“Capital structures of surviving Fortune 500 companies: A retrospective analysis for the past seven decades”

AUTHORS	Wenjuan Xie

ARTICLE INFO	Wenjuan Xie (2024). Capital structures of surviving Fortune 500 companies: A retrospective analysis for the past seven decades. *Investment Management and Financial Innovations*, *21*(1), 98-115. doi:10.21511/imfi.21(1).2024.09
DOI	http://dx.doi.org/10.21511/imfi.21(1).2024.09
RELEASED ON	Tuesday, 30 January 2024
RECEIVED ON	Friday, 01 December 2023
ACCEPTED ON	Thursday, 18 January 2024

JOURNAL	"Investment Management and Financial Innovations"
ISSN PRINT	1810-4967
ISSN ONLINE	1812-9358
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
34	5	7

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

Wenjuan Xie (USA)

CAPITAL STRUCTURES OF SURVIVING FORTUNE 500 COMPANIES: A RETROSPECTIVE ANALYSIS FOR THE PAST SEVEN DECADES

Abstract

Sixty companies on the inaugural "Fortune 500" list still remained on this list in 2020 and they have monotonically increased their leverage (median debt to total assets ratio rose from 0.5% to 20.4%) over the past 70 years. This study applies factors from classic capital structure theories to this sample and explains the dynamic choice of debt usage. The methods employed include a Bayesian information criterion selection process of explanatory variables and a set of pooled cross section and panel tests with 3,536 firm-year observations. The tests use an array of factors extracted from several established theories on capital structure, including general economic growth, tax rate, interest rate and many company-specific variables proxying profitability and growth opportunities. The firm-level results first provide support to the free cash flow theory and confirm that company size and fixed assets proportion are the two factors associated with increased borrowing. Firms in the sample also actively respond to certain debt market and macroeconomic conditions, and their leverage ratio is significantly associated with credit spread and real interest rate. Further tests across subperiods and with risk measures illustrate the impact of expected inflation, investments activities, and stock volatility, providing supporting evidence to the organizational theory. The main research conclusion is that large US companies adopt a balance sheet-based approach to increase the use of debt, and they stay sensitive and versatile to market conditions and risk landscape.

Keywords leverage, cost of capital, tax, interest rate, large-cap, capital structure, growth, risk

JEL Classification G30, G32

Received on: 1st of December, 2023
Accepted on: 18th of January, 2024
Published on: 30th of January, 2024

Wenjuan Xie, Ph.D., Associate Professor of Finance, Paul College of Business and Economics, University of New Hampshire, USA.

Conflict of interest statement:
Author(s) reported no conflict of interest

INTRODUCTION

As capital structure is a central topic in corporate finance, there is a vibrant strand of studies documenting and explaining the use of debt. Chronologically, the academic explanations for U.S. publicly traded corporations were taxes followed by bankruptcy costs and then agency costs. Today, over 65 years have passed since the original Modigliani and Miller (1958) piece set in motion what Myers (1993) called "the search for an optimal capital structure." During this time, the US economy experienced many changes in the tax code, interest rates, equity capital costs, inflation, government stimulus, corporate profitability, economic growth, and international competitions. A series of theories have also been developed to explain the dynamics of financial leverage in corporate America.

This study applies factors extracted from classic capital structure theories to the examination of large public companies' capital structure, and it aims to address the research question on what key factors from

http://dx.doi.org/10.21511/imfi.21(1).2024.09

the firms and the macroeconomy are significantly associated with increased use of debt. The research design in this paper rigorously selects factors, comprehensively models a panel data sample, and provides support to the free cash flow theory and organizational theory.

1. LITERATURE REVIEW AND HYPOTHESES

This study joins and contributes to the contemporary theories of capital structure, which have their origin in Modigliani and Miller's 1958 seminal work, "*The cost of capital, corporation finance, and the theory of investment*." This article is generally regarded as one of the watershed pieces that led to the application of scientific principles to problems in finance even though it provides no explanation for the financing decisions observed in practice (Smith, 1990). Since then, countless papers have been written about the financial structure decision with the aim of explaining possible connections between the financing and the market value of a company. For example, Rajan and Zingales (1995) study international data, Titman (2002) applies the theorem to integrated financial markets, and Welch (2004) and Warusawitharana and Whited (2016) further examine the dynamic of capital structure and equity capital markets.

For expository purposes, the theories can be categorized as the static tradeoff theory, the free cash flow theory and the pecking order theory, which is more a description of observed behavior than a theory *per se*. However, the theories are not mutually exclusive. The following paragraphs individually summarize and contrast four theories of financial structure, laying out the key factors to be considered in each theory, and connecting them to the construction of empirical tests in this study.

The static tradeoff theory recognizes the fact that tax plays an important role in the determination of capital structure. Modigliani and Miller show that an advantage for debt financing over equity financing existed when interest was a tax-deductible expense (Modigliani & Miller, 1963). However, the use of debt is accompanied by disadvantages. Two of the first to be identified are bankruptcy and financial distress costs. Bankruptcy and financial distress costs are assumed to increase with leverage ratios, and eventually these costs offset the tax benefits of debt leading to an optimal capital structure that maximizes (minimizes) the market value (cost of capital) of a company. The literature went on to identify more disadvantages associated with increases of leverage, such as the agency costs created by conflicts of interest between creditors and shareholders (Jensen & Meckling 1976). As a firm takes on more and more debt, creditors become concerned about the "games" managers and owners can play that will benefit the managers and owners at the expense of the creditors. Hence, creditors place more and more restrictions in the loans and charge higher interest rates. These creditor reactions exacerbate the financial distress costs and offset the tax advantages of borrowing. The static trade off theory guides this study by identifying key factors that have been found to be associated with leverage and summarized in many studies such as Hennessy and Whited (2005), Barry et al. (2008), Campello et al. (2010), and He et al. (2021): tax rate, bankruptcy (financial distress) cost, macroeconomic conditions, and agency cost. Free cash flow theory is then developed with a specific identification of the conflicts of interest between managers and shareholders, as elaborated in Jensen and Meckling (1976) and further developed in the last few decades by numerous studies such as Jensen (1986), Graham and Harvey (2001), Fee et al. (2013), and Graham et al. (2015). Here, agency costs arise because managers expand the firm at the expense of its owners by making negative net present value (NPV) investments and using cash to consume perks rather than distributing it to the shareholders. To discourage these managerial actions, firms are advised to finance with debt rather than equity to ensure the investments are not made and the cash is not used for the benefit of the managers but rather to finance the company's growth. This theory provides further agency-cost related variables as mentioned in Frank and Goyal (2009) and to be added to this study: firm size, growth opportunities, and asset structure.

The pecking order theory further develops the debate by proposing the key assumption of the existence of asymmetric information between managers and public investors. As argued in Myers and

Majluf (1984) and Gorton and Pennacchi (1990), because managers have more or better information than outside investors, outside investors are skeptical whenever managers raise funds by selling equity capital. Investors take this as a sign that the company is overvalued. This asymmetry causes managers to prefer using inside equity (retention of earnings) as their first financing choice, followed by debt and lastly by issuing new shares of common stock. The more profitable a firm is, the less debt or new equity it will need to issue to finance growth opportunities. Pecking order theory does not assume an optimal capital structure or target debt ratio. However, it also does not negate the advantages of tax shields or the costs of financial distress. What it predicts, other things being equal, is that firms needing more than internally generated funds for undertaking investment opportunities will exhibit increasing leverage ratios. Many succeeding studies provide evidence of the validity of this theory, including Holmström and Tirole (1998), Lins et al. (2010), and Begenau (2020), among others. Recently using Slovakian data, Horváthová et al. (2022) find an ROE threshold based nonlinear leverage trajectory. The key factors that further help explain leverage in this study are thus extracted from previous empirical studies, including measures of profitability and information asymmetry.

