PREDICTING NYSE LISTING OF OTC FIRMS: A LOGIT ANALYSIS

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There are two possible underlying driving forces, not mutually exclusive, for OTC firms to list on the NYSE. One is that management believes that listing can accomplish certain financial objectives. The other is that listed firms have certain financial attributes that are beneficial to the Exchange. We examine (1) asset growth, (2) debt-equity ratio, (3) percentage of institutional holdings, (4) stock turnover ratio, (5) stock price variance, and (6) net income variance to determine their relationships to the listing decision. Empirical results support the hypothesis that the NYSE is the underlying force for common stock listing. Listed firms have a higher stock turnover ratio, stock price variance, and net income variance than firms choosing not to list. The logit model developed in this study can correctly classify over 75% of the firms into their respective groups. This suggests that it may be useful for financial analysts to use this model as an effective tool in predicting NYSE listing of OTC firms.

I. INTRODUCTION

In recent years, continuous falls in interest rates have pushed stocks listed on the New York Stock Exchange (NYSE) to reach its new-record territory. For example, the Dow Jones Industry Index broke its 3900 mark in early 1994. With the predicted low interest rates to boost our national economy, investors have found that there is very little or no incentive to put their money in banks to earn nominal interest. Under these market environments, it is reasonable to believe stock prices will remain high and trading will continue to be active. It is imperative for the management of smaller firms to seriously consider whether to list their stocks in the Big Board to take advantage of the situation.

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Common stock listing studies have existed for several decades. Previous studies have emphasized four general areas: (1) increase the stock liquidity, (2) increasing the stock value, (3) decreasing the cost of capital, and (4) decreasing the systematic risk of stocks. The empirical findings of these studies are not consistent. However, recent studies do report an increase in the shareholder wealth associated with announcements of the NYSE listing by corporations previously listed in the over-the-counter market, especially in the short-run. The returns to investors are significant for firms that choose to switch from the over-the-counter (OTC) market to the NYSE. On the basis of these studies, it is important for financial analysts to understand the reasons behind the listing decision and to make timely predictions to assist investors in developing a trading strategy to benefit from it. Our present study focuses on OTC firms only; hence, private or AMEX firms are excluded.

We believe that there are two possible underlying driving forces for OTC firms to list on the NYSE. We should also point out that these two forces are not mutually exclusive. One is that management believes that listing can accomplish certain financial objectives, for instance, raising additional equity capital. In other words, management is the driving force behind stock-listing decisions. Two arguments can be forwarded to support this hypothesis. One is to apply the good-news-and-bad-news theory. Since the listing requirements for the NYSE are substantially higher than those for the OTC market, one may expect that such a firm is sending good news to investors. By so doing, it would be easier for the management to raise additional capital. The other argument is that a change in the trading location may simply reflect a change in the firm's character, i.e., a developmental step in its growth process [3].

The alternative hypothesis is that the NYSE has a strong incentive to identify firms currently listed in the OTC which it believes would be beneficial to the Big Board for two reasons. First, the NYSE is a fee-driven organization. Firms listed on the NYSE are expected to enjoy high trading activities and hence increase their revenue. Thus, a firm with high trading activities in the OTC market may become a target for the NYSE due to the commission-driven nature of the Big Board. Second, it is relatively inexpensive to the NYSE to identify potential candidates qualified to list on the Big Board by examining the firms' financial characteristics as an initial filter. However, it may be somewhat costly for the NYSE to follow all the firms through and recruit them. It is, therefore, beneficial for the NYSE to narrow down the candidates which have a strong possibility to list. One of the contributions of this study is to identify these factors. Based on these reasonings, we examine six independent variables and determine their relationships to the listing

decision. The purpose is to develop a model that can help financial analysts to predict such a decision. These variables are divided into two groups. In the first group, variables represent financial objectives that management may intend to achieve through listing in the NYSE. Such variables include asset growth, debt-equity ratio, and percentage of institutional holdings. Variables in the second group symbolize the attributes of firms that the NYSE may find desirable to allure them to list on the Big Board. These variables include common stock turnover ratio, stock price variance, and net income variance.

