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Two Common Problems in Capital Structure Research: The Financial-Debt-To-Asset Ratio and Issuing Activity Versus Leverage Changes

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ABSTRACT

This paper points out two common problems in capital structure research. First, although it is not clear whether non-financial liabilities should be considered debt, they should never be considered as equity. Yet, the common financial-debt-to-asset ratio (FD/AT) measure of leverage commits this mistake. Thus, research on *increases* in FD/AT explains, at least in part, decreases in non-financial liabilities. Future research should avoid FD/AT altogether. The paper also quantifies the components of the balance sheet of large publicly traded corporations and discusses the role of cash in measuring leverage ratios. Second, equity-issuing activity should not be viewed as equivalent to capital structure changes. Empirically, the correlation between the two is weak. The capital structure and capital issuing literature are distinct.

I. INTRODUCTION

Leverage is defined as the sensitivity of the value of equity ownership with respect to changes in the underlying value of the firm. Empirically, leverage ratios are frequently independent variables (sometimes as part of a hypothesis, sometimes as a control). Leverage ratios are also the dependent variable in the empirical capital structure literature. This literature tries to explain variations in corporate leverage, both in the cross section of capital structure (i.e. why some firms have high leverage) and in the time series (how capital structures evolve).

In the theory of capital structure, one common hypothesis derives directly from the equity-sensitivity channel: a firm with more leverage has both higher-powered incentives and (usually) a higher probability of financial distress. (In turn, this means that leverage can influence managerial behavior.) A second common hypothesis about leverage arises from the fact that payments to creditors are excluded from corporate income tax. These two hypotheses have formed the basic workhorse capital structure model since they were put forth by Robichek and Myers (1966).

There is also a related research literature that investigates issuing activity, especially equity-issuing activity. The same theories that apply in the capital structure context are often also applied in this context: firms that have more potential tax benefits and fewer expected distress costs are considered more likely to issue equity.

My paper points out two issues of relevance in these two literature. First, one common definition of the leverage ratio, the financial-debt-to-assets ratio (FD/AT) is simply incorrect. There are readily-available, better alternatives. Second, the equity issuing and capital structure change literatures are more distinct than is commonly realized. They are highly incongruous.

An important additional aspect of my paper is that it lays out the relative importance of individual obligations on the balance sheets of large, publicly-traded firms. In book value, liabilities are about twice as large as equity. About half of firms' liabilities are financial debt. The other half are liabilities arising in the course of operations. Of the latter, about one-third are accounts payables, one-third are unspecified other long-term liabilities, and one-third are unspecified other current liabilities. Convertible debt is, for all practical purposes, irrelevant in the average firm, as are minority interest, capitalized leases, income tax payable, and preferred stock.

II. MEASURING LEVERAGE RATIOS

There is no universally used measure of leverage. Most researchers probably spend little time pondering their measure and simply copy what their predecessors have adopted. An informal census of the recent literature suggests that about half of all recently published papers have defined leverage as financial-debt divided by assets (FD/AT).[1] Unfortunately, this measure is incorrect. This section first explains why and then shows that capital structure inference can be affected by the incorrect use of this measure, at least in some situations.

A. An illustration

Recall that the balance sheet of a firm consists of three components:

$$\text{Total assets} = \text{Financial debt} + \text{Non-financial liabilities} + \text{Equity}$$

where financial debt (FD) is the sum of long-term debt (DLTT) and debt in current liabilities (DLC). My paper objects to the use of financial debt divided by total assets (FD/AT) as a measure of leverage. (When not otherwise defined, capitalized abbreviations are Compustat mnemonics.) The assets are often

1. Many papers incorrectly write that they divide by the firm's ''assets'' or ''value,'' even if they really divide by financial capital, i.e., financial debt plus equity. My paper prefers the less misleading abbreviation ''capital'' for the latter.

quoted in book value, although they are sometimes translated into market value. This can be accomplished by subtracting the book value of equity (SEQ) and adding the market value of equity (CSHO · PRCCF). In my paper, I consider both.

The fundamental flaw of FD/AT is that its converse (1−FD/AT) includes non-financial liabilities. Thus, the FD/AT is lower not only when a firm has more equity, but also when it has more non-financial liabilities. In effect, non-financial liabilities are counted the same as equity.

