8-7-2003

Essays on the Dynamics of Capital Structure

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ESSAYS ON THE DYNAMICS OF CAPITAL STRUCTURE

A Dissertation

Submitted to the Graduate Faculty of the
University of New Orleans
in partial fulfillment of the
requirements for the degree of

Doctor of Philosophy
in the Financial Economics Program

by

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August 2003

DEDICATION

To my family, for their overwhelming love and support.

ACKNOWLEDGEMENTS

I would like to thank Dr. Ranjan D'Mello, Dr. Sudha Krishnaswami, Dr. Tarun Mukherjee, Dr. Atsuyuki Naka, Dr. Gerald Whitney, and the 2002 FMA Doctoral Student Consortium participants in the panel chaired by Dr. Sheridan Titman for helpful comments. Many thanks go to John Graham for providing the marginal tax data and to James Bartkus, Adel Sharkas, and Adel Bino for their support.

In addition, I would like to thank special and wonderful people Carmen, Ranjan, Sudha, and Tarun .I am thankful for so many things. My appreciation for you will never fade away.

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ABSTRACT

Tests of the static trade-off theory that posits that firms move towards the optimum capital structure necessitate a joint hypothesis test - whether firms adjust toward target leverage, and whether the proxy used for target leverage is the true target leverage. Prior studies use the time-series mean leverage for each firm, the industry median leverage, an estimated cross-sectional leverage, and a tobit estimated leverage using the factors suggested by the static trade-off theory as proxies for the target leverage. In this dissertation, I examine whether these proxies are equivalent and test the consistency of the proxies with the theorized behavior of the true target leverage.

My results indicate that the four proxies we examine have significantly different distributions and this holds across most industries. Further, the industry median leverage is the proxy which best exhibits behavior consistent with the true target leverage. Firm value is higher for firms closer to the industry median and lower for firms away from the industry median. A robustness check using K-means cluster analysis confirms the superiority of the industry median leverage over the other proxies of target leverage.

This study complements the previous studies on the pecking order theory and the trade-off theory. The main purpose of this study is to investigate three issues that are not considered in the previous studies. The adequacy of the specification and the assumptions of the models used in testing the trade-off and the pecking order theory. The second issue examined in this study is the validity to putting the pecking order and the trade-off theories in a horse race. The final issue examined in this study is the factors driving firms to issue (repurchase) debt or equity or combination of both and simultaneously the factors affecting the size of issue (repurchase)

CHAPTER I

A COMPARATIVE ANALYSIS OF PROXIES FOR TARGET CAPITAL STRUCTURE

Introduction

While most of the academic literature on the capital structure agrees on the importance of the target capital structure role in many corporate financing models, no attention has been given to the accuracy of the different proxies in measuring the optimal capital structure. Are the different proxies equivalent? If not, which proxy exhibits characteristics that are most consistent with the theorized true optimal capital structure.[1]

The tax benefit-bankruptcy cost trade-off models (Baxter (1967), DeAngelo and Masulis (1980), Kraus and Litzenberger (1973), Robichek and Myers (1966), Scott (1976)) predict that firms will seek to maintain an optimal capital structure by balancing the benefits and the costs of debt. The benefits include the tax shield whereas the costs include expected financial distress costs. Under the agency theoretical models (Jensen and Meckling (1976), Myers (1977), Jensen (1986), Stulz (1990), Hart and Moore (1995)) firms use the benefits of reducing potential free cash flow problems and other potential conflicts between managers and shareholders, to offset costs associated with underinvestment and asset substitution problems. These theories predict that firms maintain an optimum capital structure where the marginal benefit of debt equal the marginal cost. The implication of these theories, the target leverage hypothesis, is that firms have target leverage and they adjust their leverage toward the target over time.

Many empirical studies (Marsh (1982), Jalilvand and Harris (1984), Titman and Wessels (1988), Fisher, Heinkel and Zechner (1989), Mackie-Mason (1990), Rajan and Zingales (1995), Graham (1996a), Hull (1999), Hovakimian, Opler and Titman (2001)) find support for the target leverage hypothesis.

Recently, the target leverage hypothesis has received renewed attention. Studies emerge in which both the static trade-off theory and the pecking order theory are jointly tested. Shyam-Sunder and Myers (1999) reject the static theory and find strong confirmation for pecking order behavior using the impact of the funds of flows deficit on changes in the debt versus a target adjustment model. Hovakimian, Opler, and Titman (2001) examine the firms' debt-equity choice and argue that the residuals of a cross-sectional regression on the debt ratio are deviations from target. Fama and French (2002) incorporate dividend choice, which is an important variable in the pecking order theory, and jointly test the trade off and pecking order models, they find evidence in favor and against each of the two models. Dissanaike, Lambrecht, and Saragga (2001) find evidence that the trade-off theory can describe the debt policies of some firms. Hovakimian (2003) examines the role of the target leverage in security issues and repurchases,

[1] There has been no test of which proxy best serves as the target debt ratio. This study is the first to formally examine this issue.

and finds that debt reductions are initiated to reduce the deviation from target capital structure whereas debt issues, equity issues and equity repurchase are not.

The studies that test the target leverage hypothesis use alternative proxies for the target capital structure. For example, Jalilvand and Harris (1984) and Shyam-Sunder and Myers (1999) use the firms' leverage mean during the study period as a proxy for the target leverage. Auerbach (1985), Hovakimian, Opler, and Titman (2001), Dissanaike, Lambrecht, and Saragga (2001), Fama and French (2002) use regression-based target, where the actual debt ratio regressed over several firm- and industry-specific factors suggested by the trade-off theory and previous empirical studies.[2] Hull (1999) and Hovakimian (2003) use the industry median leverage as a proxy for the target leverage.

The need for a target leverage proxy stems from the fact that we cannot observe the true target leverage. Such a proxy needs to have characteristics that are consistent with the theorized true optimal capital structure. The growing literature that evaluates the trade-off versus the pecking order theory has produced evidence both in favor and against each of these theories. The studies that test the trade-off theory necessitate a joint hypothesis test - whether the proxy for the target leverage used is the true target leverage, and whether firms adjust toward this target. Rejecting the hypothesis that firms adjust towards the leverage target may be due to the failure of the proxy used to represent the true target, and not because firms do not adjust toward their target or vise versa. Such a joint hypothesis has a measurable effect on the estimation of the partial adjustment model and debt-equity choice models, and in general, on any hypotheses testing that requires the use of a proxy for optimal capital structure.

Using different proxies for the optimal capital structure implies that these proxies are equivalent and have the same distribution. My empirical examinations (parametric and non-parametric) of these proxies reveal that they have significantly different distributions. This implies that using different proxies of target leverage in testing any hypothesis would lead to conflicting results. The asymmetry of those different proxies distributions suggest that those proxies are not substitutable, thus it is important the find out which proxy has the most consistent characteristics with the theorized target leverage.

The trade-off theory provides clear guidance of the behavior and characteristics of the true optimal leverage .The measurable prediction of the trade-off models is that firms will have a leverage level at which the firms will maximize their value. That is, when firms move closer to their target they will have higher value, ceteris paribus, than if they move away from the target leverage ratio. Furthermore, for firms that operate below their target leverage, a positive (negative) relation between the leverage ratio (deviation from the target) and the firm value is predicted. For firms that operate above their target leverage, a negative (negative) relation between the leverage ratio (deviation from the target) and the firm value is expected. Thus, among the different proxies, the one that is the most consistent with the true target leverage must exhibit such characteristics in any particular year as well as across time and industries.

To overcome the problem of using a noisy proxy for the target leverage, I employ an empirical approach that evaluates the consistency of different proxies with the theorized behavior

[2]Harris and Raviv (1991) present a comprehensive survey of these factors.

of the true target leverage. After controlling for the non-homogeneity in the inter-industry characteristics, firms are classified into industries using the Fama and French (1997) methodology. My empirical results indicate that the median of the industry leverage is the most consistent proxy for the true optimal leverage among the different proxies used in this study. For about three-fourths of the industries in my sample, I find a negative relation between the deviation from the target leverage and firm value for firms that operate above their industry leverage median and a positive relation for firms operate below their industry leverage median. On one hand, for about half of the industries such a relation holds using the Fama-MacBeth (1973) cross sectional estimated leverage as proxy.[3] On the other hand, this relation holds for a lower percentage of the industries for the Tobit cross sectional estimated leverage and the firm mean leverage as proxies for the target leverage.[4]

The empirical evidence indicates that in two-thirds of the industries, firms increase their value by moving toward the industry leverage median and exhibit a value reduction by moving away from it. Using the firm mean leverage, the Fama-MacBeth (1973) cross sectional estimated leverage, and the Tobit cross sectional estimated leverage as proxies, I find that increasing the firms' value by moving toward the target leverage and the reduction in the firms' value by moving away from it hold in about one-third, one-half, and one-fourth of the industries with respect to the proxies mentioned above.

Since the leverage target hypothesis implies that firms' actual leverage will fluctuate around stable long-run target leverage, this yields the mean-reverting property of actual leverage. The mean-reverting property suggests that firms will cluster around a particular leverage ratio where the cluster with the highest market value should have the smallest deviation from the target. I examine this hypothesis using K-means cluster analysis. I find that firms that cluster around a particular leverage ratio and have the highest market value are those that are closer to the industry median leverage, which confirms the superiority of the industry median leverage over the other proxies.

Numerous empirical studies support my finding. For example, Schwarz and Aronson (1967), Scott and Martin (1975), Ferri and Jones (1979), Marsh (1982), Bradley, Jarrell, and Kim (1984), Hovakimian, Hovakimian, and Tehranian (2002), and Welch (2002) observe significant industry effects in firms' debt ratios and the firms' debt equity choice. Moreover, Scott and Johnson (1982), Pinegar and Wilbricht (1989), Kamath (1997), and Graham and Harvey (2001) surveys of chief financial officers show that industry-wide ratios have an important influence on CFOs financing decision.

Another finding of my study is that firms that operate above the target leverage gain different value relative to the firms below the target by moving toward the target. This suggests that firms will differ in terms of how quickly they adjust toward the target depending on their

[3] This relies on the use of year-by-year cross-sectional regression of the actual debt ratio regressed over several firm- and industry-specific factors and then averages the coefficients across years, where the time-series standard errors of the average coefficients are used to draw inferences.

[4] Since that the leverage ratio is bounded from below by zero this necessitates the use of Tobit regression. This estimation relies on the use of year-by-year cross-sectional Tobit regression of the actual debt ratio regressed over several firm- and industry-specific factors and then averages the coefficients across years, where the time-series standard errors of the average coefficients are used to draw inferences. While the firm mean leverage is the historical mean of debt ratio for each firm.

position relative to the target leverage. This result is in line of Byoun and Rhim (2002) who find evidence that firms above the target leverage have different speed of adjustment toward the target leverage than those below their target leverage.

1.1.THE TRADE-OFF THEORY

Modigliani and Miller (1958) are the first to establish the theoretical foundation of the modern research of financing decision-making. Under their famous irrelevance proposition, financing decisions do not matter, given perfect capital markets. Since then, huge developments in the capital structure theories have emerged.

The trade-off models have dominated the capital structure literature. The tax benefit-bankruptcy cost trade-off model predicts that firms operating at a leverage level beyond the optimum have higher expected marginal costs of bankruptcy that exceed the marginal tax benefits of debt. Thus, moving toward the optimum will increase the firms' market value. Firms operating at leverage levels below the optimum- where the marginal tax benefit of debt is higher than the expected marginal cost of bankruptcy- can increase their market value by increasing their debt levels. Under such a model, a firm's profitability will be negatively related to the expected financial distress costs since firms with higher and more stable profits will have a lower probability of bankruptcy. Large, well-diversified firms have less profit volatility and therefore, higher debt ratios relative to small-nondiversified firms.

The tax-deductibility of interest payments also encourages firms to incur more debt. Because the marginal tax rate is directly related to the firm's earnings level, firms with higher earnings are predicted to have more debt. Such a prediction is true as long as firms operate below their optimal leverage level. When firms operate above their optimal leverage ratio, increasing debt will increase the expected costs of financial distress. Thus, if the expected marginal cost of bankruptcy is higher than the marginal tax benefit of increasing debt, managers will decrease the firm's debt as earnings rise.

Non-debt tax shields also affect the debt-earnings relationship under the trade-off model. Firms with high non-debt tax shields are less likely to increase their debt when their earnings increase, since they already enjoy the tax benefits of the non-debt tax shields. DeAngelo and Masulis (1980) model predicts that debt is less attractive to firms with high non-debt tax shields. Firms with high non-debt tax shields may operate below their optimum leverage level compared to firms with the same characteristics but with lower non-debt tax shields.

Fischer, Heinkel, and Zechner (1989) introduce a dynamic capital structure model where, under the presence of recapitalization costs, a firm's leverage ratio will vary over time. Thus, firms will have lower and upper boundaries of leverage ratios where they will recapitalize. Firms below the lower bound will recapitalize because they forego an increased amount of debt tax shield if they do not. Firms that operate above the upper bound will also recapitalize due to increasing bankruptcy costs and agency conflicts between shareholders and bondholders. Firms within the boundary will not recapitalize persistently since the benefit of recapitalization will not exceed the recapitalization costs. Their model predicts that firms with the same characteristics will have the same recapitalization criteria. However, they could have different leverage ratios

within common leverage boundaries. Therefore, a firm's optimal leverage will be a range, rather than a point, within each firm tries to remain.

The agency cost trade-off models (Jensen and Meckling (1976), Easterbrook (1984), Jensen (1986), Stulz (1990), Harris and Raviv (1990), Hart and Moore (1995)) consider the possible conflicts of interests between the parties involved in the firm such as managers, shareholders, and bondholders.

Debtholder and shareholder conflicts arise due to the risk-shifting problem. If an investment yields a high profit, shareholders capture most of the gain, while if the investment fails; debtholders bear most of the loss because of the shareholders limited liability. Thus, shareholders have an incentive to invest in riskier projects after raising capital in the bond market. Conflicts between shareholders and managers arise because managers do not wholly own the firm. Therefore, managers will not capture the entire gain when they engage in profit increasing activity, whereas they handle the entire cost of these activities. Such conflicts will motivate managers to transfer firm resources to their own purposes and to engage in value decreasing activity. Increasing debt has the ability to reduce these conflicts. Higher debt levels will reduce the free cash flow available to managers, limiting their capacity to engage in value decreasing activity and increase their fractional ownership.

Under the agency cost models, firms identify their optimal capital structure by balancing the costs and benefits of an additional dollar of debt. The benefits of debt include the reduction of free cash flow problems (Jensen (1986) and Stulz (1990)) and the potential reduction in agency conflicts between managers and shareholders. The costs of debt include: agency conflicts between shareholders and bondholders, costs of underinvestment (Stulz (1990) and Myers (1977)), and costs of asset substitution (Jensen and Meckling (1976)). Jensen and Meckling (1976) and Myers (1977) models predict that firms with low growth opportunities (and therefore a low possibility of asset substitution) will be more levered. Firms with higher free cash flows and limited growth opportunities will have higher debt, which mitigates the cost of the manager-shareholder conflicts (Jensen (1986) and Stulz (1990)). Harris and Raviv's (1990) model predicts that firms with higher liquidation value (tangible assets) are more likely to have more debt in their capital structure.

In summary, the trade-off models predict that higher debt will be associated with higher profitability, lower non-debt tax shields, low growth opportunities, high asset tangibility, higher free cash flows, and lower expected bankruptcy costs. Lower debt will be associated with low profitability, high non-debt tax shields, high growth opportunities, low asset tangibility, lower free cash flows, and higher expected bankruptcy costs. In addition, it is predicted that firms will increase their value by moving toward their optimal capital structure, while a value reduction should be observed if they move farther from their optimal capital structure.

1.2. TESTABLE HYPOTHESES

1.2.1. The Symmetry of the Different Proxies' Distributions

The implicit assumption when using any proxy of the commonly used proxies in the literature to examine the leverage target hypothesis is that those proxies are equivalent and substitutable.[5] On other words, this assumption means that those proxies have symmetric distributions. Such an assumption can be examined using both parametric and non-parametric tests. Rejecting the hypothesis of the symmetric distributions of the different proxies suggest that those proxies are not substitutable and the results of using different proxies are not comparable. Even if two proxies are close to each other, still there is a need to inspect which proxy has the closest characteristics to the target leverage and has more capability to mimic the theorized behavior of the true optimal capital structure.

1.2.2. The Relation between the Firm Value and the Deviation from the Target Capital Structure

The trade-off models predict that the relation between the firm value and the deviation from the true optimal capital structure is negative for firms that operate below or above their optimal capital structure.[6] This implies that the relation between firm value and the actual leverage ratio is positive for firms that operate below the optimal leverage and negative for firms that operate above the optimal leverage.

To study the firm value behavior relative to the deviation from each proxy, firms are grouped by industry using Fama and French (1997) industry classification. In each industry-year, firms above and below the target proxy are divided into two sets (see figure 1, leverage-value function). The first set contains firms with a deviation from the target of less than the 50^{th} percentile of the deviation distribution (Q_1). The second set contains those firms with a deviation from the target of more than the 50^{th} percentile of the deviation distribution (Q_2).

My motivation for classifying firms into industries is the well-documented evidence that intra-industry firms are more homogenous in their characteristics, capital structure, and recapitalization criteria (Schwartz and Aronson (1967), Bowen, Daly and Huber (1982), Bradley, Jarrell, and Kim (1984), Long and Malitz (1985), and Fischer, Heinkel and Zechner (1989)) relative to inter-industry firms. For example, DeAngelo and Masulis (1980) use this evidence as one argument for the presence of an industry-related optimal capital structure.

Under the dynamics models of capital structure (e.g. Fischer, Heinkel and Zechner (1989) and Leland (1994)), classifying firms by their deviation from the target leverage is motivated by

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[5] For example, Marsh (1982), Jalilvand and Harris (1984), Shyam-Sunder and Myers (1999), Nuri and Archer (2001), and Byoun and Rhim (2002) use the firm mean as a proxy for the target leverage in their studies. Hull (1999), Hovakimian (2003), Hovakimian, Hovakimian, and Tehranian (2002) consider the industry median leverage as a proxy for the target leverage. Auerbach (1985), Hovakimian, Opler, and Titman (2001), Dissanaike, Lambrecht, and Saragga (2001), Lie (2001) Fama and French (2002), Korajczyk and Levy (2003) use regression-based proxies for the target leverage.

[6] The firm value defines as the market value (book value of assets plus the difference between market value of equity and the book value of equity) standardized by the total assets. The deviation from the target proxy defines as the absolute value of the difference between the actual debt ratio and the target proxy.

the presence of the recapitalization costs, as well as by the substitutability of debt tax shield and non-debt tax shield (DeAngelo and Masulis (1980)). For example, suppose that we have two firms, where the first firm is somewhat closer to the target leverage than the second firm. These two firms could have the same value if the second firm has sufficient non-debt tax shields to compensate for the debt tax shield. Thus, it makes more sense to consider firms closer to the target leverage and to each other to have similar value relative to firms far way from the target, given that the industry-year classification controls for the movement on a given leverage-value function and the shift in the leverage-value function.

Under the true target leverage hypothesis, I anticipate that the average firms value for those in Q_2 and below the target proxy to be less than that of firms' that belong to Q_1 and are below the target proxy. For firms above the target, I expect to find that the average firms value for the firms in the Q_1 set is higher than that for firms in the Q_2 set.

To examine the second hypothesis - the positive (negative) relation between firm value and the actual leverage ratio for firms that operate below (above) the optimal leverage - firms are classified into two categories: the first category contains firms above their target leverage proxy while the second contains firms below their target leverage proxy. Then, for each category, the correlation between firm value and leverage ratio, and firm value and the deviation from the target is tested for each industry using the parametric (Pearson) and the nonparametric (Spearman) correlations.

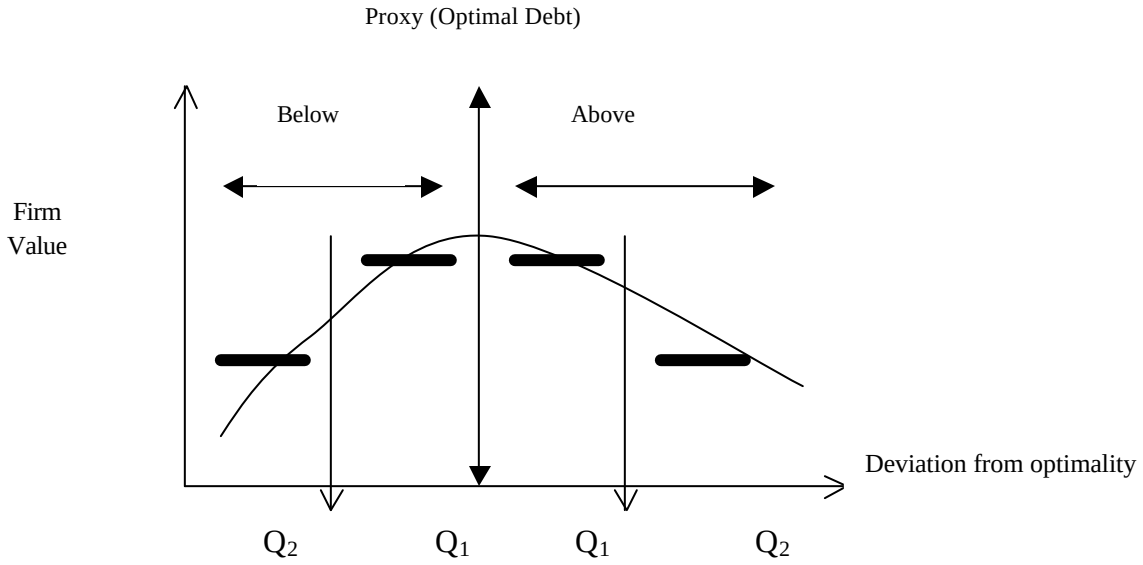
1.3. DATA AND SAMPLE SELECTION

The initial sample consists of all firms on the Compustat database for the period 1981-2000. I classify firms into 48 group using Fama-French (1997) industry classifications. As in previous studies, financial firms (SIC 6000-6999) and non-classifiable establishments (9900-9999) are excluded.[7] To enter the sample, financial data must be available to calculate the leverage ratio (total debt/total assets) and market value (book value of assets plus the difference between market value of equity and the book value of equity). Firms that have negative debt or zero total assets in any given year are excluded from the analysis in that year. Finally, I require that there are at least fifteen firms within the same industry in any given year of the study period.[8] This restriction allows the statistical tests to have the sufficient degrees of freedom to draw reliable inferences. Table 1.1 shows the number of observations in the sample for each industry included in the analysis across all years. Applying the above criteria, the final sample has 40 industries over the period 1981-2000 and 130,939 firm-year observations. Overall, the number of firms in my sample is increases over time (from 5,180 in 1981 to 7,810 firms in 2000). The number of firms across industry varies dramatically whereas within a given industry group it shows more stability over time. A description of Fama-French (1997) industry group is provided in table 1.2 and a detailed description of the SIC in each industry group in appendix A1.

[7] Non-classifiable establishments are excluded to avoid the non-homogeneity in the firms' characteristics.

[8] Only two industries in my sample have observations close to fifteen in a given year. The other industries have sufficient observations to draw inferences from both the parametric and nonparametric tests.

Figure 1.1



Leverage-Value Function

1.3.1. Leverage Ratio Stability over Time

The mean-reverting property of debt ratio under the leverage target hypothesis implies that debt ratio should not vary randomly for a given industry over time. To examine the stability of the leverage ratio across years for intra-industry firms, nonparametric and parametric methods are employed. The second column of Table 1.3 reports the P-Values of the Kruskal-Wallis test for equality of the location parameters of the debt ratio distributions across years for each industry.[9] The third column reports the P-Value of the ANOVA test for equality of the means of the debt ratio across years for each industry. The hypothesis that an industry mean (median) debt ratio is the same across the twenty years period of my study is rejected in two-third of the industries using the Kruskal-Wallis test and in one-third of the industries using parametric (ANOVA) test.

Though it is possible that the location parameters of the debt ratio distributions across years are not the same but very few of them are significantly different, to detect such differences, I use the Tukey pairwise comparisons test which allows to jointly perform all possible pairwise comparisons of the means using a single level of significance. For example, for each industry, the average debt ratio in the year 1981 is compared with the average debt ratio in each other year, and so on for all the possible combinations of years. Since, I am comparing means of the same industry across 20 years, the possible number of pairwise comparisons associated with the ANOVA is 190 pairs for each industry($H_0 : \mu_i = \mu_j \quad , i = 1981,...,2000 \quad j = 1982,...,1999 \quad i \neq j$).[10]

The fourth column of Table 1.3 reports the percentage of pairs that shows a significant difference out of all the possible pairs. For example, the ANOVA test for the industry group number four (Beer & Liquor) rejects the hypothesis that the average debt ratio is the same across the twenty years of my study, but the percentage of pairs that shows a significant difference out of all the possible pairs is 3.16%. In other words, there is a significant difference in the average debt ratio in only six pairs of all the possible pairs. Thus, the ANOVA test rejects the hypothesis that the average debt ratio is the same across the twenty years, because of the significant difference in the debt ratio across few years.

The Tukey pairwise comparisons test reveals that the differences in the average debt ratio are not persistent across all years. While the stability of the leverage ratio across all years is rejected in 37.5% of the industries, this is due to differences in the leverage ratio across some of the years, which at most accounts for only 19% of the twenty years period in my study. In general, the results indicate that the intra-industry leverage ratio is stable over time. These results are consistent with Bowen, Daly, and Huber (1982) who find that industries tend to retain their leverage ratio ranking over time. In addition, these results confirm the earlier finding of Schwartz and Aronson (1967) of the remarkable overall stability in the financial structure of industries over time. Taggart (1977), Marsh (1982), Auerbach (1985) find evidence on mean reversion in firms' debt ratios, and those firms appear to adjust toward debt targets. The key implication of leverage ratio stability is that under the trade-off model, the leverage ratio should not vary

[9] A P-Value less than 5% indicates a rejection of the null hypothesis at 5% significance level.
[10] The number of possible pairwise comparisons of r is $r!/2!(r-2)!$.

Table 1.1- Sample Distribution across Industries- Years

The sample period is 1981-2000. Financial firms are excluded. An industry is defined using Fama-French (1997) industry classification. To enter the sample, financial data must be available to calculate the leverage (total debt/total assets), Market Value (book value of assets plus the difference between market value of equity and the book value of equity). Industries with less than 15 firms in any given year are excluded to allow for enough degrees of freedom for the statistical tests. The financial data obtained from Compustat database.

	Firms frequency by industry-year																			
Industry	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1	22	22	27	31	28	28	30	28	26	27	27	27	25	27	28	27	30	29	30	30
2	130	124	120	122	122	126	138	137	132	127	122	123	128	137	136	149	158	150	139	136
4	19	18	18	16	17	16	16	15	15	18	16	15	17	17	26	31	34	34	32	30
6	58	58	53	55	51	57	63	62	65	64	62	62	71	85	92	102	102	99	92	84
7	108	112	122	130	140	151	162	159	160	154	145	139	152	169	175	187	189	188	171	165
8	73	69	70	68	65	68	68	71	67	75	76	77	73	76	77	78	81	78	80	78
9	148	148	152	160	161	170	174	170	158	143	140	144	145	149	153	166	170	164	160	151
10	112	98	95	95	86	85	83	86	87	90	91	86	102	106	106	115	121	120	111	108
11	60	54	66	72	76	96	94	106	108	122	150	169	179	182	186	192	177	159	141	132
12	95	100	111	134	149	160	183	190	190	196	209	237	254	251	250	287	292	282	277	259
13	71	77	98	113	126	146	164	173	181	184	214	239	271	290	300	357	393	393	412	401
14	97	93	96	100	104	109	113	126	125	129	130	136	138	144	142	144	138	138	141	136
15	98	94	97	96	95	98	100	93	89	88	83	83	93	93	95	96	95	91	86	82
16	80	74	70	73	66	61	62	68	57	52	53	57	60	57	54	55	53	51	48	38
17	245	235	228	219	214	207	200	196	184	173	167	159	168	172	179	186	183	174	162	146
18	101	100	95	93	85	90	96	98	92	96	92	87	101	103	105	112	119	117	116	97
19	118	114	107	105	105	102	99	111	108	110	110	110	120	125	124	133	135	133	125	119
20	48	45	45	45	41	40	35	39	38	37	38	39	38	40	40	39	40	36	34	32
21	246	250	249	251	249	250	261	263	257	241	234	231	240	255	264	291	291	282	278	257
22	110	107	110	113	107	108	106	111	109	109	112	111	113	119	121	125	123	118	118	110

Table 1.1–continued

Firms frequency by industry-year																				
Industry	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
23	108	106	108	106	106	104	105	107	106	104	101	105	113	126	128	130	130	125	120	107
24	41	39	36	37	33	32	32	32	31	33	32	31	29	28	27	31	33	31	28	27
25	17	17	18	16	15	15	15	16	16	17	16	18	17	19	20	20	20	19	19	15
27	31	29	38	40	49	58	69	73	67	76	75	73	70	64	70	74	65	55	49	45
28	36	33	33	32	29	29	31	40	41	40	37	37	37	37	33	33	37	37	37	37
30	398	477	491	481	464	427	402	382	370	368	366	346	353	371	364	372	372	346	322	312
31	256	255	258	256	255	251	245	238	238	235	230	227	228	229	229	224	224	217	209	197
32	163	161	179	182	198	202	217	221	228	230	235	245	268	278	299	351	361	358	420	410
33	45	47	49	52	55	60	65	65	63	66	68	68	64	71	85	104	101	99	92	91
34	334	339	394	452	471	549	570	567	544	523	528	570	632	697	804	1046	1145	1208	1454	1424
35	165	179	242	267	284	310	316	325	321	298	297	307	327	349	373	433	452	452	464	443
36	249	252	287	318	329	339	358	343	328	329	322	328	354	384	426	468	476	487	544	516
37	129	129	139	153	158	171	173	167	151	147	146	153	161	163	169	189	192	193	203	188
38	117	113	108	107	107	107	108	106	100	100	101	104	105	111	117	122	121	114	111	107
39	24	23	22	23	21	24	25	24	22	20	16	20	22	22	24	25	26	25	27	25
40	166	172	189	188	187	195	196	190	188	182	171	176	194	196	203	227	232	225	228	213
41	283	289	292	313	313	326	349	354	344	333	331	319	342	366	377	399	403	378	365	349
42	336	316	328	342	328	361	387	372	361	358	365	377	403	413	421	463	472	453	439	422
43	142	143	147	157	159	164	160	156	149	144	149	159	160	175	190	210	211	194	182	168
48	101	101	103	109	112	134	151	165	164	174	177	176	177	174	184	182	171	161	145	123
All	5180	5212	5490	5722	5760	6026	6221	6245	6080	6012	6034	6170	6544	6870	7196	7975	8168	8013	8211	7810

Table 1.2- Industry Classifications

Industries are classified in groups using Fama and French (1997) industry classification. A detail of the classification method and the industry SIC is provided in appendix A1.