The final strand of literature focuses on a relatively newer "organizational theory". Myers (1993), drawing on the work of Treynor (1981) and Donaldson (1984), extends the pecking order theory into an organizational theory of capital structure. These papers propose that firms maximize organizational wealth, defined as the market value of shareholders' equity plus a more insider-driven employee surplus (future value of perks, overstaffing and above market wages). Organizational theory makes a similar prediction as that of the pecking order theory, especially with the abundance of cash. Debt capital will be used to fund growth if internally generated funds are not sufficient. However, when investment opportunities do not increase in proportion to internally generated funds, the "excess" cash flow will mean that debt financing will not be needed to finance the positive NPV investments – over time, the debt ratio will fall as existing debt is paid off. These points have been illustrated in extensive research such as Graham and Leary (2011), Denis and McKeon (2012), DeAngelo and Roll (2015), and Huang and Ritter (2021). Additional factors, such as the investment sensitivity to internally available cash flows and the need/preparation for future external financing and investments (Poursoleyman et al. 2023), are also associated with maximizing long-term organizational wealth, and are included in this study in the exploration of determinants of the structure of debt.

Guided by these theories and prior empirical research and observing the stylized fact of almost monotonically increased debt ratio of the large firms in the sample, this study serves the purpose of jointly considering all theories and identifying how their representative factors are associated with leverage. Three testable hypotheses are thus developed as:

H1: The change in leverage ratio is positively associated with firm size, information asymmetry, and a firm's need for capital.

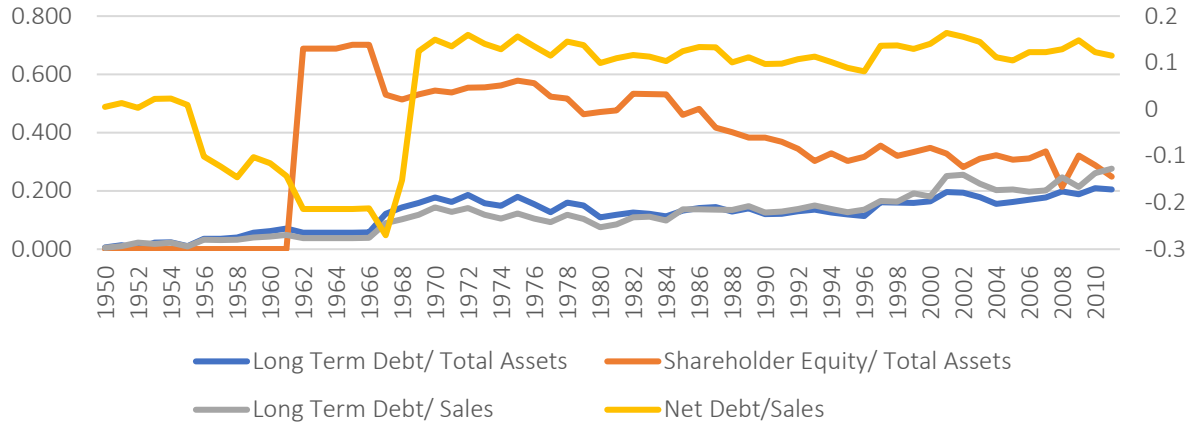
H2: The change in leverage ratio is negatively associated with the cost of debt and firm profitability.

H3: The change in leverage ratio is positively associated with tax rate and the cost of equity.

2. DATA, METHODS, AND RESEARCH ANALYSIS

This study employs quantitative multivariate methods and disentangle variables having positive and negative explanatory powers as outlined in the testable hypotheses. It constructs a sample that covers the 1950-2020 annual data of the 60 companies that were on the 1955 inaugural list of Fortune 500 and remain on the list in 2020. Data sources are COMPUSTAT, CRSP, Bureau of Labor Statistics, National Bureau of Economic Research, Federal Reserve Bank of St. Louis, Moody's, Bureau of Economic Analysis, Federal Reserve Bank of New York, and Nobel Laureate Professor Robert Shiller's website. All variable definitions follow prior research and are required to be non-missing. In addition, all independent variables need to have one-year lagged values. The final sample has 3,536 pooled firm-year observations.

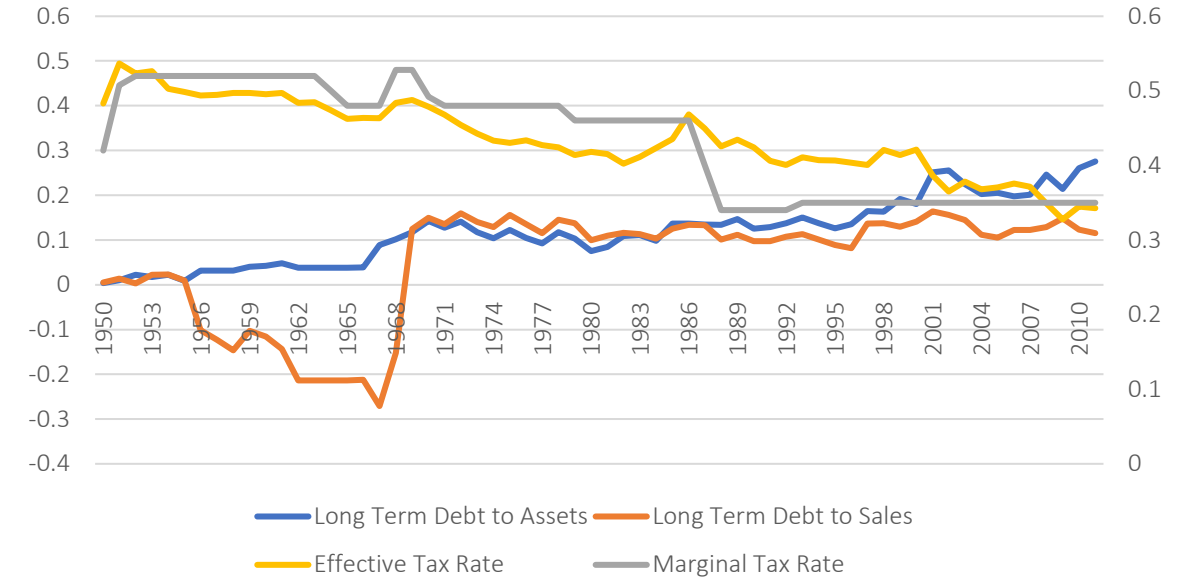
http://dx.doi.org/10.21511/imfi.21(1).2024.09



Note: The left scale applies to LT debt/total assets, Shareholder equity/total assets, and LT debt/sales. The right scale applies to net debt/sales.

Figure 1. Trends of median leverage ratios

To emphasize the stylized fact that leads to the empirical examinations in this study, a few figures are first presented. What needs to be explained for the surviving Fortune 500 companies is the almost monotonic increase in leverage from 1950 through 2020. This long-term trend is apparent in Figure 1 where four different measures of financial leverage are plotted: long-term debt to total assets, common stockholders' equity to total assets, long-term debt to sales, and net debt (long-term debt minus cash) to total assets. Although all measures are book value based and possibly subject to accounting choice distortions, the variety of them in utilizing information from different financial statements mitigates the concern to a certain extent. What is readily apparent in Figure 1 is the long-term trend increase in financial leverage since 1950 for the surviving Fortune 500 companies. The median long-term debt to total assets ratio rose from 0.5% to 20.4% and the median net debt to total sales rose from a negative 0.05% to 11.5%. The median long-term debt to sales rose from 0.4% to 27.5%. Some cyclicality exists around the long-term trend – especially in the 1970s and late 2000s – but it is the long-term trend that calls for further exploration. So, how well, if at all, do



Note: The left scale applies to the effective tax rate, long-term debt/assets, and net debt/sales. The right scale applies to the marginal tax rate.