A simple example can illustrate the problem. Consider the following two hypothetical capital structures:

	Financial debt	Non-financial liabilities	Equity	Total
Structure A	\$30 million	\$30 million	\$40 million	\$100 million
Structure B	\$30 million	–	\$40 million	\$70 million

I have chosen the claims in Structure A, so that they are roughly representative of large publicly-traded firms in the United States. Structure B is made up for illustration. It should be immediately obvious that A is the more levered structure. It has more sensitivity of equity, with respect to underlying asset changes. A decrease of 10% in the value of the firm would manifest itself as an equity loss of (\$40−\$10)/\$40−1=−25% under Structure A. The same 10% decrease in the value of the firm would manifest itself as an equity loss of (\$40−\$7)/\$40−1=−17.5% under Structure B. Yet, according to the FD/AT metric, A is less levered than B: A has an FD/AT of \$30/\$100=30%, while B has an FD/AT of \$30/\$70 ≈ 43%.

Changes in leverage are similarly affected by this problem. Structure B could *reduce* its FD/AT by assuming an additional \$50 million in accounts payables, regardless of whether the extra funds are used to fund current assets or are discarded.

It should be clear that the FD/AT is not an appropriate measure of leverage. Of course, the FD/AT ratio may well be an appropriate measure in contexts in which it is not used as a leverage ratio. For example, it can appear in debt covenants. If the goal is to predict for such firms how likely they are to experience a decline in FD/AT that then induces them to violate a covenant, explaining FD/AT is a valid research question. However, from the perspective of capital structure theory, appearing in debt covenants does not make FD/AT an appropriate measure of leverage. Many financial ratio debt covenants also limit debt-to-cash flow ratios, coverage ratios, net worth conditions, and liquidity ratios. Other non-financial covenants limit firms' dividend payouts acquisition restrictions, and capital expenditure restrictions. Some even have restrictions on key personnel or insurance policy requirements. None of these measures would automatically be considered measures of leverage by virtue of being mentioned in some covenants.

B. Non-financial liabilities

The source of the problem with the FD/AT is the presence of non-financial liabilities. They originate in the process of operating and add to the firm's assets, just as an inflow of debt or equity would add to the firm's assets. Just like financial interest payments, payments for non-financial liabilities are made from pre-tax income.[2]

A priori, it is not clear whether financial liabilities should be considered superior to non-financial liabilities. Anecdotal evidence suggests that the opposite is sometimes the case. For example,

- Like other short-term creditors, many non-financial credit providers can stop rolling over the credit before Chapter 11, and thereby recapture their funds *before* the firm encounters formal financial distress and therefore *before* longer-term financial debtors can lay claim on the assets.
- Bankruptcy trustees will often grant suppliers payments, even if they are nominally junior creditors. This is because suppliers may not otherwise be willing to help keep the company a going concern.
- Current liabilities can also include compensation and benefits, which typically receive priority (to retain necessary employees).
- Taxes have super priority.

Of course, there are also non-financial obligations where relative precedence is less clear. For example, non-current accruals can include such items as environmental accruals, accrued executive compensation (which executives will presumably draw down if financial distress were to become possible), as well as liabilities from restructuring, pre-retirement post-employment and disability benefits.

In sum, financial debt and non-financial liabilities are both senior to equity. In contrast, non-financial liabilities can be of higher, equal, or lower priority than financial debt. Unconditionally, it is a reasonable *a priori* approximation to consider the two liabilities to be of roughly equal priority.

C. Alternative leverage ratio definitions

My paper argues that the FD/AT is an incorrect measure, but it does *not* advocate the use of one best-suitable, appropriate measure of leverage. A universal best measure may not even exist, but might depend on the question being asked. Depending on the context, one may or may not want to count non-financial liabilities as debt. This yields two different measures:

2. The lack of a cash discount when products are not paid immediately (and thus become accounts payables) is the equivalent of interest costs for financial debt.

- The total-liabilities-to-assets (LT/AT) ratio ('balance sheet leverage') correctly indicates more leverage when either the firm's financial or non-financial liabilities are higher. It treats financial and non-financial liabilities alike.
- The financial-debt-to-capital (FD/CP) ratio ('financial leverage') is narrower. Here the denominator is financial debt plus equity. Unlike LT/AT, FD/CP does not consider non-financial liabilities as debt. It thus ignores obligations that would need to be paid before equity is reimbursed.

Most importantly, in contrast to FD/AT, both LT/AT and FD/CP have as their respective converses, equity-based measures, that is, equity to assets and equity to capital. Thus, even though LT/AT and FD/CP have different meanings, neither declines with increases in non-financial liabilities.

There are also other possible leverage measures.

- Some authors have subtracted cash or near cash from firms' total assets. Their reasoning and the problems that arise from measuring leverage in the presence of cash are discussed below.

Some authors, such as Fama and French (2005) and Huang and Ritter (2009), have made further adjustments to the debt numerator:

- They have considered preferred stock (PSTKL) to be debt, but not convertible debt (DCVT). Thus, they have added PSTKL and substracted DCVT. Both are fairly small in most publicly-traded firms. Therefore, this modification is unlikely to have much impact.
- They have considered deferred taxes and investment tax credits (TXDITC) not to be debt. Thus, they have subtracted TXDITC.

