANCOURT "The evolution of retailing: a suggested economic interpretation".
- 86/38 Gabriel HAWAVINI "Financial innovation and recent developments in the French capital markets", Updated: September 1986.
- 86/39 Gabriel HAWAVINI Pierre MICHEL and Albert CORHAY "The pricing of common stocks on the Brussels stock exchange: a re-examination of the evidence", November 1986.
- 86/40 Charles WYPLOSZ "Capital flows liberalization and the EMS, a French perspective", December 1986.
- 86/41 Kasra FERDOWS and Wickham SKINNER "Manufacturing in a new perspective", July 1986.
- 86/42 Kasra FERDOWS and Per LINDBERG "FMS as indicator of manufacturing strategy", December 1986.
- 86/43 Damien NEVEN "On the existence of equilibrium in hotelling's model", November 1986.
- 86/44 Ingemar DIERICKX Carmen MATUTES and Damien NEVEN "Value added tax and competition", December 1986.
- 1987
- 87/01 Manfred KETS DE VRIES "Prisoners of leadership".
- 87/02 Claude VIALLET "An empirical investigation of international asset pricing", November 1986.
- 87/03 David GAUTSCHI and Vithala RAO "A methodology for specification and aggregation in product concept testing", Revised Version: January 1987.
- 87/04 Sumantra GHOSHAL and Christopher BARTLETT "Organizing for innovations: case of the multinational corporation", February 1987.
- 87/05 Arnoud DE MEYER and Kasra FERDOWS "Managerial focal points in manufacturing strategy", February 1987.
- 87/06 Arun K. JAIN, Christian PINSON and Naresh K. MALHOTRA "Customer loyalty as a construct in the marketing of banking services", July 1986.
- 87/07 Rolf BANZ and Gabriel HAWAVINI "Equity pricing and stock market anomalies", February 1987.
- 87/08 Manfred KETS DE VRIES "Leaders who can't manage", February 1987.
- 87/09 Lister VICKERY, Mark PILKINGTON and Paul READ "Entrepreneurial activities of European MBAs", March 1987.
- 87/10 André LAURENT "A cultural view of organizational change", March 1987.
- 87/11 Robert FILDES and Spyros MAKRIDAKIS "Forecasting and loss functions", March 1987.
- 87/12 Fernando BARTOLOME and André LAURENT "The Janus Head: learning from the superior and subordinate faces of the manager's job", April 1987.
- 87/13 Sumantra GHOSHAL and Nitin NOHRIA "Multinational corporations as differentiated networks", April 1987.
- 87/14 Landis GABEL "Product Standards and Competitive Strategy: An Analysis of the Principles", May 1987.
- 87/15 Spyros MAKRIDAKIS "METAFORCASTING: Ways of improving Forecasting. Accuracy and Usefulness", May 1987.
- 87/16 Susan SCHNEIDER and Roger DUNBAR "Takeover attempts: what does the language tell us?", June 1987.
- 87/17 André LAURENT and Fernando BARTOLOME "Managers' cognitive maps for upward and downward relationships", June 1987.
- 87/18 Reinhard ANGELMAR and Christoph LIEBSCHER "Patents and the European biotechnology lag: a study of large European pharmaceutical firms", June 1987.
- 87/19 David BEGG and Charles WYPLOSZ "Why the EMS? Dynamic games and the equilibrium policy regime", May 1987.
- 87/20 Spyros MAKRIDAKIS "A new approach to statistical forecasting", June 1987.
- 87/21 Susan SCHNEIDER "Strategy formulation: the impact of national culture", Revised: July 1987.
- 87/22 Susan SCHNEIDER "Conflicting ideologies: structural and motivational consequences", August 1987.
- 87/23 Roger BETANCOURT David GAUTSCHI "The demand for retail products and the household production model: new views on complementarity and substitutability".