This study is different from previous studies in several ways. First, we believe that traditional financial statement data should be helpful for the financial analysts to make listing predictions. That is, the financial statements generated based on a set of accounting rules should be useful for such predictions. Second, we believe that the listing decision is an important one for management to make, and such a decision may be made over a period of time. Therefore, it is reasonable to believe that financial analysts should be able to detect some signals of the common stock listing decision by performing a trend analysis of financial statements long before such a decision is publicized. Third, in recent years, institutional investors, such as pension funds and mutual funds, have become one of the major forces in the financial markets. However, few studies have examined the relationship between institutional investors and the common stock listing decision. We believe that this is one of the few papers in the literature that uses the institutional investor holdings as an independent variable to examine the stock listing issue.

II. REVIEW OF LITERATURE

There are three distinct stages of the common stock listing studies. Researchers first emphasized micro issues. They hypothesized that firms can benefit from listing by (1) increasing the stock liquidity, (2) increasing the stock value, (3) decreasing the cost of capital, and (4) decreasing the systematic risk of stocks. Furst [10], Van Horne [16] and Ying et al. [17] hypothesized that listing would increase the value of the company's stock. Their empirical results were inconclusive, leaving the question unresolved. Goulet [11], Dubosky and Groth [7], and Cooper et al.[4] tested for increased market liquidity as a result of listing but failed to show such a relationship. Dhaliwal [6], Fabozzi [8], and Baker and Spitzfaden [3] hypothesized that listing would decrease the firm's cost of capital. The results of these studies were mixed. Reints and Vandenburg [15] and Philips and Zecher [14] examined the relationship between

common stock listing and a firm's systematic risk. Their empirical findings show no clear support for the belief that stock listing will decrease the firm's systematic risk.

Common stock listing studies in the 1980's have focused on management motives for stock listings, for example, Baker and Pettit [2], Freeman and Rosenbaum [9], and Baker and Johnson [1]. Results from these studies showed that management decided to move their stocks from the NASDAQ to the NYSE mainly because of non-economic reasons such as visibility and prestige. The studies also indicated that management perceived that these non-economic benefits outweighed the economic ones. Baker and Johnson's [1] study showed that management believed that the benefits of listing had not outweighed its costs.

In order to explain the NYSE listing choices of the NASDAQ firms, Cowan et al. [5] contrasted the characteristics of firms that remained in the NASDAQ system to those that listed on the NYSE. Their empirical results showed that firms that left the NASDAQ to list on the NYSE tended to have smaller stock market capitalization, fewer shareholders, few market makers, and smaller price per share that NASDAQ firms that could list but did not choose to do so (non-listed firms). Listing firms have larger volume, on average, than qualified non-listed firms. They also found than firms listed on the NYSE tended to do so after a period of strong earnings growth relative to eligible non-listed firms.

Prior studies on stock exchange listing provide solid arguments about the firm's benefits from listing, management's motives for listing, and characteristics of listed versus non-listed firms. However, these studies did not address how an investor or a financial analyst can retrieve the financial information to detect such a decision. Since investors can profit from listing announcements, it is important for financial analysts to identify the listing signals and to assist investors in developing a trading strategy to take advantage of short-term gains. The purpose of this study is to bridge this gap. By using financial statement information, a financial analyst should be able to wave a flag to investors of a possible common stock listing.

III. RESEARCH HYPOTHESES, INDEPENDENT VARIABLES, AND RESEARCH FINDINGS

There are two hypothesized driving forces for common stock listing. One is that management may use stock listing to realize a firm's financial objectives. It is reasonable to predict that a firm qualified for NYSE listing and traded on the OTC market is more likely to move up if management believes listing will fulfill its financial objectives. These objectives include financing a firm's asset growth, improving a firm's financial flexibility, and alluring or retaining institutional investors. The other is that a driving force arises from the commission-driven nature of the NYSE. It is reasonable to believe that the Big Board will identify and recruit firms with some general financial attributes that are advantageous to the NYSE and its specialists. The legitimate candidates would be firms that can generate trading volume. Such financial characteristics include a high stock turnover, a high stock price variance, and a low income stability.

There are three steps in this research project. First, we identify firms that (1) formally traded their common stocks in the OTC market but decided to move up to the NYSE (listed firms), and (2) qualified to list on the NYSE but chose to stay in the OTC market based on the NYSE listing standards (non-listed firms). In order to identify these firms, we followed the NYSE listing standards (Table 1), screened the newly listed firms on the NYSE Fact Books [13], and traced them to the Over-the-Counter Stock Price Record to ascertain which firms were formerly traded in the OTC. In this process, we identify 183 firms in the two groups. Some data are, however, incomplete for further calculations; therefore, a total of 94 companies from 1984 to 1988 are included in this study. In Table 2 shows the distribution of these firms by year and by Standard Industry Code.

