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Determinants of Capital Structure Policy - Analysis of Airline Industry

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This study aims to understand the determinants of capital structure policy of airline industry. It examines the relevance of different debt theories in the context of airline industry. Using a sample of 50 airline firms, the average leverage of airline firms was found to be 3.66. Three different measures of leverage were regressed upon variables representing size, cash flow, profitability, growth, investment opportunities, risk, liquidity and efficiency measures. This study documents positive relationship between leverage and profitability as predicted by the tradeoff theory. It also finds some evidence for signaling theory. Profitable firms signal higher cash flow generation capacity of the firm and uses higher leverage. The negative relationship between leverage and growth confirms the prediction of tradeoff theory.

Keywords: capital structure, leverage, profitability, tradeoff theory, signaling theory pecking order theory, airline industry

Introduction

Airlines Industry is basically a highly seasonal industry and its earnings are affected by fluctuations in energy prices or economic downturns. It is a part of network infrastructure industry. The specific characteristics of airline industry emerged due to decline in overall volumes on airline networks and the viability of the network business travel pricing model of the hub and spoke airlines. Economic recessions, volatile and incremental fuel prices, terrorist attacks have caused airline revenues to drop significantly in the past few decades. The process of deregulation and the subsequent process of privatization have induced important changes in the structure of the airline market. The emerging forms of business models in the airline industry can be characterized in terms of how the carrier generates revenues, its product offerings, value added services and revenue sources. The three main sets of airline business models can be classified as Full service carrier, low cost carrier and charter carrier. The sharp rise in oil prices since the year 2003, have compelled airline industry to search new methods for maintaining cost efficiency. Network costs are driven by economy of scope, economy of density and route length. The international air transport faces numerous challenges ranging from geopolitics compulsions, demographic shifts and environmental concerns. During the past few decades, the airline industry has witnessed significant changes like increased market share of low cost carriers. The sharp rise in oil prices since the year 2003, have compelled airline industry to search new methods for maintaining cost efficiency. Network costs are driven by economy of scope, economy of density and route length. The international air transport faces numerous challenges ranging from geopolitics compulsions, demographic shifts and environmental concerns. During the past few decades, the airline industry has witnessed significant changes like increased market share of low cost carriers. The origins and development of the airline industry have been heavily influenced by governments, whether through regulation, investment in infrastructure, or support for flagship carriers. The capital intensive nature of airline industry is characterized by significant investment in building infrastructure along with acquisition and maintenance of aircraft and other equipment. Hence airline companies are high debt intensity companies. Increased leverage leads to greater risk exposure for shareholders.

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Theoretical Postulates

The academic debate on corporate financial policy are classified within the perspective of taxes, contracting costs and information costs. One of the biggest advantage of debt financing is the interest tax shield deductibility. On account of debt financing, the expected tax liability of firms is lowered and as a result after tax cash flows are increased. In other words, higher leverage lowers the corporate tax rate and increases the value of firms on account of increased after tax cash flows. The benefits from interest tax shield is also determined by other tax shields such as investment tax credits or tax loss carryforwards. It can be stated that holding all else equal,

firms with more investment tax credits or tax loss carryforwards should have lower leverage ratios. Debt financing is a more attractive financing vehicle than equity since tax laws allow firms to deduct interest payments on debt from taxable income but do not provide a similar deduction for cash flows from equity.

The contracting costs theory suggest that financial managers set leverage targets by means of balancing the tax benefits of high leverage against greater probability of higher expected costs of financial distress. This leads to underinvestment problem. As debt increases, the expected costs of financial distress increases. The indirect costs of bankruptcy are huge compared to its direct costs. For example, in the context of bankruptcy, firms initiate reductions in capital investment projects which would lead to value reductions for such firms. In the context of bankruptcy possibilities, it is observed that firms reduce discretionary expenditures such as R&D investment and advertising. Hence it can be stated that firms whose value components basically composed of intangible investment opportunities or growth options will tend to have lower debt ratios. In other words, firms with higher intangible investment opportunities tend to have lower debt ratios and suffer from highest loss in value from underinvestment problem. Mature companies with low growth characteristics tend to have higher leverage ratios than high growth firms. High growth firms tend to have lower leverage ratios and are characterized by underinvestment problems. The contracting cost hypothesis predicts that tangible assets in place provide good collateral for loans while intangible investment opportunities do not.