87/24	C.B. DERR and André LAURENT	"The internal and external careers: a theoretical and cross-cultural perspective", Spring 1987.	87/41	Gavriel HAWAWINI and Claude VIALLET	"Seasonality, size premium and the relationship between the risk and the return of French common stocks", November 1987
87/25	A. K. JAIN, N. K. MALHOTRA and Christian PINSON	"The robustness of MDS configurations in the face of incomplete data", March 1987, Revised: July 1987.	87/42	Damien NEVEN and Jacques-P. THISSE	"Combining horizontal and vertical differentiation: the principle of max-min differentiation", December 1987
87/26	Roger BETANCOURT and David GAUTSCHI	"Demand complementarities, household production and retail assortments", July 1987.	87/43	Jean GABSZEWICZ and Jacques-F. THISSE	"Location", December 1987
87/27	Michael BURDA	"Is there a capital shortage in Europe?", August 1987.	87/44	Jonathan HAMILTON, Jacques-F. THISSE and Anita WESKAMP	"Spatial discrimination: Bertrand vs. Cournot in a model of location choice", December 1987
87/28	Gabriel HAWAWINI	"Controlling the interest-rate risk of bonds: an introduction to duration analysis and immunization strategies", September 1987.	87/45	Karel COOL, David JEMISON and Ingemar DIERICKX	"Business strategy, market structure and risk-return relationships: a causal interpretation", December 1987.
87/29	Susan SCHNEIDER and Paul SHRIVASTAVA	"Interpreting strategic behavior: basic assumptions themes in organizations", September 1987	87/46	Ingemar DIERICKX and Karel COOL	"Asset stock accumulation and sustainability of competitive advantage", December 1987.
87/30	Jonathan HAMILTON W. Bentley MACLEOD and J. P. THISSE	"Spatial competition and the Core", August 1987.	<u>1988</u>		
87/31	Martine QUINZII and J. P. THISSE	"On the optimality of central places", September 1987.	88/01	Michael LAWRENCE and Spyros MAKRIDAKIS	"Factors affecting judgemental forecasts and confidence intervals", January 1988.
87/32	Arnoud DE MEYER	"German, French and British manufacturing strategies less different than one thinks", September 1987.	88/02	Spyros MAKRIDAKIS	"Predicting recessions and other turning points", January 1988.
87/33	Yves DOZ and Amy SHUEN	"A process framework for analyzing cooperation between firms", September 1987.	88/03	James TEBOUL	"De-industrialize service for quality", January 1988.
87/34	Kasra FERDOVS and Arnoud DE MEYER	"European manufacturers: the dangers of complacency. Insights from the 1987 European manufacturing futures survey, October 1987.	88/04	Susan SCHNEIDER	"National vs. corporate culture: implications for human resource management", January 1988.
87/35	P. J. LEDERER and J. P. THISSE	"Competitive location on networks under discriminatory pricing", September 1987.	88/05	Charles WYPLOSZ	"The swinging dollar: is Europe out of step?", January 1988.
87/36	Manfred KETS DE VRIES	"Prisoners of leadership", Revised version October 1987.	88/06	Reinhard ANGELMAR	"Les conflits dans les canaux de distribution", January 1988.
87/37	Landis GABEL	"Privatization: its motives and likely consequences", October 1987.	88/07	Ingemar DIERICKX and Karel COOL	"Competitive advantage: a resource based perspective", January 1988.
87/38	Susan SCHNEIDER	"Strategy formulation: the impact of national culture", October 1987.	88/08	Reinhard ANGELMAR and Susan SCHNEIDER	"Issues in the study of organizational cognition", February 1988.
87/39	Manfred KETS DE VRIES 1987	"The dark side of CEO succession", November 1987	88/09	Bernard SINCLAIR- DESGAGNÉ	"Price formation and product design through bidding", February 1988.