Figure 2. Median leverage and tax rates

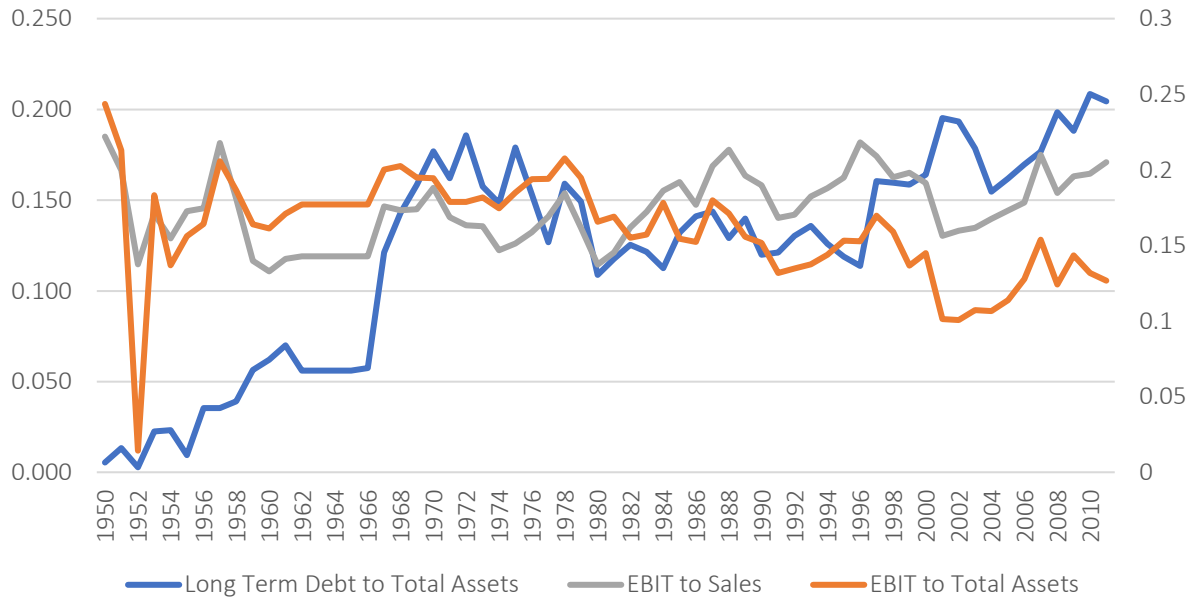
the factors identified in existing theories of capital structure explain this trend?

A few representative factors are plotted next for trend analyses. Figure 2 focuses on the basics of the static trade-off theory and contains a time-series graph of annual marginal and effective tax rates, the median long-term debt to total assets, and net debt to sales ratios. The marginal corporate tax rate dropped continuously from 42% to 21%. The effective corporate tax rate dropped from 40% to a low of 17.2%. During these years, leverage ratios rose on average, suggesting that they are not explained by the trends in either effective or marginal tax rates.

Moving on to firm-specific performance, which is a key factor in the pecking order theory, Figure 3 presents a time-series annual plot of selected median before tax profitability measures (EBIT to assets and EBIT to sales) against the median long-term debt to total assets ratio. In general, the debt to asset ratio has behaved as expected with respect to the before tax profit measures in the first two and a half decades: when before tax profitability exhibited a general trend of decline, leverage went up. However, in recent decades the correlation is mixed: despite an increase in the operating return on assets and no trend in operating profit margin, the debt ratio continues to increase.

Further attention is turned to growth opportunities (proxied by firm size), a key factor in the free cash flow theory. Figure 4 is a time-series plot of the yearly mean total assets value expressed in 2005 dollars (converted using the GDP implicit price deflator) as a multiple of its value in 1950. In real terms, the median surviving firm in 2020 was 36.2 times bigger than it was in 1950. This long-term growth in the size of the firms, especially the accelerated growth in the recent two and a half decades, is positively correlated with the increase in leverage ratios, as illustrated by the mean long-term debt to assets ratio in this figure. Not included in this figure but included in later empirical analyses are measures of operating leverage and asset structure (the portion of long-term fixed assets). A mixed but generally increasing trend in fixed assets is consistent with the overall growth in total assets and with the expectation that increased leverage should be associated with growth and increased operating leverage.

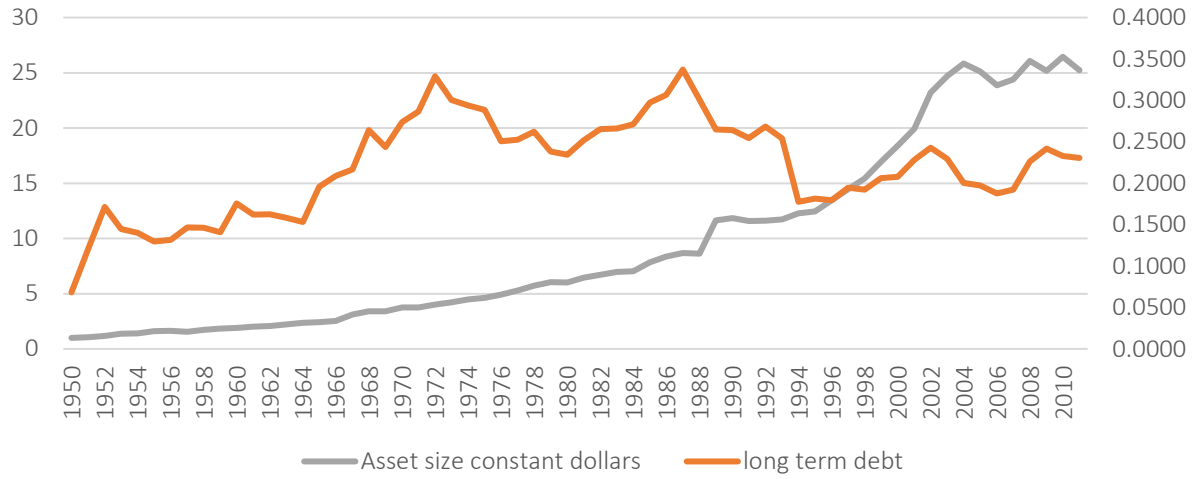
The final quick check before formalizing the empirical methods framework is driven by the relative cost of capital as outlined in Fama and French (2002) and recently examined in Wang et al. (2020), which is relevant to all capital structure theories examined thus far. Presumably, decreases (increases) in the relative cost of equity should be associated with reductions (increases) in leverage.



Note: The left scale applies to LT debt/total assets and EBIT/assets. The right scale applies to EBIT/sales.

Figure 3. Median leverage and before-tax profitability

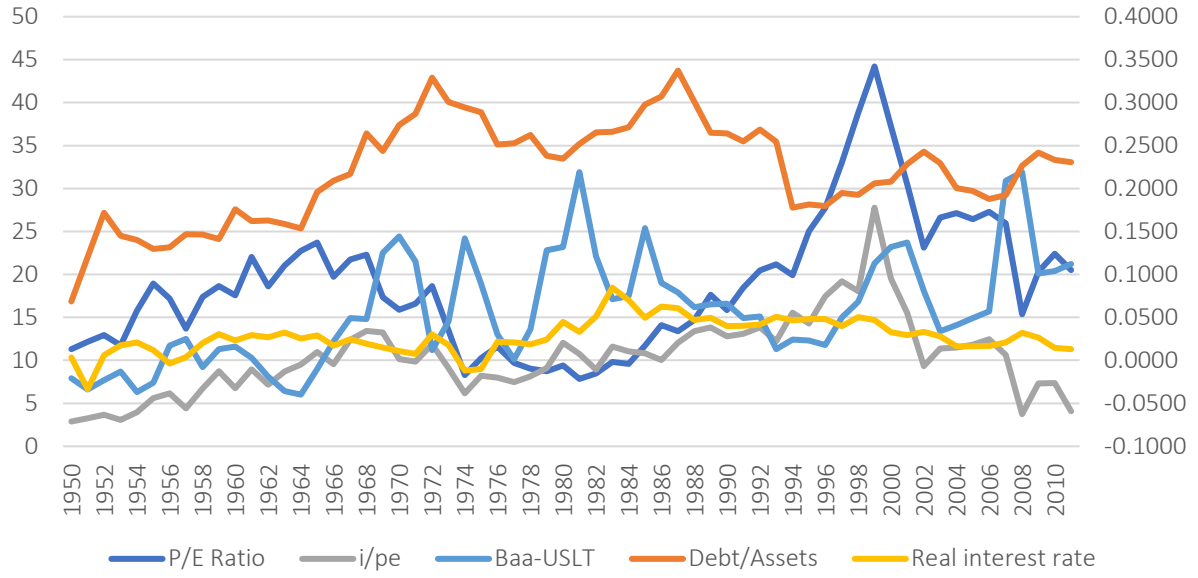
http://dx.doi.org/10.21511/imfi.21(1).2024.09



Note: The left scale applies to asset size expressed in multiples of the 1950 value. The right scale applies to the ratio of long-term debt/asset.