Agency costs is referred to as the conflict of interests which exist among different stakeholders of a firm. Agency costs theory suggest that misalignment of interests between shareholders and managers lead to agency problems. Managerial empire building motives leads to agency problems among managers. In the context of agency costs, managers seek to grow the firm beyond its optimal size or to maintain unutilized resources with the goal of increasing personal utility from status, power, compensation and prestige. Debt can be used as a tool to discipline managers as the presence of leverage compels firms to use cash flows to systematically payoff interest payments. It can be implied that higher leverage leads to lower agency costs.

Optimal debt ratio is obtained as the tradeoff of the costs and benefits of borrowing. The tradeoff theory suggests that capital structure is determined by the tradeoff between the benefits of debt and costs of debt. The tradeoff theory suggest that profitable firms have lower expected costs of financial distress and its interest tax shields are more valuable.

Information costs theory is based on the existence of information disparity between managers and investors. Information cost theories consists of two distinct but related theories of financing decisions namely signaling and pecking order theory. Signaling theory suggest that increasing leverage signifies that the firm has the ability to generate cash flows and enhance the value of the firm. Increase of leverage signals the higher cash flow generation capacity of the firm. Higher leverage may signal the firm's commitment to make future interest payments on account of the confidence that the firm have sufficient cash flows to meet these obligations. Managers of firms who believe that their assets are undervalued will generally choose to issue debt and use equity as a last resort. It can be stated that a firm would more likely to issue debt than equity if the firm is undervalued and issue stock rather than debt if the firm is overvalued. Pecking order theory suggest that firms prefer internally generated retained funds rather than external funding. The theory suggest that retained earnings are a better source of funds than outside financing. Firms with few investment opportunities and substantial free cash flows will have low debt ratios. High growth firms with lower operating cash flows will have high debt ratios. Low growth firms with high free cash flow will have relatively low debt ratios. The objectives offered by pecking order theory are inconsistent with the contracting cost theories. The signaling theory suggests that companies are more likely to issue debt than equity when they are undervalued.

Objective of the study

This research paper analyzes the determinants of the debt policy of Airline Industry. The study examines the relevance of various debt theories in the airline industry sector.

Review of literature

The theory of capital structure had been one of the most debated topics in the field of finance. Optimal capital structure was basically considered as the tradeoff between the tax advantage of debt and various leverage related costs such as bankruptcy costs, agency costs of debt and loss of non-debt tax shields (DeAngelo and Masulis, 1980); (Kim, 1978). The basic agency cost model of debt was given by Jensen and Meckling (1976) and Myers (1977). Jensen (1986) postulated that managers with discretionary spending power over cash flow make wasteful investments with firm's free cash flows. Jensen (1986), suggest that debt reduces agency costs of free cash flow by means of reducing the cash flow available for spending at the discretion of managers. DeAngelo and Masulis (1980), suggest that the possibility of losing non-debt tax shields create a substitution effect between the level of non-debt tax shields and the tax benefits of corporate leverage. Studies have shown that firms with more investment tax credits or tax loss carryforwards have lower leverage ratios to reflect the lower value of their debt tax shields. (Bradley, Jarrell and Kim, 1984), (Titman and Wessel, 1988), (Barclay, Smith and Watts, 1995). The study by Harris and Raviv (1991), suggest that leverage increases with fixed assets, non-debt tax shields, investment