87/40	Carmen MATUTES and Pierre REGIBEAU	"Product compatibility and the scope of entry", November 1987	88/10	Bernard SINCLAIR- DESGAGNÉ	"The robustness of some standard auction game forms", February 1988.
			88/11	Bernard SINCLAIR- DESGAGNÉ	"When stationary strategies are equilibrium bidding strategy: The single-crossing property", February 1988.

88/12	Spyros MAKRIDAKIS	"Business firms and managers in the 21st century", February 1988	88/29	Naresh K. MALHOTRA, Christian PINSON and Arun K. JAIN	"Consumer cognitive complexity and the dimensionality of multidimensional scaling configurations", May 1988.
88/13	Manfred KETS DE VRIES	"Alexithymia in organizational life: the organization man revisited", February 1988.	88/30	Catherine C. ECKEL and Theo VERMAELEN	"The financial fallout from Chernobyl: risk perceptions and regulatory response", May 1988.
88/14	Alain NOEL	"The interpretation of strategies: a study of the impact of CEOs on the corporation", March 1988.	88/31	Sumantra GHOSHAL and Christopher BARTLETT	"Creation, adoption, and diffusion of innovations by subsidiaries of multinational corporations", June 1988.
88/15	Anil DEOLALIKAR and Lars-Hendrik ROLLER	"The production of and returns from industrial innovation: an econometric analysis for a developing country", December 1987.	88/32	Kasra FERDOVS and David SACKRIDER	"International manufacturing: positioning plants for success", June 1988.
88/16	Gabriel HAWAWINI	"Market efficiency and equity pricing: international evidence and implications for global investing", March 1988.	88/33	Mihkel M. TOMBAK	"The importance of flexibility in manufacturing", June 1988.
88/17	Michael BURDA	"Monopolistic competition, costs of adjustment and the behavior of European employment", September 1987.	88/34	Mihkel M. TOMBAK	"Flexibility: an important dimension in manufacturing", June 1988.
88/18	Michael BURDA	"Reflections on 'Wait Unemployment' in Europe", November 1987, revised February 1988.	88/35	Mihkel M. TOMBAK	"A strategic analysis of investment in flexible manufacturing systems", July 1988.
88/19	M.J. LAVRENCE and Spyros MAKRIDAKIS	"Individual bias in judgements of confidence", March 1988.	88/36	Vikas TIBREWALA and Bruce BUCHANAN	"A Predictive Test of the NBD Model that Controls for Non-stationarity", June 1988.
88/20	Jean DERMINE, Damien NEVEN and J.F. THISSE	"Portfolio selection by mutual funds, an equilibrium model", March 1988.	88/37	Murugappa KRISHNAN Lars-Hendrik RÖLLER	"Regulating Price-Liability Competition To Improve Welfare", July 1988.
88/21	James TEBOUL	"De-industrialize service for quality", March 1988 (88/03 Revised).	88/38	Manfred KETS DE VRIES	"The Motivating Role of Envy : A Forgotten Factor in Management, April 88.
88/22	Lars-Hendrik RÖLLER	"Proper Quadratic Functions with an Application to AT&T", May 1987 (Revised March 1988).	88/39	Manfred KETS DE VRIES	"The Leader as Mirror : Clinical Reflections", July 1988.
88/23	Sjur Didrik FLAM and Georges ZACCOUR	"Equilibres de Nash-Cournot dans le marché européen du gaz: un cas où les solutions en boucle ouverte et en feedback coïncident", Mars 1988	88/40	Josef LAKONISHOK and Theo VERMAELEN	"Anomalous price behavior around repurchase tender offers", August 1988.
88/24	B. Espen ECKBO and Hervig LANGOHR	"Information disclosure, means of payment, and takeover premia. Public and Private tender offers in France", July 1985, Sixth revision, April 1988.	88/41	Charles WYPLOSZ	"Assymetry in the EMS: intentional or systemic?", August 1988.