Figure 4. Mean asset size (2005 constant dollars) vs. mean long-term debt

The question becomes: How to measure the relative cost of debt and equity? Figure 5 presents four measures: the 10-year average cyclically adjusted P/E ratios (cost of equity), the ratio of 10X long-term interest rates to P/E ratios (relative cost of equity), the yield spread between Baa corporate rated debt and long-term government (USLT) bonds (10X percentage, risk premium), and the real interest rate (the long-term government bond rate minus the GDP price deflator). Comparing the trends of these measures to that of the debt/asset ratio, it is hard to draw clear cut conclusions consistent with theories. For example, in the recent decades when P/E ratio and equity risk premium declined, debt ratio did not decrease as expected, but exhibited an upward trend. An exception is the observation that real interest rate is associated with leverage as expected: in most years of rising interest rates, debt ratio declined, and vice versa. The pattern suggests that leverage was sensitive to the level of real interest rates, and it is consistent with the finding of Barry et al. (2008). They "find strong evidence that the amount of debt issued and the number of debt issues are related to the absolute



Note: The left scale applies to P/E ratio, 10X interest rate to PE ratio, and 10X Baa – USLT yield spread percentage. The right scale applies to the ratio of debt/assets and real interest rate.

Figure 5. Cost of capital

level of interest rates and to their levels relative to historical rates" (Barry et al., 2008, p. 429).

With all these helpful but inconclusive single-pair trend analyses, this study takes a holistic approach and constructs an empirical framework linking leverage to a battery of major variables driving the contemporary financial structure theories and a group of macroeconomic variables as summarized in Barry et al. (2008).

Employing a sample of balanced longitudinal data and a procedure of multivariate regressions after a Bayesian information criterion (BIC) based core variables vector selection, this study tests the relationship between capital structure (proxied by leverage ratios) and a series of firm-year variables ($X_{i,t}$) and a vector of macroeconomic variables (Y_t) that are drawn from the theories, which controlling for the macroeconomic conditions. The baseline methods include a pooled cross-sectional regression and a panel data regression, depending on whether controlling for firm fixed effects:

$$Leverage\ ratio_{i,t} = \alpha + \beta \cdot \left(X_{i,t-1}\right) + \gamma \cdot \left(Y_{t-1}\right) + \varepsilon_{i,t}. \quad (1)$$

All variable definitions can be found in Appendix A. The dependent variable is mainly the leverage ratio, and following prior literature, three alternative definitions of book leverage ratio are used: Total debt, long-term debt, and net debt separately divided by total book assets. For robustness checks, the ratio of total debt divided by market value of assets is also used.

The independent variables are the following one-year lagged factors, reflecting a collection of those representing the various capital theories as well as those from considerations of the general economy and debt market conditions. Macroeconomic variables Y_t include: effective tax rate, top statutory tax rate, GDP growth, unemployment rate, recession period dummy, expected inflation rate, credit spread, real interest rate, and S&P 500 average P/E ratio. Firm variables $X_{i,t}$ include: firm size, fixed asset proportion, operating income, net income, market-to-book ratio, and capital expenditure. All firm-level variables are normalized by total assets.

Tables 1 presents the summary statistics of all firm-level variables expressed by decades, with the recent two decades divided by the 2008 financial crisis. A first glance discovers many similar patterns of the key variables as illustrated by the previous graphic presentations. For example, the absolute value of debt and the leverage ratios all exhibit monotonic increases, while company characteristics and macroeconomic conditions have various turbulences.

Table 2 presents the mean statistics of all macroeconomic variables expressed by decades, with the recent two decades divided by the 2008 financial

Table 1. Descriptive statistics of firm variables

	1950–1959	1960–1969	1970–1979	1980–1989	1990–1999	2000–2007	2008–2020
Obs.	531	529	529	529	529	423	466
Total Assets	686.51	1429.75	3722.24	11106.34	28269.40	54940.86	67799.72
Total Sales (Revenue)	820.47	1704.73	5019.57	12368.72	22026.18	39012.24	50506.58
Long-term debt	59.17	141.02	463.94	1681.02	5390.20	12941.66	16132.74
Cash	49.53	71.61	76.53	330.42	877.08	2985.53	5750.07
Net debt (Long-term debt minus cash)	9.64	69.41	387.41	1350.60	4513.12	9956.13	10382.67
EBIT	152.94	299.05	796.74	1820.42	3781.92	68888.86	8821.72
EBITDA	119.06	219.40	584.02	1225.59	2592.68	5016.29	6450.98
Long-term debt to total assets	0.09	0.10	0.12	0.15	0.19	0.24	0.24
Shareholders' equity to total assets	0.00	0.71	0.52	0.40	0.24	0.25	0.30
Long-term debt to total sales	0.07	0.08	0.09	0.14	0.24	0.33	0.32
Net debt to total assets	0.01	0.05	0.10	0.12	0.16	0.18	0.15
EBIT to total assets	0.22	0.21	0.21	0.16	0.13	0.25	0.13
EBIT to total sales	0.19	0.18	0.16	0.15	0.17	0.77	0.17

Note: The total number of observations is 3,536, and decade-mean statistics are reported. All dollar amounts are in thousands, and all ratios are in plain numbers. See Appendix A for detailed variable definitions.

http://dx.doi.org/10.21511/imfi.21(1).2024.09

Table 2. Mean statistics of macroeconomic variables

	1950-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000-2007	2008-2020
Obs.	10	10	10	10	10	8	12
Top statutory tax rate	0.51	0.51	0.48	0.43	0.35	0.35	0.32
Effective tax rate	0.44	0.40	0.33	0.31	0.28	0.23	0.17
Unemployment rate (%)	4.51	4.78	6.21	7.27	5.75	5.04	8.34
NBER defined recession years	4.00	3.00	5.00	3.00	2.00	1.00	2.00
Baa corporate bond annual yield (%)	3.91	5.64	9.30	12.81	8.54	7.09	6.31
Long-term government bond annual rate (%)	2.90	4.56	7.29	10.55	6.60	4.81	3.07
GDP price inflation annual rate (%)	2.46	2.41	6.66	4.69	2.22	2.56	1.70
Real interest rate (%)	0.43	2.15	0.63	5.86	4.37	2.25	1.37

Note: See Appendix A for detailed variable definitions.

crisis. The continuous reduction in statutory and effective tax rates is observed, as well as helpful statistics in key indicators of economic growth and debt market conditions. The trends of these variables are not clearly related to changes in large companies' leverage choices, neither positively nor negatively. A multivariate empirical analysis follows to find out the inherent associations of certain variables, as well as to reflect on the application of capital structure theories in these contexts.

3. RESULTS

Before the start of the baseline empirical test, it is helpful to evaluate the relevant significance of association between individual factors and the main dependent variable. A selection of core vector of variables is thus conducted using a process similar to Frank and Goyal (2009, Table III). Specifically, the process begins with a regression that includes all factors (catering to different capital structure theories and somewhat correlated), and the study of the R^2 and the Bayesian information criterion (BIC). Several worst performing variables are dropped consequently. Largely reducing redundancy and noise, this study arrives at a list of most relevant firm independent variables: size, profitability, fixed assets proportion, market-to-book ratio, and capital expenditure. The macroeconomic variables selected are top statutory tax rate, expected inflation, GDP growth, S&P 500 average P/E ratio, credit spread, and real interest rate.

Table 3 presents the regression analysis of the baseline model using only the firm variables. The three columns present results using three different definitions of the dependent variable: total debt, long-term debt, and net debt, all normalized by total assets. The results illustrate that the two strongest firm factors are increases in the size of these firms and growth of the relative amount of fixed assets. Their positive significant association with leverage is robust across three different definitions of leverage used as the dependent variable. The economic magnitude is also significant. For example, a 1% increase in the fixed asset proportion is associated with 14 basis point increase in the net debt ratio. Market-to-book and capital expenditure are weakly associated with long-term debt (column 2), but they lack explanatory power in the other two specifications.

While profitability does not seem to have explanatory power in this set of results, one can reconcile with the contemplation that these firms' consistent positive performance mitigates the speculation of debt issuance timing game, making the leverage decision relatively insensitive to whether it was a high profit or low profit year. Finally, the market-to-book and capital expenditure results appear to indicate an association of growth opportunity related debt market timing, which leads to the next set of empirical analysis. These results provide evidence that *H1* holds.