opportunities, firm size and decreases with volatility, advertising expenditures, probability of bankruptcy and profitability. Non-debt tax shields, volatility, collateral value or future growth has no effect on debt ratios (Titman and Wessels,1988). Profitable firms use more debt. Higher expected profitability leads to higher benefits of debt and lower costs of financial distress. Bradley, Jarrell and Kim (1984), suggest that leverage ratios will be negatively related to the volatility of firm earnings in the context of financial distress costs like bankruptcy costs and agency costs of debt. Bradley, Jarrell and Kim (1984), find that firms with high market to book ratio have significantly lower leverage ratios than firms with low market to book ratios. Most highly leveraged industries are mature in nature with high asset intensity. Growth industries have lowest debt ratios with high advertising and R&D intensity (Long and Malitz,1985). Leverage is lower for firms with high market to book ratios and higher for firms with higher ratios of fixed assets to total assets (Rajan and Zingales,1995). The main determinants of capital structure are stock returns, asset structure, profitability and industry classification (Yang et al., 2010). Firms expecting higher future growth ought to use greater amount of equity finance. Higher the size of the firm, lower the probability of bankruptcy and higher supply of debt will result. Myers and Majluf (1984) predict a negative relationship between profitability and leverage. Bradley, Jarrell and Kim (1984), finds that debt ratio is lower for firms with more volatile operating income. Firms with high investment opportunities (market to book ratios) have higher costs of financial distress. Firms with higher R&D and advertising tend to have higher agency costs since the assets are intangible and difficult to liquidate. Williamson (1981) found negative relationship between unlevered betas and level of borrowing. Lower the firm's profits and operating cash flows, the higher is the leverage in terms of book value or market values (Kester, 1986), (Rajan and Zingales, 1995), (Titman and Wessel, 1988). The following studies have established negative relation between profitability and leverage (Titman and Wessel, 1988), (Rajan and Zingales, 1995), (Frank and Goyal, 2009).

Hypothesis

Airline industry are high debt intensity sector. The various debt theories can be examined within the perspective of airline sector.

Firms with higher intangible investment opportunities will have lower debt ratios. Companies with high market to book ratio will have significantly lower leverage ratios than with companies with low market to book ratios.

Pecking order theory suggests that firms with few investment opportunities and substantial free cash flows will have low debt ratios. Firms with higher investment opportunities have lower price to book ratios.

Higher debt disciplines managers and reduces agency costs and increases firm value. Higher R&D and advertisement intensity increases agency costs from the perspective of lenders and lower debt ratios. Higher leverage lowers agency costs.

The debt ratio is inversely related to the variability of firm value, if the costs of financial distress are significant. Firms with more volatile operating income will have higher bankruptcy costs, borrow less, and have less debt ratio. In adverse selection condition, tangibility increases adverse selection and results in higher leverage.

Data and Methodology

We have examined the determinants of capital structure in the airline industry. The sample firms were selected based on average market capitalization for the past five years. The sample size was 50. Linear Regression model was used to examine the determinants of financial policy in the airline industry sector. The variables representing leverage was regressed on various independent variables representing size, profitability, investment opportunities and tangibility. The financial variables used were the average values for the past five years. Three regression models were used to analyze the determinants of capital structure in the airline industry. In the first model, debt equity ratio was the dependent variable and in the next model, debt to total assets was the dependent variable. In the third model total assets to equity was the dependent variable.

Data and Methodology

The study was based on 54 largest airlines in the world selected on the basis of market capitalization. The largest airline selected had market capitalization of $39905 million while the smallest airline had market capitalization of $1408 million.

Regression Models

$$DER=\alpha+\beta1LOGTA+\ \beta2LOGREV+\ \beta3OP/TA+\ \beta4NP/REV+\ \beta5OPM\ +\ \beta6EPS+\ \beta7ROE\ +\ \beta8ROA+\ \beta9ROFA+\ \beta10REVGR5+\ \beta11PE+\ \beta12P/S+\ \beta13TOBINQ+\ \beta14BETA+\ \beta15QR+\ \beta16CR+\ \beta17SA/TA-\ Model\ 1$$

$$DTA=\alpha+\beta1LOGTA+\ \beta2LOGREV+\ \beta3OP/TA+\ \beta4NP/REV+\ \beta5OPM\ +\ \beta6EPS+\ \beta7ROE\ +\ \beta8ROA+\ \beta9ROFA+\ \beta10REVGR5+\ \beta11PE+\ \beta12P/S+\ \beta13TOBINQ+\ \beta14BETA+\ \beta15QR+\ \beta16CR+\ \beta17SA/TA-\ Model\ 2$$

$$TA/TE=\alpha+\beta1LOGTA+\ \beta2LOGREV+\ \beta3OP/TA+\ \beta4NP/REV+\ \beta5OPM\ +\ \beta6EPS+\ \beta7ROE\ +\ \beta8ROA+\ \beta9ROFA+\ \beta10REVGR5+\ \beta11PE+\ \beta12P/S+\ \beta13TOBINQ+\ \beta14BETA+\ \beta15QR+\ \beta16CR+\ \beta17SA/TA-\ Model\ 3$$

Table 1 Variable Definition
The financial variables used were average values for the past five years.