Similarly, leverage could include operational leverage, such as leases (Rampini and Viswanathan 2010) and/or technology that is more fixed-cost oriented. In practice, broader leverage measures than the liabilities-to-assets ratio, are rare. Some are not feasible because of data constraints.

An entirely different approach to measuring leverage ratios can be derived from the income statement:

- Interest coverage is the ratio of interest paid over operating income.

However, such interest coverage measures are highly volatile, and it is not clear what this measure should be set to in the years in which firms lose money.

Researchers using Compustat must be warned that Compustat occasionally reports negative debt values. Moreover, Compustat excludes minority interest (MIB) from total liabilities (LT). Thus, total assets are really long-term debt plus minority interest plus stockholders' equity *plus minority interest* (AT=LT+SEQ+MIB).

D. Can the wrong leverage ratio make a difference?

The next obvious question is whether non-financial liabilities are small enough that they can *always* be ignored. If this were the case, the critique would still be correct (and a different correct leverage ratio should still be used), but existing results based on the FD/AT could always still be trusted.

i. The constitution of the typical firm

Figures 1 and 2 illustrate the average components of balance sheets of firms on the 2009 Compustat tapes. The firms on which these figures are based had to have at least $1 billion in assets and satisfy reasonable data availability requirements. Note that data availability constraints often select firms implicitly when research regressions include variables that are only sparsely available.

About 61% of firms' total assets are total liabilities, when quoted in book values. (The market value of equity is considerably higher than the book value of equity on average.) Only about half of firms' liabilities (31% of total assets) are financial. The other half are non-financial, with accounts payables, other current liabilities, other liabilities, and deferred taxes and investment tax credits playing roughly equally important roles.[3] One can argue about how deferred taxes (TXDITC) should be treated, but there is no question that non-financial liabilities are not insignificant.

ii. An example regression

My paper does not critique a specific paper. Ultimately, it would distract from the fact that the use of the FD/AT definition is not just a problem in one specific paper, but a common sin. Therefore, my paper provides generic evidence that the definition of leverage could have lead to conclusions different from those that might have been reached if a correct measure of leverage had been used.

For my illustrative regressions, I fit the cross-section of leverage ratios with the four most common variables in the capital structure literature: the firm size (log assets), the market-to-book ratio, the tangibility of assets, and the profitability of the firm (net income). In addition, I include one variable that is a component of the missing non-financial liabilities in the incorrect definition: accounts payable. More broadly, it is more likely that studies that explore the relation between the actual operations of the firm and its capital structure are affected by the incorrect definition. Thus, of the first four variables, the tangibility of assets is the most susceptible.

The samples used in my paper were large firms, after 2000, selected based on two criteria: the market value of equity and the book value of assets had to be in excess of $10 billion in the previous year. This sample represents most of the publicly-traded marketcap in the economy.

3. The figures show that convertibles, leases, and preferred stock are economically unimportant for these types of firms.

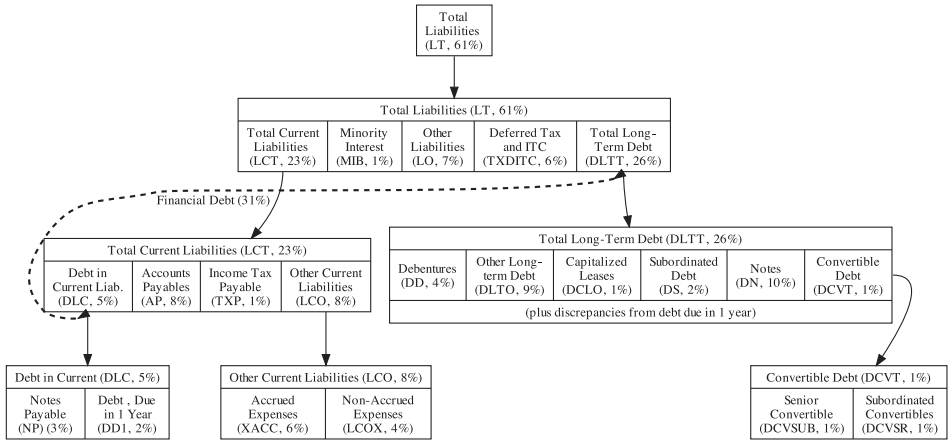

Figure 1 Balance Sheet: Components of Total Liabilities.
Description: Compustat mnemonics are below the full item names. The fraction is the average asset-normalized fraction of firm value. Because there are some missing values and because numbers are rounded, the numbers do not always add up perfectly. To be included, a firm had to have assets of $1 billion, and available data in LT, LCT, TXDITC, DLTT, DLTT, DLC, and AP. The dotted line shows the common definition of financial debt.