In Table 4 the model specification is expanded to include six macroeconomic variables previously selected by a quick check of single R^2 and BIC: top statutory tax rate, expected inflation, GDP growth, S&P 500 average P/E ratio, credit spread, and real interest rate. The three different definitions of the dependent variable continued to be used. With the addition of macroeconomic variables, the model's coefficient of determination improves, it provides some interesting new results. First, the top statutory tax rate and GDP growth do not explain the increase of debt, showing that the simple tax considerations and the economic

Table 3. Firm factors associated with leverage

	Total Debt / Book Assets	LT Debt / Book Assets	Net Debt / Book Assets
	(1)	(2)	(3)
Total assets	0.0121***	0.0099***	0.0108***
	(0.0037)	(0.0029)	(0.0031)
Operating income	–0.1146	–0.1462	–0.1323*
	(0.0820)	(0.0989)	(0.0693)
Net income	–0.1451	–0.2012	–0.1971
	(0.1792)	(0.1996)	(0.1889)
Fixed assets	0.1651***	0.1226***	0.1428***
	(0.0448)	(0.0405)	(0.0466)
Mkt/Bk	0.0009	0.0011*	0.0010
	(0.0006)	(0.0006)	(0.0007)
CapEx	0.0984	0.0931*	0.1002
	(0.0622)	(0.0489)	(0.0711)
Adjusted R^2	0.17	0.14	0.13
Obs.	3,536	3,536	3,536

Note: Variables are defined as in Appendix A. Standard errors are in parentheses. * indicates significance at the 0.10 level, *** indicates significance at the 0.01 level.

cyclicality fail to influence the debt decisions of these large firms in the sample. This reinforces the observations from the previous time-series graphs.

Second, Table 4 shows that debt ratio is significantly positively related to credit spread, and negatively associated with real interest rate. The

Table 4. Firm factors and macroeconomic conditions: book value-based leverage

	Total Debt / Book Assets	LT Debt / Book Assets	Net Debt / Book Assets
	(1)	(2)	(3)
Total assets	0.0109***	0.0112***	0.0098***
	(0.0032)	(0.0033)	(0.0029)
Operating income	–0.1091	–0.1382	–0.1281
	(0.0795)	(0.0862)	(0.0737)
Net income	–0.1502	–0.1992	–0.1672
	(0.1481)	(0.1752)	(0.1653)
Fixed assets	0.1372***	0.1183***	0.1264***
	(0.0419)	(0.0443)	(0.0501)
Mkt/Bk	0.0006	0.0009	0.0008
	(0.0005)	(0.0006)	(0.0006)
CapEx	0.0638	0.0875	0.0986*
	(0.0498)	(0.0562)	(0.0523)
Top stat. tax rate	–0.1074	–0.1252	–0.1198
	(0.0986)	(0.1076)	(0.1224)
Expected inflation	0.3982	0.5561	0.7002*
	(0.2576)	(0.3581)	(0.3550)
GDP growth	0.2111	0.3071	0.2658
	(0.1782)	(0.2298)	(0.1994)
S&P 500 P/E	0.0002	–0.0001	0.0002*
	(0.0001)	(0.0001)	(0.0001)
Credit spread	0.1214***	0.1731***	0.1554***
	(0.0319)	(0.0423)	(0.0377)
Real interest rate	–0.0562***	–0.0621***	–0.0595***
	(0.0116)	(0.0165)	(0.0172)
Adjusted R^2	0.31	0.26	0.28
Obs.	3,536	3,536	3,536

Note: Variables are defined as in Appendix A. Standard errors are in parentheses. * indicates significance at the 0.10 level, *** indicates significance at the 0.01 level.

http://dx.doi.org/10.21511/imfi.21(1).2024.09

economic magnitude is also comparable to that in prior literature: the net debt ratio increases by 16 basis point per 1% of credit spread increase, and it drops by 6 basis point per 1% rise of real interest rate. The explanatory power of these two variables is robust across three different definitions of leverage used as the dependent variable.

Third, Table 4 shows that the expected inflation is positively associated with increased debt but does not exhibit statistical significance (except for net debt ratio, column 3). In general, the real value of tax deductions on debt is higher when inflation is expected to be high, but this depends on whether the expected inflation rate is higher than current interest rates. Finally, there are mixed and less significant results about P/E ratio, which leave the question on how the individual firms' debt issuance is related to the cost of equity capital still open for exploration. Taken together, these results make *H2* accepted, but provide no support to the positive leverage-tax rate association as predicted in *H3*.

4. DISCUSSION

This section discusses the main results, illustrates their support of selected capital structure theories, and compares them with findings from prior research. As a starting point, the main findings from Tables 3 and 4 confirm that with meaningful selection and control of leverage-relevant variables, a comprehensive set of firm-level factors representing growth opportunities, asset structure and information asymmetry are jointly associated with changes in capital structure choices. Specifically, results from the firm-variable baseline model in Table 3 are in line with the findings of Frank and Goyal (2009). This study argues that for the large and mostly stable companies in the sample, the "increasing leverage" decision is primarily driven by the growth in total assets and in the proportion of PP&E assets. That is, the need for a larger size with a more fixed portion makes firms raise more debt. This first set of results also partially supports the free cash flow theory.

When expanding the model to include the explanatory power of macroeconomic variables, this paper illustrates in Table 4 similar economic magnitude of the impact of credit spread and real interest on leverage ratios. The literature cautions that the credit spread result may not indicate a causality, as it can be argued that during periods of high debt supply relative to demand, the debt market dynamics typically lead to lower relative bond prices and thus to higher credit spreads. However, the real interest rate result clearly indicates that firms indeed utilize opportunities when the cost of debt is low. This association is also confirmed in Barry et al. (2008).

Also noteworthy in Table 4 is that, unlike the strong significant findings in Frank and Goyal (2009), the expected inflation is positively associated with increased debt but does not exhibit statistical significance (except for net debt ratio, column 3). In general, the real value of tax deductions on debt is higher when inflation is expected to be high, but this depends on whether the expected inflation rate is higher than current interest rates. Up to this point, only one of the classic capital structure theories (free cash flow theory) receives support from the findings of this study, and it is sensible to further explore newer theories. While no theory can be taken in isolation of the consideration of general market conditions, the organizational theory specifically addresses the time relevance between investment opportunities and the need for debt. Further examination can thus help shed light on this relevance.

Moreover, as debt usage is a dynamic choice (Denis & McKeon 2012; Huang & Ritter 2021), further discussions are needed regarding whether firms in the sample adjust the use of debt flexibly in response to their investment activities and risk exposure in the market. To examine the robustness of the results above and facilitate extended discussion, more variables and alternative variable definitions are included, and additional tests are conducted. The newly added firm-specific variables are loss carryforwards / total assets, investment tax credit / total assets, and market-adjusted individual annual stock volatility, and their definitions are included in Appendix A.

The first extension for further discussion repeats the main estimation (as in Table 4) using alternative market value-based leverage ratios as dependent variables. Table 5 illustrates that while these companies all have large market capitalizations, the fluctuations in market value seem to have largely coincided with the changes of many independent variables, hence the debt ratios calculated against market val-

ues still exhibit similar statistical association with previously found explanatory factors: firm size, fixed assets proportion, credit spread, and real interest rate. *H1* and *H2* are supported using this alternative market value-based dependent variable. In addition, in two specifications (columns 2 and 3) the expected inflation becomes a significant factor. This new result provides inspiration for an attempt to reconcile with findings in Frank and Goyal (2009) and further examine how the expected inflation affects firms' capital structure decisions and more importantly, timing.

To provide further contrast and discussion, the next additional test studies subsamples by decades (note that the last two decades are actually 2000–2007 and 2008–2020 with the 2008 financial crisis being a more meaningful divider). This treatment provides more insights on the macroeconomic factors' effects such as the expected inflation, on a more granular time scale. In Table 6, for conciseness only the net debt ratio (based on book assets and on market cap separately) is used as the dependent variable, and the main model estimation results are reported across the seven decades using dependent variables defined from both book value and market value. As subsample sizes are smaller and to ensure sufficient degree of freedom, two variables with the least explanatory power, net income and S&P 500 P/E ratio, are dropped in this specification (see Table 6).