Variable	Definition	Proxy for parameters
DER	Debt Equity Ratio	Leverage
DTA	Debt to Total Assets	Leverage
TA/TE	Total Assets to Total Equity	Leverage
LOGTA	Log of Total Assets	Size
LOGREV	Log of Total Revenues	Size
OP/TA	Operating Profit/Total Assets	Cash Flows
NP/REV	Net Profit/Rev	Cash Flows
OPM	Operating Margin	Profitability
EPS	EPS	Profitability
ROE	Return on Equity	Profitability
ROA	Return on Asset	Profitability
ROFA	Return on Fixed Assets	Profitability
REVGR5	Revenue growth for five years	Growth
PE	Price to Earnings Ratio	Investment Opportunities
P/S	Price to Sales Ratio	Investment Opportunities
TOBINQ	Market Cap to Book Value of Assets	Investment Opportunities
BETA	Systematic Risk Measure beta	Risk Measure
QR	Quick Ratio	Liquidity
CR	Current Ratio	Liquidity
SA/TA	Total Sales to Total Assets	Efficiency Measure

Descriptive Statistics
The average market capitalization of the 50 firms was $8.547 billion. The standard deviation of the market capitalization amounted to $8.932 billion dollars. The average revenues of these 50 airline firms were $9.879 billion. The maximum revenue generated amounted to $40.18 billion dollars. The average operating and net profit for the 50 airline firms amounted to $1.0875 and $0.628 billion dollars.

Table 2 Financial Highlights of Airline firms in the latest available year

	Mean	Median	Max	Min	Standard deviation
Market Capitalization	8547.7	5107.8	39905.1	1408.8	8932.0
Revenues	9879.2	5411.1	40180.0	22.0	10720.0
Total Assets	2303.6	7474.0	51274.0	883.4	13540.1
Operating Profit	1087.5	467.5	6952.0	-291.0	1529.7
Net Profit	628.1	272.4	4373.0	-557.2	891.4

Table 3 Descriptive Statistics - Financial Variables

Variable	Mean	Median	Max	Min	Standard deviation
DER	3.63	2.71	16.9	0.53	3.72
DTA	0.72	0.53	1.3	0.35	0.19
TA/TE	4.65	3.71	17.9	1.53	3.71
LOGTA	22.82	22.73	24.7	20.60	1.10
LOGREV	22.41	22.41	24.4	16.93	1.46
OP/TA	0.08	0.07	0.2	-0.02	0.06
NP/REV	0.32	0.06	12.8	-0.05	2.40
OPM	15.27	9.69	247.5	-2.97	45.34
EPS	6.17	1.2	85.7	-2.60	18.62
ROE	20.67	18.16	88.2	-35.77	24.75
ROA	5.76	5.26	24.9	-3.55	5.91
ROFA	8.75	7.39	38.5	-4.95	9.53
REVGR5	6.29	6.06	27.3	-22.74	8.79
PE	17.93	11.69	116.8	3.93	22.29
P/S	1.41	0.86	16.3	0.21	2.96
TOBINQ	0.84	0.553	3.3	0.15	0.72
BETA	0.90	0.94	2.2	-0.43	0.58
QR	0.85	0.79	1.9	0.18	0.42
CR	0.90	0.86	2.0	0.05	0.44
SA/TA	0.79	0.77	1.7	0.02	0.34

The above table provides the descriptive statistics for all the financial variables. The airline industry is highly leveraged industry as observed from the average values of three different leverage ratios namely DER, DTA and TA/TE. The standard deviation of DER is higher than the mean suggesting variations in the leverage values of firms. The average operating margin of the airline industry amounted to 15.27 per cent. The average return on equity was 20.67 per cent. The average PE ratio was 17.93.

Results and Interpretations

In the first regression model, the leverage variable of debt to equity was regressed on various variables representing size, cash flow, profitability, growth, investment opportunities, risk, liquidity and efficiency measures.