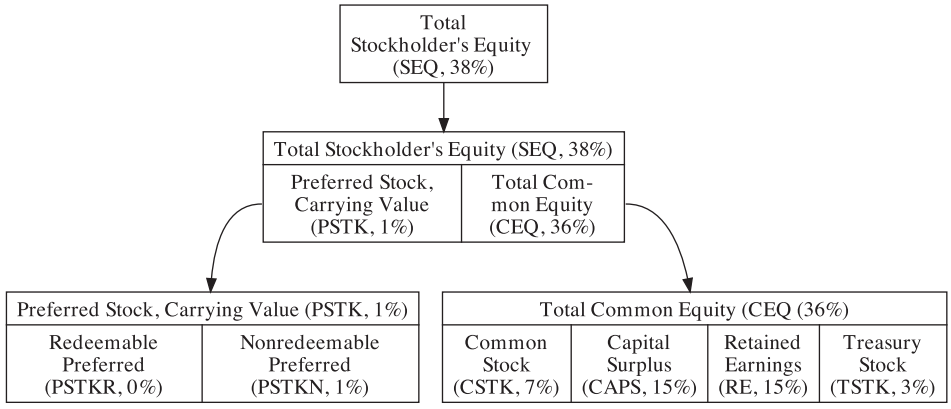

Figure 2 Balance Sheet: Components of Equity.
Description: Compustat mnemonics are below the full item names. The fraction is the average asset-normalized fraction of firm value. Because there are some missing values and because numbers are rounded, the numbers do not always add up perfectly. To be included, a firm had to have assets of $1 billion, and available data in LT, LCT, TXDITC, DLTT, DLTT, DLC, and AP.

Table 1 shows the results of regressions predicting the three leverage ratios, both in book value and market value. The dependent variables are shown in the rows; the independent variables are shown in the columns. In the first three regressions, equity value (and therefore assets and capital) are quoted in book value. In the second three regressions, they are quoted in market value.

The results are as follows:

Firm size: All regressions indicate that larger firms have more debt. However, the relation is weaker when the wrong measure of leverage, the FD/AT, is explained.

Book/market: The ratio of the book to the market value of equity is often taken as an indicator of whether a firm is a value firm or a growth firm. Value firms have lower book debt, but higher market debt. Obviously, economic inference about whether value firms have higher or lower leverage is sensitive to the type of leverage measure an author is using. The interpretation of leverage differences across growth and value firms requires careful scrutiny by readers of the capital structure literature.

Profitability: The relation between debt and profitability is weak for all measures.

Tangible assets: Inference about the tangibility of assets is sensitive to the leverage measure used. It is positive when the incorrect (book value) FD/AT or (market value) FD/MAT leverage ratios are explained. It is insignificant when FD/BCP or FD/MCP ratios are explained and it is negative when LT/AT or LT/MAT ratios are explained.

The negative relation between asset tangibility and leverage in this sample is contrary to what has been reported in a number of papers. Firms with more tangible assets do not necessarily have more leverage. The relations reported in the literature are not robust in *my* sample of firms.

Accounts payables: The incorrect leverage ratios, FD/AT and FD/MAT, suggest that firms use accounts payables as a substitute for leverage. *This inference is clearly incorrect*. When a correct measure of leverage is used, it becomes clear that firms use payables as complements.

It is important to point out that one can easily find other regressions in which the sign on tangible assets remains the same. More broadly, there are many variables and regression specifications that could be used instead of the ones reported here. Different specifications will mean different results. However, it is not important whether the discrepancy in inference is robust to all variations. The point of my paper is not to show that the use of the wrong leverage ratio definition *inevitably* leads to incorrect results. The findings of most current and future published papers are likely to hold, regardless of leverage definition. Instead, the point of my paper is that the use of this bad measure of leverage can be problematic enough that it *can* lead to incorrect results. The regressions in Table 1 are sufficient to illustrate this.