In both Panel A (book asset-based leverage) and Panel B (market value-based leverage) of Table 6, it is evident that almost in all decades, the firm size, fixed assets proportion, credit spread, and real interest rate still remain significantly associated with leverage. Moreover, the explanatory power of the expected inflation appears to be the strongest in the 70's, 90's, and the first few years in the new millennium before the 2008 crisis. This observation is even more pronounced when market value-based leverage ratios are used. Considering major economic events and certain sector breakthroughs in these subperiods, this study conjec-

Table 5. Firm factors and macroeconomic conditions: market value-based leverage

	Total Debt / Mkt Cap	LT Debt / Mkt Cap	Net Debt / Mkt Cap
	(1)	(2)	(3)
Total assets	0.0092***	0.0103***	0.0063***
	(0.0027)	(0.0029)	(0.0018)
Operating income	–0.0726	–0.1028	–0.0982
	(0.0425)	(0.0665)	(0.0577)
Net income	–0.0738	–0.1384	–0.1173
	(0.1003)	(0.1173)	(0.1228)
Fixed assets	0.0816***	0.0996***	0.1001***
	(0.0246)	(0.0302)	(0.0412)
Mkt/Bk	0.0004	0.0007	0.0006
	(0.0005)	(0.0005)	(0.0005)
CapEx	0.0281	0.0693	0.0772*
	(0.0178)	(0.0444)	(0.0391)
Top stat. tax rate	–0.0915	–0.1093	–0.0892
	(0.0718)	(0.0829)	(0.1018)
Expected inflation	0.5717	0.6364**	0.7776*
	(0.3928)	(0.3201)	(0.3924)
GDP growth	0.1836	0.2847	0.2128
	(0.1472)	(0.1987)	(0.1689)
S&P 500 P/E	0.0002	0.0001	0.0001
	(0.0002)	(0.0001)	(0.0001)
Credit spread	0.0927***	0.1193***	0.1073***
	(0.0228)	(0.0362)	(0.0311)
Real int. rate	–0.0363***	–0.0483***	–0.0422***
	(0.0094)	(0.0112)	(0.0163)
Adjusted R^2	0.29	0.22	0.24
Obs.	3,536	3,536	3,536

Note: Variables are defined as in Appendix A. Standard errors are in parentheses. * indicates significance at the 0.10 level, ** indicates significance at the 0.05 level, *** indicates significance at the 0.01 level.

http://dx.doi.org/10.21511/imfi.21(1).2024.09

Table 6. Determinants of leverage across subperiods

	1950–1959	1960–1969	1970–1979	1980–1989	1990–1999	2000–2007	2008–2020
Panel A. Dependent Variable: Net Debt / Book Assets							
Total assets	0.0121***	0.0109***	0.0094***	0.0115***	0.0102***	0.0086***	0.0091***
	(0.0037)	(0.0031)	(0.0021)	(0.0033)	(0.0028)	(0.0021)	(0.0030)
Op. income	−0.1013	−0.1302	−0.1298	−0.1117	−0.1205	−0.1288	−0.1321
	(0.0699)	(0.0826)	(0.0674)	(0.0635)	(0.0711)	(0.0756)	(0.0784)
Fixed assets	0.1314***	0.1206***	0.1277***	0.1292***	0.1189***	0.1214***	0.1225***
	(0.0528)	(0.0479)	(0.0531)	(0.0498)	(0.0426)	(0.0492)	(0.0487)
Mkt/Bk	0.0010	0.0009	0.0008	0.0009	0.0010	0.0009	0.0008
	(0.0007)	(0.0006)	(0.0007)	(0.0007)	(0.0006)	(0.0007)	(0.0005)
CapEx	0.0728	0.0876*	0.1016	0.0943	0.0922	0.1072*	0.0939
	(0.0491)	(0.0443)	(0.0572)	(0.0510)	(0.0465)	(0.0545)	(0.0478)
Stat. tax rate	−0.1073	−0.1202	−0.1146	−0.1332	−0.1082	−0.1178	−0.1192
	(0.0925)	(0.1183)	(0.0897)	(0.1218)	(0.1094)	(0.1003)	(0.1174)
Exp. inflation	0.4973	0.3893	0.6014**	0.5105	0.6116**	0.5887*	0.6006
	(0.4128)	(0.3099)	(0.2964)	(0.4221)	(0.3059)	(0.2952)	(0.4194)
GDP growth	0.2138	0.2384	0.2927	0.2615	0.3009	0.2582	0.2712
	(0.1726)	(0.1827)	(0.1924)	(0.1848)	(0.1998)	(0.1845)	(0.1718)
Credit spread	0.1602***	0.1582***	0.1533***	0.1493***	0.1518***	0.1722***	0.1610***
	(0.0410)	(0.0392)	(0.0327)	(0.0321)	(0.0310)	(0.0492)	(0.0413)
Real int. rate	−0.0618***	−0.0561***	−0.0603***	−0.0583***	−0.0611***	−0.0571***	−0.0589***
	(0.0194)	(0.0164)	(0.0188)	(0.0159)	(0.0202)	(0.0163)	(0.0178)
Adjusted R^2	0.28	0.26	0.31	0.29	0.32	0.29	0.23
Obs.	531	529	529	529	529	423	466
Panel B. Dependent Variable: Net Debt / Market Cap							
Total assets	0.0091***	0.0084***	0.0087***	0.0055***	0.0079***	0.0051***	0.0061***
	(0.0029)	(0.0023)	(0.0028)	(0.0019)	(0.0022)	(0.0016)	(0.0019)
Op. income	−0.0926	−0.1182	−0.1073	−0.0817	−0.1031	−0.0921	−0.0827
	(0.0573)	(0.0678)	(0.0602)	(0.0479)	(0.0691)	(0.0612)	(0.0523)
Fixed assets	0.1028***	0.0971***	0.1024***	0.0877***	0.0916***	0.1071***	0.0962***
	(0.0329)	(0.0311)	(0.0409)	(0.0281)	(0.0281)	(0.0446)	(0.0395)
Mkt/Bk	0.0004	0.0006	0.0007	0.0007	0.0005	0.0007	0.0006
	(0.0004)	(0.0005)	(0.0006)	(0.0008)	(0.0005)	(0.0005)	(0.0006)
CapEx	0.0711	0.0799*	0.0802	0.0479	0.0616	0.0591	0.0781
	(0.0482)	(0.0403)	(0.0415)	(0.0329)	(0.0396)	(0.0385)	(0.0407)
Stat. tax rate	−0.1102	−0.1095	−0.0821	−0.0899	−0.0763	−0.0813	−0.0884
	(0.0828)	(0.0700)	(0.0912)	(0.1015)	(0.0718)	(0.0927)	(0.0812)
Exp. inflation	0.5813	0.5103	0.6998***	0.4728	0.5882***	0.7761*	0.5695
	(0.4006)	(0.4241)	(0.2901)	(0.3941)	(0.2192)	(0.3912)	(0.3977)
GDP growth	0.1930	0.2185	0.1728	0.1996	0.2263	0.2008	0.2201
	(0.1264)	(0.1736)	(0.1517)	(0.1619)	(0.1637)	(0.1619)	(0.1947)
Credit spread	0.0981***	0.1106***	0.1044***	0.0992***	0.1117***	0.1022***	0.1075***
	(0.0278)	(0.0318)	(0.0291)	(0.0303)	(0.0325)	(0.0281)	(0.0309)
Real int. rate	−0.0419***	−0.0398***	−0.0467***	−0.0439***	−0.0521***	−0.0402***	−0.0414***
	(0.0114)	(0.0102)	(0.0137)	(0.0108)	(0.0126)	(0.0151)	(0.0138)
Adjusted R2	0.27	0.21	0.33	0.3	0.27	0.26	0.23
Obs.	531	529	529	529	529	423	466

Note: Variables are defined as in Appendix A. Standard errors are in parentheses. * indicates significance at the 0.10 level, ** indicates significance at the 0.05 level, *** indicates significance at the 0.01 level.

tures that the general favorable economic growth and market conditions contributed to the optimism and heavier use of debt. This provides partial evidence to the time relevance argument of the organizational theory and echoes prior findings as in Frank and Goyal (2009), DeAngelo and Roll (2015), and Poursoleyman et al. (2023).