Code	Industry group	Code	Industry group
1	Agriculture	23	Automobiles and Trucks
2	Food Products	24	Aircraft
4	Beer & Liquor	25	Shipbuilding, Railroad Equipment
6	Recreation	27	Precious Metals
7	Entertainment	28	Non-Metallic and Industrial Metal Mining
8	Printing and Publishing	30	Petroleum and Natural Gas
9	Consumer Goods	31	Utilities
10	Apparel	32	Communication
11	Healthcare	33	Personal Services
12	Medical Equipment	34	Business Services
13	Pharmaceutical Products	35	Computers
14	Chemicals	36	Electronic Equipment
15	Rubber and Plastic Products	37	Measuring and Control Equipment
16	Textiles	38	Business Supplies
17	Construction Materials	39	Shipping Containers
18	Construction	40	Transportation
19	Steel Works Etc	41	Wholesale
20	Fabricated Products	42	Retail
21	Machinery	43	Restaurants, Hotels, Motels
22	Electrical Equipment	48	Miscellaneous

Table 1.3-Parametric and Nonparametric Tests of the Stability of the Intra-Industry Leverage

The Kruskal-Wallis test is a nonparametric test of equality of the location parameters of the leverage ratio distributions for intra-industry firms across years. The ANOVA test is a parametric test of equality of the means of the leverage ratio for intra-industry firms across years. The null hypothesis in both tests is stated as the follows: H0:μ1981= μ1982=…=. μ2000. A Tukey pairwise comparisons test allows for simultaneously carrying out all 190-hypothesis tests at a single, given level of significance. The Tukey pairwise comparisons test column report the percentage of years-pairs in which the differences in the means are significantly different from zero at the 5% level of significance.

Industry group	Kruskal-Wallis Test	ANOVA Test	Tukey Pairwise Comparisons Test
	P-Value	P-Value	Percentage
1	0.36	0.14	6.84%
2	0.28	0.39	4.21%
4	0.10	0.00	3.16%
6	0.00	0.27	2.11%
7	0.11	0.26	0.00%
8	0.00	0.00	7.89%
9	0.00	0.00	11.58%
10	0.00	0.46	0.00%
11	0.02	0.18	0.00%
12	0.00	0.52	2.63%
13	0.00	0.53	0.00%
14	0.00	0.49	0.00%
15	0.00	0.00	2.11%
16	0.00	0.11	3.16%
17	0.09	0.51	0.00%
18	0.29	0.16	0.00%
19	0.11	0.61	0.00%
20	0.28	0.36	0.00%
21	0.00	0.06	2.63%
22	0.02	0.50	0.00%
23	0.00	0.00	7.89%
24	0.65	0.27	0.00%
25	0.56	0.77	0.00%
27	0.26	0.67	0.00%
28	0.12	0.32	4.21%
30	0.00	0.32	0.00%
31	0.00	0.00	2.11%
32	0.00	0.00	7.89%
33	0.10	0.10	0.00%
34	0.00	0.05	0.53%
35	0.00	0.02	10.53%
36	0.00	0.34	7.89%
37	0.00	0.16	1.58%
38	0.00	0.00	1.05%
39	0.00	0.00	2.11%
40	0.29	0.36	0.00%
41	0.00	0.06	4.74%
42	0.00	0.00	18.95%
43	0.00	0.45	0.53%
48	0.00	0.72	0.00%

randomly for a given industry over time. Such a result works in favor of the existence of an optimal capital structure that firms try to preserve across time.

1.4. TARGET LEVERAGE PROXIES

In this section, I review the major proxies for the optimal capital structure commonly used in the literature and considered in this study.

Marsh (1982) uses the average debt ratio over the study period for each firm (firm mean, hereafter) as a proxy for the target leverage in his study of debt equity choice. Jalilvand and Harris (1984) use the firm mean in their study of the target adjustment model. Shyam-Sunder and Myers (1999), Nuri and Archer (2001), and Byoun and Rhim (2002) use the firm mean as a proxy for the target leverage in their studies of testing the trade-off model vs. the pecking order model. Thus, the firm mean is included in this study as a one of the target leverage proxies.

Hull (1999) uses the industry median leverage as a proxy for the target leverage in his study of the consistency of the market reaction to the debt equity swaps and equity issue with the sole purpose to reduce debt with the trade-off models. Hovakimian (2003), Hovakimian, Hovakimian, and Tehranian (2002) consider the industry median leverage as proxy for the target leverage in studying the role of target leverage in the firm decision to issue and repurchase security or to issue combination of debt and equity. I include the industry leverage median as one of the proxies in this study (industry median, hereafter).

Auerbach (1985), Hovakimian, Opler, and Titman (2001), Dissanaike, Lambrecht, and Saragga (2001), Lie (2002), Fama and French (2002), Korajczyk and Levy (2003) use regression-based proxies for the target leverage. They regress the actual debt ratio over several firm- and industry-specific factors suggested by the trade-off theory and previous empirical studies. The fact that leverage ratio is bounded by zero necessitates the use of an econometric technique such as a Tobit regression to prevent the estimated leverage ratio from being negative and to obtain consistent estimators. Hovakimian, Opler, and Titman (2001) are the first to control for this problem using Tobit regression model. I include two regression-based proxies; the first is estimated using Fama-MacBeth (1973) procedures (cross-sectional, hereafter) and the second are estimated using a Tobit model estimation to account for the fact that zero bound the debt ratio from below (Tobit-cross-sectional, hereafter).

For the regression-based proxies the actual debt ratio is regressed over the following independent variables:

- Growth options: Rajan and Zingales (1995), Titman and Wessels (1988) argue that firms with high growth options depend on equity financing more than on debt financing. Their argument suggests a negative relation between leverage and growth options. Like Fama and French (2002) and Hovakimian, Opler and Titman (2001)), I use both the ratio of market-to-book value and the ratio of research and development to total assets as proxies for the firm's growth options.
- Size: Titman and Wessels (1988) argue that larger firms are more diversified, thus they face lower probability of bankruptcy. This suggests that the larger the firm size, the higher the

firm's debt capacity. Thus, size is expected to be positively related to leverage. The logarithm of total assets used as proxy firm size.

- Tangible Assets: In addition to size, Titman and Wessels (1988) argue that tangibility of assets, as a measure of collateral, is positively related to leverage. Thus, firms with a higher percentage of tangible assets from their total assets will have a higher capacity to raise debt.
- Non-debt tax shields: according to Modigliani and Miller (1958), the major incentive for borrowing is to take advantage of interest tax shields. The presence of other non-debt tax shields (depreciation and amortization) mitigates such incentive. The ratio of depreciation to total assets is used as a measure of the non-debt tax shields.
- Profitability: it has been argued that the probability of bankruptcy rises as the volatility of earnings increases. Since operating income is independent of the effects of leverage and since it represents the income available for interest payments, higher profitable firms expected to have higher debt ratio. Following Fama and French (2002), earnings before interest and taxes scaled by total assets are used as a proxy for profitability.

Table 1.4 shows the results of the estimations of both the cross-sectional and the Tobit-cross-sectional proxies using Fama and MacBeth (1973) and Tobit estimation methods. The coefficients of the independent variables represent the means across years. To account for the autocorrelation in the annual coefficients, I follow Fama and French (2002) procedure in approximating the inflation factor of the standard errors of annual Coefficients.[11] The first autocorrelations of the slopes are between 0.3 and 0.62 and for a longer lags it decay like an AR1. Thus, I require t-statistics above 5.2 and 7.1 to infer reliability at 0.05 and 0.01 levels respectively.

My results support the previous empirical results of Bradley, Jarrell and Kim (1985), Long and Malitz (1985), Titman and Wessels (1988), Rajan and Zingales (1995), Hovakimian, Opler and Titman (2001), and Fama and French (2002). All the independents variables coefficients' signs are consistent with their predicted sign, except for the market to book ratio in the Fama-MacBeth regression. Fama and French (2002) also find such a positive relation using the same estimation method.

1.5. EMPIRICAL RESULTS

To study whether the different proxies have symmetric distributions, I report in Tables 1.5 and 1.6 the parametric and nonparametric tests of the differences in the location parameters of each proxy distribution. Both the ANOVA and the Kruskal-Wallis tests reject the hypothesis that there are no differences in the location parameters among the four proxies across all the industries at 10% significance level.

[11] As Fama and French point out the procedure is a conservative approach to account for the autocorrelations in the annual coefficients.

Table 1.4-Regressions-Based Target Leverage

The dependent variable is defined as the total debt divided by total assets. The Fama-MacBeth (1973) regressions are run for each year of 1981-2000 period. The Tobit model estimation regressions are run for each year of 1981-2000 period. The coefficients of the independent variables represent the means across years. To count for the autocorrelation in the annual coefficients, I follow Fama and French (2001) procedure by approximating the inflation factor of the stranded errors of annual coefficients. To count for the autocorrelation in the annual slops. Thus, I require t-statistics above 5.2 and 7.1 to infer reliability at 0.05 and 0.01 levels respectively. ** and * indicate that the coefficient is statistically different from zero at 0.01 and 0.05 levels.

Independent Variables	**Dependent variable debt ratio**	
	Estimation Method	
	Fama-MacBeth	**Tobit model**
Constant	0.085**	-1.708**
Market To Book Ratio	0.015**	-0.036*
R&D to Total Assets	-0.196*	-0.455*
Instrument variable =1 if firm have no R&D	0.076*	0.136**
Size-Logarithm of Total Assets	0.011*	0.088**
Tangible Assists to Total Assets	0.158**	0.854**
Depreciation to Total Assets	-0577*	-0.463*
Profitability	-0.213**	-0.398**
R-Square	0.221	0.183

However, given the fact that I am interested in knowing which proxies are different, I employ the Tukey pairwise comparisons test (parametric) and the Kruskal-Wallis pairwise comparisons test (nonparametric) to identify which pairs of proxies are the source of the differences. Examining the percentages of significant differences among the different pairs of proxies across all the industries obviously reveals that the proxies' distributions are not symmetric. I find that there are no significant differences in the proxies' distributions in about 32.5% (30% using nonparametric test) of the industries between the firm mean leverage and the industry median leverage. While, there are no significant differences in the proxies' distributions between the firm's mean leverage and the cross-sectional leverage for about 55% (40% using nonparametric test) of the industries. For only 15% (0% using nonparametric test) of the industries there are no significant differences in the proxies' distributions between the firm mean leverage and the Tobit cross-sectional leverage. While there are no significant differences in the proxies' distributions between the industry median leverage and the cross-sectional leverage proxies' for about 45% (17.5% using nonparametric test) of the industries. The industry median leverage and the Tobit cross-sectional leverage proxies' show no significant differences in their distributions in about 20% (2.5% using nonparametric test) of the industries. Finally, there are no significant differences between the cross-sectional leverage and the Tobit cross-sectional leverage in about 15% (0% using nonparametric test) of the industries.

The overall result shows, there is strong evidence that the different proxies have significantly different distributions. Nevertheless, across all industries, the firm mean and cross-sectional proxies have the closest distributions; this is indicated by both the parametric and nonparametric tests.

The results above suggest that using different proxies of optimal capital structure in corporate finance models could lead to different results depending on the proxy used. For example, the parametric and nonparametric tests indicate that the distribution of the firm mean proxy is to the left of the distribution of the Tobit cross-sectional proxy, suggesting that the firm mean as a target proxy yields more over-leveraged firms relative to the Tobit cross-sectional proxy.

Given that the different proxies are not equivalent, I turn now to investigate which proxy exhibits characteristics that are most consistent with the theorized true optimal capital structure. I first examine the relation between the leverage ratio and the firm value for firms above and below their target leverage. Table 1.7 presents the correlations between leverage ratio and firm value over time for firms above and below their target leverage, while Table 1.8 presents the correlations between the absolute value of the deviation from the target leverage and firm value. Table 1.9 shows, for each proxy, the proportions of industries that yield consistent results with the prediction of the trade-off model among all the industries. As it is obvious from table 1.9, among all the proxies, the industry median is the most consistent with the prediction of the trade-off model.

Table 1.5-Tukey Pairwise Comparisons Test -Mean Differences

The differences in means among the deferent proxies are conducted using T-test. Proxy1 represents the firm's leverage mean for the study period, proxy2 represents the industry leverage median (An industry is defined using Fama-French (1997) industry classification), proxy3 represents the estimated cross-sectional leverage (estimated using Fama-MacBeth (1973) procedures) and proxy4 represents the estimated cross-sectional leverage using Tobit model. The Tukey pairwise comparisons test allows for simultaneously carrying a joint hypothesis testing at a single given level of significance. * indicate that difference in the means is statistically different from zero 0.05 levels.

Industry	ANOVA P-Value	Proxy1-Proxy2 Mean differences	Proxy1-Proxy 3 Mean differences	Proxy1-Proxy4 Mean differences	Proxy2-Proxy3 Mean differences	Proxy2-Proxy4 Mean differences	Proxy3-Proxy4 Mean differences
1	0.00	0.07*	0.07*	0.18*	0.01	0.11*	0.11*
2	0.00	0.01*	0.01	0.12*	-0.01*	0.11*	0.12*
4	0.10	-0.03	-0.01	0.00	0.02	0.03	0.02
6	0.00	-0.01	-0.01	0.17*	0.00	0.18*	0.18*
7	0.00	0.04*	0.00	0.16*	-0.03*	0.12*	0.15*
8	0.00	0.00	-0.03	0.11*	-0.02	0.11*	0.14*
9	0.00	0.01	-0.02*	0.11*	-0.03*	0.10*	0.13*
10	0.00	0.08*	0.04	0.18*	-0.04	0.10*	0.14*
11	0.00	0.23*	0.03	0.03	-0.21*	-0.20*	0.01
12	0.00	0.13	0.02	0.21*	-0.11	0.08	0.19*
13	0.00	0.11*	0.05*	0.19*	-0.06*	0.08*	0.14*
14	0.00	0.03	-0.02	0.07*	-0.05*	0.04*	0.09*
15	0.00	0.04*	0.02*	0.16*	-0.03*	0.12*	0.15*
16	0.00	-0.04*	-0.04*	0.00	0.00	0.04*	0.04*
17	0.00	0.01	0.00	0.12*	0.00	0.11*	0.12*
18	0.00	0.07*	0.02	0.18*	-0.05*	0.12*	0.17*
19	0.00	0.01*	0.00	0.08*	-0.01*	0.07*	0.08*
20	0.00	0.04*	0.00	0.12*	-0.04*	0.08*	0.12*
21	0.00	0.05*	0.03*	0.16*	-0.02*	0.10*	0.13*
22	0.10	0.17	0.07	0.17	-0.09	0.01	0.10

Table 1.5 -continued

Industry	ANOVA P-Value	Proxy1- Proxy2 Mean differences	Proxy1- Proxy3 Mean differences	Proxy1-Proxy4 Mean differences	Proxy2-Proxy3 Mean differences	Proxy2-Proxy4 Mean differences	Proxy3-Proxy4 Mean differences
23	0.00	0.03*	0.01	0.09*	-0.02*	0.06*	0.08*
24	0.00	0.01	0.00	0.09*	0.00	0.08*	0.09*
25	0.00	0.11*	0.08*	0.07	-0.04	-0.05	-0.01
27	0.00	0.33*	0.21*	0.38*	-0.12*	0.05	0.17*
28	0.08	0.09	-0.03	0.04	-0.12	-0.04	0.08
30	0.00	0.16*	0.10*	0.25*	-0.06*	0.09*	0.15*
31	0.00	-0.01*	-0.01*	0.01*	0.00	0.02*	0.02*
32	0.00	0.03*	-0.06*	0.10*	-0.09*	0.06*	0.16*
33	0.00	0.21*	0.09*	0.14*	-0.12*	-0.06*	0.05*
34	0.00	0.19*	0.09*	0.22*	-0.1*	0.04*	0.14*
35	0.00	0.12*	0.03	0.16*	-0.09*	0.05*	0.13*
36	0.00	0.65*	0.59*	0.71*	-0.06	0.05	0.11
37	0.00	0.07*	0.03*	0.15*	-0.04*	0.07*	0.12*
38	0.00	0.00	-0.01	0.06*	-0.01	0.07*	0.07*
39	0.00	0.01	-0.01	0.07*	-0.02*	0.05*	0.07*
40	0.00	0.01	0.00	0.13*	-0.01	0.12*	0.13*
41	0.00	0.05*	0.02	0.17*	-0.03*	0.12*	0.15*
42	0.00	0.05*	0.03*	0.16*	-0.02*	0.11*	0.13*
43	0.00	0.05*	0.03*	0.19*	-0.02	0.14*	0.16*
48	0.00	0.47*	0.39*	0.53*	-0.08	0.06	0.14*
%		67.5	45	85	55	80	85

Table 1.6 -Kruskal-Wallis Pairwise Comparisons Test -Location Parameters

The differences in the location parameters among the deferent proxies are conducted using Kruskal-Wallis pairwise comparisons test. Proxy1 represents the firm's leverage mean for the study period, proxy2 represents the industry leverage median (An industry is defined using Fama-French (1997) industry classification), proxy3 represents the estimated cross-sectional leverage (estimated using Fama-MacBeth (1973) procedures) and proxy4 represents the estimated cross-sectional leverage using Tobit model. The Kruskal-Wallis pairwise comparisons test allows for simultaneously carrying a joint hypothesis testing at a single given level of significance. * indicates that differences in the location parameters are statistically different from zero at 0.05 levels. R_i-R_j represents the difference between the average ranks.

Industry	Kruskal-Wallis P-Value	Proxy 1-Proxy2 R_i-R_j	Proxy1-Proxy3 R_i-R_j	Proxy1-Proxy4 R_i-R_j	Proxy2-Proxy3 R_i-R_j	Proxy2-Proxy4 R_i-R_j	Proxy3-Proxy4 R_i-R_j
1	0.00	91	53	496*	38	587*	550*
2	0.00	212	472*	279*	260*	300*	267*
4	0.00	154*	57	214*	97*	368*	270*
6	0.00	348*	17	183*	331*	217*	847*
7	0.00	34	102*	232*	987*	235*	342*
8	0.00	318*	355*	130*	37	161*	656*
9	0.00	341*	761*	300*	420*	334*	769*
10	0.00	157	20	215*	138*	199*	136*
11	0.00	266*	11	220*	264*	456*	194*
12	0.00	124*	420*	233*	825*	498*	813*
13	0.00	887*	112	862*	999*	497*	973*
14	0.00	4	258*	627*	261*	623*	884*
15	0.00	52	199*	969*	146*	202*	168*
16	0.00	499*	253*	322*	246*	821*	575*
17	0.00	108*	776*	373*	306*	814*	509*
18	0.00	139	761*	365*	900*	226*	126*
19	0.00	371*	693*	848*	322*	219*	541*
20	0.00	127*	256*	833*	383*	705*	108*
21	0.00	175	472*	331*	297*	506*	802*
22	0.00	67	113	281*	180*	214*	394*

Table 1.6-continued

Industry	Kruskal-Wallis P-Value	Proxy1-Proxy2 R_i-R_j	Proxy1-Proxy3 R_i-R_j	Proxy1-Proxy4 R_i-R_j	Proxy2-Proxy3 R_i-R_j	Proxy2-Proxy4 R_i-R_j	Proxy3-Proxy4 R_i-R_j
23	0.00	321*	224*	203*	97	170*	180*
24	0.00	142*	95	497*	47	639*	592*
25	0.00	44*	25	157*	68*	114*	182*
27	0.00	319*	204	1564*	523*	1245*	768*
28	0.00	316*	72	686*	388*	371*	758*
30	0.00	748*	230*	706*	305*	634*	936*
31	0.00	68	39	152*	29	1456*	484*
32	0.00	748*	313*	215*	238*	897*	283*
33	0.00	127*	66	136*	133*	93	429*
34	0.00	720*	403	184*	679*	199*	998*
35	0.00	180*	114*	883*	294*	703*	979*
36	0.00	420*	922*	104*	328*	626*	546*
37	0.00	964*	73	455*	890*	359*	480*
38	0.00	513*	536*	147*	23	985*	200*
39	0.00	23	78*	333*	101*	310*	410*
40	0.00	614*	974*	324*	360*	855*	421*
41	0.00	32	902*	827*	934*	824*	917*
42	0.00	884*	609*	959*	149*	870*	102*
43	0.00	288*	192	402*	96	373*	382*
48	0.00	625*	117*	154*	549*	217*	272*
%		70	60	100	82.5	97.5	100

When the industry median is the target leverage, the Pearson (Spearmen) correlation coefficients indicate that in about 93% (95%) of the industries there is significant evidence that firms below their target could increase their market value by moving toward their target leverage, while in about 65% (75%) of the industries firms above their target suffer a value loss by moving away from it. The cross-sectionally estimated proxy turns out to be the second most consistent proxy with the predictions of the trade-off model. Finally, the firm leverage mean, as proxy of the target leverage is the least consistent proxy using the correlation tests.

The correlation test of the proxies can be considered a weak-form test, especially for the correlation between leverage ratio and the firm value for firms that operate below their target leverage, since the firm value, by definition, will increase as the firm increases its leverage. The correlation test for firms above their target leverage is a strong-form test. The strong-form test reveals that in the majority of the industries, firms above their target suffer a value loss by moving away from it when, I use the industry median as optimal capital structure proxy.

To form a bird's eye view, I turn to examine the firm value behavior relative to the deviation from each proxy. To test whether there are significant differences in firm value as the firm moves closer versus farther from their target, I utilize both parametric and nonparametric pairwise comparison tests of the firm's value for firms above and below the target and for each set as described in section 2.2. Table 1.10 reports the test results of the Tukey pairwise comparisons test of the differences in the average firm value across the two main different sets.

In Table 1.11, the Kruskal Wallis test of pairwise comparisons is reported. Comparing the significant differences in the average firm value across the two sets for the four proxies with the predicted relation reveals that the highest consistency with the prediction of the trade-off model is obtained by the industry median as proxy, regardless of the testing procedure (parametric or nonparametric).

Table 1.12 presents the test of proportion of the consistency across all the industries. In about 65% of the industries, the median mimics the behavior of the true optimal leverage using the nonparametric test and 63% of the industries using the parametric test. The firms' mean leverage is consistent in about 30% of the industries using the nonparametric test and in 28% using the parametric test. The cross-sectional proxy in about 50% of the industries using the nonparametric test and 38% using the parametric test. The Tobit cross-sectional proxy in about 25% of the industries using the nonparametric test and 18% using the parametric test. Those results resemble my previous results in which the industry median leverage has the most consistent characteristics with the true optimal capital structure.[12]

[12] I also run all my tests using the market value rather than the market value standardized by total assets. In addition, I run the correlation tests for each individual year then I test them across years. The main results were not different. To check the sensitivity of my results to the industry classification, I classify industries using two digits SIC grouping and rerun all the tests. I find the industry median leverage perform as the best proxy for the target leverage.

Table 1.7- Correlation: Leverage Ratio and Firm Value

For each industry – year, firms are classified into two categories: firms above their target leverage proxy and firms below their target leverage proxy. For each category, the Pearson and Spearman correlations between the market value standardized by total assets and the leverage ratio are calculated across time. The hypothesis for firms below their target is that the correlation coefficient is positive and for firms above their target is that the correlation coefficient is negative. ** and * indicate that the correlation between the market value standardized by total assets and the leverage ratio is statistically significant at 0.01 and 0.05 levels.

Industry	Firm Mean				Industry Median				Cross-Sectional				Cross-Sectional-Tobit			
	Pearson		Spearman		Pearson		Spearman		Pearson		Spearman		Pearson		Spearman	
	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above
1	0.03	-0.29**	0.03	-0.29**	0.11	-0.13*	0.23**	-0.03	0.13*	-0.07	0.06	-0.12	0.21**	-0.03	0.27**	0.01
2	0.01	-0.03	0.01	-0.03	0.20**	-0.07*	0.30**	-0.08**	0.22**	-0.03	0.33**	-0.01**	0.28**	0.00	0.48**	0.04
4	0.37**	-0.17	0.37**	-0.17	0.30**	-0.14*	0.34**	-0.31**	0.24**	-0.07	0.33**	-0.09	0.25**	-0.01	0.42	-0.05
6	0.26**	-0.16**	0.26**	-0.16**	0.11**	-0.03	0.20**	-0.07	0.14**	-0.03	0.25**	-0.01	0.02	-0.05	0.54	0.11**
7	0.27**	0.19**	0.27**	0.19**	0.08**	-0.07*	0.15**	0.02	0.15**	-0.03	0.28**	0.16**	0.24**	-0.06*	0.54	0.24**
8	0.32**	-0.06	0.32**	-0.06	0.27**	-0.05*	0.37**	-0.11*	0.30**	-0.03	0.42**	0.04	0.34**	0.00	0.57	0.13**
9	-0.03	-0.25**	-0.03	-0.25**	0.13**	-0.05*	0.16**	-0.14**	0.11**	-0.06*	0.05	-0.23**	0.17**	-0.04	0.22	-0.13**
10	0.04	-0.05	0.04	-0.05	0.10**	-0.02	0.18**	-0.11**	0.07*	-0.02	0.18**	-0.07	0.20**	-0.01	0.32**	-0.03
11	0.34**	0.15*	0.34**	0.15*	0.01	-0.03*	-0.06	0.10**	0.16**	-0.05	0.13**	0.04	0.12**	0.03	0.30**	0.26**
12	0.10**	-0.02	0.10**	-0.02	0.04	-0.01	0.04*	-0.16**	0.05*	-0.01	0.03	-0.16**	0.03	-0.01	0.12**	-0.10**
13	0.18**	-0.19**	0.18**	-0.19**	0.16**	-0.06*	0.16**	-0.25**	0.05*	-0.04	0.14**	-0.12**	0.09**	-0.03	0.29**	-0.03
14	0.19**	-0.13**	0.19**	-0.13**	0.25**	-0.06*	0.47**	-0.26**	0.11**	-0.05	0.36**	-0.14**	0.15**	-0.03	0.58	0.00
15	-0.08	0.23**	-0.08	0.23**	0.17**	0.13**	0.18**	0.21**	0.17**	0.26**	0.20**	0.29**	0.18**	0.12**	0.34	0.24**
16	0.06	0.01	0.06	0.01	0.28**	0.01	0.32**	0.16**	0.22**	0.06	0.36**	0.16**	0.32**	0.04	0.42	0.19**
17	0.16**	0.05	0.16**	0.05	0.14**	-0.04*	0.26**	-0.04	0.20**	0.00	0.29**	0.03	0.41**	0.03	0.60	0.13**
18	0.14**	-0.13**	0.14**	-0.13**	0.13**	-0.07*	0.29**	-0.16**	0.18**	-0.02	0.37**	-0.04	0.46**	0.02	0.61**	0.08**
19	-0.01	-0.23**	-0.01	-0.23**	0.09**	-0.14**	0.14**	-0.13**	0.00	-0.16**	0.04	-0.20**	0.09*	-0.11**	0.16**	-0.06*
20	0.16*	-0.05	0.16*	-0.05	0.17**	-0.19**	0.12*	-0.15**	0.18**	-0.15**	0.12*	-0.16**	0.15*	-0.10*	0.31**	0.05
21	0.10**	-0.19**	0.10**	-0.19**	0.12**	-0.04*	0.14**	-0.18**	0.09**	-0.02	0.14**	-0.13**	0.12**	-0.01	0.34**	-0.07**
22	-0.17**	-0.41**	-0.17**	-0.41**	0.11**	-0.01	0.10**	-0.26**	0.00	-0.08**	-0.03	-0.35**	-0.01	-0.07*	0.14**	-0.21**

Table 1.7 -continued

Industry	Firm Mean				Industry Median				Cross-Sectional				Cross-Sectional-Tobit			
	Pearson		Spearman		Pearson		Spearman		Pearson		Spearman		Pearson		Spearman	
	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above
23	0.05	0.13**	0.05	0.13**	0.20**	0.01	0.23**	-0.05	0.26**	0.05	0.26**	0.06	0.30**	0.08**	0.43**	0.05
24	-0.09	-0.47**	-0.09	-0.47**	0.19**	-0.21**	0.31**	-0.28**	0.06	-0.29**	0.16**	-0.47**	0.09	-0.21**	0.31**	-0.22**
25	-0.36*	-0.38*	-0.36**	-0.38*	-0.07	-0.12*	-0.06	-0.06	-0.24**	-0.19*	-0.26**	-0.02	-0.24**	-0.19*	-0.24**	0.00
27	0.14*	-0.10	0.14*	-0.10	0.12**	-0.07*	0.05	-0.20**	0.06	-0.06	0.08*	-0.09	-0.01	-0.07	0.27**	0.05
28	0.31**	0.04	0.31**	0.04	0.25**	-0.04	0.47**	-0.24**	0.23**	-0.04	0.36**	-0.19**	0.00	-0.03	0.62**	-0.09
30	0.36**	-0.02	0.36**	-0.02	0.13**	-0.07**	0.4**	-0.16**	0.04*	-0.05**	0.47**	-0.01	0.09**	-0.02	0.74	0.18**
31	0.24**	0.06*	0.24**	0.06*	0.11**	-0.07**	0.21**	-0.09**	0.20**	0.05*	0.41**	0.15**	0.25**	0.10**	0.47	0.15**
32	0.27**	-0.24**	0.27**	-0.24**	0.18**	-0.07**	0.39**	-0.14**	0.05*	-0.08**	0.28**	-0.08**	0.1**	-0.06**	0.51	0.05*
33	0.10	-0.21**	0.10	-0.21**	0.03*	-0.07*	0.00	0.07*	0.09*	-0.09*	0.04	0.05	0.03	-0.04	0.24	0.14**
34	0.03	-0.08**	0.03	-0.08**	0.01*	-0.02*	0.10**	-0.08**	0.02	-0.02	-0.08**	-0.05**	0.01	-0.02	0.09	-0.09**
35	0.04	-0.17**	0.04	-0.17**	0.01*	-0.04*	0.07**	-0.18**	0.00	-0.04	-0.04**	-0.25**	-0.01	-0.02	0.14**	-0.16**
36	-0.05*	-0.17**	-0.05*	-0.17**	0.01*	-0.07**	0.07**	-0.27**	0.00	-0.07**	-0.08**	-0.31**	0.01	-0.05**	0.12**	-0.17**
37	0.20**	-0.16**	0.20**	-0.16**	0.08	-0.06*	0.09**	-0.24**	0.01	-0.07*	0.03	-0.28**	-0.01	-0.04	0.12**	-0.13**
38	0.27**	0.03	0.27**	0.03	0.29**	-0.04	0.33**	-0.04	0.4**	0.1**	0.49**	0.11**	0.46**	0.05	0.66**	0.07**
39	0.02	0.23*	0.02	0.23*	0.41**	0.02*	0.37**	0.13*	0.43**	0.07	0.44**	0.23**	0.30**	0.06	0.43	0.17**
40	0.05	-0.15**	0.05	-0.15**	0.11**	-0.07*	0.21**	-0.18**	0.08**	-0.1**	0.11**	-0.20**	0.20**	-0.06**	0.32	-0.09**
41	0.14**	-0.10	0.14**	-0.10	0.09**	-0.01*	0.22**	-0.12**	0.10**	0.00	0.22**	-0.02	0.03	0.03	0.52**	0.03*
42	0.04	0.01	0.04	0.01	0.07**	-0.04*	0.07**	-0.06**	0.11**	0.01	0.14**	0.06**	0.15**	0.00	0.20**	0.03*
43	-0.02	0.00	-0.02	0.00	0.10**	-0.02*	0.03	0.03	0.02	0.07**	0.11**	0.18**	0.21**	-0.01	0.12**	0.12**
48	0.33**	0.07	0.33**	0.07	0.11**	-0.01*	0.38**	-0.09**	0.05	-0.01	0.41**	0.18**	0.11**	0.00	0.65**	0.14**

Table 1.8-Correlation: Deviation from the Target Leverage Proxy and the Firm Value

For each industry – year firms are classified into two categories: firms above their target leverage proxy and firms below their target leverage proxy. For each category, the Pearson and Spearman correlations between the market value standardized by total assets and the absolute deviation from the target proxy are calculated across time. The hypothesis for firms below their target is that the correlation coefficient is positive and for firms above their target is that the correlation coefficient is negative. ** and * indicate that the correlation between the market value standardized by total assets and the absolute deviation from the target proxy is statistically significant at 0.01 and 0.05 levels.