Table 1 Sample capital structure regressions

	Constants	Log(AT)	BEQ/MEQ	NI/AT	PPEGT/AT	AP/AT	$\bar{R}^2$(%)
BV							
FD/AT							
Coef	0.149	0.041	−0.062	−0.183	0.034	−0.220	
Std coef	0.000	0.256	−0.119	−0.129	0.088	−0.158	
T_{NW}	(+7.16)	(+8.50)	(−4.72)	(−1.29)	(+3.71)	(−7.72)	(+7.5)
FD/BCP							
Coef	0.116	0.086	−0.090	−0.272	0.020	0.227	
Std coef	0.000	0.354	−0.114	−0.129	0.035	0.108	
T_{NW}	(+3.93)	(+11.11)	(−2.24)	(−1.32)	(+1.48)	(+7.01)	(+15.7)
LT/AT							
Coef	0.384	0.074	−0.101	−0.230	−0.024	0.325	
Std coef	0.000	0.408	−0.170	−0.143	−0.056	0.207	
T_{NW}	(+16.49)	(+18.65)	(−5.01)	(−1.26)	(−2.49)	(+15.64)	(+29.6)
MV							
FD/MAT							
Coef	−0.001	0.050	0.047	−0.159	0.020	−0.158	
Std coef	0.000	0.336	0.098	−0.122	0.056	−0.123	
T_{NW}	(−0.08)	(+10.76)	(+3.87)	(−1.35)	(+2.53)	(−5.69)	(+15.2)
FD/MCP							
Coef	−0.137	0.095	0.105	−0.271	0.011	0.203	
Std coef	0.000	0.447	0.152	−0.144	0.022	0.110	
T_{NW}	(−5.61)	(+18.27)	(+5.20)	(−1.47)	(+1.13)	(+6.33)	(+32.9)
LT/MAT							
Coef	0.002	0.099	0.161	−0.286	−0.028	0.345	
Std coef	0.000	0.454	0.226	−0.150	−0.054	0.182	
T_{NW}	(+0.09)	(+23.00)	(+7.84)	(−1.40)	(−2.76)	(+14.26)	(+45.8)

Description: The sample are all firms on Compustat from 2000 to 2009, with available assets in the current year, and at least $10 billion in assets and equity market value in the previous year. (The number of firm years in the regressions ranges from 2283 to 2380. The number of firms ranges from 252 in 2000 to 319 in 2009.) The dependent variables are shown in the rows; the independent variables are shown in the columns. All independent variables are lagged by 1 year. In the far left column, BV indicates measures where equity is in book value, and MV indicates measures where equity is in market value. Some mnemonics are directly from Compustat: AT is total assets, LT is total liabilities, NI is net income, PPEGT is tangible assets, and AP is accounts payable. Other mnemonics are derived: BEQ is the book value of equity (SEQ+MIB), MEQ is the market value of equity (PRCCF · CSHO), FD is financial debt (DLTT+DLC), BCP is the book value of capital (FD+BEQ), MCP is the market value of capital (FD+MEQ), and MAT is the market value of assets (AT–BEQ+MEQ). Std coef is the standardized coefficient (i.e., multiplied by the SD of the independent variable, and divided by the SD of the dependent variable). The *T*-statistic is Newey–White heteroskedasticity adjusted.
Interpretation: There are variables for which the inference depends on the measure of leverage. For asset-normalized tangible assets, the financial-debt-to-asset ratio suggests a positive coefficient, while the other two leverage ratios suggest a zero or negative correlation. For accounts payables, the financial-debt-to-asset ratio suggests a negative correlation, while the other two leverage ratios suggest positive correlations.

E. Cash and near-cash effects

A more subtle problem than the treatment of non-financial liabilities arises from the ability of firms to borrow and lend money. A firm could borrow cash overnight and deposit the funds into US treasuries (which in turn back these cash borrowings). The transaction costs to execute this trade are extremely low in developed economies. To a first order, these cash markets are close to perfect in the economic sense. Unfortunately, the ability of firms to execute such economically empty transactions can imply that the leverage measures discussed above are actually indeterminate.

Return to the hypothetical firm with liabilities of US$60 million and equity of US$40 million (for a leverage ratio of 60%). Assume that this firm holds only real assets, and that these US$100 million in 'projects' have an optimal leverage ratio of 60%.

Now allow this firm to borrow and lend B=US$100 million simultaneously. Its debt increases to US$160 million and its leverage ratio increases to (US$100+US$60)/(US$100+US$60+US$40)=US$160/US$200=80%. Clearly, the firm has not changed. It still has US$40 million in equity. The extra cash is meaningless – it is fully committed to pay for the debt. The real assets of US$100 are still financed with a leverage ratio of 60%. However, the additional cash has increased the measured balance sheet debt from LT/AT=60% to (LT+B)/(AT+B)=80%. With arbitrary amounts of borrowing and lending activities possible, the measured leverage ratio for this firm is indeterminate between 60% and 100%. The same firm could have a 60% ratio today, a 100% ratio tomorrow, and an 80% ratio the day after. Of course, the same problem applies to the (FD/CP) ratio, FD/(FD+EQ). Empty cash borrowing committed only to debt service can change this ratio from FD/(FD+EQ) to (FD+B)/(FD+EQ+B).