Table 4 Regression Model 1
Dependent variable: natural log of (1+ increase in UTB due to current year positions)

Regression Equation

DER = 12.3 - 1.17 LOGTA + 0.85 LOGREV
- 44.3 OP/TA - 19.3 NP/REV
+ 0.311 OPM - 0.0465 EPS
+ 0.2235 ROE - 0.879 ROA
+ 0.256 ROFA - 0.1029 REVGR5
- 0.0019 PE - 0.04 P/S
+ 1.69 TOBINQ - 0.551 BETA
- 8.4 QR + 7.4 CR - 1.46 SA/TA

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
1.35545	92.04%	84.07%	37.65%

Coefficients

Term	Coef	SE Coef	T-Value	P-Value	VIF
Constant	12.9	12.3	1.05	0.308	
LOGTA	-0.86	4.00	-0.22	0.831	342.50
LOGREV	0.55	3.94	0.14	0.890	356.67
OP/TA	-44.3	30.9	-1.43	0.170	57.03
NP/REV	-19.9	28.8	-0.69	0.498	55.69
OPM	0.312	0.203	1.54	0.142	40.92
EPS	-0.0477	0.0881	-0.54	0.595	12.14
ROE	0.2236	0.0238	9.38	0.000	4.65
ROA	-0.881	0.714	-1.23	0.234	151.12
ROFA	0.259	0.191	1.35	0.193	41.39
REVGR5	-0.1044	0.0827	-1.26	0.224	5.72
PE	-0.0023	0.0432	-0.05	0.959	3.36
P/S	-0.08	1.51	-0.05	0.961	31.08
TOBINQ	1.76	2.38	0.74	0.469	37.61
BETA	-0.548	0.822	-0.67	0.514	3.81
QR	-8.6	10.8	-0.80	0.436	350.73
CR	7.6	10.8	0.70	0.492	346.48
SA/TA	-1.24	5.75	-0.22	0.831	52.46

The adjusted R square value was 0.84. It means that 84 per cent of variation in leverage was explained by independent variables. Debt equity ratio is positively related to the profitability variable of ROE with statistical significance at all levels. The t statistic value was 9.34.

Table 5 Regression Model 2
In the regression model 2, debt to total assets (DTA) was regressed on all independent variables.

Regression Equation

DTA = 0.841 - 0.293 LOGTA + 0.294 LOGREV
- 1.95 OP/TA - 0.58 NP/REV + 0.0178 OPM
- 0.00004 EPS + 0.00367 ROE - 0.0120 ROA
-0.0043 ROFA + 0.00715 REVGR5
- 0.00040 PE+ 0.0098 P/S - 0.035 TOBINQ
+ 0.0126 BETA - 0.125 QR + 0.119 CR
- 0.077 SA/TA

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
0.0768955	80.58%	61.16%	0.00%

Coefficients

Term	Coef	SE Coef	T-Value	P-Value	VIF
Constant	0.841	0.700	1.20	0.247	
LOGTA	-0.293	0.228	-1.29	0.216	342.50
LOGREV	0.294	0.225	1.31	0.208	356.67
OP/TA	-1.95	1.76	-1.10	0.285	57.03
NP/REV	-0.58	1.64	-0.35	0.727	55.69
OPM	0.0178	0.0115	1.54	0.142	40.92
EPS	-0.00004	0.00502	-0.01	0.993	12.14
ROE	0.00367	0.00136	2.70	0.015	4.65
ROA	-0.0120	0.0407	-0.30	0.771	151.12
ROFA	-0.0043	0.0109	-0.39	0.701	41.39
REVGR5	0.00715	0.00471	1.52	0.148	5.72
PE	-0.00040	0.00246	-0.16	0.872	3.36
P/S	0.0098	0.0863	0.11	0.911	31.08
TOBINQ	-0.035	0.136	-0.26	0.801	37.61
BETA	0.0126	0.0468	0.27	0.791	3.81
QR	-0.125	0.617	-0.20	0.842	350.73
CR	0.119	0.615	0.19	0.849	346.48
SA/TA	-0.077	0.328	-0.23	0.818	52.46

The adjusted R square value was 61%. In the model, the leverage variable of debt to total assets was positively

related to profitability ratio ROE with statistical significance at 5% and 10% level of significance.