Industry	Firm Mean				Industry Median				Cross-Sectional				Cross-Sectional-Tobit			
	Pearson		Spearman		Pearson		Spearman		Pearson		Spearman		Pearson		Spearman	
	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above
1	-0.09	-0.22*	-0.16	-0.25*	-0.06	-0.16**	-0.16*	-0.09	-0.17**	-0.18**	-0.24*	-0.07	-0.07	-0.15**	0.03	-0.10
2	-0.09*	0.03	-0.03	0.08	-0.16**	-0.10**	-0.29**	-0.12**	-0.08**	-0.12**	-0.22**	-0.15**	0.06	-0.1**	0.11**	-0.18**
4	-0.15	-0.18	0.06	-0.19	-0.22**	-0.19*	-0.25**	-0.25**	-0.10	-0.13	-0.20	-0.09	0.10	-0.17*	0.27**	-0.17*
6	-0.08	-0.07	-0.31**	-0.14*	-0.08*	-0.03	-0.20**	-0.07	-0.05	-0.08	-0.08	-0.03	0.01	-0.08*	0.45**	-0.02
7	-0.03	-0.11*	0.03	-0.03	-0.07*	-0.07**	-0.13**	0.01	-0.02	-0.05	-0.12**	-0.03	0.10**	-0.06*	0.34**	-0.08**
8	-0.13**	-0.07	-0.03	-0.02	-0.18**	-0.06*	-0.29**	-0.17**	-0.02	-0.12**	-0.14**	-0.15*	0.13**	-0.05	0.40**	-0.11**
9	-0.06	-0.03	-0.17**	-0.18**	-0.10**	-0.06*	-0.12**	-0.17**	-0.04	-0.06*	-0.18**	-0.13**	0.13**	-0.07**	0.13**	-0.20
10	-0.07	-0.02	0.05	0.05	-0.12**	-0.01	-0.17**	-0.08*	-0.05	-0.03	-0.16**	-0.12*	0.05	-0.02	0.17**	-0.14**
11	-0.10*	-0.09	-0.18**	-0.10	-0.10*	-0.02	-0.14**	0.13**	-0.04	-0.06	-0.10*	-0.09	-0.12**	0.00	0.32**	0.10**
12	-0.08**	-0.12**	-0.15**	-0.15**	-0.07**	-0.01	-0.22**	-0.10**	-0.03	-0.07**	-0.17**	-0.10**	0.01	-0.01	0.08**	-0.13**
13	-0.06	-0.06	-0.25**	-0.20**	-0.17**	-0.05*	-0.20**	-0.22**	0.01	-0.04	-0.17**	-0.13**	0.02	-0.04	0.14**	-0.10
14	-0.10**	-0.06	-0.17**	-0.14**	-0.20**	-0.07*	-0.44**	-0.32**	-0.06*	-0.11**	-0.28**	-0.28**	0.04	-0.07	0.34**	-0.28**
15	0.04	0.19**	-0.01	0.26**	-0.11**	0.09**	-0.11**	0.13**	-0.01	0.16**	-0.01	0.08	-0.22**	0.05	0.29**	0.05
16	0.01	-0.05	-0.08	0.01	-0.16**	-0.06*	-0.23**	-0.12**	-0.02	-0.04	-0.06	-0.05	-0.19**	-0.05	0.25**	-0.02
17	-0.03	-0.02	-0.04	-0.05	-0.13**	-0.05*	-0.24**	-0.07**	-0.09**	-0.05	-0.19**	-0.13**	0.29**	-0.05*	0.18**	-0.19**
18	-0.07	-0.01	-0.05	-0.11*	-0.11**	-0.08**	-0.27**	-0.18**	-0.06	-0.11**	-0.15**	-0.19**	0.02	-0.16**	0.23**	-0.20
19	-0.17**	-0.10*	-0.25**	-0.14**	-0.04	-0.14**	-0.10**	-0.15**	-0.06*	-0.11**	-0.09	-0.13**	-0.04	-0.10	0.00	-0.13**
20	-0.08	-0.13	-0.02	-0.15*	-0.20**	-0.20**	-0.14*	-0.14**	-0.14**	-0.14*	-0.16	-0.07	-0.03	-0.17**	0.16*	-0.05
21	-0.04	-0.05	-0.11**	-0.20**	-0.12**	-0.04*	-0.16**	-0.15**	-0.04	-0.04	-0.18**	-0.09**	-0.01	-0.04*	0.09**	-0.19
22	-0.02	-0.06	-0.20**	-0.22**	-0.12**	-0.01	-0.11**	-0.24**	-0.09**	-0.03	-0.16**	-0.19**	-0.02	-0.07*	0.04	-0.21**

Table 1.8- continued

Industry	Firm Mean				Industry Median				Cross-Sectional				Cross-Sectional-Tobit			
	Pearson		Spearman		Pearson		Spearman		Pearson		Spearman		Pearson		Spearman	
	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above	Below	Above
23	0.16**	0.13**	0.15**	0.11**	-0.18**	-0.01	-0.21**	-0.08*	-0.06	-0.06	-0.17**	-0.14**	0.18**	-0.03	0.26**	-0.11**
24	-0.23**	-0.13	-0.25**	-0.18*	-0.19**	-0.20**	-0.31**	-0.31**	-0.19**	-0.21**	-0.3**	-0.26**	0.08	-0.23**	0.23**	-0.31
25	-0.28*	-0.36*	-0.10	-0.10	0.12	-0.08	0.15	-0.01	-0.07	-0.11	-0.10	0.06	-0.06	-0.12	-0.01	0.00
27	-0.08	-0.05	-0.04	-0.08	-0.10*	-0.07*	-0.02	-0.22**	0.07	-0.13**	-0.08	-0.19*	-0.01	-0.08*	0.18**	0.01
28	-0.09	-0.15	0.01	-0.06	-0.17**	-0.04	-0.40**	-0.25**	-0.09	-0.17**	-0.26**	-0.23**	-0.03	-0.15	0.33**	-0.30**
30	-0.04	-0.04	-0.08**	-0.17**	-0.1**	-0.07**	-0.36**	-0.17**	-0.01	-0.10**	-0.19**	-0.15**	-0.31**	-0.06**	0.64**	-0.13
31	-0.02	-0.04	-0.09**	-0.09**	-0.13**	-0.06**	-0.25**	-0.07**	-0.07**	-0.07**	-0.16**	-0.16**	0.14**	-0.11**	0.08**	-0.21
32	-0.07*	-0.11**	-0.35**	-0.30**	-0.13**	-0.07**	-0.35**	-0.18**	-0.05*	-0.07**	-0.22**	-0.08	0.01	-0.08**	0.24**	-0.10**
33	-0.08	-0.10	0.01	-0.11	-0.14**	-0.03	-0.11*	0.15**	-0.05	-0.07	0.00	0.04	0.03	0.00	0.26**	0.11**
34	-0.03	-0.01	-0.19**	-0.14**	-0.04**	-0.02*	-0.19**	-0.02*	0.00	-0.01	-0.1**	-0.03	0.00	-0.01	-0.06**	-0.10**
35	-0.06**	-0.08*	-0.17**	-0.15**	-0.06**	-0.03*	-0.19**	-0.15**	-0.03	-0.02	-0.25**	-0.13**	0.00	-0.02	-0.07**	-0.17
36	-0.01	-0.05	-0.15**	-0.12**	-0.08**	-0.05**	-0.16**	-0.18**	-0.04**	-0.03	-0.21**	-0.12**	0.00	-0.04*	0.03	-0.18
37	-0.03	-0.02	-0.02	-0.22**	-0.12**	-0.04*	-0.25**	-0.18**	-0.08**	-0.02	-0.25**	-0.13**	-0.01	-0.03	-0.07*	-0.14
38	-0.11**	-0.06	-0.25**	-0.07	-0.19**	-0.10**	-0.24**	-0.14**	-0.06*	-0.09**	-0.14**	-0.14**	-0.32**	-0.12**	0.43**	-0.21**
39	0.33**	0.18*	0.21*	0.29**	-0.36**	-0.05	-0.35**	-0.01	-0.23**	-0.12	-0.27*	-0.12	-0.09	-0.06	0.00	-0.06
40	-0.06	-0.04	-0.15**	-0.14**	-0.12**	-0.07**	-0.22**	-0.17**	-0.12**	-0.04	-0.18**	-0.15**	0.00	-0.06**	0.16**	-0.19
41	-0.03	-0.02	-0.12**	-0.11**	-0.09**	0.00	-0.22**	-0.11**	-0.08**	0.00	-0.19**	-0.10**	-0.18**	-0.02	0.23**	-0.18
42	-0.03	-0.02	-0.04	-0.02	-0.10**	-0.03*	-0.12**	-0.03	-0.02	-0.04*	-0.07**	-0.05	-0.01	-0.03	0.00	-0.07**
43	-0.07	-0.02	-0.14**	-0.08*	-0.12**	-0.02	-0.06*	0.06*	-0.04	0.01	0.03	0.06	0.05	-0.03	0.12**	0.02
48	-0.02	-0.02	-0.04	-0.05	-0.06*	-0.02	-0.30**	-0.14**	-0.02	-0.02	-0.07	-0.10*	0.04	-0.01	0.62**	-0.09**

Table 1.9-Test of Proportions - Correlations

Each cell represents the proportion of significant correlation coefficients consistent with the predictions of the trade-off model for each proxy. In Panel A, columns 2, 3 and 4 report the proportions of consistency between market value standardized by total assets and leverage ratio using Pearson correlation coefficients. Columns 5,6 and 7 report the proportions of consistency between market value standardized by total assets and leverage ratio using Spearman correlation coefficients. In Panel B, columns 2, 3 and 4 report the proportions of consistency between market value standardized by total assets and the absolute deviation from the target proxy using Pearson correlation coefficients. Columns 5,6 and 7 report the proportions of consistency between market value standardized by total assets and the absolute deviation from the target proxy using Spearman correlation coefficients. ** and * indicate that the proportion of the proxy is statistically greater than 0.5 at 0.01 and 0.05 levels. < and << Indicate that the proportion of the proxy is statistically less than the proportion of industry median proxy at 0.01 and 0.05 levels.

Panel A: Consistency of the correlation coefficients between the firm value and the leverage ratio						
Proxy	**Pearson**			Spearman		
	Below	**Above**	**Both**	Below	Above	Both
Firm Mean	0.25	0.23	0.00<<	0.53	0.45	0.18<<
Industry Median	0.88**	0.75**	0.65**	0.88**	0.68**	0.65
Cross-Sectional	0.73**	0.30	0.15<<	0.73**	0.43	0.23<<
Cross-Sectional-Tobin	0.68**	0.23	0.13<<	0.58*	0.28	0.20<<
Panel B: Consistency of the correlation coefficients between the firm value and the absolute deviation from the target proxy						
Proxy	**Pearson**			Spearman		
	Below	**Above**	**Both**	Below	Above	Both
Firm Mean	0.28	0.18	0.13<<	0.50	0.55*	0.45<<
Industry Median	0.93**	0.65**	0.60**	0.95**	0.75**	0.73
Cross-Sectional	0.40	0.43	0.23<<	0.73**	0.60**	0.55<
Cross-Sectional-Tobin	0.45	0.48	0.05<<	0.48	0.38	0.23<<

Table 1.10- Tukey Pairwise Comparisons Test -Firm Value

For each industry – year firms are classified into two categories: firms above their target leverage proxy and firms below their target leverage proxy. The absolute deviation from the target (|the proxy target minus the actual leverage ratio|) for each category is calculated. For each category, firms are further divided into two sets. The first set contains those firms with a deviation from the target of less than the 50^{th} percentile of the deviation distribution (Q_1); the second set contains those firms with a deviation from the target of more than the 50^{th} percentile of the deviation distribution (Q_2). To test if there are significant differences in the firm market value, as it stands closer relative to further away from their target. The Tukey pairwise comparisons test jointly testing for the differences in the average market value standardized by total assets among the different sets at a 5% level of significance. Each cell reports the differences in the means. * indicates that difference in the means is statistically different from zero 0.05 levels.

Industry	Firm Mean		ustry Median		Cross-Sectional		Cross-Sectional-Tobit	
	Below	Above	Below	Above	Below	Above	Below	Above
	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1
1	0.08	-0.820	-0.14	-0.26*	-0.480	-0.17	0.09	-0.31
2	0.14	-0.28	-0.44*	-0.16*	-0.17*	-0.18*	0.90	-0.72
4	-0.16	-0.24*	-0.83*	-0.83*	-0.56	-0.53	0.76	-0.45*
6	-0.11	-0.12	-0.24*	-0.11*	-0.86	-0.13*	0.16	-0.14*
7	0.10	-0.24*	-0.11*	-0.93*	-0.75	-0.63*	-0.33*	-0.84*
8	-0.19	-0.44	-0.89*	-0.95*	-0.61*	-0.10*	-0.93*	-0.07*
9	-0.58	-0.10	-0.13*	-0.16*	-0.95*	-0.83*	0.18*	-0.07*
10	-0.18	-0.15	-0.42*	-0.63*	-0.36*	-0.32	0.41	-0.41*
11	-0.13	-0.75*	-0.07	-0.41*	-0.41*	-0.34*	-0.99*	0.13*
12	-0.95*	-0.65*	-0.31*	-0.37*	-0.13	-0.27*	0.03	-0.05
13	-0.57*	-0.53*	-0.30*	-0.57*	-0.57	-0.14*	-0.25*	-0.25*
14	-0.11*	-0.28*	-0.38*	-0.24*	-0.16*	-0.23*	-0.43*	-0.15*
15	-0.02	0.20	-0.17*	0.06	-0.10	0.38	-0.33*	-0.83
16	0.07	-0.15*	-0.25*	-0.10	-0.05	-0.08	-0.27*	-0.05
17	0.00	-0.18	-0.83*	-0.47*	-0.75*	-0.47*	0.11*	-0.41*
18	0.06	0.10	-0.11	-0.15*	-0.13	-0.26*	-0.28*	-0.23*
19	-0.69*	-0.92*	-0.23	-0.63*	-0.42*	-0.49*	-0.13	-0.19
20	-0.05	-0.24*	-0.18	-0.29*	-0.27*	-0.12	-0.12	-0.31*
21	-0.46*	-1.15*	-0.52*	-0.28	-0.39*	-0.21	-0.06	-0.22
22	-0.13	-0.70	-0.11*	-0.21*	-0.13*	-0.12*	0.10	-0.02*

Table 1.10- continued

Industry	Firm Mean		Industry Median		Cross-Sectional		Cross-Sectional-Tobit	
	Below	Above	Below	Above	Below	Above	Below	Above
	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1
23	0.17*	0.16*	-0.38*	-0.89*	-0.37*	-0.37	0.14*	-0.30
24	-0.30*	0.15	-0.48*	-0.18*	-0.46*	-0.26*	0.23	-0.41*
25	-0.70	-0.38*	-0.12*	-0.33*	0.18	-0.31	-0.15	-0.49
27	0.19	-0.55*	-0.41*	-0.25*	-0.05	-0.32*	-0.32*	0.03
28	-0.19*	-0.04	-0.11*	-0.10*	-0.17*	-0.19*	0.14	-0.20*
30	-0.57*	-0.45*	-0.44*	-0.21*	-0.07	-0.14*	0.12*	-0.13*
31	0.00	-0.48	-0.11*	-0.47	-0.69*	-0.88*	-0.13*	-0.99*
32	-0.49*	-0.63*	-0.10*	-0.59*	-0.05*	-0.57*	-0.04*	-0.58*
33	-0.61*	-0.30	-0.07	-0.14	-0.06	-0.18	-0.17*	0.32*
34	-0.05	0.50	-0.01	-0.03	0.08	-0.30	-0.24	0.08
35	-0.17*	-0.28*	-0.13	-0.38	-0.60	-0.16	-0.39	-0.01
36	-0.59	-0.08*	-0.10*	-0.19*	-0.06*	-0.62	0.60	-0.09*
37	-0.11	-0.10	-0.19*	-0.06	-0.21*	-0.09	0.07	-0.03
38	-0.06*	-0.13*	-0.17*	-0.12*	-0.12*	-0.10*	0.26*	-0.09*
39	0.19	0.12	-0.11*	0.09	-0.10*	-0.71*	-0.14	-0.49
40	-0.09*	0.04	-0.14*	-0.42*	-0.15*	-0.83*	0.11*	-0.87*
41	-0.54*	-0.29*	-0.62*	-0.43*	-0.67*	0.47*	0.78*	-0.11
42	-0.23	-0.18	-0.12*	-0.10*	-0.48	-0.08*	-0.21	-0.09*
43	-0.10*	- 0.50*	-0.38*	-0.61*	-0.20	-0.08	0.42	-0.28*
48	-0.18	0.82	-0.74	-0.77	-0.12	-0.41	0.39*	0.04

Table 1.11-Kruskal-Wallis Pairwise Comparisons Test - Firm Value

For each industry – year firms are classified into two categories: firms above their target leverage proxy and firms below their target leverage proxy. The absolute deviation from the target (|the proxy target minus the actual leverage ratio|) for each category is calculated. For each category, firms are further divided into two sets. The first set contains those firms with a deviation from the target of less than the 50^{th} percentile of the deviation distribution (Q_1); the second set contains those firms with a deviation from the target of more than the 50^{th} percentile of the deviation distribution (Q_2). To test if there are significant differences in the firm market value, as it stands closer relative to further away from their target. The Kruskal-Wallis pairwise comparisons test jointly testing for the differences in the mean/ median market value standardized by total assets among the different sets at a 5% level of significance. Each cell reports the differences in the mean rank. * indicate that difference in the location parameters is statistically different from zero at 0.05 levels.

Industry	Firm Mean		Industry Median		Cross-Sectional		Cross-Sectional-Tobit	
	Below	Above	Below	Above	Below	Above	Below	Above
	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1
1	-4	-15*	-22	-14	-27*	4	1	-23
2	16	-9	-234*	-60*	-165*	-70*	-33	-143*
4	7	-15	-25*	-14	-12	-5	-27*	-11
6	-62*	-29*	-107*	-16	-15	5	-97*	-3
7	-12	-14	-94*	19	-96*	-9	-142*	-54
8	12	-17	-115*	-63*	-62*	-60*	-110*	-63*
9	-60*	-79*	-105*	-157*	-139*	-93*	-68	-203*
10	14	-11	-74*	-74*	-114*	-63*	-57	-114*
11	-33*	- 19	-27	-161*	-78*	-35	-149	77*
12	-75*	- 44*	-121*	-121*	-182*	-86*	-144*	-161*
13	-135*	-71*	-254*	-190*	-218*	-85*	-171*	-144*
14	-51*	-69*	-254*	-179*	-184*	-156*	-155*	-200*
15	-2	34	-57*	56*	-11	29	-74	6
16	- 2	-16	-94*	-44*	-19	-25	-42*	-10
17	-22	-53*	-277*	-54	-218*	-109*	-87*	-247
18	-10	-28	-80*	-94*	-63*	-98*	-45*	-95*
19	-60*	-37	-42	-69*	-57*	-60*	12	-66*
20	3	-14	-7	-31	-17	-14	-21	-11
21	-82*	-142*	-218*	-163*	-260*	-89*	-75	-298
22	-63*	-77*	-55*	-140*	-97*	-114*	-29	-138

Table 1.11- continued

Industry	Firm Mean		Industry Median		Cross-Sectional		Cross-Sectional-Tobit	
	Below	Above	Below	Above	Below	Above	Below	Above
	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1	Q_2-Q_1
23	38	22	-83*	-28	-86*	-77*	-74	-77
24	-25*	-2	-52*	-45*	-48*	-31*	-21	-56*
25	-2	-11*	13	-3	1	7	0	2
27	6	-9	-23	-35	0	-21	-36*	32
28	-12	0	-58*	-35*	-42*	-28	-39*	-65
30	-82*	-110	-682*	-192*	-373*	-157*	-768	-194*
31	-85*	-82*	-231*	-93*	-176*	-202*	-71	-275
32	-146*	-87*	-414*	-194*	-271*	-95*	-148*	-145*
33	3	-7	-9	49*	6	20	-79*	69
34	-245*	-130*	-56	59	-390	26	-151	-290*
35	-137*	-91	-206*	-194*	-451	-134*	-82	-307
36	-160*	-109*	-38	-342*	-351	-207*	-223	-335*
37	-36	-87	-141*	-121*	-188*	-74*	-55*	-104*
38	-62*	-63	-167*	-96*	-141	-80*	-147*	-177*
39	9	8	-30*	-4	-25*	-24	0	-21
40	-83*	-36	-190*	-102*	-159	-106*	-78	-197*
41	-99*	-68	-349*	-120*	-327	-107*	-241*	-352
42	-26	-51	-230*	-122*	-165	-137*	-27	-243*
43	-51*	-51	-47	29	24	43	-61	3
48	-13	-19	-227*	-65*	-79	-35	-309*	-76

Table 1.12-Test of Proportions - Firm Value Differences

For each industry – year firms are classified into two categories: firms above their target leverage proxy and firms below their target leverage proxy. The absolute deviation from the target (|the proxy target minus the actual leverage ratio|) for each category is calculated. For each category, firms are further divided into two sets. The first set contains those firms with a deviation from the target of less than the 50^{th} percentile of the deviation distribution (Q_1); the second set contains those firms with a deviation from the target of more than the 50^{th} percentile of the deviation distribution (Q_2). To test if there are significant differences in the firm market value, as it stands closer relative to further away from their target. Tukey pairwise comparisons test and Mann-Whitney U Test comparisons test of the mean/ median market value standardized by total assets between Q_2 and Q_1 below and above the target proxy are performed. The proportion in each cell represents the proportions of significant tests consistent with the predictions of the trade-off model ($Q_2 < Q_1$) for each proxy. ** and * indicate that the proportion of the proxy is statistically greater than 0.5 at 0.01 and 0.05 levels. < and << Indicate that the proportion of the proxy is statistically less than the proportion of the industry median proxy at 0.01 and 0.05 levels.

	Test of Proportions Consistency of correlation coefficients between market value and leverage ratio					
Proxy	**Parametric- Tukey pairwise comparisons test**			Nonparametric- Kruskal-Wallis pairwise comparisons test		
	Below	**Above**	**Both**	Below	Above	Both
Firm Mean	0.38	0.50	$0.28^{<<}$	0.50	0.48	$0.30^{<<}$
Industry Median	0.78**	0.75**	0.63	0.83**	0.73**	0.65
Cross-Sectional	0.58*	0.58*	$0.38^{<<}$	0.58*	0.65**	$0.50^{<}$
Cross-Sectional-Tobin	0.30	0.58*	$0.18^{<<}$	0.50	0.53	$0.25^{<<}$

An attention-grabbing observation from those tests emerges; firms moving toward the target from above gain different value relative to firms moving toward the target from below. For example, the industry group number four could gain in value of 0.63 if it is above the target and move toward it. On the other hand, the gain in value is 0.42 if it is below the target and move toward it. This implies that firms above and below the target should adjust toward the target with different speeds since they have a different amount of value gain. For example, the partial adjustment model, which is commonly used for testing the trade-off model, assumes that firms above and below the target leverage have the same speed of adjustment. The implication of my result indicates that it is necessary to control for the firm location relative to the target leverage when testing the trade off model using the partial adjustment model. Recently, Byoun and Rhim (2002) find evidence that firms have different speed of adjustment toward the target leverage when they are above as opposed to when they are below their target leverage.[13]

1. 6. ROBUSTNESS CHECK

The leverage target hypothesis yields the mean-reverting property of actual leverage. Intuitively, if firms have an optimal leverage ratio and have tendency to adjust toward it, it is more likely to find firms clustering closer to that target. The main prediction of the trade-off model is that firms closer to their optimal leverage will maximize their value. Thus, the cluster with the highest market value should have the smallest deviation from the target.

We utilized K-Means Cluster Analysis to check the robustness of my previous results. This procedure attempts to identify relatively homogeneous groups of cases based on selected characteristics. For each industry-year, K-means clustering is performed using the debt ratio to classify firms into four clusters. Each cluster contains a group of firms that have the closest leverage ratio to each other (the minimum distance) and the farthest distance from the other three groups. In total, there are 3,200 clusters across all industries and years. I calculate the average firm value and the average debt ratio for each industry-year-cluster. For each industry-year, I keep the cluster with the highest average firm value, leaving us with 800 clusters out of the 3,200. For each one of these clusters, the deviation of the cluster leverage from each target proxy is calculated and the target proxy with the closest distance from the cluster leverage is identified. The results show that 60.1% of the clusters that have the maximum average firm value are closest to the industry median leverage, 11.9% are closest to the firm mean leverage, 20% are closest to the cross-sectional leverage and 8% are closest to the Tobit cross-sectional leverage. Overall, the results confirm the robustness of my findings that is the industry median leverage as proxy is superior to the other proxies.

[13] Byoun and Rhim (2002) use the firm mean as proxy for the target leverage.

1.7. CONCLUSIONS

The evaluation of the consistency of the target leverage proxies with the behavior of the true optimal leverage reveals that the industry median is a superior proxy to the alternative proxies used in the literature for the target leverage. This result implies that there is some degree of bias against the trade-off model when other than the industry median is used as proxy for the target leverage.

Numerous empirical studies support my finding. Schwarz and Aronson (1967), Scott and Martin (1975), Ferri and Jones (1979), Bradley, Jarrell, and Kim (1984) observe significant industry effects in debt ratios. Different industries found to develop an optimal financial structure conditioned by the intensity of their operational risks and by the characteristics of the industry asset structure. The stylized facts concerning industry characteristics and capital structure shows that firms within the same industry are more similar than those in different industries and that industries tend to retain their relative leverage ratio ranking over time (Bowen, Daly, and Huber (1982)).

Marsh (1982) finds that firms are most likely to issue debt (equity) when they expect that other firms will issue debt (equity). Hovakimian, Hovakimian, and Tehranian (2002) find that industry debt ratio is an important determinant of the debt equity choice, and Welch (2002) shows that the industry debt ratio appears to be the best predictor of a firm's debt ratio.

In Scott and Johnson's (1982) survey of chief financial officers of the Fortune 1000 corporations, over 50% of the CFOs stated that industry-wide ratios have an important influence on their financing decision. Other surveys of Chief Financial Officer's show that some managers claim to pursue a target adjustment model while others claim to follow alternative financing models ((Pinegar and Wilbricht (1989), Kamath (1997)). Graham and Harvey (2001) find that most firms claim to have target leverage but achieving the target is not of primary importance.

The investor's behavioral literature provides a theoretical explanation of this result as well. In his famous book, "The General Theory of Employment, Interest, and Money", Keynes (1936) argues that the behavior of investors in financial markets is like newspaper beauty contests in which readers were asked to choose the six prettiest faces from 100 photographs. The winner was the person whose preferences were closest to the average preferences of all participants. Keynes reasoned that contest participants, like financial investors, do not choose faces that they personally find the most attractive, but instead are guided by their expectations of other people's expectations. With a large number of investors trying to guess the optimal capital structure for a particular firm, the question is not what you think is the optimal. Nor is the question what you believe other investors think of as optimal. You are trying to guess what the other investors are guessing. Alternatively, as Keynes writes: "We devote our intelligence to anticipating what average opinion expects the average opinion to be" (Keynes, 1936). Since each investor's guess about the optimal debt ratio is bounded by the minimum and maximum debt ratio of the industry, the average opinion will be concentrated around the industry mean or median.

Patel, Zeckhauser, and Hendricks (1991) use behavioral explanations to explain people's buying decisions in mutual fund markets. They also describe the so-called "herd migration behavior," that may explain the debt-equity ratios of firms. They note that animals are aware of the safety of traveling in groups. According to Patel et al., "financial players also may migrate in herds". Firms should balance the gains of reaching the optimal capital structure against the costs of "leaving the herd," that is, of getting too far out of line with the industry. Even though a firm may benefit by moving its debt ratio towards its optimum, and this optimum may be both firm specific and time varying, the firm may also incur a cost or penalty from the market because it deviates from the herd. For example, bankers often will not lend to borrowers whose debt ratio is higher than the industry average debt ratio.

The results hold even within the information asymmetry framework. Within this framework, managers are able to determine the optimal debt ratio that will maximize the firm value from their own perspective. Investors who are less informed relative to the manager will perceive the optimal capital structure to be the industry debt ratio. Under this assumption, the market reaction (investors) to debt ratio increases and decreases will depend on the relative position of the firm leverage ratio, compared to its peers in the industry. The manager will find that moving toward the optimal debt ratio, as the investors perceive it, will increase the firm value.

Another supporting evidence to my findings comes from the market reaction to pure capital structure changes. Hull (1999) studies the market reaction to debt equity swaps and equity issue with the sole purpose to reduce debt. Using the industry leverage median as proxy for the target leverage, he finds a supporting evidence of the target leverage hypothesis. The market reaction is less negative for firms that reduce their debt and move toward their target leverage relative to the firms that reduce their debt and move away from their target leverage.

CHAPTER II

THE TRADE-OFF THEORY AND THE PECKING ORDER THEORY: ARE THEY MUTUALLY EXCLUSIVE?

Introduction

The growing literature of evaluating the efficiency of the trade-off theory versus the pecking order theory has produced mixed evidence. Shyam-Sunder and Myers (1999) find more supportive evidence for the pecking order theory versus the trade-off theory. Hovakimian, Opler, and Titman (2001) examine the firms' debt-equity issuance (reduction) choice and find that deviation from the target leverage plays a more significant role in the repurchase decision than in the issuance decision of securities. Among their conclusions, is that their results are consistent with the pecking order model in the short-run and reversion to the target leverage in the long-run. Byoun and Rhim (2002) find that both of the theories explain significant variations in the firms' total debt. Fama and French (2002) find evidence in favor and against both of the theories. Frank and Goyal (2003) find evidence inconsistent with the pecking order theory especially for small firms. Lemmon and Zender (2002) find no supporting evidence for the trade-off theory, yet the costs of adverse selection were not able to explain the pecking order financing behavior that they documented. Korajczyk and Levy (2003) find that the deviation from the target capital structure has a significant role in the firm choice of which type of security to issue or repurchase. In addition, their findings support the Hovakimian, Opler, and Titman (2001) results that firms adjust toward the target leverage more actively than suggested by Shyam-Sunder and Myers (1999). Hovakimian (2003) examines the role of the target leverage in security issues and repurchases, and finds that debt reduction is initiated to reduce the deviation from target capital structure whereas debt issue, equity issue, and equity repurchase are not driven by this motivation.

On one hand, the pecking order theory predicts that firms with low and moderate leverage will issue debt to finance their deficit whereas firms with a high leverage(those who exhausted their debt capacity) will issue equity. On the other hand, the trade-off theory suggests that firms in a financing deficit and below their optimal target leverage (low leverage) will issue debt to adjust toward their optimal leverage and they will issue equity if they are above their optimal leverage (high leverage). Thus, what we empirically capture as rate of adjustment toward the target leverage could be due to the pecking order behavior, whereas what we empirically capture as the ability of the financing deficit to explain the changes in debt could be due to the trade-off behavior.