Table 1: Minimum Listing Requirements on the NYSE

1. Number of shareholders who hold 100 shares or more	$ 2,000
2. Number of shares publicly held	$ 1,000,000
3. Aggregate market value of publicly-held shares	$16,000,000
4. Net tangible assets	$16,000,000
5. Pre-tax income: preceding year	$ 2,000,000
6. Pre-tax income: latest year	$ 2,000,000
7. Net Income	None

Source: Fact Book, New York Stock Exchange, 1987.

The actual number of OTC firms listed on the NYSE during the 1985 to 1989 period is substantially higher than what we have in our sample. There are two reasons for this. First, we need to have three years' data prior to the listing decision for Asset Growth, Debt-Equity Ratio, and

Net Income Variance. Moreover, some industries have been excluded from our analysis due to their unique characteristics, e.g., transportation, utilities, finance, insurance, and real estate.

Then, in the second step, we retrieve data from three sources for our analysis: (1) Standard and Poor's COMPUSTAT data file to calculate the asset growth, debt-equity ratio, and income stability; (2) Standard and Poor's Daily Stock Price Records for the OTC to compute the common stock turnover and stock price variance; and (3) Nelson's Directory of Wall Street Research to identify the percentage of institutional holdings. Based on our earlier reasonings, the NYSE may allure firms with certain financial attributes in order to create trading activities for the Big Board. We predict that there is a higher common stock turnover, a higher stock price variance, and a lower income stability for listed firms than there are for non-listed firms. We also believe that there is a significant difference in the percentage of institutional holding; the direction of difference is, however, not predicted.

Table 2: Sample Distribution

Panel A: by Year			
Year	Listed	Non-listed	Total
1985	3	24	27
1986	7	14	21
1987	11	6	17
1988	11	18	29
Total	32	62	94

Panel B: by SIC			
SIC*	Listed	Non-listed	Total
2	7	11	18
3	11	35	46
5	6	9	15
7	6	5	11
8	2	2	4
Total	32	62	94

*: SIC is based on the first digit of 4-digit Standardized Industrial Classification Code.

Both univariate and multivariate analyses are performed in this study. In the univariate analysis, we conduct the parametric t-test and nonparametric Mann-Whitney U test to examine our research hypotheses. The empirical evidence from both tests supports our hypotheses. From Table 3, one can find that listed firms do have a higher stock turnover, a

higher stock price variance, and a lower stock stability than those of non-listed firms.

Table 3: Univariate Analysis

Panel A: Parametric t-test

Variables	Non-listed	Listed	t-Value	1-tailed Probability
Asset Growth	1.6215	1.8291	-0.39	0.338
Debt/Equity	0.8969	1.4414	-1.03	0.165
Percent of Institutional Holdings	0.2697	0.3628	-2.27	0.028*
Common Stock Turnover Ratio	0.9103	1.5446	-3.15	0.002
Stock Price Variance	0.4394	0.7873	-2.72	0.005
Net Income Variance	1.4921	8.1727	-1.30	0.100

Panel B: Nonparametric Mann-Whitney U test

Variables	Mean Rank Non-listed	Listed	Z Value	1-tailed Probability
Asset Growth	45.15	52.06	-1.1650	0.122
Debt/Equity	48.01	46.52	0.2513	0.401
Percent of Institutional Holdings	42.98	56.25	-2.2351	0.025*
Common Stock Turnover Ratio	40.16	61.64	-3.4830	0.0003
Stock Price Variance	39.81	62.41	-3.8062	0.0001
Net Income Variance	42.23	57.72	-2.6092	0.005

*: a two-tailed probability

In the multivariate analysis, we use the six independent variables to construct a logit model in order to predict common stock listing. The empirical evidence indicates that common stock turnover is the most significant variable based on its p-value, which is significant at the 5% level. The stock price variance and income variance variables show the 10% level of significance with a one-tailed test. The Chi-Square statistic reveals that all variables taken together significantly explain the difference

in listed and non-listed firms at the 1% level. Overall, this logit model is able to correctly classify over 75% of the sample firms into the two groups (Table 4).