88/25	Everette S. GARDNER and Spyros MAKRIDAKIS	"The future of forecasting", April 1988.	88/42	Paul EVANS	"Organizational development in the transnational enterprise", June 1988.
88/26	Sjur Didrik FLAM and Georges ZACCOUR	"Semi-competitive Cournot equilibrium in multistage oligopolies", April 1988.	88/43	B. SINCLAIR-DESGAGNE	"Group decision support systems implement Bayesian rationality", September 1988.
88/27	Murugappa KRISHNAN Lars-Hendrik RÖLLER	"Entry game with resalable capacity", April 1988.	88/44	Essam MAHMOUD and Spyros MAKRIDAKIS	"The state of the art and future directions in combining forecasts", September 1988.
88/28	Sumantra GHOSHAL and C. A. BARTLETT	"The multinational corporation as a network: perspectives from interorganizational theory", May 1988.	88/45	Robert KORAJCZYK and Claude VIALLET	"An empirical investigation of international asset pricing", November 1986, revised August 1988.
			88/46	Yves DOZ and Amy SHUEN	"From intent to outcome: a process framework for partnerships", August 1988.

- 88/47 Alain BULTEZ,  
Els GIJSBRECHTS,  
Philippe NAERT and  
Piet VANDEN ABEELE "Asymmetric cannibalism between substitute  
items listed by retailers", September 1988.
- 88/48 Michael BURDA "Reflections on 'Wait unemployment' in  
Europe, II", April 1988 revised September 1988.
- 88/49 Nathalie DIERKENS "Information asymmetry and equity issues",  
September 1988.
- 88/50 Rob WEITZ and  
Arnoud DE MEYER "Managing expert systems: from inception  
through updating", October 1987.
- 88/51 Rob WEITZ "Technology, work, and the organization: the  
impact of expert systems", July 1988.
- 88/52 Susan SCHNEIDER and  
Reinhard ANGELMAR "Cognition and organizational analysis: who's  
minding the store?", September 1988.
- 88/53 Manfred KETS DE VRIES "Whatever happened to the philosopher-king: the  
leader's addiction to power, September 1988.
- 88/54 Lars-Hendrik RÖLLER  
and Mihkel M. TOMBAK "Strategic choice of flexible production  
technologies and welfare implications",  
October 1988
- 88/55 Peter BOSSAERTS  
and Pierre HILLION "Method of moments tests of contingent claims  
asset pricing models", October 1988.
- 88/56 Pierre HILLION "Size-sorted portfolios and the violation of  
the random walk hypothesis: Additional  
empirical evidence and implication for tests  
of asset pricing models", June 1988.
- 88/57 Wilfried VANHONACKER  
and Lydia PRICE "Data transferability: estimating the response  
effect of future events based on historical  
analogy", October 1988.
- 88/58 B. SINCLAIR-DESGAGNE  
and Mihkel M. TOMBAK "Assessing economic inequality", November 1988.
- 88/59 Martin KILDUFF "The interpersonal structure of decision  
making: a social comparison approach to  
organizational choice", November 1988.
- 88/60 Michael BURDA "Is mismatch really the problem? Some estimates  
of the Chelwood Gate II model with US data",  
September 1988.
- 88/61 Lars-Hendrik RÖLLER "Modelling cost structure: the Bell System  
revisited", November 1988.
- 88/62 Cynthia VAN HULLE,  
Theo VERMAELEN and  
Paul DE WOUTERS "Regulation, taxes and the market for corporate  
control in Belgium", September 1988.
- 88/63 Fernando NASCIMENTO  
and Wilfried R.  
VANHONACKER "Strategic pricing of differentiated consumer  
durables in a dynamic duopoly: a numerical  
analysis", October 1988.
- 88/64 Kasra FERDOWS "Charting strategic roles for international  
factories", December 1988.
- 88/65 Arnoud DE MEYER  
and Kasra FERDOWS "Quality up, technology down", October 1988.