This study complements the previous studies on the pecking order theory and the trade-off theory. The main purpose of this study is to investigate three issues that are not considered in the previous studies. The adequacy of the specification and the assumptions of the models used in

testing the trade-off and the pecking order theory. The second issue examined in this study is the validity to putting the pecking order and the trade-off theories in a horse race. The final issue examined in this study is the factors driving firms to issue (repurchase) debt or equity or combination of both and simultaneously the factors affecting the size of issue (repurchase).[14]

Previous empirical works on the trade-off theory and the pecking order theory that use the partial adjustment model and Shyam-Sunder and Myers (1999) model (the pecking order model hereafter) have two implicit assumptions.[15] The first assumption is the symmetric behavior assumption. Under the partial adjustment model, firms adjust toward their leverage target with the same rate regardless if they are above or below the target leverage. This implies that the cost and benefit of being above the target leverage is identical to the one of being below the target. However, the trade-off theory does not predict such a behavior.

Under the pecking order model, a symmetric behavior of firms in a financing deficit (shortage of internal sources of funds to finance their new investment) or a financing surplus (excess of internal sources of funds over their new investment) is predicted (see Shyam-Sunder and Myers, 1999). In other words, firms in financial deficit use debt to finance their new investment whereas firms in financing surplus end up paying down debt rather than repurchasing equity.

The second assumption is the homogeneous coefficient assumption. The partial adjustment model employed to examine the trade-off theory assumes that firms within the same industry and across industries adjust toward their target capital structure with the same rate. Such an assumption ignores the fact that there are significant differences in the characteristics of firms within the same industry and across industries that affect the rate of adjustment. The non-time-varying coefficient assumption under the pecking order model assumes that firms within the same industry and across industries finance their external financing needs with the same proportion of debt over time, ignoring the degree of information asymmetry, firm's debt capacity, equity market condition and other firms' characteristics which significantly affect the amount of debt that a firm can issue.

Theoretically, the trade-off theory is more adaptable since it is able to accommodate the determinants of debt financing suggested by the pecking order theory. The pecking order theory implies that adverse selection costs and debt capacity are supposed to be the only relevant factors that explain the debt financing and these factors overwhelm the factors that determine the optimal leverage in the trade-off theory (Myers (1984)). I investigate the possibility that firms do not view the pecking order and the trade-off theory as mutually exclusive. It is also important to understand the factors that affect both the rate of adjustment and the proportion of debt financing (reduction) relative to the financing deficit (surplus) in the context of both of the theories.

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[14] The combination issues in earlier studies either excluded (Marsh (1982) and Hovakimian, Opler, and Titman (2001), Hovakimian (2003)) or reclassified as debt or equity issues using some criteria (Mackie-Mason (1990)). Hovakimian, Hovakimian, Tehranian (2002) study the case of combined debt equity financing using probit regressions (combination issue vs. equity issue and combination issue vs. equity issue). Hovakimian (2003) study the determinants of debt vs. equity choice and debt reduction vs. equity repurchases choice.

[15] Shyam-Sunder and Myers (1999) model states that financing deficit-surplus suppose to explain the changes in debt. The model specified as: $\Delta D_t = a_0 + a_1 Fin + e$. The partial adjustment model states that deviation from the target leverage suppose to explain the changes in debt. The model specified as: $\Delta D_t = a_0 + a_1 (D_t^* - D_{t-1}) + e$.

Hovakimian, Opler, and Titman (2001) conclude that the choice of the form of financing should be examined separately from the choice of the size of financing. Using a two stage Bivariate Probit – Tobit model, I examine simultaneously the factors affecting the firms' choice of the form of financing (repurchase) and the size of issue (repurchase) . Unlike the previous empirical work on the debt-equity issuance (repurchase) choice, in this study the firms' choice of the form of financing (repurchase) is conditional on the firms external funds needs (financing surplus). In addition, unlike the previous empirical work on the pecking order and the trade-off theory, which overlooked the role of the short-term debt, this study considers the role of the short-term debt under both the trade-off theory and the pecking order theory.[16]

The specification problems of the static model employed by Shyam-Sunder and Myers (1999) are illustrates the failure of the model in providing evidence in favor of the pecking order theory. Shyam-Sunder and Myers (1999) fundamental assumption of a symmetrical behavior is rejected across all industries. Debt reduction closely tracks the financing surplus, while the equity issues closely tracks the financing deficit. This study documents that the better fit of the financing surplus group rather than the financing deficit group is the reason for the good fit of their model, as measured by R-square. In addition, the bias in the financing deficit coefficient due to the equity issues as illustrated by Chirinko and Singha (2000), is not the only source of bias in the model's coefficients. The evidence that some firms substitute debt for equity, while they are in financing deficit, leads to a negative bias in the financing deficit coefficient. Whereas for firms that substitute equity for debt, the financing deficit coefficient suffer from a positive bias.

Firms that use equity or more equity (as proportion of the financing deficit) financing are those which have higher market to book ratio, smaller size, lower profitability, lower tangible assets, lower marginal tax rate, greater net loss carry forward, higher probability of bankruptcy, higher information asymmetry problem, and higher stock prices run up.[17] Firms that use their financing surplus to repurchases debt or more debt (as proportion of the financing surplus) repurchase are those which have, on average, higher market to book ratio, greater non-debt tax shields, higher probability of bankruptcy, higher information asymmetry problem, and higher stock prices run up.[18]

The modified pecking order model, which allows the financing coefficient to vary with the firms characteristics, provides empirical evidence that not only the pecking order theory's factors affect the financing deficit-surplus coefficient, but also the trade-off theory factors play a significant role in determining the proportion of debt to be issued or repurchased. In addition, the market-timing hypothesis has a significant impact on the proportion of debt to be issued or repurchased.

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[16] Barclay and Smith (1995) document positive relation between debt maturity and firm size. Gertler and Gilchrist (1994) find that net short-term debt issues by small firms are less sensitive to the business cycle.

[17] More equity finance indicates firms that issue both debt and equity, where equity financing represents between 50% and 100% of their financing deficit.

[18] More debt repurchases indicates firms that repurchases both debt and equity, where debt reduction represents between 50% and 100% of the financing surplus.

The symmetrical rate of adjustment assumption is rejected across all industries; firms tend to adjust faster toward the target leverage when they are above the target relative when they are below the target leverage. This study documents evidence consistent with the notion that firms adjust toward the target on the long-run, while the pecking order factors and the market-timing hypothesis contribute to the short-run deviation from the target leverage. Firms that overshoot their target leverage from below are those characterized by, low growth options, higher sales, higher tangible assets, higher marginal tax rate, lower net loss carry forward, lower R&D, less financial distress, higher information asymmetry, higher financing deficit relative to their assets and higher stock prices decline. Firms that are below the target leverage and move away from their target are those characterize by smaller size, lower sales, high growth options, lower tangible assets, lower marginal tax rate, higher net loss carry forward, higher R&D, higher stock price run up, lower information asymmetry, more financial distress and lower deficit.

For the firms group above their target leverage, firms with smaller size, lower sales, high growth options, lower tangible assets, lower marginal tax rate, higher R&D, higher information asymmetry, more financial distress, higher stock price run up and higher financing surplus are those which overshoot their target. Firms that move away from their target are the firms that have a larger size, low growth options, high tangible assets, high financing deficit, and a decline in their stock prices.

The modified partial adjustment model, which allow the rate of adjustment to vary with the firms characteristics, suggests that the pecking order factors and the market-timing hypothesis play a significant role in accelerating or slowing the rate of adjustment toward the target leverage. Higher information asymmetry accelerate (slow) the rate of adjustment toward the target leverage for firm that adjust from below (above), while higher stock prices run up slow (accelerate) the rate of adjustment toward the target leverage for firm that adjust from below (above).

The examination of the factors that affect the choice of financing (repurchasing) form and the size of issue (repurchase) also support the notion that the trade-off and the pecking order theory are not mutually exclusive. The market to book ratio is negatively (positively) related to both the probability of issuing debt (equity) and the size of issue. The tangible assets are positively related to both the probability of issuing debt and the size of issue and negatively related to the likelihood of issuing equity. The financing deficit has a positive impact on the likelihood of issuing debt or equity, also it has a positive impact on the size of both the equity and the debt issues for firms that issue a combination of debt and equity, but it has a negative impact on the pure debt and equity issues. This suggests that firms with a large financing deficit do not tend to substitute debt for equity or equity for debt.

The two-stage model finds evidence in support of the trade-off theory; firms that are better off issuing equity (ending closer to the target leverage by issuing equity) are most likely to issue equity instead of debt. The size of debt (equity) issue is positively (negatively) related to the actual deviation from the target leverage, suggesting that debt (equity) issue size is an increasing (decreasing) function of the distance from the target leverage for firms below their target leverage and a decreasing (increasing) function for firms above their target leverage. In addition, the higher the marginal tax rates the higher the likelihood of issuing debt rather than equity. Higher marginal tax rate discourages firms that issue pure equity from repurchasing debt, and

encourages firms that issue pure debt to repurchase equity. The net loss carry forward encourages firms to substitute debt for equity and discourages firms from substitute equity for debt. This suggests that firms suffering from a net loss carry forward, attempt to reduce their interest payment obligation by reducing the debt levels through equity issue.

The market-timing hypothesis finds a strong support for both the choice and the size of the financing form. Stock price run up increases (decreases) the likelihood of issuing (repurchasing) equity, while the size of equity issue (repurchase) relative to the financing deficit (surplus) is an increasing (decreasing) function of the stock prices run up. Higher stock prices increase the likelihood of debt repurchases and encourage firms to repurchase more debt and to substitute debt for equity.

2.1. THE PECKING ORDER THEORY

The pecking order theory (Myers and Majluf (1984) and Myers (1984)) and its extensions (Lucas and McDonald (1990)) are based on the idea of asymmetric information between managers and investors. Managers know more about the true value of the firm and the firm's riskiness than less informed outside investors. If the information asymmetry results in an underpricing of the firm's equity and the firm is required to finance a new project by issuing equity, the underpricing may be so severe that new investors capture most of the net present value (NPV) of the project, resulting in a net loss to existing shareholders. Thus, managers who work in the best interest of the current shareholders will reject the project. To avoid the underinvestment problem, managers will seek to finance the new project using a security that is not undervalued by the market, such as internal funds or riskless debt. Therefore, this affects the choice between internal and external financing. The pecking order theory is able to explain why firms tend to depend on internal sources of funds and prefer debt to equity if external financing is required. Thus, a firm's leverage is not driven by the trade-off theory, but it is simply the cumulative results of the firm's attempts to mitigate information asymmetry.

The pecking order theory predicts that the financing deficit is the main determinant of debt issue and firms will use external financing only if internal funds are not sufficient to finance the firm's growth opportunities.

If external funds are needed, the pecking order theory predicts that:

1. Firms will issue the safest security it can, given that the cost of financial distress is ignored, where safe security is defined as security not affected by revelation of managers' inside information (Shyam-Sunder and Myers, 1999). This implies that firms will first issue debt and then equity.
2. Firms will issue equity when the cost of financial distress is significantly high and the degree of underpricing is not too low.

This prediction suggests that firms with moderate debt levels and lower costs of financial distress use more debt financing relative to equity financing. On the other hand, firms with high debt ratios use more equity financing relative to debt financing. As Shyam-Sunder and Myers (1999) point out, the behavior of firms in a financing deficit that subsequently have a financing surplus is supposed to be symmetric. In other words, firms that use debt to finance their growth

opportunities when they are in a financing deficit will reduce debt when they have a financing surplus rather than carry out equity repurchases. This leads to a negative relation between leverage and firm profitability (earnings or free cash flows) under the pecking order hypothesis. The pecking order theory fundamentally relies upon information asymmetry and adverse selection costs, yet there is no reason to believe that the distribution of the information asymmetry is uniformly distributed across time (Goswami, Neo, and Rebelled (1995). However, Choe, Masulis, and Nanda (1993), Bayless and Chaplinsky (1996) and Eisfeldt (2001) argue that that adverse selection cost varies counter-cyclically. Therefore, the predictions of the pecking order theory strongly depend upon the existence of information asymmetry and the associated adverse selection costs.

2.2. THE PECKING ORDER MODEL

Shyam-Sunder and Myers (1999) as well as the subsequent empirical work that use their model, define financing deficit-surplus as.[19]

$$Fin_t^{\pm} = Div_t + I_t + \Delta WC_t - C_t = \Delta LTD_t + \Delta E_t \quad (1)$$

Fin_t Financing deficit-surplus.

Div_t Cash dividends at time t.

I_t Net investment at time t.

ΔWC_t Net increase in working capital at time t.

C_t Cash flow after interest and taxes at time t.

ΔLTD_t Net debt issued at time t (long-term debt issuance – long-term debt reduction)

ΔE_t Net equity issued in time t.

Where a positive value of Fin_t indicates a financing deficit and a negative one indicates financing surplus. In contrast to Shyam-Sunder and Myers (1999), Frank and Goyal (2003) find that the current portion of long-term debt does not belong to the definition of financing deficit-surplus.

The financing deficit-surplus as it is defined in equation (1) is concerned with modeling the long-term debt financing since the short-term debt is included in the working capital changes. Since the pecking order theory predicts that firms will issue securities in order of their sensitivity to the information asymmetry problem, firms expect to use short-term debt, long-term debt, and equity as a last resort. This implies that short-term debt should be exhausted before firms issue long-term debt. Thus, this study is concerned with modeling both long-term and short-term debt financing.

Using the balance sheet, we can rewrite it as:

[19] For example, Frank and Goyal (2003), Lemmon and Zender (2002), Nuri and Archer (2001), and Byoun and Rhim (2002).

Current assets	Current liability
	Debt
Net Capital Stock	Short-Term
	Long-Term
	Total Equity
	Net Equity
	Retained
Net Assets	Net Assets

Rearranging the balance sheet items leads to:

+(Current assets- Current liability)	+ Debt (Short-term+ Long-term)
+Net Capital Stock (A)	+ Equity
	+ Retained Earnings
Net Assets	Net Assets
$D_t + EQ + RE_t = A_t + WC_t$	

The sources and uses identity at time t is written as:

$$\Delta LTD_t + \Delta STD_t + \Delta EQ_t + \Delta RE_t = \Delta A_t + \Delta WC_t \quad (2)$$

$$\Delta LTD_t + \Delta STD_t + \Delta EQ_t = \Delta A_t + \Delta WC_t - \Delta RE_t = Fin_t \quad (3)$$

Δ The change in a variable from time *t-1* to *t*.

LTD_t Long-Term debt.

STD_t Short-Term debt.

A_t Net assets (Investment).

D_t Total debt (long-term + short-term debt).

EQ_t Net Equity.

WC_t Working capital (excluding short-term debt).

RE_t Retained earning.

Fin_t Financing deficit-surplus.

The behavioral equation (3) states that the total financing of investment can be met by internal funds or / and debt or / and equity, allowing for the substitutability between debt and equity or between short-term and long-term debt. In addition, the financing surplus can be used to reduce debt, equity, or both.

The pecking order theory predicts that, debt typically grows when investment exceeds internal funds and falls when investment is less than internal funds. So the managers' problem in each period is to decide which changes they will make in each financing resources, given the size of their financing deficit-surplus and the market conditions. The financing deficit-surplus in equation (3) is equivalent to the previous studies, except that I am modeling long-term and short-

term financing, and therefore the changes in the short-term debt are excluded from the financing deficit-surplus variable.

The primary model used by Shyam-Sunder and Myers (1999)

$$\Delta D_t = a_0 + a_1 Fin_t + e_t \qquad (4)$$

Splitting the total debt financing to long-term debt and short-term debt yields:

$$\Delta LTD_t = d_0 + d_1 Fin_t + n_t \qquad (5)$$

$$\Delta STD_t = l_0 + l_1 Fin_t + x_t \qquad (6)$$

Where

$$d_0 + l_0 = a_0 \quad , \quad d_1 + l_1 = a_1 \qquad (7)$$

n_t, x_t Error terms.

Given the balance sheet constraint, the equity equation is determined by

$$\Delta EQ_t = b_0 + b_1 Fin_t + h_t \qquad (8)$$

e_t, h_t Error terms.

The simplest form of the pecking order theory predicts that a_0 is not different from zero and a_1 is close to one. This implies that b_1 will be close to zero, and given the balance sheet constraint the following will hold;

$$a_0 + b_0 = 0 \quad \text{and} \quad a_1 + b_1 = 1 \qquad (9)$$

Chirinko and Singha (2000) illustrate how Shyam-Sunder and Myers (1999) model generates misleading inferences when evaluating the patterns of external financing and conclude that alternative tests are needed to discriminate among the competing hypotheses of the trade-off model and the pecking order model. The main critiques of the model are:

1. It is not be useful for testing the pecking order model at high leverage ratios when the debt capacity is very exhausted.
2. Equity issues could drive a negative bias in the financing coefficient.
3. The test based on their model is a joint hypothesis of ordering and proportions.
4. In addition, they show that firms that have an optimal capital structure and use their financing deficit-surplus to adjust toward the target will produce high coefficient of the pecking order model, leading to incorrect inference that this financing patterns is consistent with the pecking order model.

All recent empirical work have ignored Chirinko and Singha (2000) critique of the failure of the model to test the pecking order theory and have drawn conclusions against or in favor of the pecking order theory using this model.

2.2.1. Data and Sample Selection

The initial sample consists of all firms on the Compustat database for the period 1980-2001. As in previous studies, financial firms (SIC 6000-6999), regulated utilities (SIC 4900-4999) and non-classifiable establishments (9900-9999) are excluded. To enter the sample, financial data must be available for all the of following variables: total assets, long-term debt, short-term debt, retained earnings, book value of equity, market value of equity, depreciation,

investments tax credits, net loss carry forward, R&D, advertising expenses, working capital items, net sales, tangible assets, earnings before interest and taxes, daily stock prices on the CRSP data base, and the marginal tax rates.[20] Firms that have negative debt or zero total assets in any given year are excluded from the analysis. The financing deficit-surplus is calculated from the balance sheet using equation 3. Table 2.1 shows the number of observations, annual averages of the ratios of financing deficit-surplus to assets, net debt issued to assets, and net equity issued to assets. Applying the above criteria, the final sample has 89,591 firm-year observations.

Figure 2.1 shows the roles of net debt, net equity, and financing deficit-surplus relative to the total assets, whereas figure 2.2 shows the roles debt issue (repurchase), equity issue (repurchase) and the financing deficit (surplus) relative to total assets for the 1981-2001 period.

Fig 2.1 shows that net equity issuance track the financing deficit- surplus more closely then debt. Moreover, in the early 1990s firms, on average, issue net equity more than their financing deficit, which suggests that firms substitute debt for equity.[21]

Fig. 2.1 shows that my data closely represents Frank and Goyal (2003) data for the same period, (see Frank and Goyal (2003) ,figure 1 page 230), even though that I am using the balance sheet to construct the data, whereas they use the cash statement by sources and use of funds.[22] On the other hand, Fig. 2.2 shows that debt reduction tracks the financing surplus much more closely than the equity repurchase. While, net equity issuance tracks the financing deficit much more closely than the net debt issuance during the 1990s relative to the 1980s.

2.3. THE SYMMETRICAL BEHAVIOR ASSUMPTION

As Shyam-Sunders and Myers (1999) point out, the symmetric behavior of firms in financing deficit and financing surplus is supposed to be observed. In other words, firms in financing deficit use debt to finance their investments and reduce debt, rather then repurchase equity, when they are in financing surplus. Thus, the sign of the independent variable (Fin_t) does not matter. To examine the validity of the symmetric behavior assumption under the pecking order model, a spline regression model is employed to test the zero difference of the financing coefficient when firms are in financing deficit or surplus. The model controls for shifts in the slope and shifts in the intercept as following:

$$\Delta LTD_t = b_0 + b_1 D_1 + b_2 Fin_t + b_3 Fin_t D_1 + z_t \quad (10)$$

$$\Delta STD_t = l_0 + l_1 D_1 + l_2 Fin_t + l_3 Fin_t D_1 + t_t \quad (11)$$

[20] The marginal tax rates are the simulated marginal tax rates (Graham (1996a, 1996b)) for the 1980-2001 period. John Graham kindly made this data available for academic uses.

[21] Frank and Goyal (2003) who did not control for the financing deficit and financing surplus, find that equity issuance track the financing deficit-surplus more closely than debt for 1971-1998 period.

[22] The use of the balance sheet to construct the data avoid the problem generated by the major change in standard forms of reporting corporate cash flows in 1988. Moreover, using the balance sheet to construct the data and applying the criteria of the availability of the financial data items yield significantly higher number of observations comparing to the use of the cash statements of sources and use of funds.

Table 2.1- Sample Distribution across Years

The sample period is 1980-2001. Financial firms, regulated utilities, and non-classifiable establishments are excluded. N indicates the number of observation in each year. The ratios of financing deficit-surplus to assets, net debt issued to assets, and net equity issued to assets for each year is reported. The financing deficit-surplus is the sum of investment and changes in working capital (excluding short-term debt) minus cash flow after interest, taxes, and dividends. Net debt issued includes long-term debt and short-term debt.

Yea	N	Financing deficit to assets	Net debt issued to assets	Net equity issued to assets
198	3058	0.05	0.02	0.03
198	3231	0.06	0.03	0.04
198	3192	0.04	0.02	0.02
198	3390	0.08	0.01	0.07
198	3460	0.06	0.03	0.03
198	3425	0.06	0.02	0.03
198	3517	0.08	0.03	0.05
198	3614	0.07	0.02	0.04
198	3531	0.05	0.03	0.02
198	3424	0.06	0.02	0.03
199	3437	0.03	0.00	0.03
199	3557	0.05	-0.02	0.07
199	3871	0.07	-0.01	0.08
199	4332	0.11	0.00	0.11
199	4646	0.11	0.02	0.08
199	5031	0.13	0.03	0.11
199	5559	0.17	0.02	0.15
199	5538	0.13	0.03	0.10
199	5267	0.10	0.04	0.05
199	5074	0.11	0.03	0.09
200	4953	0.15	0.00	0.14
200	4484	0.08	-0.02	0.09
Tota	89591	0.09	0.02	0.07

Δ	The change in a variable from time *t-1* to *t*.
LTD_t	Long-term debt.
STD_t	Short-term debt.
Fin_t	Financing deficit-surplus.
D_1	Indicator variable takes the value 1 if $Fin_t < 0$ (Financing Surplus) and 0 otherwise

To control for the non-homogeneity of the firms' characteristics across industries and the temporal distribution of informational asymmetry, Fama and French industry classification is used to classify industries into nine groups.[23] For example, firms in industries that exhibit high cyclicality in the short-run demand are expected to have higher level of informational asymmetry regarding the short-run prospects.

The model (equations (10) and (11) scaled by total assets) is estimated using Fama-MacBeth's (1973) methodology at the industry level and across industries.[24] This estimation method uses the average of a series of annual cross-sectional regressions as the point estimate and use the time series of standard errors to draw inferences.[25]

Table 2.2 presents the empirical results of the model where the dependent variables are the changes in total debt, long-term debt, and short-term debt respectively. Columns 2 to 4 show the estimation results of the original model (equations, 4, 5 and 6 scaled by total assets); the financing coefficient varies across industries and the short-term debt plays a significant role as source of external financing in the majority of the industries. Columns 5 to 9 present the estimation results of the test for the hypothesis of the symmetric behavior assumption under the pecking order model.

Three clear results emerge from this test; first, the symmetric behavior is significantly rejected at the industry level as well as across all industries. Second, firms have the tendency to reduce debt by a significantly higher proportion when they have financing surplus comparing to the proportion of debt issued when they have financing deficit. For example, for each dollar of the financing surplus, firms use 0.747 cents to reduce their total debt whereas for each dollar of the financing deficit firms' use 0.285 cents of debt to fill their external financing needs. Finally, the explanatory power, as measured by adjusted R-Square, increases when control for firms in financing deficit or financing surplus.

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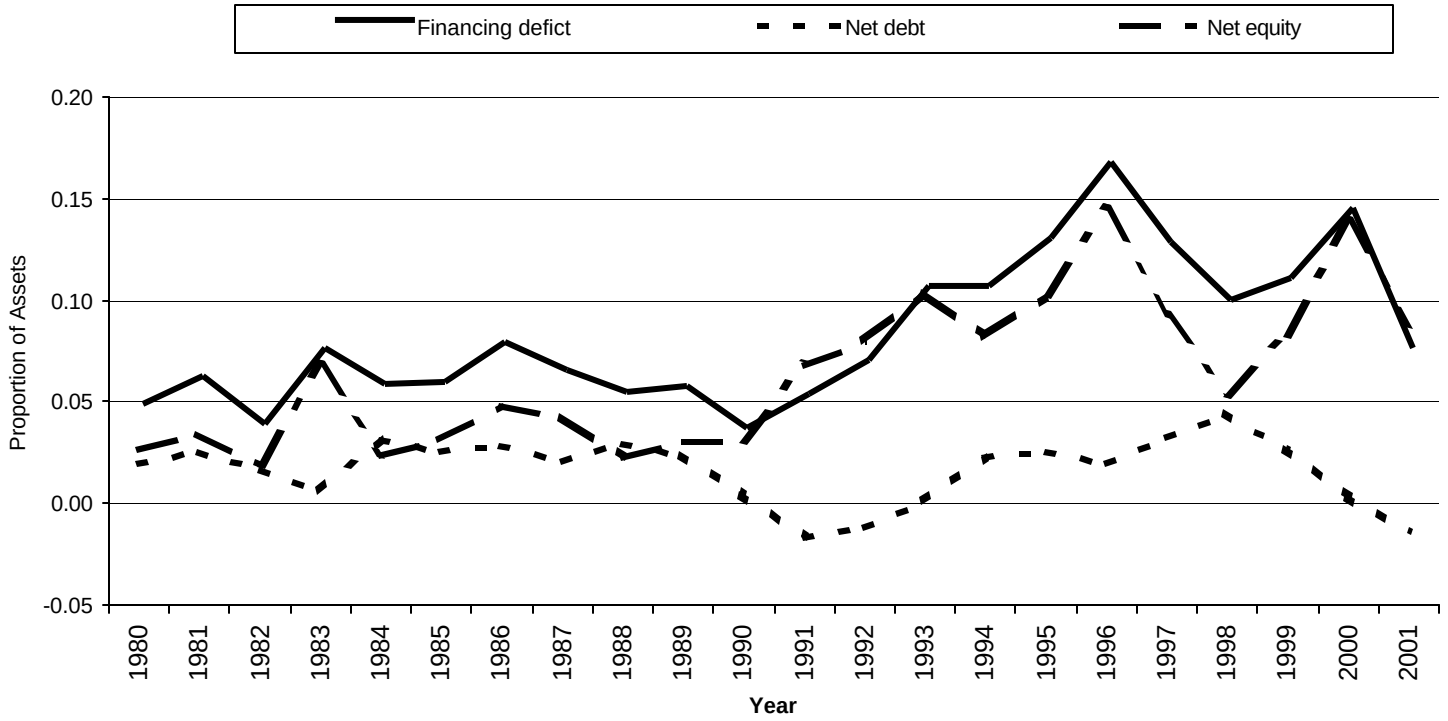
[23] Appendix A2 provides a details description of these groups.

[24] Frank and Goyal (2003) use Fama-MacBeth method as alternative estimation method. They find that their conclusions are not sensitive to the use of deferent estimation methods.

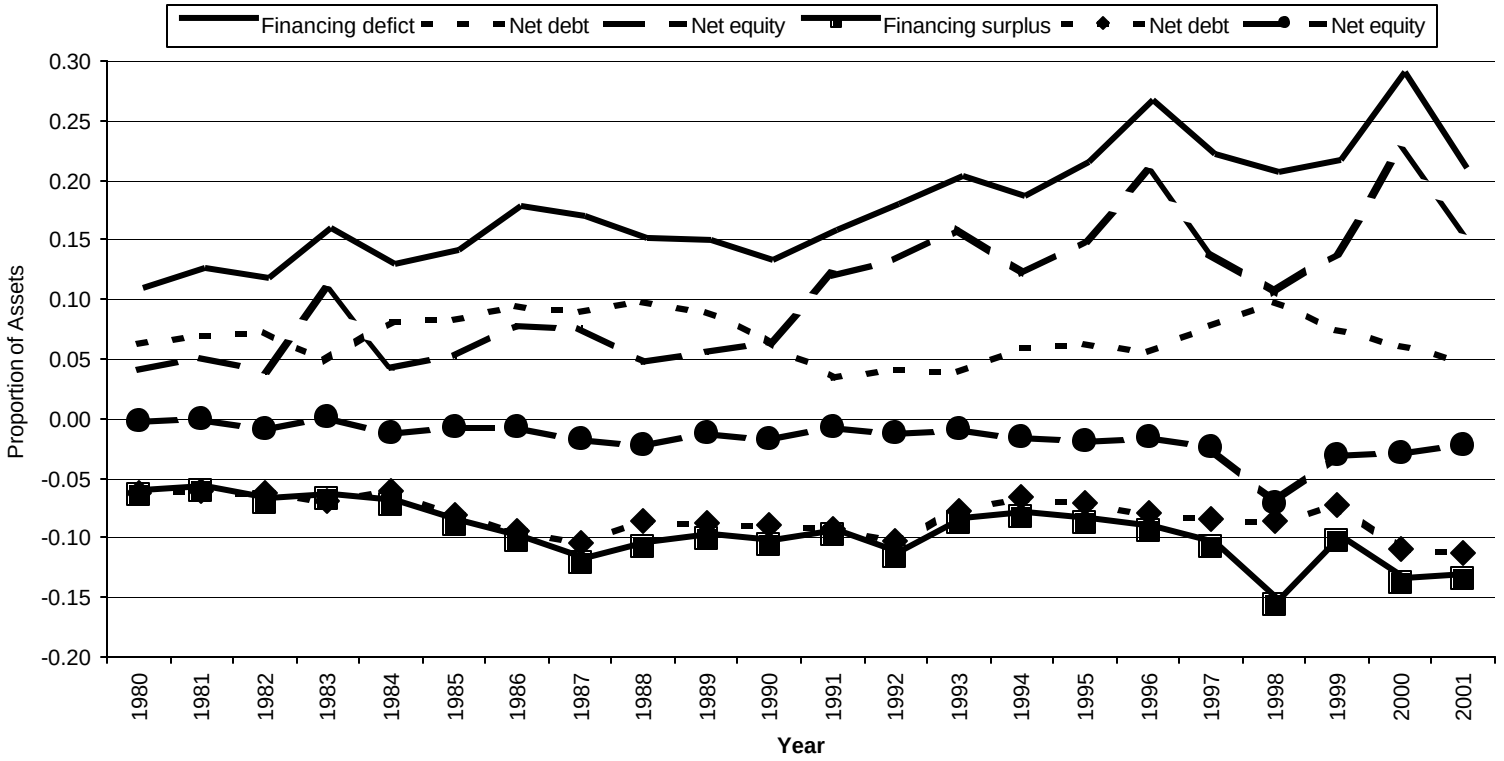
[25] As Fama and French (2002) point out, the Fama-MacBeth method overcomes the problems of the correlation of residuals across firms and the bias in the standard errors of the regression slops due to the correlation of residuals across years. In addition, the standard errors of the average slops across year are robust to heretoscedasticity.