Fortunately, if the function of cash is to repay debt, there is one easy correction that can recover the 'projects' leverage ratio' of interest from the balance sheet reported 'projects+cash-borrowing leverage ratio.' The researcher can subtract the firm's cash assets (CH). This suggests a better definition of leverage. Instead of LT/AT, researchers can use

$$\text{Cash-adjusted leverage ratio} = \frac{\text{LT} - \text{CH}}{\text{AT} - \text{CH}}.$$

Unfortunately, this correction raises as many problems as it solves.

1. The cash may not have been committed for repayment but for real projects that have the same characteristics as the firm's projects. In this case, the 80% leverage ratio in the example may have been observed because it was the firm's optimal debt ratio, after all. (It may not have been the case that the unused parked cash merely served to distort the firm's correct 60% leverage ratio on its real assets into an 80% 'fake' measured leverage ratio.)

2. It is not clear whether near-cash assets should be treated just like cash. For example, instead of subtracting cash (CH), it may be better to subtract out cash and short-term investments (CHSTI), accounts receivables (RECT), accounts receivables net of accounts payable (RECT−AP), or even current assets minus current liabilities (ACT−LCT).
3. Myers and Read (2010) point out that there is also implicit leverage (just like cash) in the firm's real options. More broadly, many projects and leases contain implicit leverage. In this context, implied leverage can function just like cash in driving a wedge between actual project and measured balance sheet leverage ratios. This problem cannot be addressed by the subtraction of cash or near-cash.
4. Even if the cash is fully committed to paying off debt, there is another problem. The naïve market-based asset-leverage ratio

$$\text{Bad leverage measure} = \frac{\text{LT} - \text{CH}}{\text{AT} - \text{SEQ} + \text{CSHO} \cdot \text{PRCCF} - \text{CH}}$$

would produce badly distorted inference. For firms whose market value of assets (AT−SEQ+CSHO · PRCCF) is not greater than their cash holdings, the denominator could become zero or negative if cash is subtracted out. Any ratio that can take a zero or negative denominator never makes any sense.
This sign problem is an even greater concern for financial capital-based leverage ratios, because the value of capital is less than the value of assets. Thus, the denominator is smaller to begin with. The naïve financial-leverage ratio

$$\text{Bad leverage measure} = \frac{\text{FD} - \text{CH}}{\text{FD} + \text{EQ} - \text{CH}}$$

where EQ is now either the market value or the book value of debt, is therefore useless, too. For firms whose financial capital (FD+EQ) is not greater than their cash, the denominator could become zero or negative if cash is subtracted out.
One method to deal with this ratio problem is to winsorize the net-of-cash-liabilities first, i.e., LT′=max (LT−CH, 0). The revised (prime) total-liability figure can then be used instead of the original total liability figure to compute a better leverage ratio

$$\text{Leverage ratio} = \frac{\max(\text{LT} - \text{CH},\ 0)}{\max(\text{LT} - \text{CH},\ 0) + \text{CSHO} \cdot \text{PRCCF}}.$$

With this correction, any firm with more cash than liabilities is treated as if it were unlevered, albeit without regard to the extent by which its cash exceeds its liabilities.

The analogous winsorized financial debt measure is FD′=max (FD−CH, 0), and the improved leverage ratio is

$$\text{Leverage ratio} = \frac{\max(\text{FD} - \text{CH}, 0)}{\max(\text{FD} - \text{CH}, 0) + \text{EQ}}$$

where EQ is either the book value of equity (SEQ) or the market value of equity (CSHO · PRCCF+PSTK).

In sum, there is no clear economic method to handle cash holdings. Theories of leverage are typically about the underlying real assets (projects). Measures to test these theories should not be distorted by economically empty cash–debt transactions. Unfortunately, without knowledge whether cash or near-cash is committed to covering the debt or committed to covering real projects (and/or without the implicit leverage in real options or projects), it may well be impossible to compute a meaningful debt ratio on the underlying projects. Even when it is known that cash is committed to debt repayment, care must be applied in the calculation of the revised leverage ratio to avoid meaningless ratios that can have non-positive values in the denominator.

One research strategy would be to run estimations with uncorrected and corrected leverage ratios. However, because for some firms or even for some firm-years (but not others), cash may back debt, while for others cash may back projects, this is not a perfect solution, either. One would need a direct proxy for when cash backs debt and when it backs projects. Such a proxy is usually not available.