Table 4: Logit Analysis

Variables	Parameter Estimate	Chi-Square	P-Value
CONSTANT	-2.3307	17.0558	0.0001
AG	-0.0698	0.3679	0.2721
DER	0.1747	1.5523	0.1064
% INST	0.4845	0.0978	0.3772
CSTR	0.6486	3.5783	0.0293
SPV	0.7214	2.5079	0.0566
NIV	0.1121	2.2153	0.0684

Number of Firms Included in the Model : 94
Listed Firms : 32
Non-listed Firms : 62

Correctly Classified Percentage: 75.3%

Chi-Square Statistic : 19.687
Degree of Freedom : 6
P : 0.0031
AG: Asset Growth
DER: Debt-Equity Ratio
% INST: Percentage of Institutional Holdings
CSTR: Common Stock Turnover Ratio
SPV: Stock Price Variance
NIV: Net Income Variance

This study shows that a firm with a high stock turnover, a high stock price variance, and a low earning stability would be the best candidate to list on the NYSE. The logical explanation to this phenomenon would be the commission-driven nature of the Big Board. It would be most beneficial to the NYSE to search for a firm with good potentials to generate trading activities. The empirical evidence also supports that the percentage of institutional holdings of listed firms is higher than that of non-listed firms. Since it is easier to trade stocks in the

NYSE than it is in the OTC market, institutional investors of OTC stocks may push the management to list their stocks in NYSE.

Some words of caution are appropriate here. The first is related to the potential problem of disproportionate samples in our logit model. The estimate coefficients of the explanatory variables are not affected by the unequal sampling rates of the two groups. It may, however, affect the constant term. Therefore, if we are mainly interested in identifying which explanatory variables are significant, which is indeed the case, we need not make any changes in the estimated coefficient. One the other hand, if the estimated model is used for prediction purposes, an adjustment in the constant term is necessary [12].

Moreover, in order to demonstrate the predictive power of the logit model, we have to perform an out-of-sample forecast. Unfortunately, the small sample sizes have precluded us from such an attempt.

IV. CONCLUSION

With a recent history of low interest rates and the economy on the verge of an economic recovery, it seems that now is the best time for companies to expand their operations. Common stock listing literature has examined a number of areas in which firms may benefit from stock listing. Recent studies have indicated that investors will benefit from such an action due to an increase in stock price, especially in the short-run. The purpose of this study is to identify some financial attributes of a listed company in order to assist financial analysts to predict such a move. By better predicting common stock listing, a financial analyst can help investors develop a trading strategy to take advantage of common stock listing and profit from such a decision.

The empirical evidence supports that the logit model developed in this study can correctly classify over 75% of the firms into their respective groups. This indicates that it may be useful for financial analysts to use this model as an effective tool in predicting common stock listing.

APPENDIX

I. The formulas used in calculating the values of independent variables

(1)   Asset Growth (AG) = $(A_{i,-1} - A_{i,-4}) \div A_{i,-4}$

Where $A_{i,-1}$: total assets for the firm i at the end of one fiscal year prior to the listing decision.

$A_{i,-4}$: total assets for the firm i at the end of four fiscal years prior to the listing decision.

(2)   Debt-Equity Ratio (DER) $= \sum_{y=-1}^{-3} DB_{i,y} \div \sum_{y=-1}^{-3} EQ_{i,y,}$

where $DB_{i,y}$: total liabilities for the firm i at fiscal year y when the listing decision is made.

$Eq_{i,y}$: total shareholders' equity for the firm i at fiscal year y when the listing decision is made.

(3)   Percentage of Institutional Holdings   (%INST)

(4)   Common Stock turnover Ratio (CSTR) $= \sum_{m=-3}^{-15} TV_{i,m} \div \sum_{m=-3}^{-15} SO_{i,m,}$

where $TV_{i,m}$: trading volume for the stock i at month m.

$SO_{i,m}$: share outstanding for the stock i at month m.

(5)   Stock Price Variance (SPV) $= s^2(SP_{i,m}) \div [\sum_{m=-3}^{-15} (Sp_{i,m}) \div 13],$

where $SP_{i,m}$: closing stock price for the stock i at month m.

(6)   Net Income Variance (NIV)

$= S^2(NI_{i,y}) \div [\sum_{y=-1}^{-4} (Ni_{i,y}) \div 4],$

where $Ni_{i,y}$: net income for firm i at fiscal year y when the listing decision is made.

II. Logit Model

P_i of common stock listing

$= F(Z_i)$

$= F(a + \beta_1 AG + \beta_2 DER + \beta_3 \%INST + \beta_4 CSTR + \beta_5 SPV + \beta_6 NIV)$

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