Figure 2.1-Financing Deficit-Surplus by Year



The figure plots annual averages of the ratios of financing deficit-surplus to assets, net debt issued to assets, and net equity issued to assets for the period between 1980 and 2001.The sample include companies on the Compustat database. Financial firms and regulated utilities are excluded.

Figure 2.2- Financing Deficit and Financing Surplus by Year



The figure plots annual averages of the ratios of financing deficit (surplus) to assets, debt issuance (reduction) to assets, and equity issuance (repurchase) to assets for the period between 1980 and 2001.The sample include companies on the Compustat database. Financial firms and regulated utilities are excluded.

Table 2.2-Tests of Pecking Order Model- Symmetrical Behavior Assumption

The sample period is 1980-2001. Financial firms, regulated utilities, and non-classifiable establishments are excluded. Industries are classified using Fama-French industry classification. The dependent variable is the change in total debt, long-term debt, and short-term debt, respectively. The independent variable is the sum of investment and changes in working capital (excluding short-term debt) minus cash flow after interest, taxes, and dividends. D_1 is an indicator variable takes the value 1 if the firm has financing surplus and zero otherwise. Fama-MacBeth (1973) procedures use to estimate the model. The total assets scale all variables. ** and * indicate that the coefficient is statically different from zero at 0.01 and 0.05 levels.

Industry Group	Constant	Fin_t	Adj-R^2	Constant	D_1	Fin_t	$Fin_t * D$	Adj-R^2
Dependent variable: Δ Total Debt								
Consumer Nondurable	-0.011*	0.667**	0.636	0.018*	-0.016*	0.479**	0.410**	0.695
Consumer Durables	-0.012*	0.638**	0.631	0.017*	-0.019*	0.457**	0.413**	0.701
Oil, Gas and Coal	-0.018*	0.594**	0.627	0.012*	-0.028*	0.458**	0.302**	0.672
Chemicals and Allied Products	-0.008	0.267*	0.260	0.032**	-0.030*	0.143**	0.663**	0.402
Manufacturing	-0.013*	0.393**	0.383	0.024**	-0.036**	0.235**	0.477**	0.500
Telephones and Television	-0.003	0.532**	0.577	0.021*	-0.030*	0.452**	0.405*	0.630
Wholesale & Retail	-0.025*	0.521**	0.505	0.023**	-0.023*	0.287**	0.580**	0.653
Everything Else	-0.027*	0.612**	0.612	0.024*	-0.032*	0.344**	0.467**	0.683
All Groups	-0.020*	0.497**	0.506	0.026**	-0.038*	0.285**	0.463**	0.621
Dependent variable: Δ Long Term Debt								
Consumer Nondurable	-0.007	0.488**	0.428	0.007	-0.002	0.379**	0.242*	0.470
Consumer Durables	-0.008*	0.484**	0.461	0.007	-0.010	0.393**	0.196*	0.505
Oil, Gas and Coal	-0.016	0.475**	0.412	0.008	-0.039*	0.397**	0.139**	0.459
Chemicals and Allied Products	-0.008	0.234*	0.221	0.020*	-0.015*	0.154**	0.481**	0.332
Manufacturing	-0.009*	0.304**	0.281	0.014*	-0.020*	0.208**	0.337**	0.358
Telephones and Television	-0.006	0.482**	0.489	0.012*	-0.030*	0.440**	0.274*	0.528
Wholesale & Retail	-0.020*	0.413**	0.367	0.014*	-0.011	0.247**	0.425**	0.485
Everything Else	-0.024*	0.535**	0.488	0.016*	-0.020*	0.317**	0.374**	0.542
All Groups	-0.016	0.409**	0.381	0.016*	-0.021*	0.257**	0.347**	0.468
Dependent variable: Δ Short Term Debt								
Consumer Nondurable	-0.004	0.179*	0.146	0.011*	-0.014*	0.100**	0.167*	0.196
Consumer Durables	-0.004	0.154*	0.147	0.010*	-0.009*	0.064**	0.217*	0.221
Oil, Gas and Coal	-0.002	0.120*	0.119	0.004	0.010	0.061*	0.163*	0.202
Chemicals and Allied Products	0.000	0.033	0.051	0.012*	-0.015*	-0.011*	0.183**	0.126
Manufacturing	-0.004	0.089*	0.072	0.010**	-0.016**	0.027*	0.140**	0.113
Telephones and Television	0.002	0.050	0.065	0.009*	0.00	0.012	0.131	0.144
Wholesale & Retail	-0.005	0.108*	0.098	0.009**	-0.012*	0.040**	0.155*	0.156
Everything Else	-0.003	0.077*	0.054	0.008*	-0.012*	0.026*	0.093*	0.083
All Groups	-0.003	0.088*	0.068	0.010**	-0.017**	0.028*	0.116**	0.102

Table 2.3- Tests of Pecking Order Model- the Power of the Test

The sample period is 1980-2000. Financial firms, regulated utilities, and non-classifiable establishments are excluded. An industry group is defined using Fama-French industry classification. Firms are classified in two main groups: financing deficit firms (*Fin* >0) and financing surplus firms (*Fin* <0). The dependent variable is the change in long-term debt and short-term debt, respectively. The independent variable is the sum investment, change in working capital (excluding short-term debt) minus cash flow after interest, taxes, and dividends. Fama-MacBeth procedures use to estimate the model for each financing group separately. The total assets scale all variables. ** and * indicate that the coefficient is statically different from zero at 0.01 and 0.05 levels.

Industry Group	Constant	Deficit	Adj-R^2	Constant	Surplus	Adj-R^2
Dependent variable: Δ Total Debt						
Consumer Nondurable	0.018*	0.479**	0.384	0.002	0.889**	0.767
Consumer Durables	0.017*	0.457**	0.394	-0.002	0.870**	0.751
Oil, Gas and Coal	0.012	0.458**	0.388	-0.017	0.760**	0.736
Chemicals and Allied Products	0.032**	0.143	0.118	0.002	0.807**	0.639
Manufacturing	0.024**	0.235*	0.162	-0.012	0.713**	0.676
Telephones and Television	0.021	0.452**	0.430	-0.008	0.857**	0.762
Wholesale & Retail	0.023**	0.287*	0.210	0.000	0.866**	0.820
Everything Else	0.024*	0.344**	0.265	-0.008	0.811**	0.761
All Groups	0.026**	0.285*	0.215	-0.012	0.747**	0.738
Dependent variable: Δ Long Term Debt						
Consumer Nondurable	0.007	0.379**	0.253	0.006	0.622**	0.448
Consumer Durables	0.007	0.393**	0.295	-0.003	0.589**	0.478
Oil, Gas and Coal	0.008	0.397**	0.247	-0.031	0.536*	0.485
Chemicals and Allied Products	0.020*	0.154	0.110	0.005	0.635**	0.482
Manufacturing	0.014*	0.208*	0.127	-0.006	0.545**	0.462
Telephones and Television	0.012	0.440**	0.390	-0.017	0.713*	0.566
Wholesale & Retail	0.014*	0.247*	0.160	0.003	0.672**	0.555
Everything Else	0.016	0.317**	0.202	-0.004	0.692**	0.591
All Groups	0.016*	0.257*	0.164	-0.005	0.604**	0.530
Dependent variable: Δ Short Term Debt						
Consumer Nondurable	0.011*	0.100*	0.058	-0.004	0.267*	0.174
Consumer Durables	0.010*	0.064*	0.033	0.001	0.281*	0.248
Oil, Gas and Coal	0.004	0.061*	0.031	0.014	0.224	0.194
Chemicals and Allied Products	0.012*	-0.011*	0.019	-0.003	0.172*	0.137
Manufacturing	0.010**	0.027*	0.011	-0.006	0.167*	0.125
Telephones and Television	0.009	0.012	0.016	0.009	0.143	0.225
Wholesale & Retail	0.009**	0.040*	0.017	-0.003	0.194*	0.173
Everything Else	0.008*	0.026*	0.010	-0.004	0.119*	0.112
All Groups	0.010**	0.028*	0.009	-0.007	0.143*	0.113

Shyam-Sunders and Myers (1999) use the explanatory power of the model as one criterion to evaluate the pecking order model versus the trade-off model. To investigate if the explanatory power of their model is driven by a better fit of the model for firms in financing deficit or surplus, I split the sample into two main groups: financing deficit group and financing surplus group. As Table 2.3 shows the explanatory power of the model is driven by the better fit of the financing surplus group rather than the financing deficit.

Since the pecking order theory predicts that debt issuance supposes to track the financing deficit more closely. Whereas the symmetric behavior assumption implies that debt issuance and debt reduction, suppose to track the financing deficit (surplus) in the same manner. The above results work against Shyam-Sunders and Myers' (1999) conclusion that the pecking order model provides superior fit of the data relative to the trade-off model.

2.4. THE PROPORTIONS OF DEBT FINANCING AND THE FIRMS ATTRIBUTES

The pecking order theory implies that firms can issue only one type of security at different levels of debt capacity. This makes it difficult to apply the pecking order model to all firms, regardless of their debt capacity and attributes. Another problem with the pecking order model is that it ignores the factors affect the firms' demand of debt. These factors are important because they may limit the demand of debt for firms with a low debt capacity. For example, managers of low debt capacity firms could issue equity rather than debt if they feel that equity is highly overvalued by investors. In addition, managers of small firms that have a low financial distress will not be able to use debt to meet their financing deficit due to the high floatation cost of debt. Thus, the pecking order model does not explain why low debt capacity firms will issue equity or why firms will issue combination of debt and equity in the same time or why firms substitute debt for equity or equity for debt. Moreover, the pecking order theory assumes that some of these financing behaviors do not exist.

Some of these questions are in the line of Chirinko and Singha (2000) critique, yet Chirinko and Singha (2000) overlooked these empirical questions, where they assume the symmetric behavior and consider the case where firms issue debt and equity in the same time without considering the possibility of debt-equity substitution. To address these questions, this study analyzes the factors that characterize the short-run financing deficit–surplus using univariate and multivariate analysis.

2.4.1. The Modified Pecking Order Model

The pecking order theory has no explanation of why firms would issue debt to repurchase equity or issue equity to reduce debt. In addition, the mixed results documented in the recent literature suggest that the trade-off theory and the pecking order theory are not mutually exclusive (e.g. Fama and French (2002) and Hovakimian, Opler, and Titman (2001)). Thus, an examination of the factors that affect the proportion of debt financing (reduction) within the context of both theories is needed. The pecking order theory implies that adverse selection costs, debt capacity and equity market conditions are supposed to be the only relevant factors that explain the financing coefficient. If these factors overwhelm the factors that determine the optimal leverage in the trade-off theory as Myers (1984) suggests, we suppose to find that the

factors related to the trade-off theory add no information in explaining the financing deficit-surplus coefficients.

The pecking order model is modified to allow the financing coefficient to be a function of the firm's characteristics. This will enable us to examine the factors affecting the proportion of debt financing (reduction) relative to the financing deficit (surplus) and to evaluate the consistency of those factors with the prediction of the pecking order and the trade-off theory. Such a model relaxes the assumptions of the pecking order model (the symmetric behavior, and the non-varying time coefficients). In addition, it accommodates the determinants of the use of debt suggested by both theories and control for the factors other than the adverse selection cost (e.g. debt capacity, equity market conditions and growth options).
For each financing deficit–surplus group the modified model is

$$\Delta D_t = a_0 + a_i Def_t + e_t \qquad (13)$$

$$a_i = b_0(M/B)_i + b_1 Tang_i + b_2\, Info_i + b_3\, MTR_{t-1,i} + b_4 MTR_{t-1}, i * D_1 + b_5 RDAD_i + b_6 NDTS_i + b_7 NDTS_i * D_2 + b_8 AbDev_{t-1,i} + b_9 AbDev_{t-1,i} * D_3 + b_{10} Size_i + b_{11} St_i \qquad (14)$$

M/B Market to book ratio of ith firm.
Tang Tangible assets to total assets of ith firm.
Info Information asymmetry proxy of ith firm.
MTR Marginal tax rate at time t-1 of ith firm.
D_1 Indicator variable takes the value of 1 if the firm has net loss carry forward at time t-1 of ith firm.
RDAD The sum of R&D and the advertising expenses relative to total assets of ith firm.
NDTS Non-Debt tax shield, the sum of depreciation and investment tax credits relative to total assets of ith firm.
D_2 Indicator variable takes the value of 1 if the Altman's (1986) Z > 3, 0 otherwise.
AbDev Absolute value of the deviation from the target leverage at time t-1 of ith firm.
D_3 Indicator variable takes the value of 1 if the firm is above its target leverage, 0 otherwise.
Size The logarithm of the total assets of ith firm.
St The ratio of stock prices at time *t* relative to time t-1 of ith firm.

Investment inefficiencies

Investment inefficiencies are caused by the conflicts of interest between managers, shareholders, and bondholders. Myers (1977,1984) models suggest that due to the underinvestment problem, firms with high growth options may use less debt to preserve their debt capacity (to avoid either foregoing future investment opportunity or financing them with more risky securities). In addition, as suggested by Myers (1977) firms with high growth options may employ short-term debt to overcome the underinvestment problem. Thus, we expect to find firms with higher growth options, as measured by the market to book ratio (*M/B*), to use less debt financing as proportion of their financing deficit. Thus, a negative relation between the proportion of long-term debt financing and the growth options, and a positive relation between the proportion of short-term debt financing and the growth options is predicted. The opposite relation is predicted for firms having a financing surplus.

Yet, the trade-off theory implies that such a relation is predicted if lenders are not willing to accept the growth options as collateral for long-term debt. Because executing those options are optional and lenders have no control over the mangers after they received loan. Thus, the potential moral hazard problem increases the lender incentive not to finance high growth options firms that have a lack of high tangible collateral.

Debt Capacity

The pecking order theory predicts that firms will issue equity as a last resort. Specifically, when firms exhausted their debt capacity and the degree of underpricing is not too high. Thus, firms' debt capacity plays significant role in the choice and the size of debt financing. To control for the firms' debt capacity, I use the tangible assets (the ratio of plant and equipment to total assets as a measure of tangible assets (*Tang*)). Firms with higher tangible assets expected to have higher debt capacity, lower costs of financial distress. MacKie-Mason (1990) uses the tangible assets as control variable for the moral hazard problem, where managers take their investment decisions after the debt has been issued. His argument is that debt should be cheaper when firms' value depends heavily on investment already in place. The trade-off theory predicts that tangible assets can be viewed as debt collateral. Thus, firms with greater tangible assets have the ability to issue more debt. These competing hypotheses agree on that the higher the tangible assets of a firm, the most likely to use more debt financing as proportion of their financing deficit. In addition to the tangible assets, firms' size is also used as control variable for the debt capacity. Since most likely large firms are well diversified and more profitable relative to small firms. Frank and Goyal (2003) find that the pecking order model fits better for large firms. They argue that such a result is inconsistent with the prediction of the pecking order theory since those large firms are less likely to suffer from information asymmetry. Their argument could be true, unless the firm size can proxy for debt capacity and financial distress. Under such assumption, large firms are expected to have higher debt capacity and lower cost of financial distress, which enable them to issue more debt.

Information asymmetry

The main prediction of the pecking order theory is that firms with high information asymmetry rely more on issuing debt to finance their external financing needs, given that the financial distress cost is low. Short–term debt, which is less sensitive to the information asymmetry problem relative to long-term debt (Flannery (1986)), should constitute a higher proportion of the debt financing if the information asymmetry is uniformly distributed over time. Under such assumption, we expect to find a higher impact of information asymmetry on the proportion of short-term debt financing. Following Bhagat and Thompson (1985), Blackwell and Spivey (1990), Krishnaswami, Spindt, Subramaniam (1999), and Krishnaswami and Subramaniam (1999), the residual volatility in daily stock returns is used as a metric of information asymmetry. The residual volatility in daily stock returns is the standard deviation of the value weighted market adjusted return residuals, calculated on the daily base for each firm-year (*Info*). The pecking order theory predicts that the coefficient on the *Info* variable to be positive for the financing deficit group.

Optimal capital structure

The pecking order theory states that firms do not have well-defined target leverage. In addition, Myers (1984) suggests that the adverse selection costs overwhelm the forces that determine the optimal leverage in the trade-off theory. While, the trade-off theory predicts that in addition to the internal fund deficit (surplus), other factors such as the deviation from the target leverage, marginal tax rates, net loss carry forward, financial distress and non-debt tax shields sources may affect the proportion of debt financing (reduction).

If the proportion of debt financing (reduction) is chosen to minimize the deviation from target leverage, we expect to find that the firms' deviation from the target leverage has a significant impact on the proportion of debt financing (reduction). To examine this hypothesis, I use the absolute value of the actual leverage deviation from the target leverage in the previous year. Since the trade-off theory predicts that firms below the target are most likely to use more debt financing and firms above the target to use less debt financing. I add the interaction of the deviation from the target leverage (*AbDev*) with indicator variable (equal 1 if the firms are above their target leverage and 0 otherwise) to test this hypothesis. Thus, for the financing deficit (surplus) group, a positive (negative) coefficient for *AbDev* variable and a negative (positive) coefficient for $AbDev + AbDev*D_3$ is predicted.

The trade-off theory predicts that firms with high marginal tax rate (MTR_{t-1}) have greater incentive to issue debt due to the tax-deductibility of interest payments. DeAngelo and Masulis (1980) argue that non-debt tax shields, depreciation and investment tax credit (*NDTS*), can substitute for the interest deductibility. MacKie-Mason (1990) argues that non-debt tax shields do not always crowd out interest deductibility. Specifically, profitable firms could have large non-debt tax shields, high marginal tax rate, and issue more debt. Highly distressed firms, close to tax exhaustion, are most likely to avoid debt financing since non-debt tax shield crowd out the associated debt tax shield. Thus, DeAngelo and Masulis (1980) model predicts that the relation between the debt financing and the non-debt tax shields is negative, whereas MacKie-Mason (1990) argument indicates that this relation is positive for profitable firms and negative for highly distressed firms. On the other hand, the ability of the firms to carry forward their net operating losses can affect the amount of debt financing. Firms that have a net loss carry forward (*NLCF*) have a disincentive to use more debt financing as proportion of their deficit relative to firms that do not experiencing a loss.

Like Graham (1996a), I use the marginal tax rate and the marginal tax rate interaction with and indicator variables for firms that have *NLCF* at time t-1; the trade-off theory predicts a positive relation between the MTR_{t-1} and the proportion of debt financing. Firms with *NLCF* are expected to use debt less aggressively than firms without *NLFC*, thus a negative sign of $MTR_{t-1} * D_1$ is predicted. To test MacKie-Mason's (1990) prediction that non-debt tax shield does not crowd out interest deductibility for profitable firms, like MacKie-Mason (1990) and Graham (1996a), I interact the non-debt tax shield (*NDTS*) with indicator variable that takes the value 1 if the firm's Altman's Z (1968) is greater than three. Altman's Z equals the sum of 3.3 times earnings before interest and taxes plus sales plus 1.4 times retained earnings plus 1.2 times working capital divided by total assets. This interacted term allows separating the profitability

and debt substitution aspects of non-debt tax shields. If MacKie-Mason's (1990) argument holds, a negative sign for *NDTS* and a positive one for $NDTS * D_2$ are expected.

In addition to depreciation and investment tax credit, research and development and advertising expenses (*RDAD*) provide other sources of non-debt tax shields to firms. Myers (1977) argues that these sources create assets that can be viewed as options, which are subject to managerial discretion and higher agency cost. Whether these sources reflect the agency cost of discretionary assets or non-debt tax shields, the relation between this variable and the proportion of debt financing should be negative for the financing deficit group and positive for the financing surplus group.

Market timing hypothesis

If firms timing their equity issue (reduction) with a favorable market conditions, we expect to find that such a behavior to affect the proportion of debt financing (reduction) relative to the financing deficit (surplus). Lucas and MacDonald (1990) model predicts that managers with superior private information will delay equity issue until their stock prices rises. Korajczyk, Lucas, and MacDonald (1990) find evidence supporting this prediction, where firms' equity issuance finds to cluster following stock prices run up. Hovakimian, Opler, and Titman (2001) find evidence that stock prices run up (decline) play significant role in the firms' choice of equity issuance and repurchase decision. Baker and Wurlger (2002) find supporting evidence for the market-timing hypothesis. The ratio of stock price (*St*) at current period relative to the previous one is used to test the market-timing hypothesis[26].

If firms timing their equity issue (reduction) with a favorable market conditions, we expect to find a negative sign of *St* for the financing deficit group. While the opposite sings for the financing surplus group are expected. To examine this hypothesis a second model is estimated where the *St* variable is added to explanatory variables.

2.4.1.1. Descriptive Statistics and Univariate Analysis

To investigate the factors that characterize the short-run financing behavior patterns at the firms level, firms are classified into two main groups. The financing deficit group ($Fin_t > 0$) and financing surplus group ($Fin_t < 0$). This classification is motivated by the previous results, which reject the symmetrical behavior of firms under financing deficit and surplus. For each firm the proportion of debt financing (reduction) is calculated using the following equation:

$$\frac{\Delta D_{t,i}}{Fin_{t,i}} = a_{t,i} \qquad (12)$$

For each group firms are classified into four subgroups as following

1-Financing deficit subgroups

[26] Taggart (1977) and Jalilvand and Harris (1984) use similar proxy of the stock prices run up. Marsh (1982) and Frank and Goyal (2003) use the abnormal stock return as proxy for the stock prices run up. I also tried the abnormal return as proxy for the stock price run up, the results dose not change.

$a_{t,i} \leq 0$	Pure equity financing (firms that issue equity and firms that issue equity and reduce debt, where equity financing represents at least 100% of the financing deficit).
$0 < a_{t,i} \leq 0.5$	More equity financing (firms that issue both debt and equity, where equity financing represents between 50% and 100% of the financing deficit).
$0.5 < a_{t,i} < 1$	More debt financing (firms that issue both debt and equity, where debt financing represents between 50% and 100% of the financing deficit).
$a_{t,i} \geq 1$	Pure debt financing (firms that issue debt and firms issue debt and reduce equity, where debt financing represents at least 100% of the financing deficit).

2-Financing surplus subgroups

$a_{t,i} \leq 0$	Pure equity reduction (firms that reduce equity and firms that issue debt and reduce equity, where equity reduction represents at least 100% of the financing surplus).
$0 < a_{t,i} \leq 0.5$	More equity reduction (firms that reduce both debt and equity, where equity reduction represents between 50% and 100% of the financing surplus).
$0.5 < a_{t,i} < 1$	More debt reduction (firms that reduce both debt and equity, where debt reduction represents between 50% and 100% of the financing surplus).
$a_{t,i} \geq 1$	Pure debt reduction (firms that reduce debt and firms that reduce debt and issue equity, where debt reduction represents at least 100% of the financing surplus).

Table 2.4 reports descriptive statistics for each subgroup. The sample distribution of the proportion of debt financing shows that 66% of the firms fall into the financing deficit group. Of those, 40% use debt to finance more than half of their external financing needs, 25% use equity to finance more than half of their external financing needs, 20% use pure equity to finance their deficit (including firms that substitute equity for debt). Finally, 15% of the firms in financing deficit group issue pure debt to finance their deficit (including firms that substitute debt for equity). Table 2.4 confirms Chirinko and Singha (2000) critiques to Shyam-Sunders and Myers (1999) model where equity issue creates a degree of negative bias in their test. In addition to that, this study results indicate that substituting equity for debt lead to positive bias and substituting debt for equity lead to more bias that is negative. For example, the Consumer Nondurable industry group has a financing deficit coefficient of 0.479; this high coefficient is driven by the fact that 69% of the firms in this industry use more debt (as proportion of their financing deficit) to finance their deficit. On the other hand, the Chemicals and Allied Products industry group has financing deficit coefficient of 0.143; this low coefficient is driven by the fact that 61% of the firms in this industry use more equity (as proportion of their financing deficit) to finance their

Table 2.4- The Distribution of the Proportion of Debt Financing

Firms are classified in two main groups: financing deficit firms (Fin >0) and financing surplus firms (Fin <0). For each firm the financing coefficient is calculated using the following equation: $\Delta D_t / Fin_t = a$. Where D_t is the total debt at time t, Fin_t is the sum investment, change in working capital (excluding short-term debt) minus cash flow after interest, taxes, and dividends. For financing deficit group firms classified in three sets as the following: $a_t \le 0$, pure equity financing, $0 < a_t \le 0.5$, more equity financing $0.5 < a_t < 1$, more debt financing and $a_t \ge 1$, pure debt financing. While, for the financing surplus group these values present, pure equity reduction, more equity reduction, more debt reduction, and pure debt reduction, respectively. Panel A reports the mean of a_t for each subgroup. Panel B reports the percentage of observation in each subgroup and the number of observations in each industry group.

	Financing Deficit Firms					**Financing Surplus Firms**				
	Pure equity financing	More equity financing	More debt financing	Pure debt financing	All	Pure equity reduction	More equity reduction	More debt reduction	Pure debt reduction	All
Panel A					Mean					
Consumer Nondurable	-0.71	0.18	0.88	1.35	0.65	-0.90	0.15	0.90	1.30	0.85
Consumer Durables	-0.83	0.20	0.88	1.31	0.61	-0.95	0.18	0.88	1.33	0.92
Oil, Gas and Coal	-0.84	0.21	0.86	1.30	0.53	-0.85	0.15	0.89	1.35	0.92
Chemicals and Allied Products	-0.43	0.11	0.84	1.44	0.31	-1.02	0.15	0.84	1.44	0.80
Manufacturing	-0.62	0.14	0.86	1.32	0.40	-0.93	0.14	0.88	1.41	0.93
Telephones and Television	-0.67	0.23	0.83	1.32	0.53	-1.03	0.22	0.87	1.48	0.90
Wholesale & Retail	-0.56	0.13	0.86	1.29	0.42	-0.91	0.12	0.89	1.38	0.90
Everything Else	-0.66	0.17	0.85	1.28	0.49	-0.95	0.13	0.88	1.38	0.92
All industries	-0.62	0.15	0.86	1.32	0.46	-0.94	0.14	0.88	1.39	0.91
Panel B		*% Of Observations*			*N*		*% Of Observations*			*N*
Consumer Nondurable	14%	17%	46%	23%	4059	7%	14%	48%	31%	3132
Consumer Durables	15%	15%	48%	22%	3053	6%	11%	51%	32%	2205
Oil, Gas and Coal	15%	22%	45%	18%	2996	5%	14%	48%	33%	1576
Chemicals and Allied Products	27%	34%	29%	10%	4294	11%	19%	48%	22%	1749
Manufacturing	23%	25%	38%	14%	16797	6%	16%	53%	25%	9293
Telephones and Television	15%	23%	48%	14%	2244	8%	13%	46%	33%	687
Wholesale & Retail	21%	27%	38%	14%	15658	6%	16%	51%	27%	7096
Everything Else	18%	24%	44%	14%	6991	6%	14%	52%	28%	3520
All industries	20%	25%	40%	15%	56092	7%	15%	51%	27%	29258

Table 2.5- the Proportion of Debt Financing- the Firms Attributes

Firms are classified in two main groups: financing deficit firms (Fin >0) and financing surplus firms (Fin <0). For each firm the financing coefficient is calculated using the following equation: $\Delta D_t / Fin_t = a$. Where D_t is the total debt at time t, Fin_t is the sum investment, change in working capital (excluding short-term debt) minus cash flow after interest, taxes, and dividends. For financing deficit group firms classified into four subgroups as the following: $a_t \le 0$, pure equity financing, $0 < a_t \le 0.5$, more equity financing $0.5 < a_t < 1$, more debt financing and $a_t \ge 1$, pure debt financing. *Size* is the logarithm of the total assets. *Sales* are the logarithm of the net sales. *Marginal tax rate* is the simulated MTR provided by John Graham. *Tang* is the ratio of tangible assets to total assets. *Net Loss Carry forward* the ratio of firms net loss carry forward to total assets. *Non-debt tax shield* is the ratio of deprecation and investment tax credit to total assets. *RDAD* is the ratio of R&D and advertising expenses to total assets. *Altman Z equals* the sum of 3.3 times earnings before interest and taxes plus sales plus 1.4 times retained earnings plus 1.2 times working capital divided by total assets. *Market-to-Book ratio* is the ratio of market value (book value of assets plus the difference between market value of equity and the book value of equity) to total assets. *Information asymmetry* computed as the standard deviation of the value weighted market adjusted return residuals, calculated on the daily base for each firm-year. *St* is a proxy for stock prices run up –decline calculated as the ratio of the stock price at time t relative to the price at time t-1. Dev_t the firms' deviation form the industry leverage median at time t. ** and * indicate that difference in the means is statistically different from zero at 0.01 and 0.05 levels.

	Financing Deficit Firms									
	Mean				**Mean differences**					
Characteristics	Pure equity financing	More equity financing	More debt financing	Pure debt financing	(1)-(2)	(1)-(3)	(1)-(4)	(2)-(3)	(2)-(4)	(3)-(4)
Size	4.527	4.624	5.237	5.382	-0.097**	-0.711**	-0.856**	-0.613**	-0.759**	-0.145**
Sales	4.307	4.291	5.224	5.454	0.016	-0.917**	-1.147**	-0.932**	-1.163**	-0.230**
Tangible Assets	0.258	0.256	0.358	0.369	0.002	-0.101**	-0.111**	-0.103**	-0.113**	-0.010**
Marginal tax rate	0.179	0.182	0.266	0.278	-0.004	-0.087**	-0.099**	-0.083**	-0.096**	-0.012**
Net Loss Carry forward	0.208	0.207	0.085	0.061	0.001	0.123**	0.147**	0.122**	0.146**	0.024*
Non debt tax shield	0.050	0.040	0.035	0.029	0.010	0.015*	0.021*	0.005	0.011**	0.006
RDAD	0.088	0.090	0.037	0.030	-0.002	0.051**	0.058**	0.053**	0.060**	0.007**
Altman Z	-0.079	1.995	2.459	3.523	-2.074**	-2.538**	-3.602*	-0.464	-1.528*	-1.064**
Market-to-Book ratio	2.622	2.630	1.524	1.329	-0.008	1.098**	1.293**	1.106**	1.301**	0.195**
Information asymmetry	0.616	0.514	0.800	0.915	0.102	-0.184**	-0.299**	-0.286**	-0.401**	-0.115
St	1.870	1.300	0.821	0.704	0.570*	1.049**	1.166*	0.479**	0.596*	0.117*
Dev_t-Dev_{t-1}	-0.067**	-0.076*	-0.062*	-0.060						

Table 2.6- the Proportion of Debt Repurchases- the Firms Attributes

Firms are classified in two main groups: financing deficit firms (Fin >0) and financing surplus firms (Fin <0). For each firm the financing coefficient is calculated using the following equation: $\Delta D_t / Fin_t = a$. Where D_t is the total debt at time t, Fin_t is the sum investment, change in working capital (excluding short-term debt) minus cash flow after interest, taxes, and dividends. For financing surplus group firms classified into four subgroups as the following: $a_t \le 0$, pure equity reduction, $0 < a_t \le 0.5$, more equity reduction $0.5 < a_t < 1$, more debt reduction and $a_t \ge 1$, pure debt reduction. *Size* is the logarithm of the total assets. *Sales* are the logarithm of the net sales. *Marginal tax rate* is the simulated MTR provided by John Graham. *Tang* is the ratio of tangible assets to total assets. *Net Loss Carry forward* the ratio of firms net loss carry forward to total assets. *Non-debt tax shield* is the ratio of deprecation and investment tax credit to total assets. *RDAD* is the ratio of R&D and advertising expenses to total assets. *Altman Z equals* the sum of 3.3 times earnings before interest and taxes plus sales plus 1.4 times retained earnings plus 1.2 times working capital divided by total assets. *Market-to-Book ratio* is the ratio of market value (book value of assets plus the difference between market value of equity and the book value of equity) to total assets. *Information asymmetry* computed as the standard deviation of the value weighted market adjusted return residuals, calculated on the daily base for each firm-year. *St* is a proxy for stock prices run up –decline calculated as the ratio of the stock price at time t relative to the price at time t-1. Dev_t the firms' deviation form the industry leverage median at time t. ** and * indicate that difference in the means is statistically different from zero at 0.01 and 0.05 levels.