III. ISSUING ACTIVITY AND CAPITAL STRUCTURE ACTIVITY

In this section, I discuss a second issue that has occasionally added confusion in the literature. It is a common fallacy to consider evidence of equity issuing activity to be indicative of corporate delevering activity (i.e., the inverse of leverage changes). This fails for many reasons:

1. It omits the fact that firms issue equity not only into the public markets, but also for other purposes. It was pointed out by Fama and French (2005) that shares issued for compensation purposes are more prevalent than public seasoned equity issuing activity.
2. It omits the fact that firms also repurchase equity.
3. It omits the fact that firms purchase and retire debt. Again, it was pointed out by Fama and French (2005) that much equity is issued in the context of M&A, where it is also likely that significant amounts of debt are raised.
4. It omits the fact that operating performance changes leverage ratios. In market values, leverage ratios are affected by stock price changes. This was pointed out by Welch (2004). In book values, leverage ratios are

affected by retained earnings and depreciation. This was pointed out by Chang and Dasgupta (2009).

5. It omits the fact that leverage ratios are not linear. This was pointed out by Chen and Zhao (2006).

The last point deserves elaboration. Heterogeneity in capital ratios among different industries and types of firms is a well-known empirical regularity. For example, disproportionally, many technology firms have zero debt. This heterogeneity complicates translating value changes into capital structure effects. For example, consider the effect of a firm that doubles its equity value (either through net equity issuing or through a value change). If the firm was originally financed 50–50 by debt and equity, it will end up with 33–67 debt and equity. This firm would experience a decline in its debt–equity ratio. However, if it was financed all-equity (0–100 debt and equity), the same doubling of equity will cause no change in its leverage ratio.

Another consequence is that when a firm that is 90–10 debt–equity financed, even if it issues four times as much debt as equity (80–20), it is still rebalancing toward equity, not toward debt. Conversely, it follows that it is not enough to show that certain firms, which should have more equity, tend to issue more equity than debt in order to demonstrate that they are in fact rebalancing. The original capital structure determines whether a given debt and equity change leads to an increase or a decrease in leverage.

Chen and Zhao (2006) show empirically that seemingly natural inference on other variables (specifically on a target–debt ratio) can be reversed: on average, a third variable can relate positively to net debt-issuing activity and/or negatively to net equity issuing, and yet relate negatively to debt ratio changes.

A. The empirical relation between equity issuing and leverage changes

Table 2 shows that the discrepancy between issuing and capital structure change is not merely a minor conceptual nuance. The regressions correlate contemporaneous changes in leverage ratios with the issuance of common and preferred equity from the flow-of-funds statement (SSTK). In the lower panel, the regressions also include the issuance of long-term debt (DLTIS). The variables are timed so that they are contemporaneous.[4]

The regressions show that firms that issued more common and preferred equity are the same firms that *increased* their leverage ratios. More importantly, the correlation between issuing activity and leverage changes is so modest that the two are almost orthogonal.

Consequently, the empirical literature on (equity) issuing activity and capital structure should be seen as distinct. A variable that explains equity-issuing activity does not necessarily explain capital structure changes, and vice versa.

4. The exception is of course the scaling of the independent variable. The value of capital is a stock variable measured at the beginning of the period over which both changes in leverage and equity issuance is measured.

Table 2 Changes in leverage and issuing activity

	Constants	SSTK/BCP$_{-1}$	$\bar{R}^2$ (%)
BV			
Δ(FD/BCP)			
Coef	0.265	14.814	
Std coef	0.000	0.035	
T_{NW}	(+0.70)	(+1.43)	(+0.1)
Δ(LT/AT)			
Coef	0.447	2.484	
Std coef	0.000	0.015	
T_{NW}	(+3.09)	(+0.39)	(−0.0)
MV			
Δ(FD/MCP)			
Coef	1.874	27.383	
Std coef	0.000	0.114	
T_{NW}	(+8.01)	(+2.22)	(+1.3)
Δ(LT/MAT)			
Coef	2.148	12.905	
Std coef	0.000	0.056	
T_{NW}	(+10.61)	(+1.41)	(+0.3)

	Constants	SSTK/BCP$_{-1}$	DLTIS/BCP$_{-1}$	$\bar{R}^2$ (%)
BV				
Δ(FD/BCP)				
Coef	−0.370	9.852	5.659	
Std coef	0.000	0.023	0.096	
T_{NW}	(−1.13)	(+1.01)	(+2.48)	(+0.9)
Δ(LT/AT)				
Coef	−0.020	−1.142	4.244	
Std coef	0.000	−0.007	0.181	
T_{NW}	(−0.11)	(−0.19)	(+3.75)	(+3.2)
MV				
Δ(FD/MCP)				
Coef	1.003	20.262	7.874	
Std coef	0.000	0.085	0.231	
T_{NW}	(+3.37)	(+1.89)	(+4.47)	(+6.5)
Δ(LT/MAT)				
Coef	1.403	6.381	6.829	
Std coef	0.000	0.028	0.216	
T_{NW}	(+5.52)	(+0.82)	(+4.42)	(+4.8)