To further discuss the role of operational loss (as in Horváthová et al. (2022)) and perceived risk (as in

Table 7. Further exploration of firm-specific factors

	Net Debt / Book Assets	Net Debt / Mkt Cap
Total assets	0.0122***	0.0092***
	(0.0037)	(0.0027)
Operating income	–0.0927	–0.1009
	(0.0561)	(0.0726)
Loss carryforward	–0.0078	–0.0051
	(0.0119)	(0.0044)
Inv. tax credit	0.0046***	0.0067**
	(0.0019)	(0.0034)
Fixed assets	0.0992***	0.1173***
	(0.0276)	(0.0382)
Mkt/Bk	0.0005	0.0007
	(0.0006)	(0.0005)
Stock volatility	0.0186**	0.0222***
	(0.0095)	(0.0087)
CapEx	0.0461	0.0681
	(0.0328)	(0.0372)
Top stat. tax rate	–0.1017	–0.0927
	(0.0667)	(0.0628)
Expected inflation	0.5163	0.6772*
	(0.3725)	(0.3417)
GDP growth	0.2209	0.3137
	(0.1726)	(0.2009)
Credit spread	0.1063***	0.1127***
	(0.0311)	(0.0372)
Real int. rate	–0.0727***	–0.0631***
	(0.0272)	(0.0213)
Adjusted R^2	0.36	0.29
Obs.	3,128	3,128

Note: Variables are defined as in Appendix A. Standard errors are in parentheses. * indicates significance at the 0.10 level, ** indicates significance at the 0.05 level, *** indicates significance at the 0.01 level.

Welch (2004) and Wang et al. (2020)) in the determination of capital structure, the final extended test turns direction to address more firm specific variables that have been recently found to be relevant to leverage. Since the benefit of debt is directly related to tax deductibility/incentives, and prior literature finds the association between debt structure/volume and investment activities, this robustness check includes individual firm's loss carryforwards and investment tax credit as two new independent variables. Moreover, as Wang et al. (2020) find the cost of equity being the key factor driving large companies' choices of equity financing, a market-adjusted individual annual stock volatility is added as a firm-specific risk measure as well as a gauge of the cost of equity. The main estimation is augmented to include these three additional explanatory variables as well as using debt ratios based on both book assets and market cap separately as the dependent variables. The sample size decreases slightly to 3,128 observations due to data availability.

Table 7 documents a slightly improved R^2 and confirms the robust explanatory power of firm size, fixed assets proportion, credit spread, and real interest rate. Among the three new variables, the investment tax credit and the stock volatility are found to be positively related to debt ratios. Thes new results confirm the impact of corporate investment activities and cost of equity on the choice of leverage: when the tax policy encourages investment activities and when equity is relatively more expensive due to perceived risk, firms increasingly turn to debt for external financing. The prediction about the positive association of leverage and cost of equity in *H3* and existing findings in the literature (Welch, 2004; Barry et al., 2008; Wang et al., 2020) are thus supported by this last set of results.

As for future extension of this study, three more sets of estimations can further enhance the versatility of its empirical settings. First, though the firms in the sample are all large, stable, and repu-

http://dx.doi.org/10.21511/imfi.21(1).2024.09

table with minimum default risk, it is worthwhile to recognize variations in individual debt terms and characteristics. Including individual debt rating would be beneficial to address this point. In addition, as uncertainty due to cash flow volatility is found to be directly related to companies' dynamic adjustments of leverage in earlier stages of firm life (Ren et al., 2023), including cash flow volatility and related uncertainty factors may further shed light on U.S. large firms' choice of capital structure. Finally, an alternative model specification is to put these big firms into sector/industry context – this treatment can further shed light on the trend of leverage increase. Adding the industry leverage as an independent variable can potentially provide more insights but a caveat would be sample size constraints for sparsely populated industries.

CONCLUSION

The purpose of this study is to apply classic capital structure theories and examine the main factors associated with an almost monotonic upward trend of leverage among the U.S. large firms. Focusing on the 70-year debt financing of companies that were in the starting lineup of the Fortune 500 list and are still going strong as of 2020, this study's main results indicate that large "elite" firms not only actively utilize debt market opportunities and are sensitive to the general interest environment, but also dynamically adjust debt level according to their growth opportunities, information asymmetry, and goal of maximizing organizational wealth. These findings validate the free cash flow theory and provide support for the organizational theory of capital structure choices.

Further examinations discover that certain tax incentives and the perceived equity risk also contribute to increased use of debt. In addition, more discussions are made in favor of critical macroeconomic factors, especially those that impact the cost and benefit of borrowing, being directly related to leverage choices. These factors' explanatory power provides favorable evidence for the organizational theory.

In conclusion, this study extends the ongoing scholarly discussion regarding corporate debt decisions and makes a significant contribution to the corporate finance literature on the topics of the association between capital structure and growth needs, in the context of macroeconomic environment shifts. After comprehensively considering all capital structure theories, selecting representative factors, and conducting rigorous empirical tests, this study presents findings that support the free cash flow theory and organizational theory, clarify the corporate debt policy in general, and highlight large firms' responses in different time periods when the market conditions were quite different.

AUTHOR CONTRIBUTIONS

Conceptualization: Wenjuan Xie.
Data curation: Wenjuan Xie.
Formal analysis: Wenjuan Xie.
Investigation: Wenjuan Xie.
Methodology: Wenjuan Xie.
Project administration: Wenjuan Xie.
Resources: Wenjuan Xie.
Software: Wenjuan Xie.
Supervision: Wenjuan Xie.
Validation: Wenjuan Xie.
Visualization: Wenjuan Xie.
Writing – original draft: Wenjuan Xie.
Writing – review & editing: Wenjuan Xie.

ACKNOWLEDGEMENTS

The author declares no financial or personal relationships with other people or organizations that could inappropriately influence my work. The author thanks the journal editor and anonymous referees, Ahmad Etebari, Fred Kaen, discussants and participants at the Northeast Business and Economics Association 2022 annual meeting and the 2023 Global Finance Conference for their constructive critiques. All errors remain my responsibility.

REFERENCES

1. Barry, C. B., Mann, S. C., Mihov, V. T., & Rodriguez, M. (2008). Corporate Debt Issuance and the Historical Level of Interest Rates. *Financial Management, 37*(3), 413-430. https://doi.org/10.1111/j.1755-053X.2008.00019.x
2. Begenau, J. (2020). Capital requirements, risk choice, and liquidity provision in a business-cycle model. *Journal of Financial Economics, 136,* 355-378. https://doi.org/10.1016/j.jfineco.2019.10.004
3. Campello, M., Graham, J., & Harvey, C. (2010). The Real Effects of Financial Constraints. *Journal of Financial Economics, 97,* 470-487. https://doi.org/10.1016/j.jfineco.2010.02.009
4. DeAngelo, H., & Roll, R. (2015). How Stable Are Corporate Capital Structures? *Journal of Finance, 70,* 373-418. https://doi.orgS./10.1111/jofi.12163
5. Denis, D., & McKeon. (2012). Debt Financing and Financial Flexibility: Evidence from Proactive Leverage Increases. *Review of Financial Studies, 25,* 1897-1929. https://doi.org/10.1093/rfs/hhs005
6. Donaldson, G. (1984). *Managing Corporate Wealth*. New York: Praeger.
7. Fama, Eugene F., & Kenneth R. French. (2002). Testing Trade-Off and Pecking Order Predictions About Dividends and Debt. *Review of Financial Studies, 15*(1), 1-33. https://doi.org/10.1093/rfs/15.1.1
8. Fee, C., C. Hadlock, & Pierce, J. (2013). Managers With and Without Style: Evidence Using Exogenous Variation. *Review of Financial Studies, 26,* 567-601. Retrieved from https://econpapers.repec.org/article/ouprfinst/v_3a26_3ay_3a2013_3ai_3a3_3ap_3a567-601.htm
9. Frank, Murray Z., & Vidhan K. Goyal, (2009). Capital Structure Decision: Which Factors Are Reliably Important? *Financial Management, 38,* 1-37. https://doi.org/10.1111/j.1755-053X.2009.01026.x
10. Gorton, G., & Pennacchi, G. (1990). Financial Intermediaries and Liquidity Creation. *Journal of Finance, 45,* 49-71. https://doi.org/10.2307/2328809
11. Graham, J., & Harvey, C. (2001). The Theory and Practice of Corporate Finance: Evidence from the Field. *Journal of Financial Economics, 60,* 187-243. https://doi.org/10.1016/S0304-405X(01)00044-7
12. Graham, J., & Leary, M. (2011). A Review of Empirical Capital Structure Research and Directions for the Future. *Annual Review of Financial Economics, 3,* 309-345. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1729388
13. Graham, J., Leary, M., & Roberts, M. (2015). A Century of Capital Structure: The Leveraging of Corporate America. *Journal of Financial Economics, 118,* 658-683. https://doi.org/10.1016/j.jfineco.2014.08.005
14. He, W., Hu, M., Mi, L., & Yu, J. (2021). How Stable Are Corporate Capital Structures? International Evidence. *Journal of Banking and Finance, 126,* 106103. https://doi.org/10.1016/j.jbankfin.2021.106103
15. Hennessy, C., & Whited, T. (2005). Debt Dynamics. *Journal of Finance, 60,* 1129-1165. Retrieved from https://econpapers.repec.org/article/blajfinan/v_3a60_3ay_3a2005_3ai_3a3_3ap_3a1129-1165.htm
16. Holmström, B., & Tirole, J. (1998). Private and Public Supply of Liquidity. *Journal of Political Economy, 106*, 1-40. https://doi.org/10.1086/250001
17. Horváthová, J., Mokrišová, M., & Petruška, I. (2022). Indebtedness and profitability – A threshold model approach. *Investment Management and Financial Innovations, 19*(3), 13-27. http://dx.doi.org/10.21511/imfi.19(3).2022.02
18. Huang, R., & Ritter, J. (2021). Corporate Cash Shortfalls and Financing Decisions. *Review of Financial Studies, 34,* 1789-1833. https://doi.org/10.1093/rfs/hhaa099
19. Jensen, M. (1986). Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. *American Economic Review, 76,* 323-329. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=99580
20. Jensen, M., & Meckling, W. (1976). Theory of the firm: managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics, 4,* 305-360. https://doi.org/10.1016/0304-405X(76)90026-X
21. Lins, K., Servaes, H., & Tufano, P. (2010). What Drives Corporate Liquidity? An International Survey of Cash Holdings and Lines of Credit. *Journal of Financial Economics, 98,* 160-176. https://doi.org/10.1016/j.jfineco.2010.04.006