	Financing surplus group									
	Mean				**Mean differences**					
Attribute	Pure equity reduction	More equity reduction	More debt reduction	Pure debt reduction	(1)-(2)	(1)-(3)	(1)-(4)	(2)-(3)	(2)-(4)	(3)-(4)
Size	5.790	4.963	5.012	5.063	0.826**	0.777**	0.727**	-0.049	-0.099**	-0.050
Sales	5.896	4.992	5.182	5.259	0.904**	0.715**	0.637**	-0.189**	-0.267**	-0.078*
Tangible Assets	0.331	0.281	0.352	0.339	0.050**	-0.021**	-0.009	-0.071**	-0.058**	0.013**
Marginal tax rate	0.277	0.255	0.280	0.276	0.022**	-0.002	0.001	-0.025**	-0.021**	0.004
Net Loss Carry forward	0.070	0.075	0.098	0.117	-0.005	-0.028	-0.047**	-0.024	-0.042**	-0.019
Non debt tax shield	0.051	0.049	0.056	0.057	0.002	-0.005*	-0.006**	-0.008**	-0.008**	-0.001
R& D to Assets	0.049	0.059	0.032	0.043	-0.010**	0.018**	0.007*	0.028**	0.017**	-0.011**
Altman Z	2.132	2.227	-1.698	-1.145	-0.095	3.830**	3.278**	3.925**	3.373**	-0.552
Market-to-Book ratio	1.246	1.411	1.696	1.822	-0.165**	-0.450**	-0.576**	-0.285**	-0.411**	-0.126
Information asymmetry	0.470	0.498	0.685	0.721	-0.028	-0.216**	-0.252**	-0.187**	-0.223**	-0.036
St	0.735	0.792	1.320	1.672	-0.057	-0.585*	-0.937*	-0.528*v	-0.880*	-0.352
Dev_t-Dev_{t-1}	-0.014**	-0.007**	-0.017*	0.003						

deficit. The positive bias is more severe for the financing surplus group where 27% of the firms fall into the pure debt reduction subgroup. Thus, it is clear that Shyam-Sunders and Myers (1999) model has a major weakness as a test of the pecking order theory. Tables 2.5 and 2.6 characterize firms in the financing deficit and surplus subgroups.

Firms that use pure equity and more equity financing as proportion of their financing deficit are, on average, those which have higher market to book ratio, smaller size, lower profitability, lower tangible assets, lower marginal tax rate, greater net loss carry forward, higher probability of bankruptcy, lower information asymmetry problem, and higher stock prices run up. Firms that use pure debt reduction and more debt reduction as proportion of their financing surplus are the firms which have, on average, higher market to book ratio, greater non-debt tax shields, higher probability of bankruptcy, higher information asymmetry problem, and higher stock prices run up. Those results are in the line of Hovakimian, Opler, and Titman's (2001) findings that equity issuer firms are less profitable, small, have high stock prices, higher market to book ratio. While their univariate analysis indicates that the deviation from the target is more import factor in security repurchase then in security issuances, my results show that firms choose a combination of security issue (repurchase) to minimize the deviation from the target. The difference in the deviation from the target leverage between two consecutive years indicates that firms almost across all subgroups are getting closer to the target.

The univariate analysis indicates that the cost of adverse selection is not the main factor that characterizes the high proportion of debt financing. The information asymmetry proxy finds to be higher for firms that issue pure debt relative to firms that issue pure equity. The debt capacity factors significantly characterize the high proportion of debt financing. More important, the factors suggested by the trade-off theory, agency cost and market-timing hypothesis are quite important in determining the proportion of securities to be issued or repurchases.

2.4.1.2. Empirical Results- Multivariate Analysis

Table 2.8 presents the estimation results of the model for the financing deficit group and the financing surplus group. In support for Myers (1977,1984) and Jensen and Meckling (1986), and Lang, Ofek and Stulz (1996) models, firms with a higher growth options use less long-term debt financing as proportion of their financing deficit. In addition, the growth options coefficient has a positive sign for short-term debt financing, which support Myers (1977) solution of the underinvestment problem, where high growth options firms may role over short-term debt to overcome this problem. On the other hand, the financing surplus group confirms these results. Higher growth options firms tend to reduce their long-term debt by a higher proportion of their financing surplus relative to short-term debt.

The firms' debt capacity proxy, the tangible assets (or size), is positively related to the proportion of long-term debt financing. Whereas, the size is negatively related to the proportion of short-term debt financing. This results on the line of Barclay and Smith (1995) findings of the positive relation between debt maturity and firm size. This also can be explained by the limited ability of small firms to access the capital market due to the high flotation cost of long-term debt.

Table 2.7- Correlation Matrix

In the correlation matrix, the correlation coefficients below the diagonal present the correlation among the independent variables for the financing deficit group. While, the correlation coefficients above the diagonal present the correlation among the independent variables for the financing surplus group. *M/B* is the market to book ratio. *Tang* is the ratio of tangible assets to total assets. *Info* is a metric proxy of information asymmetry computed as the standard deviation of the value weighted market adjusted return residuals, calculated on the daily base for each firm-year. *MTR* is the marginal tax rate at time t-. *RDAD* is the summation of R&D and the advertising expenses relative to total assets. *NDTS* is the non-debt tax shield, the sum of depreciation and investment tax credits relative to total assets. *AbDev* is the absolute value of the deviation from the target leverage at time t-1. *St* is a proxy for stock prices run up –decline calculated as the ratio of the stock price at time t relative to the price at time t-1. *Size* is the logarithm of the total assets.

Correlations	*M/B*	*Tang*	*Info*	MTR_{t-1}	*RDAD*	*NDTS*	*St*	*Size*	*AbDev*
M/B		**-0.049**	**0.007**	**-0.031**	**0.164**	**-0.024**	**0.131**	**-0.127**	**-0.003**
Tang	-0.204		**-0.056**	**0.050**	**-0.171**	**0.218**	**-0.022**	**0.257**	**0.014**
Info	0.021	-0.030		**-0.114**	**0.038**	**0.065**	**0.162**	**-0.129**	**-0.104**
MTR_{t-1}	-0.175	0.130	-0.056		**-0.064**	**-0.075**	**0.045**	**0.169**	**0.070**
RDAD	0.183	-0.173	0.044	-0.203		**0.027**	**0.012**	**-0.085**	**-0.005**
NDTS	-0.030	0.207	0.038	-0.063	0.087		**-0.010**	**-0.047**	**-0.060**
St	0.188	-0.042	0.140	0.024	0.008	-0.043		**-0.008**	**0.009**
Size	-0.119	0.278	-0.062	0.200	-0.120	-0.016	-0.005		**0.020**
AbDev	-0.013	0.010	-0.006	0.044	-0.007	-0.005	0.003	0.013	

Table 2.8- The Modified Pecking Order Model

The dependent variables are the changes in long-term debt and short–term debt scaled by total assets. The Fama-MacBeth (1973) regressions are run for each year of 1980-2001 periods. *M/B* is the market to book ratio. *Tang* is the ratio of tangible assets to total assets. . *Info* is a metric proxy of information asymmetry computed as the standard deviation of the value weighted market adjusted return residuals, calculated on the daily base for each firm-year. *MTR* is the marginal tax rate at time t-1. D_1 is an indictor variable takes the value of one if the firm has net loss carry forward at time t-1. *RDAD* is the summation of R&D and the advertising expenses relative to total assets. *NDTS* is the non-debt tax shield, the sum of depreciation and investment tax credits relative to total assets. D_2 is an indictor variable take the value of one if the Altman's (1986) Z > three, zero otherwise. *AbDev* is the absolute value of the deviation from the target leverage at time t-1. D_3 is an indictor variable takes the value of one if the firm is above its target leverage, 0 otherwise. *Size* is the logarithm of the total assets *St* is a proxy for stock prices run up –decline calculated as the ratio of the stock price at time t relative to the price at time t-1. ** and * indicate that the coefficient is statistically different from zero at 0.01 and 0.05 levels.

Independent variable	**Financing deficit group**				**Financing surplus group**			
	Δ Long Term Debt		**Δ Short Term Debt**		**Δ Long Term Debt**		**Δ Short Term Debt**	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Constant	-0.005**	-0.005**	0.009**	0.009**	-0.003**	-0.004**	-0.005**	-0.005**
M/B	-0.021**	-0.021**	0.002**	0.001*	0.067**	0.064**	0.007	0.005
Tang	0.345**	0.341**	0.028	0.030	0.046	0.042	0.002	0.001
Info	0.008**	0.010**	0.026**	0.029**	0.017	0.009	0.026**	0.031**
MTR_{t-1}	0.753*	0.709*	0.179**	0.131**	1.209*	1.278*	1.500	1.541
$MTR_{t-1*} D_1$	-0.197*	-0.207*	0.079*	0.059*	-0.118*	-0.132*	-0.147	-0.143
RDAD	-0.209**	-0.211**	-0.040	-0.045	-0.591*	-0.591*	0.497	0.506
NDTS	-0.115*	-0.119*	0.050*	0.049*	1.032**	1.044**	-0.686**	-0.687**
*NDTS** D_2	0.140*	0.149*	-0.152**	-0.130*	-0.404**	-0.435**	0.223**	0.221**
AbDev	0.015*	0.016*	0.006	0.006	-0.174*	-0.191*	0.222	0.233
*AbDev** D_3	-0.062**	-0.062**	-0.010*	-0.009*	0.303**	0.311**	-0.041	-0.031
Size	0.063**	0.050**	-0.009*	-0.007*	0.073**	0.072**	0.036*	0.031**
St		-0.004*		-0.015**		0.011*		0.005
Adj-R^2	0.369	0.371	0.101	0.111	0.768	0.770	0.263	0.266

However, the tangible assets have no significant role in affecting the proportion of long-term or short–term debt reduction, whereas size is positively related to the proportion of long-term or short–term debt reduction.

Consistent with the pecking order model, after controlling for the debt capacity, the information asymmetry is positively related to the proportion of long-term debt financing. In addition, the information asymmetry effect on the proportion of short-term debt financing is positive and slightly higher in magnitude relative to the proportion of long-term debt financing. On the other hand, the information asymmetry shows no significant role in affecting the proportion of long-term debt reduction, while it has a significant positive effect on the proportion of short-term debt reduction. One possible explanation is the degree of sensitivity of the short-tem debt to information asymmetry, which could lead to less misspricing of the short-term debt relative to long-term debt and that is why firms will tend to reduce short-term debt rather the long-term-debt.

I find a significant support for the hypothesis that higher marginal tax rate lead firms to use more debt financing. In addition, firms that have *NLCF* use long-term debt less aggressively relative to firms without *NLCF*, while firms with *NLCF* use more aggressively short-term debt financing. This could occur because firms with *NLCF* are not able to access the long-term debt market as easy as they might take a bank loan. On the other hand, the marginal tax rate has a positive impact on the proportion of long-term reduction. Firms that are more profitable tend to reduce their long-term debt by a higher proportion relative to less profitable firms (firms that have *NLCF*). On the other hand, neither the MTR_{t-1} nor the interaction between MTR_{t-1} and *NLCF* has an effect of the proportion of short-term debt reduction.

The sign and the magnitude of the coefficient on the *NDTS* support MacKie-Mason (1990) argument, a positive sign for $NDTS * D_2$, where non-debt tax shields does not crowded out interest deductibility for profitable firms and it does for highly distress firms. This is consistent with the notion that highly distress firms utilize the non-debt tax shield more than less distressed firms. In addition, for highly distressed firms the non-debt tax shields variable is positively related to the proportion of short-term debt financing. This suggests that those firms have low ability to access the long-term debt market. When firms have financing surplus, highly distress firms tend to reduce their long-term debt by a higher proportion relative to healthy firms.

The other source of the non-debt tax shields, the sum of R&D and the advertising expenses relative to total assets (*RDAD*), negatively affect the proportion of long–term debt financing or reduction and has no significant effect on the short-term debt financing or reduction.

In support of the trade-off theory, firms below their target leverage tend to issue more debt as proportion of their financing deficit when they have financing deficit and reduce less debt when they have financing surplus. Firms above their target leverage tend to issue less debt as proportion of their financing deficit and reduce more debt when they have financing surplus.

Finally, to investigate the market-timing hypothesis (model 2), firms with high stock price tend to issue less debt when they have a financing deficit and to reduce more debt when they have a financing surplus. This implies that firms in financing deficit issue more equity when they have

stock prices run up. Whereas firms that have a financing surplus tend to repurchase more equity if they have a stock prices decline. Korajczyk, Lucas, and MacDonald (1990) and Hovakimian, Opler, and Titman (2001) and Baker and Wurlger (2002) find evidence supporting this prediction.

In general, the multivariate analysis indicates that, after controlling for the debt capacity, the information asymmetry problem is not the only determinant of the proportion of debt financing or debt reductions. The factors suggested by the trade-off models play a significant role in the firm decision of how much to use debt to fill their financing deficit or how much to reduce debt in allocating their financing surplus. Finally, the deviation from the target leverage plays a significant role in determined the proportion of debt financing or reduction.

2.5. THE TRADE-OFF THEORY

The previous results of the factors affecting the proportion of debt financing (reduction) imply that the pecking order theory and the trade-off theory are not mutually exclusive. Firms may strive for a target debt ratio range and within this range the pecking order behavior may describe incremental decisions or, over time, firms may switch between target adjustment and pecking order behavior. Fischer, Heinkel, and Zechner (1989) and Leland (1994,1998) models show how market frictions can lead firms to deviate from their target leverage. Hovakimian and Opler and Titman (2001) conclude that the different effect of profitability on the debt ratio and the debt-equity issue choice appear to be consistent with a pecking order behavior in the short-run and revision to the target in the long-run. This leads to the possibility that firms do not view the pecking order and trade-off theories as mutually exclusive (Fama and French (2002)). For example, firms below their target leverage with high information asymmetry are most likely to issue debt, given that they have a high debt capacity, thus, accelerating their rate of adjustment. If these firms have stock price run up, managers find themselves better off issuing equity, even though this decision leads to a temporary deviation from the target leverage.

In this section, I investigate the assumptions of the partial adjustment model and the factors affecting the rate of adjustment toward the target leverage. In addition, I investigate whether the pecking order factors contribute to the short-run deviation from the target leverage.

2.6. THE PARTIAL ADJUSTMENT MODEL

The general form of the standard partial adjustment model used in the literature to examine the adjustment process toward a leverage target relies on the changes in debt that is partially absorbed by the difference between debt target, D_t*, and lagged debt, D_{t-1}

$$D_t - D_{t-1} = a_0 + a_1\left(D_t^* - D_{t-1}\right) + e_t \qquad (15)$$

D_t Total debt at time t.

D_t* Optimal debt level at time t.

a_1 Adjustment rate coefficient.

e_t Error term.

Where

$a_1 = 0$ Reflects no adjustment to the target.

$0 < a_1 < 1$ Reflects partial adjustment to the target due to a positive cost of adjustment.

$a_1 = 1$ Reflects a full adjustment to the target (the adjustment is costless).

The parameter α_1 may be interpreted in terms of the relative cost of being away from the optimal leverage and the cost of recapitalization (adjusting). If the cost function of recapitalization and the cost function of being away from the optimal debt can be approximated by quadratic terms, then the total loss function can be written as

$$\ell = f\left(D_t - D_t^*\right)^2 + j\left(D_t - D_{t-1}\right)^2 \qquad (16)$$

The first term measures the cost of being away from the target, and the second term measures the cost of adjustment (recapitalization). The problem now is to minimize the loss function. Taking the first derivative,

$$\frac{\partial \ell}{\partial D_t} = 2f\left(D_t - D_t^*\right) + 2j\left(D_t - D_{t-1}\right) = 0$$

$$\frac{\partial \ell}{\partial D_t} = 2f\left(D_t - D_t^*\right) + 2j\left(D_t - D_{t-1}\right) = 0$$

$$D_t - D_{t-1} = \frac{f}{f+j}\left(D_t^* - D_{t-1}\right)$$

$$D_t - D_{t-1} = a_1\left(D_t^* - D_{t-1}\right) \qquad (17)$$

The adjustment rate coefficient α_1 depends on the ratio of the marginal cost of being away from the target to the marginal cost of adjustment. Obviously, the higher the adjustment cost, the slower the rate of adjustment. A full adjustment will occur if the cost of adjustment is too low or the cost of being away is to high. Further, firms will not adjust their debt toward the optimal leverage if the cost of being away from the optimal leverage is zero.

Splitting the total debt to long-term debt and short-term debt yields

$$LTD_t - LTD_{t-1} = d_0 + d_1\left(D_t^* - D_{t-1}\right) + n_t \qquad (18)$$

$$STD_t - STD_{t-1} = l_0 + l_1\left(D_t^* - D_{t-1}\right) + x_t \qquad (19)$$

$$d_0 + l_0 = a_0 \quad , \quad d_1 + l_1 = a_1 \qquad (20)$$

LTD_t Long-term debt level.

STD_t Short-term debt level.

D_t Total debt level.

D_t^* Target debt level.

d_1 The contribution of long-term debt in the total adjustment rate coefficient.

l_1 The contribution of short-term debt in the total adjustment rate coefficient.

n_t, x_t Error terms.

Scaling all variables by the total assets yields a comparability of the both the pecking order and the trade off model.

2.7. THE SYMMETRICAL RATE OF ADJUSTMENT ASSUMPTION

The two main implicit assumptions of the partial adjustment model are: first, firms above and below the target have the same rate of adjustment toward the target –the symmetric rate of adjustment assumption. Second, the adjustment rate coefficient is non-time varying (the same across industries, across firms within the same industry and over time).

Because the driving forces behind the trade-off theory are taxes, bankruptcy costs, non-debt tax shields and agency costs, one can expect that interesting differences exist between different industries regarding the adjustment rate toward the optimal capital structure. To control for the industry effect, firms are classified into industries groups using Fama-French industry classification. To check the symmetric rate of adjustment assumption, I use indicator variables as following:

$$TD_t - TD_{t-1} = f_0 + f_1 D_1 + f_2\left(D_t^* - D_{t-1}\right) + f_3\left(D_t^* - D_{t-1}\right)D_1 + V_t \qquad (21)$$

$$LTD_t - LTD_{t-1} = d_0 + d_1 D_1 + d_2\left(D_t^* - D_{t-1}\right) + d_3\left(D_t^* - D_{t-1}\right)D_1 + n_t \qquad (21a)$$

$$STD_t - STD_{t-1} = l_0 + l_1 D_1 + l_2\left(D_t^* - D_{t-1}\right) + l_3\left(D_t^* - D_{t-1}\right)D_1 + x_t \qquad (21b)$$

TD_t	Total debt.
LTD_t	Long-term debt level.
STD_t	Short-term debt level.
D_t	Total debt level.
D_t^*	Target debt level.
D_1	Indicator variable takes the value 1 if the firm above the target and 0 otherwise
n_t, x_t	Error terms.

Table 2.9 presents the empirical results of the model, where the dependent variables are the changes in total debt, long-term debt, and short-term debt respectively. The estimation results of the equations, 21, 21a,and 21b show that the adjustment rate varies across industries and long-term debt plays significant role in the adjustment process across all industries, whereas the contribution of the short-term debt in the adjustment process vary across industries. Moreover, the assumption of the symmetric rate of adjustment is rejected across all industries. Firms have tendency to adjust faster toward the target when they are above the target relative to being below the target. When controlling for the firm position relative to the target leverage, the explanatory power measured by adjusted R-square is improved across all industries indicating that the model provides a better fit of the data.

2.8. FACTORS AFFECTING THE RATE OF ADJUSTMENT

The partial adjustment model assumes that the adjustment rate is the same across industries, firms and over time. To allow the adjustment rate to vary across firms and to capture the pecking order and the trade-off theory factors' that affect the rate of adjustment, I allow the rate of adjustment to be a function of the factors suggested by both theories:

$$D_t - D_{t-1} = a_0 + a_i\left(D_t^* - D_{t-1}\right) + e_t \qquad (23)$$

$$a_i = b_0(M/B)_i + b_1 Tang_i + b_2\, Info_i + b_3 St_i + b_4 MTR_{t-1,i} + b_5 MTR_{t-1,i} * D_1 + b_6 NDTS_i + b_7 RDAD_i + b_8 Dis_{t-1,i} + b_9 Fin_i * D_2 + b_{10} Fin_i * D_3 + b_{11} Size_i \quad (23a)$$

where

M/B	Market to book ratio of ith firm.
Tang	Tangible assets to total assets of ith firm.
Info	Information asymmetry proxy of ith firm.
St	Stock prices ratio between t and t-1 of ith firm.
MTR	Marginal tax rate at time t-1 of ith firm.
D_1	Indicator variable takes the value of 1 if the firm has net loss carry forward at time t-1 of ith firm.
RDAD	The sum of R&D and the advertising expenses relative to total assets of ith firm.
NDTS	Non-Debt tax shield, the sum of depreciation and investment tax credits relative to total assets of ith firm.
Dis	Absolute value of the distance from the target leverage at time t-1 of ith firm.
Fin	Firms' financing deficit-surplus of ith firm.
D_2	Indicator variable takes the value of 1 if *Fin*>0 (firms are in financing deficit), 0 otherwise.
D_3	Indicator variable takes the value of 1 if *Fin*<0(firms are in financing surplus), 0 otherwise.
Size	The logarithm of total assets of ith firm.

The trade-off theory predicts that firms' profitability, tangible assets, size, financing deficit size and the distance from the target leverage (due to higher cost of being away from the target) are positively related to the rate of adjustment for firms that adjustment from below. At the same time, non-debt tax shields, expected bankruptcy cost, growth options, financing surplus size, and the net loss carry forward are negatively related to the rate of adjustment for this group of firms. Accordingly, firms' profitability, tangible assets, size, and financing deficit size are negatively related to the rate of adjustment for firms that adjust from above, whereas, non-debt tax shields, expected bankruptcy cost, growth options, financing surplus size, and the net loss carry forward are positively related to the rate of adjustment for this group of firms.

The agency cost models predict that the *M/B* has a negative impact on the rate of adjustment for firms operates below the target leverage and a positive one for firms above the target leverage. Firms' size and tangible assets serve as proxy for the firms' debt capacity and financial distress, thus a positive sign for the coefficients are expected. For firms below their target, the *MTR* is predicted to have a positive impact on the rate of adjustment, whereas firms with a net loss carry forward (*NLCF*) have fewer incentives to adjust. On the other hand, for firms above their target leverage, the opposite effect is supposed to be observed. Non-debt tax shields sources (*NDTS* and *RDAD)* are expected to reduce the rate of adjustment for firms below their target, since they already enjoy a high non-debt tax shields, and to accelerate it for firms above their target. The finance deficit-surplus variables are introduced to capture the contribution of external financing needs (surplus) to the adjustment process.

Table 2.9- Tests of Partial Adjustment Model- the Symmetrical Rate of Adjustment Assumption

The sample period is 1980-2001. Financial firms are excluded. Industries are classified using Fama-French industry classification. The dependent variable is the change in total debt, long-term debt, and short-term debt, respectively. The independent variable is the deviation from the target leverage, where the target leverage measured by the industry leverage median. D_1 is an indicator variable takes the value 1 if the firm is above its target leverage and zero otherwise. Fama-MacBeth (1973) procedures use to estimate the model. The total assets scale all variables. ** and * indicate that the coefficient is statically different from zero at 0.01 and 0.05 levels.

Industry Group	Constant	$(D_t^* - D_{t-1})$	Adj-R^2	Constant	D_1	$(D_t^* - D_{t-1})$	$(D_t^* - D_{t-1})D_1$	Adj-R^2
Dependent variable: Δ Total Debt								
Consumer Nondurable	0.016*	0.342**	0.283	-0.006**	0.060**	0.306**	0.131**	0.356
Consumer Durables	0.016	0.379**	0.278	-0.002	0.060**	0.301**	0.204**	0.358
Oil, Gas and Coal	0.040**	0.351**	0.291	-0.006*	0.077**	0.318**	0.103**	0.377
Chemicals and Allied Products	0.026**	0.311*	0.213	-0.015**	0.032**	0.246**	0.102**	0.259
Manufacturing	0.019**	0.338**	0.263	0.001	0.048**	0.309**	0.100**	0.312
Telephones and Television	0.059**	0.323*	0.251	-0.023**	0.071**	0.354**	0.120*	0.336
Wholesale & Retail	0.026**	0.428**	0.361	0.001	0.063**	0.402**	0.109**	0.429
Everything Else	0.029**	0.400**	0.351	-0.001	0.061**	0.423**	0.080*	0.398
All Groups	0.025**	0.422**	0.365	-0.003*	0.064**	0.395**	0.081**	0.418
Dependent variable: Δ Long Term Debt								
Consumer Nondurable	0.013*	0.258**	0.205	-0.003*	0.043**	0.237**	0.083**	0.256
Consumer Durables	0.013	0.277**	0.198	0.000	0.042**	0.231**	0.139**	0.269
Oil, Gas and Coal	0.033*	0.284**	0.205	-0.005*	0.058**	0.270**	0.071**	0.266
Chemicals and Allied Products	0.024**	0.237*	0.156	-0.015**	0.022**	0.195**	0.067*	0.203
Manufacturing	0.017**	0.263**	0.190	0.003*	0.037**	0.232**	0.095**	0.230
Telephones and Television	0.051**	0.322*	0.248	-0.022**	0.064**	0.336**	0.100*	0.330
Wholesale & Retail	0.022**	0.348**	0.283	0.002	0.050**	0.327**	0.079**	0.343
Everything Else	0.026**	0.371**	0.315	0.001	0.056**	0.368**	0.050*	0.369
All Groups	0.022**	0.368**	0.306	-0.002*	0.055**	0.336**	0.078**	0.356
Dependent variable: Δ Short Term Debt								
Consumer Nondurable	0.003	0.085*	0.075	-0.003*	0.018**	0.068**	0.048**	0.117
Consumer Durables	0.003	0.101*	0.093	-0.002*	0.018**	0.070**	0.066**	0.114
Oil, Gas and Coal	0.007	0.068	0.082	-0.001	0.019**	0.047**	0.031*	0.131
Chemicals and Allied Products	0.003	0.074*	0.086	0.000	0.010**	0.051**	0.035*	0.110
Manufacturing	0.003	0.074*	0.055	-0.002*	0.011**	0.077**	0.005	0.071
Telephones and Television	0.008	0.000	0.052	-0.002	0.007*	0.018**	0.020*	0.080
Wholesale & Retail	0.004*	0.080*	0.088	0.000	0.013**	0.075**	0.030**	0.115
Everything Else	0.003	0.029	0.054	-0.001	0.004*	0.056**	0.030*	0.074
All Groups	0.003*	0.055*	0.104	-0.001*	0.009**	0.059**	0.004	0.150

Firms below the target and in need for external funds are supposed to issue debt. This will positively affect their rate of adjustment (a positive sign of $Fin*D_2$). If these firms have a financing surplus then this will reduce their rate of adjustment (a negative sign of $Fin*D_3$), unless, they use their financing surplus to repurchase equity.

If fixed costs constitute a major portion of the total costs of changing capital structure, firms with optimal leverage will alter their capital structure only if they are sufficiently far away from the optimal capital structure. Thus, the likelihood of adjustment is a positive function of the distance between optimal and actual leverage. To test this hypothesis, I use the distance from the target leverage (*Dis*); the expected sign of this variable is positive for the firms above or below their target leverage.

If firms follow the trade-off theory in the long-run, they may deviate from the target in the short-run due to the pecking order theory factors. On other words, firms view the trade-off and the pecking order theory as not mutually exclusive. We expect to find that these factors contribute positively or negatively in the rate of adjustment. For example, firms below the target and have high information asymmetry ($Info$) are expected to use debt financing under the pecking order theory such behavior will contribute positively in the rate of adjustment toward the target. Also, if firms timing their equity issue with a favorable market conditions, the stock price run up (*St*) will contribute positively in the rate of adjustment if they are above their target leverage and negatively if they are below their target leverage.

2.8.1. The Short-Run Rate of Adjustment and the Firms' Attributes - Univariate Analysis

According to the trade-off theory, firms have a target leverage at which their value is maximized. That is, when firms move closer to their target they have higher value, on average, than if they would have move away from the target leverage. Thus, managers find it beneficial to adjust toward this target in the long-run. However, in the short-run firms could deviate from the target leverage due to different reasons. For example, if firms have a high future growth options and they would like to preserve their debt capacity to finance such a future growth, firms those below the target have less incentive to adjust toward the target in the short-run. Accordingly, firms above the target leverage tend to reduce their debt leading to higher rate of adjustment or even over shooting the target. Stock prices run up or decline is another factor that could make firms deviate from target leverage. If firms find out that the market overvalues their equity, this encourage them to issue equity leading firms below the target to move away from the target leverage or toward the target leverage for firms above the target.

This raise the possibility that moving away from or overshooting the target leverage is driven by the pecking order theory factors, market conditions, and agency costs. To investigate what characterize firms that adjust or overshoot or move away form their target leverage in the short-run, firms are classified in two main groups: firms above the target and firms below the target. For each firm (i), the short-run rate of adjustment is calculated using the following equation:

$$\frac{D_{t,i} - D_{t-1,i}}{D^*_{t,i} - D_{t-1,i}} = a_{t,i} \qquad (22)$$

For each group firms are classified in three subgroups as the following

1-Below the target leverage subgroups.

$a_{t,i} > 1$ Firms that over adjust.

$0 < a_{t,i} \leq 1$ Firms that move toward the target.

$a_{t,i} < 0$ Firms that move away from the target.

2- Above the target leverage subgroups.

$a_{t,i} > 1$ Firms that over adjust.

$0 < a_{t,i} \leq 1$ Firms that move toward the target.

$a_{t,i} < 0$ Firms that move away from the target.

Table 2.10 reports the mean of the adjustment rate and the number of observations for each subgroup. About 48% of the firms that operate below the target leverage adjust toward the target, 20% over adjust, and the rest move away from the target. For firms that operate above the target, 42% of those adjust toward the target, 22% over adjust, and 36% move away from the target.

Table 2.11 reports a summary statistics of the firm's characteristics in each of the above subgroups. For the firms group that are below the target, firms with low growth options, higher sales, higher tangible assets, higher marginal tax rate, lower net loss carry forward, lower R&D, less financial distress, higher information asymmetry, higher deficit relative to their assets and higher stock prices decline are the firms which overshoot their target. Firms with smaller size, lower sales, high growth options, lower tangible assets, lower marginal tax rate, higher net loss carry forward, higher R&D, higher stock price run up, more financial distress and lower deficit are the firms which move away from their target.