Description: The sample and statistics are the same as in Table 1, except that current FD, LT, and MEQ (as well as SSTK and DLTIS) had to also be available. SSTK is the Compustat-reported equity stock issued, as reported on the flow-of-funds statement. DLTIS is the Compustat-reported amount of long-term debt issued. The independent variables are scaled by book capital measured at the beginning of the period (BCP$_{-1}$).
Interpretation: The correlation between contemporaneous issuing activity and changes in leverage was modest. Seemingly perverse, it even appears that firms that issued equity increased their leverage.

IV. CONCLUSION

First, my paper has put forward the case that the very common measure of leverage, the FD/AT, incorrectly classifies non-financial liabilities the same as equity, that is, as the opposite of leverage. Thus, it classifies increases in non-financial liabilities as decreases in leverage. This issue is not the same as disagreement over whether non-financial liabilities are the same as financial debt. Such disagreements are legitimate and concern the question of whether the better measure of leverage is the liabilities-to-assets ratio (LT/AT, which considers non-financial liabilities the same as financial liabilities) or the financial-debt-to-capital ratio (FD/CP, which ignores non-financial liabilities).

My paper has not made the claim that any specific findings in (prior) empirical work will not hold if the FD/AT is replaced with a valid leverage measure. It has only shown that it is possible that findings can be reversed. Thus, the validity of existing findings in the literature has to be assessed on a case-by-case basis. Without replication, it is not *a priori* certain that any specific empirical finding that had been based on the incorrect FD/AT still holds. The robustness of any result will depend on how a variable of interest correlates with the discrepancy between non-financial liabilities and financial debt. Of most concern are studies that explore firms that change their real operations in a way that can affect their non-financial liabilities.

An analogy to the use of an incorrect leverage ratio would be the use of percent price changes (sans dividends and stock splits) in lieu of stock returns in studies of asset pricing. Although such an erroneous definition would be embarrassing, it would not make a difference in most academic research studies. However, for any given study, there is no *a priori* assurance that this would be so, *unless* it was checked that the lack of dividends was indeed unimportant.

Ultimately, my paper offers the simple suggestion that future research abandon the use of the FD/AT leverage measure. Such use is an elementary mistake. Researchers should instead use either the liabilities-to-assets ratio, or, if they want to focus on financial leverage only, the FD/CP ratio. There is no additional effort to getting it right.

Second, my paper has discussed the indeterminacy and measurement problems in reported corporate debt ratios that arise from the presence of a perfect financial market for cash in the economy.

Third, my paper has made the case that the empirical issuing activity and the empirical capital structure literature should be viewed as distinct. The correlation between equity issuing activity and capital structure changes is either insignificant or outright perverse (firms issuing equity on average *increase* their leverage).

There are other important problems in published capital structure research that my paper has not discussed. The most important problem may well be the fact that most research has ignored the fact that financial leverage is a bounded variable. Chang and Dasgupta (2009) and Iliev and Welch (2010) show that

placebo processes can generate many findings previously attributed to deliberate managerial behavior. As a profession, we may well have been too eager to find empirical support for our existing theories of capital structure.

I want to conclude with some opinions. I believe that the most important challenge in the capital structure literature today remains explaining why managerial capital structure activity creates the following two simple (statistically first-order) empirical regularities:

1. Managers are very active in their year-to-year net issuing activities (Welch 2004, Table 4), inducing typical leverage ratio changes on the order of 10% per year.
2. This managerial leverage change activity is largely orthogonal to the leverage change caused by stock returns. (This leads to a near one-to-one relation, on average, between stock-return-adjusted current debt ratios and future debt ratios [Welch 2004, Table 3].)

These regularities are not the deeper causes. Although the literature has uncovered some forces that contribute on the margin to explaining managerial capital structure activity, the first-order managerial motives still remain largely a mystery. Future research will find it easier to unravel this mystery by using a correct measure for leverage, by realizing the problems created by the presence of cash and near-cash, and by not confusing equity issuing evidence with leverage change evidence. In addition, though not the subject of this paper, research will also find it easier to unravel this mystery (a) by testing any empirical findings on non-normal simulated placebo processes and (b) by subtracting out the stock return induced capital structure change (from total capital structure change) to recover the managerially induced capital structure change. The former is responsible for about half of the variation in capital structure changes, and it is only the latter that requires explanation.

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