Table 6 Regression Model 3
In this model, the leverage variable of total assets to total equity was regressed on various independent variables reflecting different parameters.

Regression Equation

TA/TE =12.9 - 0.86 LOGTA + 0.55 LOGREV
- 44.3 OP/TA - 19.9 NP/REV + 0.312 OPM
- 0.0477 EPS+ 0.2236 ROE - 0.881 ROA
+ 0.259 ROFA - 0.1044 REVGR5
- 0.0023 PE - 0.08 P/S+ 1.76 TOBINQ
- 0.548 BETA - 8.6 QR + 7.6 CR
- 1.24 SA/TA

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
1.34935	92.08%	84.15%	39.43%

Coefficients

Term	Coef	SE Coef	T-Value	P-Value	VIF
Constant	12.9	12.3	1.05	0.308	
LOGTA	-0.86	4.00	-0.22	0.831	342.50
LOGREV	0.55	3.94	0.14	0.890	356.67
OP/TA	-44.3	30.9	-1.43	0.170	57.03
NP/REV	-19.9	28.8	-0.69	0.498	55.69
OPM	0.312	0.203	1.54	0.142	40.92
EPS	-0.0477	0.0881	-0.54	0.595	12.14
ROE	0.2236	0.0238	9.38	0.000	4.65
ROA	-0.881	0.714	-1.23	0.234	151.12
ROFA	0.259	0.191	1.35	0.193	41.39
REVGR5	-0.1044	0.0827	-1.26	0.224	5.72
PE	-0.0023	0.0432	-0.05	0.959	3.36
P/S	-0.08	1.51	-0.05	0.961	31.08
TOBINQ	1.76	2.38	0.74	0.469	37.61
BETA	-0.548	0.822	-0.67	0.514	3.81
QR	-8.6	10.8	-0.80	0.436	350.73
CR	7.6	10.8	0.70	0.492	346.48
SA/TA	-1.24	5.75	-0.22	0.831	52.46

The adjusted R square value was 84 per cent. The profitability ratio of ROE is positively related to leverage with statistical significance at all levels. The t value was 9.38.

Table 7 Regression Model

In the model, the debt equity ratio was regressed upon select independent variables to avoid multi collinearity problems.

Regression Equation

DER =5.40 + 0.047 LOGTA - 0.2257 OPM
+ 0.1874 ROE - 0.1081 REVGR5
+ 0.0190 PE - 1.19 QR- 0.554 BETA
- 3.58 SA/TA - 0.273 TOBINQ

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
1.66814	81.39%	75.19%	33.05%

The adjusted R square value was 75%.

Coefficients

Term	Coef	SE Coef	T-Value	P-Value	VIF
Constant	5.40	9.15	0.59	0.560	
LOGTA	0.047	0.363	0.13	0.898	1.88
OPM	-0.2257	0.0538	-4.19	0.000	1.90
ROE	0.1874	0.0236	7.93	0.000	3.05
REVGR5	-0.1081	0.0602	-1.79	0.084	2.05
PE	0.0190	0.0414	0.46	0.650	2.06
QR	-1.19	1.01	-1.17	0.251	2.23
BETA	-0.554	0.590	-0.94	0.356	1.30
SA/TA	-3.58	1.66	-2.16	0.040	2.86
TOBINQ	-0.273	0.758	-0.36	0.722	2.49

The leverage ratio is negatively related to operating profit margin (OPM) and positively related to ROE with statistical significance. The variable representing revenue growth REVGR is negatively related to the leverage ratio with statistical significance.

Conclusion

This study aims to understand the determinants of capital structure policy of airline industry. The paper examines the relevance of different debt theories in the context of airline industry. The study was based on a sample size of 50 airline firms. The average leverage of airline firms was 3.66. The study uses regression analysis to understand the determinants of leverage. Three different measures of leverage were regressed upon variables representing size, cash flow, profitability, growth, investment opportunities, risk, liquidity and efficiency measures. The study documents positive relationship between leverage and profitability as predicted by the tradeoff theory. Profitable firms signal higher cash flow generation capacity of the firm and uses higher leverage. Thus the study finds some evidence for signaling theory. The negative relationship between leverage and growth confirms the prediction of tradeoff theory.

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