For the firms group that are above their target, firms with smaller size, lower sales, high growth options, lower tangible assets, lower marginal tax rate, higher R&D, higher information asymmetry, more financial distress, higher stock price run up and higher financing surplus are the firms which overshoot their target. While firms that move away from their target are the firms which have a larger size, low growth options, high tangible assets, high financing deficit, and a decline in their stock prices. The above results suggest that in addition to the trade-off factors, the pecking order theory factors characterize the firms who deviate from their target leverage (move away or overshoot). Higher information asymmetry, higher debt capacity, lower stock price run up, lower growth options, and higher financing deficit are associated with firms that overshot their target form below or firms that move away from their target from above. Whereas, lower information asymmetry, lower debt capacity, higher stock price run up, higher growth options, and lower financing deficit are associated with firms that overshot their target form above or firms that move away from their target from below.

Table 2.10- The Short-Run Rate of Adjustment

Firms are classified in two main groups: Firms below their target leverage and Firms above their target leverage. For each firm the adjustment coefficient is calculated using the following equation: $D_t - D_{t-1} / D_t^* - D_{t-1} = a$. Where D, is the total debt at time t, D^* is the target leverage at time t. Where the target leverage measured by industry leverage median. For firms above their target leverage, firms classified into three subgroups as the following: $a_t < 0$, firms move away from the target, $0 < a_t \leq 1$, firms adjust toward the target, $a_t > 1$, firms overshoot the target. The same sub-grouping applies to firms above their target leverage. Panel A reports the mean of a_t for each subgroup. Panel B reports the percentage of observation in each subgroup and the number of observations in each industry group.

	Below the target group				**Above the target group**			
	Firms move away from the target	Firms adjust toward the target	Firms overshoot the target	All	Firms move away from the target	Firms adjust toward the target	Firms overshoot the target	All
Panel A				*Mean*				
Consumer Nondurable	-0.49	0.34	1.70	0.30	-0.83	0.44	1.83	0.31
Consumer Durables	-0.54	0.36	1.79	0.30	-0.82	0.43	1.87	0.33
Oil, Gas and Coal	-0.55	0.32	1.87	0.32	-0.87	0.36	2.05	0.27
Chemicals & Allied Products	-0.47	0.23	2.03	0.25	-0.82	0.34	1.99	0.15
Manufacturing	-0.50	0.28	1.85	0.27	-0.75	0.39	1.88	0.25
Telephones and Television	-0.52	0.36	1.80	0.38	-0.80	0.36	1.91	0.26
Wholesale & Retail	-0.55	0.30	1.87	0.32	-0.80	0.38	1.90	0.25
Everything Else	-0.51	0.33	1.80	0.37	-0.78	0.40	1.89	0.32
Total	-0.52	0.31	1.84	0.31	-0.80	0.39	1.90	0.26
Panel B	*% Of Observations*			*N*	*% Of Observations*			*N*
Consumer Nondurable	36%	45%	19%	3738	34%	43%	23%	3553
Consumer Durables	36%	43%	21%	2767	34%	42%	24%	2491
Oil, Gas and Coal	34%	45%	21%	2292	37%	38%	25%	2280
Chemicals and Allied Products	33%	49%	18%	3018	40%	42%	18%	3025
Manufacturing	33%	48%	19%	12089	36%	43%	21%	12601
Telephones and Television	32%	46%	22%	1258	40%	33%	27%	1373
Wholesale & Retail	30%	50%	20%	11620	37%	41%	22%	10917
Everything Else	31%	48%	21%	5019	34%	42%	24%	5131
Total	32%	48%	20%	41801	36%	42%	22%	41371

Table 2.11- the Short-Run Rate of Adjustment- the Firms Attributes

Firms below and above their target leverage are classified in three subgroups, firms move away from the target; firms adjust toward the target and firms that overshot the target. The firms' characteristics and the differences in those characteristics are reported for each subgroup. *Size* is the logarithm of the total assets. *Sales* are the logarithm of the net sales. *Marginal tax rate* is the simulated MTR provided by John Graham. *Tang* is the ratio of tangible assets to total assets. *Net Loss Carry forward* the ratio of firms net loss carry forward to total assets. *Non-debt tax shield* is the ratio of deprecation and investment tax credit to total assets. *RDAD* is the ratio of R&D and advertising expenses to total assets. *Altman Z equals* the sum of 3.3 times earnings before interest and taxes plus sales plus 1.4 times retained earnings plus 1.2 times working capital divided by total assets. *Market-to-Book ratio* is the ratio of market value (book value of assets plus the difference between market value of equity and the book value of equity) to total assets. *Information asymmetry* computed as the standard deviation of the value weighted market adjusted return residuals, calculated on the daily base for each firm-year. *St* is a proxy for stock prices run up –decline calculated as the ratio of the stock price at time t relative to the price at time t-1. *Financing deficit-surplus* is the firm's Financing deficit-surplus relative to total assets. ** and * indicate that difference in the means is statistically different from zero at 0.01 and 0.05 levels.

Attributes	Firms move away from the target (1)	Firms adjust toward the target (2)	Firms overshoot the target (3)	Mean differences (1)-(2)	(1)-(3)	(2)-(3)
Below the target group						
Size	4.710	5.304	5.385	-0.594**	-0.675**	-0.081**
Sales	4.635	5.121	5.347	-0.486**	-0.712**	-0.226**
Tangible Assets	0.280	0.366	0.371	-0.086**	-0.091**	-0.005
Marginal tax rate	0.239	0.248	0.261	-0.009**	-0.022**	-0.013**
Net Loss Carry forward	0.106	0.063	0.086	0.044**	0.020**	-0.023**
Non debt tax shield	0.057	0.047	0.046	0.010	0.011	0.001
RDAD	0.069	0.042	0.039	0.027**	0.029**	0.003
Altman Z	1.111	2.381	3.175	-1.270**	-2.063**	-0.794*
Market-to-Book ratio	2.216	1.729	1.627	0.487**	0.589**	0.101**
Information asymmetry	0.535	0.589	0.694	-0.054*	-0.159*	-0.105**
St	1.431	1.100	0.833	0.331*	0.598**	0.267*
Financing deficit-surplus	0.074	0.125	0.257	-0.051**	-0.183**	-0.132**
Above the target group						
Size	5.265	5.087	4.844	0.178**	0.422**	0.244**
Sales	5.164	5.129	4.938	0.035	0.226**	0.191**
Tangible Assets	0.373	0.348	0.315	0.025**	0.058**	0.033**
Marginal tax rate	0.243	0.244	0.235	-0.001	0.009**	0.009**
Net Loss Carry forward	0.149	0.174	0.156	-0.025**	-0.007	0.018
Non debt tax shield	0.053	0.058	0.055	-0.005**	-0.002	0.003**
RDAD	0.046	0.050	0.055	-0.004**	-0.008**	-0.004
Altman Z	4.464	2.105	1.658	2.359**	2.806**	0.447
Market-to-Book ratio	1.561	1.548	1.797	0.013	-0.236**	-0.249**
Information asymmetry	0.759	0.824	0.809	-0.065*	-0.050*	0.015
St	0.550	1.230	1.582	-0.680**	-1.032**	-0.352
Financing deficit-surplus	0.131	-0.042	-0.074	0.173**	0.204**	0.032**

2.8.2. Empirical Results – Multivariate Analysis

Table 2.12 reports the estimation results of the model using the Fama-MacBeth method. The model is estimated for firms above and below their target. For the long-term debt contribution in the total rate of adjustments, high growth options tend to reduce the rate of adjustment for firms below their target leverage and to accelerate it for firms above their target leverage. However, high growth options increase the total rate of adjustment through the short-term debt contribution in the total rate of adjustments for firms below the target leverage.

The expected sign of the growth options on the rate of adjustment for the short-term debt is the opposite of the expected one, for firms that above their target. The tangible assets have a positive impact on the rate of adjustment in the long-term debt model and in the short-term debt model for firms that adjust from below. For these firms, size has a positive impact on the contribution of the long-term debt in the total rate of adjustments and a negative impact on the contribution of the short-term debt in the total rate of adjustments.

For firms that adjust from above, the tangible assets has insignificant impact on the short-term debt contribution in the total rate of adjustments, while it is negatively significant for the contribution of the long-term debt in the total rate of adjustments. In the same time, size shows a positive significant effect on the long-term debt contribution in the total rate of adjustment.

Higher information asymmetry contributes positively in the rate of adjustment for firms below their target and negatively for firms above their target. This is consistent with the effect of the pecking order behavior within the context of the trade-off theory. Yet, the information asymmetry has no significant impact on the short-term debt contribution in the total rate of adjustments. The market equity conditions play a significant role in the rate of adjustments. Stock prices run up reduce the rate of adjustments for firms below the target and increase the rate of adjustments for firms above the target.

As predicted, the non-debt tax shields sources are negatively (positively) affecting the long-term debt contribution in the total rate of adjustments rate for firms below (above) their target, but these factors have no effect in the short-term debt contribution in the total rate of adjustments rate.

Firm with a high marginal tax rate adjust faster toward the target relative to firms that have a net loss carry forward, when they are below their target leverage; while when these firms are above their target leverage, high marginal tax rate decreases the rate of adjustment toward the target relative to those which have a net loss carry forward. Yet, marginal tax rate has no significant effect on the short-term debt model except for firms that operate below their target leverage.

Table 2.12- The Factors Affecting the Rate of Adjustment

Firms are classified in two main groups: firms below their target leverage and firms above their target leverage. The dependent variables are the changes in long-term debt and short–term debt scaled by total assets. The Fama-MacBeth (1973) regressions are run for each year of 1980-2001 periods. The rate of adjustment allowed being a function of the firms' attributes. *M/B* is the market to book ratio. *Tang* is the ratio of tangible assets to total assets. *Info* is a metric proxy of information asymmetry computed as the standard deviation of the value weighted market adjusted return residuals, calculated on the daily base for each firm-year. *St* is a proxy for stock prices run up –decline calculated as the ratio of the stock price at time t relative to the price at time t-1. *MTR* is the marginal tax rate at time t-1. D_1 is an indictor variable takes the value of one if the firm has net loss carry forward at time t-1. *NDTS* is the non-debt tax shield, the sum of depreciation and investment tax credits relative to total assets. *RDAD* is the summation of R&D and the advertising expenses relative to total assets. *Dis* is the absolute value of the distance from the target leverage at time t-1. *Fin* is the firms' financing deficit-surplus. D_2 is an indictor variable takes the value of one if $Fin>0$ (firms are in financing deficit), zero otherwise. D_3 is an indictor variable takes the value of 1 if $Fin<0$ (firms are in financing surplus), 0 otherwise. *Size* is the logarithm of the total assets. ** and * indicate that the coefficient is statistically different from zero at 0.01 and 0.05 levels.

	Below the target leverage group		**Above the target leverage group**	
Independent variable	**Δ Long Term Debt**	**Δ Short Term Debt**	**Δ Long Term Debt**	**Δ Short Term Debt**
Constant	0.015**	0.007**	0.019**	0.003*
M/B	-0.053**	0.007*	0.051*	0.031*
Tang	0.232**	0.069**	-0.057**	-0.022
Info	0.060**	0.043	-0.016*	0.005
St	-0.010**	-0.007**	0.080**	0.010*
MTR_{t-1}	0.314*	0.257**	-0.303*	-0.009
$MTR_{t-1*} D_1$	-0.231*	0.773	0.464**	-0.371
NDTS	-0.112*	0.236	0.267*	-0.509
RDAD	-0.494**	0.027	0.074*	0.216
Distance	0.073**	-0.051	0.112*	-0.014
$Fin* D_2$	1.621**	0.197**	-0.921**	-0.189*
$Fin* D_3$	-1.002*	-0.561*	0.328**	0.106*
Size	0.029**	-0.002*	0.022**	0.004
Adj-R^2	0.484	0.150	0.587	0.186

Firms farther away from the target have tendency to adjust faster toward the target using long-term debt regardless if they are above their target or below their target. However, the distance from the target leverage has no significant effect on the rate of adjustment of the short-term debt. Finally, the financing deficit plays a significant role in increasing the rate of adjustment for firms below the target and reducing it for firms above the target. On the other hand, the financing surplus plays a significant role in increasing the rate of adjustment for firms above the target and reducing it for firms below the target.

Putting together, the factors affecting the proportion of debt financing and those affecting the rate of adjustment indicate that the trade-off model and the pecking order model are not mutually exclusive. Managers tend to adjust toward target leverage but this does not prevent them from deviating from this target to take advantage of the market equity conditions and the information asymmetry problem. Consistent with this conclusion, the trade-off theory factors play significant role in determining the proportion of debt financing (reduction relative to the financing deficit (surplus).

2.9. THE FINANCING (REPURCHASES) CHOICES AND THE SIZE OF ISSUE (REPURCHASES)

The previous literature of examining the pecking order and the trade-off theory through the debt versus equity choice and securities repurchases choice (Hovakimian, Opler, and Titman (2001), Hovakimian (2003) and Korajczyk and Levy (2003)) does not control for the firms' financing deficit or surplus when they issue or repurchases securities. In addition, the combination issue (repurchases) of debt and equity has given almost no attention in the literature. Hovakimian, Opler, and Titman (2001) find evidence that the factors affecting the choice of the form of financing are different then those affect the choice of the size of financing (repurchases). Such finding required studying those factors separately, but simultaneously. Thus, this section focuses on studying the factors affecting the firms' choice of issue (repurchases) equity, debt, and the combination of both and simultaneously the composition of combination issue (repurchases).

2.9.1. The Model

Because the choice of financing method is interdependent, a two stage Bivariate Probit-Tobit model is used. The first stage examines the factors affecting the firms' choice of the form of financing (repurchases). The second stage examines the factors that affect the size of issue (repurchases) given that the firm decides to use a particular form of financing (repurchases). The model setup is as the following:

$$y^*_{1,i} = a\, x_{1,i} + e_1 \qquad (24a)$$

$$y^*_{2,i} = b\, x_{2,i} + e_2 \qquad (24b)$$

Equation (24a) is the selection function of issuing debt or not and equation (24b) is the selection function of issuing equity or not. The $x_{1,i}, x_{2,i}$ denotes vectors of exogenous variables (for the i^{th} firm) and the a, b are vectors of parameters. The observed outcomes are defined by the binary indicator variables y_1 and y_2. The model is completed with the size of issue (repurchase) equation

$$z_i = l x_{3,i} + e_3 \quad (24c)$$

z_i is the size of debt issue (repurchases) relative to the financing deficit (surplus) for the i[th] firm and $x_{3,i}$ is vector of exogenous variables. The error terms e_1, e_2 and e_3 are distributed according to the trivariate normal distribution with zero means, variances equal s^2 and correlation coefficients r_{12}, r_{13}; and r_{23}; respectively. The correlation coefficient r_{12} may be negative, for example, when unobservable factors that encourage firms to issue debt also could lead them not to issue equity. The bivariate probit model utilizes a maximum likelihood estimation (MLE) method to allow the error terms to be correlated across equations. The parameter r_{12} estimates the correlation between the error terms of the bivariate probit equations. If the MLE estimate of the correlation coefficient r_{12} is significant, then the bivariate probit estimation is more efficient than that of independent probit equations (Meng and Schmidt (1985)).

At the second estimation stage, the Tobit issue (repurchases) size equations incorporate the probability of the limit and nonlimit observations from the first stage estimation and takes in consideration the correlation across equations, which may arise because of unobservables (captured by e_3) may be correlated with the unobservables e_1, e_2 that influence the choice of the form of financing.[27] That is, the correlation coefficients r_{13}, r_{23} may not equal zero.

2.9.1.1. The Model- Security Issuance Decision

The model specifications for the financing choice are

$$y^*_{1,i} = a\ x_{1,i} + e_1 \quad (25a)$$

$$y^*_{2,i} = b\ x_{2,i} + e_2 \quad (25b)$$

$$z_i = l x_{3,i} + e_3 \quad (25c)$$

$y_1 = 1$ If the firm issues debt and 0 if not.

$y_2 = 1$ If the firm issues equity and 0 if not.

z_i the size of debt issue relative to the financing deficit for the i[th] firm.

z is bounded by 0 form below and 1 from above when $y_1 = 1, y_2 = 1$ (double censoring) and bounded by 1 form below (lower tail censoring) when $y_1 = 1, y_2 = 0$.

The bivariate probit process for both decisions is influenced by the x vector variables, which include the standard sets of variables used in the previous empirical work on the debt equity choice. Specifically, market to book ratio (*M/B*), firms tangible assets (*Tang*), size of the financing deficit-surplus (*Fin*), sources of non-debt tax shields (*NDTS, RDAD*), profitability (*MTR*), net loss carry forward (*NLCF*), stock prices run up / decline (*St*), Firm size (*Size*), and the projected deviation from the target leverage (*PDev*).[28] Hovakimian, Opler, and Titman (2001) introduce the projected deviation from the target leverage (*PDev*) in their study of the debt equity

[27] The two stage estimation method introduced by Heckman (1976), Lee (1976) and Amemiya (1978,1979).

[28] For studies that use these factors, see for example, Marsh (1982), Hovakimian, Opler, and Titman (2001), Hovakimian (2003) and Korajczyk and Levy (2003).

choice. This variable measures the projected differences between the absolute deviation from the target leverage if firm issues debt and the absolute deviation from the target if firms issue the same amount of equity ($\left|Lev^{D} - T\arg et\right| - \left|Lev^{E} - T\arg et\right|$).

Hovakimian, Opler, and Titman's (2001) projected deviation approach has strong intuitive appeal. However, since I am interested in studying the proportion of debt financing (reduction) rather than the choice of financing, modification of their measure of the projected deviation from the target leverage is needed. The modified measures are

$$PDev = \left|Lev^{*D} - T\arg et\right| - \left|Lev^{*E} - T\arg et\right| \qquad (26)$$

For the financing deficit group

$$Lev^{*D} = \frac{\Pr e\, Issue\, Debt + Financing\ \ deficit}{\Pr e\, Issue\, TA + Financing\ \ deficit} \qquad (26a)$$

$$Lev^{*E} = \frac{\Pr e\, Issue\, Debt}{\Pr e\, Issue\, TA + Financing\ \ deficit} \qquad (26b)$$

Where the firms target leverage is measured by the industry leverage median. If firms take in consideration their target leverage when they decide their choice of the financing form, we expect that the *PDev* variable is negatively (positively) related to the probability of debt (equity) financing, since that a positive value of *PDev* indicate that the firms will ended up closer to the target if they issue equity.

$$y_1^* = b_0(M/B)_i + b_1 Tang_i + b_2\, Fin_i + b_3 PDev_i + b_4 RDAD_i + + b_5 NDTS_i + b_6 MTR_{t-1,i} + b_7 NLCF_i + b_8 St_i + b_9 Size_i + e_1 \qquad (27a)$$

$$y_2^* = a_0(M/B)_i + a_1 Tang_i + a_2\, Fin_i + a_3 PDev_i + a_4 RDAD_i + a_5 NDTS_i + a_6 MTR_{t-1,i} + a_7 NLCF_i + a_8 St_i + a_9 Size_i + h_2 \qquad (27b)$$

$y_1 = 1$ If the firm issues debt and 0 if not.

$y_2 = 1$ If the firm issues equity and 0 if not.

M/B	Market to book ratio of ith firm.
Tang	Tangible assets to total assets of ith firm.
Fin	Financing deficit to total assets of ith firm.
PDev	Projected deviation from the target leverage of ith firm.
RDAD	The sum of R&D and the advertising expenses relative to total assets of ith firm.
NDTS	Non-Debt tax shield, the sum of depreciation and investment tax credits to total assets of ith firm.
MTR	Marginal tax rate at time t-1 of ith firm.
NLCF	Net loss carry forward at time t-1 to total assets of ith firm.
St	Stock prices ratio between t and t-1 of ith firm.
Size	The logarithm of total assets of ith firm.

To investigate whether the firm characteristics that affect the choice of the financing form also affect the amount of funds that they issue, the second stage regression is modeled as the following

$$E[z \mid y_1 = 1, y_2 = 1] = q_0 (M/B)_i + q_1 Tang_i + q_2 Fin_i + q_3 Dev_i + q_4 RDAD_i + q_5 NDTS_i + q_6 MTR_{t-1,i} + q_7 NLCF_i + q_8 St_i + q_9 Size_i + p_2 \quad (28a)$$

$$E[z \mid y_1 = 1, y_2 = 0] = f_0 (M/B)_i + f_1 Tang_i + f_2 Fin_i + f_3 Dev_i + f_4 RDAD_i + f_5 NDTS_i + f_6 MTR_{t-1,i} + f_7 NLCF_i + f_8 St_i + f_9 Size_i + k_2 \quad (28b)$$

z_i the size of debt issue relative to the financing deficit for the i[th] firm.

$y_1 = 1$ If the firm issues debt and 0 if not.

$y_2 = 1$ If the firm issues equity and 0 if not.

M/B Market to book ratio of i[th] firm.

Tang Tangible assets to total assets of i[th] firm.

Fin Financing deficit to total assets of i[th] firm.

Dev Actual deviation from the target leverage of i[th] firm.

RDAD The sum of R&D and the advertising expenses relative to total assets of i[th] firm.

NDTS Non-Debt tax shield, the sum of depreciation and investment tax credits to total assets of i[th] firm.

MTR Marginal tax rate at time t-1 of i[th] firm.

NLCF Net loss carry forward at time t-1 to total assets of i[th] firm.

St Stock prices ratio between t and t-1 of i[th] firm.

Size The logarithm of total assets of i[th] firm.

While the choice of financing is assumed to be function of the projected deviation from the target, the issue size (repurchases) is assumed to be function of the actual deviation from the target leverage (*Dev*). The expected signs of these variables are discussed earlier in this study.

2.9.1.1. The Model- Security Repurchase Decision

The model specifications for the security reduction choice are

$$q^*_{1,i} = a\ w_{1,i} + e_1 \quad (29a)$$

$$q^*_{2,i} = b\ w_{2,i} + e_2 \quad (29b)$$

$$r_i = l\ u_{3,i} + e_3 \quad (29c)$$

$q_1 = 1$ If the firm reduces debt and 0 if not.

$q_2 = 1$ If the firm reduces equity and 0 if not.

r_i is the size of debt reduction relative to the financing surplus for the i[th] firm.

r is bounded by 0 form below and 1 from above when $q_1 = 1, q_2 = 1$ (double censoring) and bounded by 1 form below (lower tail censoring) when $q_1 = 1, q_2 = 0$.

$$q_1^* = l_0(M/B)_i + l_1 Tang_i + l_2 Fin_i + l_3 PDev_i + l_4 RDAD_i + + l_5 NDTS_i + l_6 MTR_{t-1,i} + l_7 NLCF_i + l_8 St_i + l_9 Size_i + e_1 \quad (30a)$$

$$q_2^* = d_0(M/B)_i + d_1 Tang_i + d_2 Fin_i + d_3 PDev_i + d_4 RDAD_i + d_5 NDTS_i + d_6 MTR_{t-1,i} + d_7 NLCF_i + d_8 St_i + d_9 Size_i + e_2 \quad (30b)$$

$q_1 = 1$ If the firm reduces debt and 0 if not.

$q_2 = 1$ If the firm reduces equity and 0 if not.

M/B	Market to book ratio of i[th] firm.
Tang	Tangible assets to total assets of i[th] firm.
Fin	Financing surplus to total assets of i[th] firm.
PDev	Projected deviation from the target leverage of i[th] firm.
RDAD	The sum of R&D and the advertising expenses relative to total assets of i[th] firm.
NDTS	Non-Debt tax shield, the sum of depreciation and investment tax credits to total assets of i[th] firm.
MTR	Marginal tax rate at time t-1 of i[th] firm.
NLCF	Net loss carry forward at time t-1 to total assets of i[th] firm.
St	Stock prices ratio between t and t-1 of i[th] firm.
Size	The logarithm of total assets of i[th] firm.

For the financing surplus group a positive value of *PDev* indicates that the firms will end up closer to the target if they repurchase more equity. Thus, we expect that the choice of debt (equity) repurchase to be negatively (positively) related to *PDev*.

$$PDev = \left|Lev^{*D} - T\arg et\right| - \left|Lev^{*E} - T\arg et\right| \quad (31)$$

$$Lev^{*D} = \frac{\Pr e\ Issue\ Debt - Financing\ \ surplus}{\Pr e\ Issue\ TA - Financing\ \ surplus} \quad (31a)$$

$$Lev^{*E} = \frac{\Pr e\ Issue\ Debt}{\Pr e\ Issue\ TA - Financing\ \ surplus} \quad (31b)$$

To investigate whether the firm characteristics that affect the security reduction choice also affect the amount of funds that they reduce, the second stage regression is modeled as the following

$$E[r \mid q_1 = 1, q_2 = 1] = n_0(M/B)_i + n_1 Tang_i + n_2 Fin_i + n_3 Dev_i + n_4 RDAD_i + n_5 NDTS_i + n_6 MTR_{t-1,i} + n_7 NLCF_i + n_8 St_i + n_9 Size_i + e_1 \quad (32a)$$

$$E[r \mid q_1 = 1, q_2 = 0] = w_0(M/B)_i + w_1 Tang_i + w_2 Fin_i + w_3 Dev_i + w_4 RDAD_i + w_5 NDTS_i + w_6 MTR_{t-1,i} + w_7 NLCF_i + w_8 St_i + w_9 Size_i + h_2 \quad (32b)$$

r_i is the size of debt reduction relative to the financing surplus for the i[th] firm.

$q_1 = 1$ If the firm reduces debt and 0 if not.

$q_2 = 1$ If the firm reduces equity and 0 if not.

M/B	Market to book ratio of i^{th} firm.
Tang	Tangible assets to total assets of i^{th} firm.
Fin	Financing surplus to total assets of i^{th} firm.
Dev	Actual deviation from the target leverage of i^{th} firm.
RDAD	The sum of R&D and the advertising expenses relative to total assets of i^{th} firm.
NDTS	Non-Debt tax shield, the sum of depreciation and investment tax credits to total assets of i^{th} firm.
MTR	Marginal tax rate at time t-1 of i^{th} firm.
NLCF	Net loss carry forward at time t-1 to total assets of i^{th} firm.
St	Stock prices ratio between t and t-1 of i^{th} firm.
Size	The logarithm of total assets of i^{th} firm.

2.9.2. EMPIRICAL RESULTS

Table 2.13 presents the two-stage model estimation results for the financing deficit group. Columns 2 to 5 show the partial derivative of the probability of issuing debt given that the firms already issued equity, the probability of issuing equity given that the firms already issued debt, the probability of issuing pure debt or pure debt and reduce equity, and the probability of issuing pure equity or pure equity and reduce debt, respectively. Columns 6 and 7 present the determinants of: the size of debt issue given that the firm issued a combination of debt and equity, and the size of debt issue given that the firm issued pure debt, respectively. The significant negative correlation, -0.283, between the bivariate probit equations indicates that unobservable factors that encourage firms to issue debt lead them not to issue equity and vice versa. At the same time, the correlations between the Bivariate Probit model equations and the Tobit equations indicate that unobservable factors that encourage firms to issue debt also lead them to issue higher amount of debt and lower amount of equity.

The market to book ratio is negatively (positively) related to both the probability of issuing debt (equity) and the size of issue. Unlike Hovakimian, Opler, and Titman who find a positive relation between the issue size of long-term debt and market to book ratio, my results indicate that such a relation is negative. This might occur due to controlling for the firms' financing deficit-surplus status. This result is consistent with notation that high growth options firms have lower probability to issue debt and when they issue debt, higher growth options lead them to issue debt by smaller size issues relative to firms with a low growth options.

Tangible assets are positively related to both the probability of issuing debt and the size of issue. Yet, the magnitude of this impact is much higher for the probability of debt financing relative to that of equity financing. This result is consistent with the prediction of the pecking order theory, in which firms with high debt capacity are most likely to issue debt rather than equity, and when they issue debt the higher the debt capacity the higher the size of issue. The tangible assets are negatively related to the likelihood of issuing equity. as predicted by the trade-off theory.

Table 2.13- The Financing Choices and the Size of Issue

Bivariate Probit –Tobit two stage method estimation .The dependent variables in the first stage are: y1 equal 1 if the firm issues debt and 0 otherwise and y2 equal 1 if the firm issues equity and 0. In the second stage, Z is the size of debt issue relative to the financing deficit. The coefficients represent the partial derivative evaluated at the mean of the independent variables. M/B is the market to book ratio. Tang is the ratio of tangible assets to total assets. Deficit is the sum investment, change in working capital (excluding short-term debt) minus cash flow after interest, taxes, and dividends relative to total assets. Dev is the deviation from the target leverage at time t-1. RDAD is the summation of R&D and the advertising expenses relative to total assets. NDTS is the non-debt tax shield, the sum of depreciation and investment tax credits relative to total assets. MTR is the marginal tax rate at time t-1. NLCF is the ratio of firms net loss carry forward to total assets. St is a proxy for stock prices run up –decline calculated as the ratio of the stock price at time t relative to the price at time t-1. Size is the logarithm of the total assets. ** and * indicate that the coefficient is statistically different from zero at 0.01 and 0.05 levels.

	$\frac{\partial \Pr o[y_1 \mid y_2 = 1]}{\partial x_i}$	$\frac{\partial \Pr o[y_2 \mid y_1 = 1]}{\partial x_i}$	$\frac{\partial \Pr o[y_1 \mid y_2 = 0]}{\partial x_i}$	$\frac{\partial \Pr o[y_2 \mid y_1 = 0]}{\partial x_i}$	$E[Z\|_{y_1=1,y_2=1}]$	$E[Z\|_{y_1=1,y_2=0}\}$
M/B	-0.054**	0.064**	-0.041**	0.056**	-0.049**	-0.083**
Tang	0.256**	-0.031*	0.209**	-0.024*	0.135**	0.236*
Deficit	0.441**	0.579*	0.384**	0.467*	0.149**	-1.089**
PDev	-0.386**	0.343**	-0.300**	0.255**		
Dev					0.392**	0.818**
RDAD	-0.407*	0.304**	-0.345**	0.193**	-0.270**	-0.647**
NDTS	-0.317*	-0.094	-0.243*	-0.103	-0.238*	0.083
MTR_{t-1}	0.223**	-0.266*	0.177**	-0.214**	0.163**	0.488**
NLCF	-0.012*	0.018**	-0.010*	0.016**	-0.001	-0.046*
St	-0.013**	0.025**	-0.005**	0.014**	-0.017*	-0.029*
Size	0.028*	-0.004	0.023*	0.001	0.020*	0.055*
r_{12}		-0.283**				
r_{13}					0.613**	0.794**
r_{23}					-0.588**	-0.367**
R^2					0.133	0.143

The financing deficit has a positive impact on the likelihood of issuing debt or equity; numerically it has higher impact on the probability of issuing equity. This suggests that firms with a large financing deficit are not able to entirely finance their deficit by issuing debt only, given their debt capacity. The financing deficit has also a positive impact on the size of the debt issues for firms that issue a combination of debt and equity, but it has a negative impact on the pure debt issues. This suggests that firms with a large financing deficit do not tend to substitute equity for debt.

The projected deviation from the target leverage has the expected signs; firms that are better off issuing equity (ending closer to the target leverage by issuing equity) are most likely to issue equity instead of debt. The size of debt issue is positively related to the actual deviation from the target leverage, suggesting that the debt issue size is an increasing function of the distance from the target leverage for firms below their target leverage and a decreasing function for firms above their target leverage. Moreover, the higher coefficients of the actual deviation from the target leverage in the debt ($Z|y_1=1,y_2=0$) imply that firms below their target leverage tend to substitute equity for debt, whereas firms above their target leverage tend to substitute debt for equity.