http://dx.doi.org/10.21511/imfi.21(1).2024.09

22. Modigliani, F., & Miller, M. H. (1958). The Cost of Capital, Corporation Finance, and the Theory of Investment. *American Economic Review, 48,* 261-297. Retrieved from https://fdjpkc.fudan.edu.cn/_upload/article/files/91/a3/fb1aedf9496dbda48b8f6c1096de/a36f7904-24d0-44be-8245-02dff89842d7.pdf

23. Modigliani, F., & Miller M. H. (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *American Economic Review, 53,* 433-443. Retrieved from https://www.jstor.org/stable/1809167

24. Myers, S. C. (1993). Still Searching for Optimal Capital Structure. *Journal of Applied Corporate Finance, 6*(1), 4-14. https://doi.org/10.1111/j.1745-6622.1993.tb00369.x

25. Myers, S. C., & Majluf, N. S. (1984). Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have. *Journal of Financial Economics, 13,* 187-221. https://doi.org/10.1016/0304-405X(84)90023-0

26. Poursoleyman, E., Mansourfar, G., & Abidin, S. (2023). Debt structure: a solution to the puzzle of capital structure, *International Journal of Managerial Finance, 19*(1), 22-47. Retrieved from https://ideas.repec.org/a/eme/ijmfpp/ijmf-03-2021-0155.html

27. Rajan, R. G., & Zingales, L. (1995). What Do We Know About Capital Structure? Some Evidence from International Data. *Journal of Finance, 50,* 1421-1460. https://doi.org/10.1111/j.1540-6261.1995.tb05184.x

28. Ren, D., Chen, Y., Maynard, A., & Pysarenko, S., (2023). Valuating the capital structure under incomplete information. *Investment Management and Financial Innovations*, 20(3), 48-67. http://dx.doi.org/10.21511/imfi.20(3).2023.05

29. Smith, Clifford W. Jr. (1990). The theory of corporate finance: A historical overview. In Clifford W. Smith, Jr. (Ed.), *The Modern Theory of Corporate Finance* (pp. 3-24). New York: McGraw-Hill. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=244161

30. Titman, S. (2002). The Modigliani–Miller Theorem and the Integration of Financial Markets. *Financial Management, 31,* 101-115. https://doi.org/10.2307/3666323

31. Treynor, J. L. (1981). The Financial Objective in the Widely Held Corporation. *Financial Analysts Journal, 37*(2), 68-71. https://doi.org/10.2469/faj.v37.n2.68

32. Wang, Z., Ettinger, M., Xie, Y., & Xu, L. (2020). The cost of capital: U.S.-based multinational corporations versus U.S. domestic corporations. *Global Finance Journal, 44,* 100443. https://doi.org/10.1016/j.gfj.2018.07.002

33. Warusawitharana, M., & Whited, T. (2016). Equity Market Misvaluation, Financing, and Investment. *Review of Financial Studies, 29,* 603-654. https://doi.org/10.1093/rfs/hhv066

34. Welch, I. (2004). Capital Structure and Stock Returns. *Journal of Political Economy, 112,* 106-131. https://doi.org/10.1086/379933

APPENDIX A

Definition of Variables

Total Assets: Book value from Balance Sheet. In thousands of US dollars in Table 1. Treated by natural logarithm for all regressions.

Total market value of assets: Market value of equity (fiscal year-end closing price times share outstanding) plus debt in current liabilities plus long-term debt minus deferred taxes. In thousands of US dollars and used as denominator to standardize debt for independent variables.

Total Sales: Net revenue from Income Statement. In thousands of US dollars.

Total debt: Book value debt in current liabilities plus long-term debt from Balance Sheet. In thousands of US dollars and standardized by total assets to be used as an independent variable in regressions.

Long-term debt: Book value from Balance Sheet. In thousands of US dollars. Standardized by total assets or total market value of assets as independent variable in regressions.

Cash: Cash and cash equivalents from Balance Sheet. In thousands of US dollars.

Net debt: Long-term debt minus cash and cash equivalents from Balance Sheet. In thousands of US dollars. Standardized by total assets or total market value of assets as independent variable in regressions.

EBIT: Earnings before interest and tax from Income Statement. In thousands of US dollars.

EBITDA: earnings before interest, tax, depreciation and amortization from Income Statement. In thousands of US dollars.

Top statutory tax rate: Rate of the top bracket of corporate tax. In plain numbers.

Effective tax rate: Corporate tax paid divided by taxable income for the same year, from Income Statement. In plain numbers.

Unemployment rate: Annual rate as published by the Bureau of Labor Statistics, in percentages.

Recession years: Defined by National Bureau of Economic Research, binary variable that takes the value 1 if the year is marked as in recession, and 0 otherwise.

Baa corporate bond annual yield: Moody's average annual yield of Baa-rated 10-year corporate bonds, in percentages.

Long-term government bond annual rate: Average 10-year US government bond annual yield, published by Federal Reserve Bank of St. Louis, in percentages.

GDP price inflation rate: Annual rate of inflation as measured by changes in the prices of goods and services produced in the United States, including those exported to other countries. Published by the Bureau of Economic Analysis, in percentages.

Real interest rate: Nominal interest rate adjusted for inflation, from Rober Shiller's website and Federal Reserve Bank of St. Louis, in percentages.

http://dx.doi.org/10.21511/imfi.21(1).2024.09

Operating Income: The operating income from Income Statement, standardized by total assets.

Net Income: The net income from Income Statement, standardized by total assets.

Fixed Assets: Net Property, Plant and Equipment from Balance Sheet, standardized by total assets.

Mkt/Bk: Market-to-book ratio, defined as total market value of equity (fiscal year-end closing price times share outstanding) divided by total shareholder's equity from Balance Sheet.

CapEx: Capital expenditure from Cash Flow Statement, standardized by total assets.

Expected inflation: Short-term (1 year) expected inflation rate based on GDP price, published by Federal Reserve Bank of New York, in percentages.

GDP growth: Real GDP (in 2005 dollars) annual growth rate, published by Bureau of Economic Analysis, in percentages.

S&P 500 P/E: 10-year average cyclically adjusted average price-to-earnings ratio of all S&P 500 firms for a given year, provided by Robert Shiller's website.

Credit spread: Moody's average annual yield of Baa-rated 10-year corporate bonds minus 10-year treasury bond yield of the same year, in percentages.

Loss carryforward: Net operating loss carryforward from Income Statement (as a result of previous year's deferred tax asset), standardized by total assets.

Inv. tax credit: investment tax credit from Balance Sheet, standardized by total assets.

Stock volatility: Annual standard deviation of individual stock's daily excess return (individual stock return minus that of the S&P 500 index), in plain numbers.