Examining the impact of the sources of non-debt tax shields (*RDAD* and *NDTS*) on the choice and the size of the form of financing reveals that *NDTS* play a significant role in the decision to issue debt but not in the decision to issue equity. Whereas *NDTS* has only a significant role in the size of debt issue if firms issue a combination of debt and equity, While the *RDAD* play a significant role in the decision to issue debt or equity and in the size of the issue. The signs of the *RDAD* coefficients are consistent with the prediction of the trade-off theory and agency theory, where *RDAD* can be regarded as sources of non-debt tax shields or proxy for future growth options, respectively.

Consistent with trade-off theory firms with a higher marginal tax rate are more likely to issue debt rather than equity. Given the choice of combination issue, higher marginal tax rate encourages issuing more debt as proportion of their financing deficit. In addition, higher marginal tax rate encourages firms who issue pure debt to repurchase equity.

The net loss carry-forward increases the likelihood of issuing equity and decreases the likelihood of issued debt, but it has no effect on the size of the financing form. On the other hand, the net loss carry-forward encourages firms to substitute debt for equity. This suggests that firms suffering from a net loss carry forward, attempt to reduce their interest payment obligation by reducing the debt levels through equity issue.

The market-timing hypothesis finds a strong support for both the choice and the size of the financing form. A Stock price run up increases the likelihood of issuing equity and the size of equity issue relative to the financing deficit, for firms that issue combination of debt and equity. Whereas, higher stock price encourages firms to substitute debt for equity

Finally, firm size has a positive impact on the likelihood of issuing debt and the size of debt issue, while it has no significant impact on the likelihood of issuing equity.

Table 2.14 presents empirical results for the financing surplus group. Columns 2 to 5 show the partial derivative of the probability of repurchase debt given that the firms already repurchased equity, the probability of repurchase equity given that the firms already repurchase debt, the probability of repurchase debt or repurchase debt and issue equity, and the probability of repurchase equity or repurchase equity and issue debt, respectively. Columns 6 and 7 respectively, present the factors affecting the size of debt repurchases given that the firms repurchase both debt and equity. The size of debt repurchases given that the firm repurchase debt only.

The market to book ratio is positively related to both the probability of repurchasing debt and the size of repurchases. The market to book ratio has no significant impact on the likelihood of equity repurchases. The tangible assets are positively related to both the probability of repurchasing debt and the size of debt repurchasing. The financing surplus has a positive impact on the likelihood of repurchasing debt or equity; numerically it has a higher impact on the probability of repurchasing debt. On the other hand, the financing surplus has a positive impact on the size the debt repurchases, for firms that repurchase a combination of debt and equity, but it has a negative impact on the pure debt and equity repurchases. Again, consistent with the results of the financing deficit group, this suggests that firms with a large financing surplus do not tend to substitute equity for debt. These results confirm my previous results that debt reductions track the financing surplus more closely than debt issues track the financing deficit.

The projected deviation from the target leverage has the expected sign; firms that are better off repurchasing equity (ending closer to the target leverage by repurchasing equity) are most likely to repurchase equity rather than debt. In addition, the actual deviation from the target leverage also indicates that firms below the target repurchase more equity and less debt, whereas firms above the target leverage repurchase more debt and less equity.

The *RDAD* variable shows no significant impact on the choice of equity or debt repurchases and on the size of repurchases. While the *NDTS* variable plays a positive significant role in the likelihood to repurchase debt and the size of debt repurchases, it has a negative significant one in the likelihood to repurchase equity and no effect on the size of equity repurchases. A higher marginal tax rate increases the likelihood of equity repurchases more than it increase the likelihood of debt repurchases. While higher marginal tax rate decreases the size of debt repurchases, it has no effect on the size of equity repurchases. The net loss carry forward increases the likelihood of debt repurchases and decreases the likelihood of equity repurchases, while it has no affect on the size of equity repurchases. On the other hand, the net loss carry forward encourages firms to reduce their debt by an amount higher than their financing surplus by issuing equity (substitute debt for equity). The stock prices run up proxy has a significant impact on both the likelihood of securities repurchases and the size of repurchases. Higher stock prices increase the likelihood of debt repurchases and decreases the likelihood of equity repurchases, whereas higher stock prices encourages firms to repurchase more debt and to substitute debt for equity.

Table 2.14- The Repurchases Choices and the Size of Repurchases

Bivariate Probit –Tobit two stage method estimation .The dependent variables in the first stage are: q_1 equal 1 if the firm repurchases debt and 0 otherwise and q_2 equal 1 if the firm repurchases equity and 0. In the second stage r is the size of debt repurchases relative to the financing surplus. The coefficients represent the partial derivative evaluated at the mean of the independent variables. *M/B* is the market to book ratio. *Tang* is the ratio of tangible assets to total assets. *Deficit* is the sum investment, change in working capital (excluding short-term debt) minus cash flow after interest, taxes, and dividends relative to total assets. *Dev* is the deviation from the target leverage at time t-1. *RDAD* is the summation of R&D and the advertising expenses relative to total assets. *NDTS* is the non-debt tax shield, the sum of depreciation and investment tax credits relative to total assets. *MTR* is the marginal tax rate at time t-1. *NLCF* is the ratio of firms net loss carry forward to total assets. *St* is a proxy for stock prices run up –decline calculated as the ratio of the stock price at time t relative to the price at time t-1. *Size* is the logarithm of the total assets. ** and * indicate that the coefficient is statistically different from zero at 0.01 and 0.05 levels.

	$\frac{\partial \Pr o[q_1 \mid q_2 = 1]}{\partial x_i}$	$\frac{\partial \Pr o[q_2 \mid q_1 = 1]}{\partial x_i}$	$\frac{\partial \Pr o[q_1 \mid q_2 = 0]}{\partial x_i}$	$\frac{\partial \Pr o[q_2 \mid q_1 = 0]}{\partial x_i}$	*E[r|q₁=1,q₂=1]*	*E[r|q₁=1,q₂=0]*
M/B	0.038*	-0.001	0.028*	-0.003	0.027*	0.032**
Tang	0.106**	-0.167*	0.078**	-0.181*	0.093*	0.360*
Surplus	0.713**	0.104**	0.600*	0.189**	0.311**	-0.487*
PDev	-0.140*	0.150*	-0.120*	0.156*		
Dev					-0.285*	-0.148**
RDAD	-0.073	0.018	-0.057	-0.023	-0.297	0.036
NDTS	0.564**	-0.411**	0.571**	-0.352**	0.238*	0.230**
MTR_{t-1}	0.136*	0.259**	0.100**	0.319**	-0.033*	-0.296**
NLCF	0.029**	-0.057**	0.015**	-0.059**	0.071**	0.135**
St	0.015**	-0.093**	0.010**	-0.120**	0.030*	0.025**
Size	0.020	0.003	0.016	0.005	0.016	0.033
r_{12}			-0.248**			
r_{13}					0.852**	0.800**
r_{23}					-0.479**	-0.738**
R^2					0.107	0.168

In summery, the examination of the factors affecting the choice of the financing form and the size of the issue indicate the trade off theory and the pecking order theory are not mutually exclusive.

2.10 Conclusion

The examination of the factors that affect the choice of financing (repurchasing) form and the size of issue (repurchase) also support the notion that the trade-off and the pecking order theory are not mutually exclusive. The market to book ratio is negatively (positively) related to both the probability of issuing debt (equity) and the size of issue. The tangible assets are positively related to both the probability of issuing debt and the size of issue and negatively related to the likelihood of issuing equity. The financing deficit has a positive impact on the likelihood of issuing debt or equity, also it has a positive impact on the size of both the equity and the debt issues for firms that issue a combination of debt and equity, but it has a negative impact on the pure debt and equity issues. This suggests that firms with a large financing deficit do not tend to substitute debt for equity or equity for debt.

The two-stage model finds evidence in support of the trade-off theory; firms that are better off issuing equity (ending closer to the target leverage by issuing equity) are most likely to issue equity instead of debt. The size of debt (equity) issue is positively (negatively) related to the actual deviation from the target leverage, suggesting that debt (equity) issue size is an increasing (decreasing) function of the distance from the target leverage for firms below their target leverage and a decreasing (increasing) function for firms above their target leverage. In addition, the higher the marginal tax rates the higher the likelihood of issuing debt rather than equity. Higher marginal tax rate discourages firms that issue pure equity from repurchasing debt, and encourages firms that issue pure debt to repurchase equity. The net loss carry forward encourages firms to substitute debt for equity and discourages firms from substitute equity for debt. This suggests that firms suffering from a net loss carry forward, attempt to reduce their interest payment obligation by reducing the debt levels through equity issue.

The market-timing hypothesis finds a strong support for both the choice and the size of the financing form. Stock price run up increases (decreases) the likelihood of issuing (repurchasing) equity, while the size of equity issue (repurchase) relative to the financing deficit (surplus) is an increasing (decreasing) function of the stock prices run up. Higher stock prices increase the likelihood of debt repurchases and encourage firms to repurchase more debt and to substitute debt for equity.

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Appendix A1:

Fama-French industry classifications - 48 industry group

1-Agriculture
0100-0199 Agric production - crops
0200-0299 Agric production - livestock
0700-0799 Agricultural services
0910-0919 Commercial fishing
2048-2048 Prepared feeds for animals

2-Food Products
2000-2009 Food and kindred products
2010-2019 Meat products
2020-2029 Dairy products
2030-2039 Canned-preserved fruits
2040-2046 Flour and other grain mill products
2050-2059 Bakery products
2060-2063 Sugar and confectionery products
2070-2079 Fats and oils
2090-2092 Misc food preps
2095-2095 Roasted coffee
2098-2099 Misc food preparations

4-Beer & Liquor
2080-2080 Beverages
2082-2082 Malt beverages
2083-2083 Malt
2084-2084 Wine
2085-2085 Distilled and blended liquors

6-Recreation
0920-0999 Fishing, hunting & trapping
3650-3651 Household audio visual equip
3652-3652 Phonographic records
3732-3732 Boat building and repair
3930-3931 Musical instruments
3940-3949 Toys

7-Entertainment
7800-7829 Services - motion picture production and distribution
7830-7833 Services - motion picture theatres
7840-7841 Services - video rental
7900-7900 Services - amusement and recreation
7910-7911 Services - dance studios
7920-7929 Services - bands, entertainers
7930-7933 Services - bowling centers
7940-7949 Services - professional sports
7980-7980 Amusement and recreation services (?)
7990-7999 Services - misc entertainment

8-Printing and Publishing
2700-2709 Printing publishing and allied
2710-2719 Newspapers: publishing-printing
2720-2729 Periodicals: publishing-printing
2730-2739 Books: publishing-printing
2740-2749 Misc publishing
2770-2771 Greeting card publishing
2780-2789 Book binding
2790-2799 Service industries for print trade

9-Consumer Goods
2047-2047 Dog and cat food
2391-2392 Curtains, home furnishings
2510-2519 Household furniture
2590-2599 Misc furniture and fixtures
2840-2843 Soap & other detergents
2844-2844 Perfumes cosmetics
3160-3161 Luggage
3170-3171 Handbags and purses

33-Personal Services
7020-7021 Rooming and boarding houses
7030-7033 Camps and recreational vehicle parks
7200-7200 Services - personal
7210-7212 Services - laundry, cleaners
7214-7214 Services - diaper service
7215-7216 Services - coin-op cleaners, dry cleaners
7217-7217 Services - carpet, upholstery cleaning
7219-7219 Services - laundry, cleaners
7220-7221 Services - photo studios, portrait
7230-7231 Services - beauty shops
7240-7241 Services - barber shops
7250-7251 Services - shoe repair
7260-7269 Services - funeral
7270-7290 Services - miscellaneous
7291-7291 Services - tax return
7292-7299 Services - Miscellaneous 7395-7395 Services – photo finishing labs (School pictures)
7500-7500 Services - auto repair, services
7520-7529 Services - automobile parking
7530-7539 Services - auto repair shops
7540-7549 Services - auto services, except repair (car washes)
7600-7600 Services - Misc repair services
7620-7620 Services - Electrical repair shops
7622-7622 Services - Radio and TV repair shops
7623-7623 Services - Refridg and air conditioner repair
7629-7629 Services - Electrical repair shops
7630-7631 Services - Watch, clock and jewelry repair
7640-7641 Services - Reupholster, furniture repair
7690-7699 Services - Misc repair shops
8100-8199 Services - legal
8200-8299 Services - educational
8300-8399 Services - social services
8400-8499 Services - museums, galleries, botanic gardens
8600-8699 Services - membership organizations
8800-8899 Services - private households

34-Business Services
2750-2759 Commercial printing
3993-3993 Signs, advertising specialty
7218-7218 Services - industrial launderers
7300-7300 Services - business services
7310-7319 Services - advertising
7320-7329 Services - credit reporting agencies, collection services
7330-7339 Services - mailing, reproduction, commercial art
7340-7342 Services - services to dwellings, other buildings
7349-7349 Services - cleaning and builging maint
7350-7351 Services - misc equip rental and leasing
7352-7352 Services - medical equip rental
7353-7353 Services - heavy construction equip rental
7359-7359 Services - equip rental and leasing
7360-7369 Services - personnel supply services
7370-7372 Services - computer programming and data processing
7374-7374 Services - computer processing, data prep
7375-7375 Services - information retrieval services
7376-7376 Services - computer facilities management service
7377-7377 Services - computer rental and leasing
7378-7378 Services - computer maintenance and repair
7379-7379 Services - computer related services
7380-7380 Services - misc business services
7381-7382 Services - security

9-Consumer Goods

3172-3172 Personal leather goods, except handbags
3190-3199 Leather goods
3229-3229 Pressed and blown glass
3260-3260 Pottery and related products
3262-3263 China and earthenware table articles
3269-3269 Pottery products
3230-3231 Glass products
3630-3639 Household appliances
3750-3751 Motorcycles, bicycles and parts (Harley & Huffy)
3800-3800 Misc inst, photo goods, watches
3860-3861 Photographic equip (Kodak etc, but also Xerox)
3870-3873 Watches clocks and parts
3910-3911 Jewelry-precious metals
3914-3914 Silverware
3915-3915 Jewelers' findings, materials
3960-3962 Costume jewelry and notions
3991-3991 Brooms and brushes
3995-3995 Burial caskets

10-Apparel

2300-2390 Apparel and other finished products
3020-3021 Rubber and plastics footwear
3100-3111 Leather tanning and finishing
3130-3131 Boot, shoe cut stock, findings
3140-3149 Footwear except rubber
3150-3151 Leather gloves and mittens
3963-3965 Fasteners, buttons, needles, pins

11-Healthcare

8000-8099 Services - health

12-Medical Equipment

3693-3693 X-ray, electro medical app
3840-3849 Surg & med instru
3850-3851 Ophthalmic goods

13-Pharmaceutical Products

2830-2830 Drugs
2831-2831 Biological products
2833-2833 Medicinal chemicals
2834-2834 Pharmaceutical preparations
2835-2835 In vitro, in vivo diagnostics
2836-2836 Biological products, except diagnostics

14-Chemicals

2800-2809 Chemicals and allied products
2810-2819 Industrial inorganical chems
2820-2829 Plastic material & synthetic resin
2850-2859 Paints
2860-2869 Industrial organic chems
2870-2879 Agriculture chemicals
2890-2899 Misc chemical products

15-Rubber and Plastic Products

3031-3031 Reclaimed rubber
3041-3041 Rubber & plastic hose and belting
3050-3053 Gaskets, hoses, etc
3060-3069 Fabricated rubber products
3070-3079 Misc rubber products (?)
3080-3089 Misc plastic products
3090-3099 Misc rubber and plastic products (?)

16-Textiles

2200-2269 Textile mill products
2270-2279 Floor covering mills
2280-2284 Yarn and thread mills
2290-2295 Misc textile goods
2297-2297 Nonwoven fabrics

34-Business Services

7383-7383 Services - news syndicates
7384-7384 Services – photo finishing labs
7385-7385 Services - telephone interconnections
7389-7390 Services - misc business services
7391-7391 Services - R&D labs
7392-7392 Services - management consulting & P.R.
7393-7393 Services - detective and protective (ADT)
7394-7394 Services - equipment rental & leasing
7396-7396 Services - trading stamp services
7397-7397 Services - commercial testing labs
7399-7399 Services - business services
7510-7519 Services - truck, auto, trailer rental and leasing
8700-8700 Services - engineering, accounting, research, management
8710-8713 Services - engineering, accounting, surveying
8720-8721 Services - accounting, auditing, bookkeeping
8730-8734 Services - research, development, testing labs
8740-8748 Services - management, public relations, consulting
8900-8910 Services - misc
8911-8911 Services - engineering & architect
8920-8999 Services - misc

35-Computers

3570-3579 Office computers
3680-3680 Computers
3681-3681 Computers - mini
3682-3682 Computers - mainframe
3683-3683 Computers - terminals
3684-3684 Computers - disk & tape drives
3685-3685 Computers - optical scanners
3686-3686 Computers - graphics
3687-3687 Computers - office automation systems
3688-3688 Computers - peripherals
3689-3689 Computers - equipment
3695-3695 Magnetic and optical recording media
7373-7373 Computer integrated systems design

36-Electronic Equipment

3622-3622 Industrial controls
3661-3661 Telephone and telegraph apparatus
3662-3662 Communications equipment
3663-3663 Radio TV comm equip & apparatus
3664-3664 Search, navigation, guidance systems
3665-3665 Training equipment & simulators
3666-3666 Alarm & signaling products
3669-3669 Communication equipment
3670-3679 Electronic components
3810-3810 Search, detection, navigation, guidance
3812-3812 Search, detection, navigation, guidance

37-Measuring and Control Equipment

3811-3811 Engr lab and research equipment
3820-3820 Measuring and controlling equipment
3821-3821 Lab apparatus and furniture
3822-3822 Automatic controls - Envir and applic
3823-3823 Industrial measurement instru
3824-3824 Totalizing fluid meters
3825-3825 Elec meas & test instr
3826-3826 Lab analytical instruments
3827-3827 Optical instr and lenses
3829-3829 Meas and control devices
3830-3839 Optical instr and lenses

38-Business Supplies

2520-2549 Office furniture and fixtures
2600-2639 Paper and allied products

16-Textiles
2298-2298 Cordage and twine
2299-2299 Misc textile products
2393-2395 Textile bags, canvas products
2397-2399 Misc textile products

17-Construction Materials
0800-0899 Forestry
2400-2439 Lumber and wood products
2450-2459 Wood buildings-mobile homes
2490-2499 Misc wood products
2660-2661 Building paper and board mills
2950-2952 Paving & roofing materials
3200-3200 Stone, clay, glass, concrete etc
3210-3211 Flat glass
3240-3241 Cement hydraulic
3250-3259 Structural clay prods
3261-3261 Vitreous china plumbing fixtures
3264-3264 Porcelain electrical supply
3270-3275 Concrete gypsum & plaster
3280-3281 Cut stone and stone products
3290-3293 Abrasive and asbestos products
3295-3299 Non-metalic mineral products
3420-3429 Handtools and hardware
3430-3433 Heating equip & plumbing fix
3440-3441 Fabicated struct metal products
3442-3442 Metal doors, frames
3446-3446 Architectual or ornamental metal work
3448-3448 Pre-fab metal buildings
3449-3449 Misc structural metal work
3450-3451 Screw machine products
3452-3452 Bolts, nuts screws
3490-3499 Misc fabricated metal products
3996-3996 Hard surface floor cover

18-Construction
1500-1511 Build construction - general contractors
1520-1529 Gen building contractors - residential
1530-1539 Operative builders
1540-1549 Gen building contractors - non-residential
1600-1699 Heavy Construction - not building contractors
1700-1799 Construction - special contractors

19-Steel Works Etc
3300-3300 Primary metal industries
3310-3317 Blast furnaces & steel works
3320-3325 Iron & steel foundries
3330-3339 Prim smelt-refin nonfer metals
3340-3341 Secondary smelt-refin nonfer metals
3350-3357 Rolling & drawing nonferous metals
3360-3369 Non-ferrous foundries and casting
3370-3379 Steel works etc
3390-3399 Misc primary metal products

20-Fabricated Products
3400-3400 Fabricated metal, except machinery and trans eq
3443-3443 Fabricated plate work
3444-3444 Sheet metal work
3460-3469 Metal forgings and stampings
3470-3479 Coating and engraving

21-Machinery
3510-3519 Engines & turbines
3520-3529 Farm and garden machinery
3530-3530 Constr, mining material handling machinery
3531-3531 Construction machinery
3532-3532 Mining machinery, except oil field
3533-3533 Oil field machinery

38-Business Supplies
2670-2699 Paper and allied products
2760-2761 Manifold business forms
3950-3955 Pens pencils and office supplies

39-Shipping Containers
2440-2449 Wood containers
2640-2659 Paperboard containers, boxes, drums, tubs
3220-3221 Glass containers
3410-3412 Metal cans and shipping containers

40-Transportation
4000-4013 Railroads-line haul
4040-4049 Railway express service
4100-4100 Transit and passenger trans
4110-4119 Local passenger trans
4120-4121 Taxicabs
4130-4131 Intercity bus trans (Greyhound)
4140-4142 Bus charter
4150-4151 School buses
4170-4173 Motor vehicle terminals, service facilities
4190-4199 Misc transit and passenger transportation
4200-4200 Motor freight trans, warehousing
4210-4219 Trucking
4220-4229 Warehousing and storage
4230-4231 Terminal facilities - motor freight
4240-4249 Transportation
4400-4499 Water transport
4500-4599 Air transportation
4600-4699 Pipelines, except natural gas
4700-4700 Transportation services
4710-4712 Freight forwarding
4720-4729 Travel agencies, etc
4730-4739 Arrange trans - freight and cargo
4740-4749 Rental of railroad cars
4780-4780 Misc services incidental to trans
4782-4782 Inspection and weighing services
4783-4783 Packing and crating
4784-4784 Fixed facilities for vehicles, not elsewhere classified
4785-4785 Motor vehicle inspection
4789-4789 Transportation services

41-Wholesale
5000-5000 Wholesale - durable goods
5010-5015 Wholesale - autos and parts
5020-5023 Wholesale - furniture and home furnishings
5030-5039 Wholesale - lumber and construction materials
5040-5042 Wholesale - professional and commercial equipment and supplies
5043-5043 Wholesale - photographic equipment
5044-5044 Wholesale - office equipment
5045-5045 Wholesale - computers
5046-5046 Wholesale - commerical equip
5047-5047 Wholesale - medical, dental equip
5048-5048 Wholesale - ophthalmic goods
5049-5049 Wholesale - professional equip and supplies
5050-5059 Wholesale - metals and minerals
5060-5060 Wholesale - electrical goods
5063-5063 Wholesale - electrical apparatus and equipment
5064-5064 Wholesale - electrical appliance TV and radio
5065-5065 Wholesale - electronic parts
5070-5078 Wholesale - hardware, plumbing, heating equip
5080-5080 Wholesale - machinery and equipment
5081-5081 Wholesale - machinery and equipment (?)
5082-5082 Wholesale - construction and mining equipment
5083-5083 Wholesale - farm and garden machinery
5084-5084 Wholesale - industrial machinery and equipment

21-Machinery
3534-3534 Elevators
3535-3535 Conveyors
3536-3536 Cranes, hoists
3538-3538 Machinery
3540-3549 Metalworking machinery
3550-3559 Special industry machinery
3560-3569 General industrial machinery
3580-3580 Refrig & service ind machines
3581-3581 Automatic vending machines
3582-3582 Commercial laundry and drycleaning machines
3585-3585 Air conditioning, heating, refrid eq
3586-3586 Measuring and dispensing pumps
3589-3589 Service industry machinery
3590-3599 Misc industrial and commercial equipment and mach

22-Electrical Equipment
3600-3600 Elec mach eq & supply
3610-3613 Elec transmission
3620-3621 Electrical industrial appar
3623-3629 Electrical industrial appar
3640-3644 Electric lighting, wiring
3645-3645 Residential lighting fixtures
3646-3646 Commercial lighting
3648-3649 Lighting equipment
3660-3660 Communication equip
3690-3690 Miscellaneous electrical machinery and equip
3691-3692 Storage batteries
3699-3699 Electrical machinery and equip

23-Automobiles and Trucks
2296-2296 Tire cord and fabric
2396-2396 Auto trim
3010-3011 Tires and inner tubes
3537-3537 Trucks, tractors, trailers
3647-3647 Vehicular lighting
3694-3694 Elec eq, internal combustion engines
3700-3700 Transportation equipment
3710-3710 Motor vehicles and motor vehicle equip
3711-3711 Motor vehicles & car bodies
3713-3713 Truck & bus bodies
3714-3714 Motor vehicle parts
3715-3715 Truck trailers
3716-3716 Motor homes
3792-3792 Travel trailers and campers
3790-3791 Misc trans equip
3799-3799 Misc trans equip

24-Aircraft
3720-3720 Aircraft & parts
3721-3721 Aircraft
3723-3724 Aircraft engines, engine parts
3725-3725 Aircraft parts
3728-3729 Aircraft parts

25-Shipbuilding, Railroad Equipment
3730-3731 Ship building and repair
3740-3743 Railroad Equipment

27-Precious Metals
1040-1049 Gold & silver ores

28-Non-Metallic and Industrial Metal Mining
1000-1009 Metal mining
1010-1019 Iron ores
1020-1029 Copper ores
1030-1039 Lead and zinc ores
1050-1059 Bauxite and other aluminum ores
1060-1069 Ferroalloy ores
1070-1079 Mining

41-Wholesale
5085-5085 Wholesale - industrial supplies
5086-5087 Wholesale - machinery and equipment (?)
5088-5088 Wholesale - trans eq except motor vehicles
5090-5090 Wholesale - misc durable goods
5091-5092 Wholesale - sporting goods, toys
5093-5093 Wholesale - scrap and waste materials
5094-5094 Wholesale - jewelry and watches
5099-5099 Wholesale - durable goods
5100-5100 Wholesale - nondurable goods
5110-5113 Wholesale - paper and paper products
5120-5122 Wholesale - drugs & propietary
5130-5139 Wholesale - apparel
5140-5149 Wholesale - groceries & related prods
5150-5159 Wholesale - farm products
5160-5169 Wholesale - chemicals & allied prods
5170-5172 Wholesale - petroleum and petro prods
5180-5182 Wholesale - beer, wine
5190-5199 Wholesale - non-durable goods

42-Retail
5200-5200 Retail - bldg material, hardware, garden
5210-5219 Retail - lumber & other building mat
5220-5229 Retail
5230-5231 Retail - paint, glass, wallpaper
5250-5251 Retail - hardward stores
5260-5261 Retail - nurseries, lawn, garden stores
5270-5271 Retail - mobile home dealers
5300-5300 Retail - general merchandise stores
5310-5311 Retail - department stores
5320-5320 Retail - general merchandise stores (?)
5330-5331 Retail - variety stores
5334-5334 Retail - catalog showroom
5340-5349 Retail
5390-5399 Retail - Misc general merchandise stores
5400-5400 Retail - food stores
5410-5411 Retail - grocery stores
5412-5412 Retail - convenience stores
5420-5429 Retail - meat, fish mkt
5430-5439 Retail - fruite and vegatable markets
5440-5449 Retail - candy, nut, confectionary stores
5450-5459 Retail - dairy product stores
5460-5469 Retail - bakeries
5490-5499 Retail - miscellaneous food stores
5500-5500 Retail - auto dealers and gas stations
5510-5529 Retail - auto dealers
5530-5539 Retail - auto and home supply stores
5540-5549 Retail - gasoline service stations
5550-5559 Retail - boat dealers
5560-5569 Retail - recreational vehicle dealers
5570-5579 Retail - motorcycle dealers
5590-5599 Retail - automotive dealers
5600-5699 Retail - apparel & acces
5700-5700 Retail - home furniture and equipment stores
5710-5719 Retail - home furnishings stores
5720-5722 Retail - household appliance stores
5730-5733 Retail - radio, TV and consumer electronic stores
5734-5734 Retail - computer and computer software stores
5735-5735 Retail - record and tape stores
5736-5736 Retail - musical instrument stores
5750-5799 Retail
5900-5900 Retail - misc
5910-5912 Retail - drug & proprietary stores
5920-5929 Retail - liquor stores
5930-5932 Retail - used merchandise stores

28-Non-Metallic and Industrial Metal Mining
1080-1089 Mining services
1090-1099 Misc metal ores
1100-1119 Anthracite mining
1400-1499 Mining and quarrying non-metalic minerals

30-Petroleum and Natural Gas
1300-1300 Oil and gas extraction
1310-1319 Crude petroleum & natural gas
1320-1329 Natural gas liquids
1330-1339 Petroleum and natural gas
1370-1379 Petroleum and natural gas
1380-1380 Oil and gas field services
1381-1381 Drilling oil & gas wells
1382-1382 Oil-gas field exploration
1389-1389 Oil and gas field services
2900-2912 Petroleum refining
2990-2999 Misc petroleum products

31-Utilities
4900-4900 Electric, gas, sanitary services
4910-4911 Electric services
4920-4922 Natural gas transmission
4923-4923 Natural gas transmission-distr
4924-4925 Natural gas distribution
4930-4931 Electric and other services combined
4932-4932 Gas and other services combined
4939-4939 Combination utilities
4940-4942 Water supply

32-Communication
4800-4800 Communications
4810-4813 Telephone communications
4820-4822 Telegraph and other message communication
4830-4839 Radio-TV Broadcasters
4840-4841 Cable and other pay TV services
4880-4889 Communications
4890-4890 Communication services (Comsat)
4891-4891 Cable TV operators
4892-4892 Telephone interconnect
4899-4899 Communication services

42-Retail
5940-5940 Retail - misc
5941-5941 Retail - sporting goods stores, bike shops
5942-5942 Retail - book stores
5943-5943 Retail - stationery stores
5944-5944 Retail - jewelry stores
5945-5945 Retail - hobby, toy and game shops
5946-5946 Retail - camera and photo shop
5947-5947 Retail - gift, novelty
5948-5948 Retail - luggage
5949-5949 Retail - sewing & needlework stores
5950-5959 Retail
5960-5969 Retail - non-store retailers (catalogs, etc)
5970-5979 Retail
5980-5989 Retail - fuel & ice stores (Penn Central Co)
5990-5990 Retail - retail stores
5992-5992 Retail - florists
5993-5993 Retail - tobacco stores
5994-5994 Retail - newsdealers
5995-5995 Retail - computer stores
5999-5999 Retail stores

43-Restaraunts, Hotels, Motels
5800-5819 Retail - eating places
5820-5829 Restaraunts, hotels, motels
5890-5899 Eating and drinking places
7000-7000 Hotels, other lodging places
7010-7019 Hotels motels
7040-7049 Membership hotels and lodging
7213-7213 Services - linen

48-Miscellaneous

3999-3999 Misc manufacturng industries
4950-4959 Sanitary services
4960-4961 Steam, air conditioning supplies
4970-4971 Irrigation systems
4990-4991 Cogeneration - SM power producer

VITA

Joseph Farhat was born in Amman, Jordan in 1969. He received his bachelor degree in Economics from Zagazig University in 1991. In 1997, he received his Master of Science in Economics from the University of Jordan. Joseph worked as instructor of Economics at the Hashemite University.

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DOCTORAL EXAMINATION REPORT

CANDIDATE: Joseph Basheer Farhat

MAJOR FIELD: Financial Economics

TITLE OF DISSERTATION: "Essays on the Dynamics of Capital Structure"

APPROVED:

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