CAPITAL STRUCTURE DECISIONS OF U.S.-BASED FOOD PROCESSING FIRMS: A TRANSACTION COST ECONOMICS PERSPECTIVE

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ABSTRACT

A theoretical framework contributing to our understanding of capital structure decisions is emerging from transaction costs economics (TCE). Williamson initially proposed the economic drivers associated with debt versus equity financing. He suggests that debt and equity not be viewed primarily as financial instruments but as governance structures. An important concept within the TCE paradigm is asset specificity or idiosyncratic investment, which in turn can be linked to debt versus equity financing. Every firm is faced with boundary decisions that determine their focus and core competency in the long-term – decisions to make or buy. The decision in corporate finance among debt or equity to finance investment is another make or buy decision for the firm. The analysis reported here investigates the determinants of capital structure choice among a cross-section of publicly-traded U.S.-based food firms, using a TCE framework. The purpose of the analysis is to better understand the economic drivers associated with equity versus debt financing within agribusiness. Results demonstrate that a firm's profitability, size, asset specificity, and investment autonomy are important determinants of capital structure for U.S-based food processors.

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Introduction

Exploring the determinants of capital structure among agribusiness firms is important for several key reasons. One is that scant attention has been directed toward U.S. agribusiness or, specifically, to U.S.-based food firms. Many researchers have revisited the theory of corporate capital structure since Modigliani and Miller's (MM) groundbreaking 1958 paper. Since the MM analysis, numerous competing theories of capital structure choice have emerged.[2] These theoretical efforts have been supported by considerable empirical research. Several studies have applied these theories to the financial structure of U.S. farm businesses (Barry, Bierlen, and Sotomayor; Ahrendsen, Collender, and Dixon; Jensen and Langemeier; Gwinn, Barry, and Ellinger). However, modest research attention has extended beyond the farm gate to downstream firms.

Another key reason for examining capital structure is that boundary decisions are of critical importance for U.S.-based food firms. These firms compete in an industry where strategic and organizational considerations are important and where rivalry is increasingly based on intangible and/or highly idiosyncratic assets (Sporleder, 1999).

[2] An excellent synthesis of recent literature is in Harris and Raviv.

Boundary decisions made by a firm's managers and board determine both the firm's focus and core competency over the long-term.[3] The economic drivers of such decisions and their influence on managerial decision-making provide a deeper understanding of why managers make the decisions they make in the long-term. Additionally, whether the calculus of debt versus equity financing changes systematically with these economic motivators becomes is important to our understanding.

A theoretical framework potentially useful for understanding the fundamental drivers associated with debt versus equity financing is emerging from the transaction cost economics (TCE) literature. The framework provides a new lens through which to view corporate finance decisions, and provides important new explanatory power regarding corporate capital structure. The objective of this paper is to empirically investigate the determinants of capital structure among U.S.-based food processing firms, using a theoretical framework that incorporates some testable hypotheses based on TCE logic. The aim is to better understand the economic drivers associated with equity versus debt financing, at least within the U.S.-based food processor segment of the global food system.

The remainder of the paper is organized as follows. The fundamental tenets of the TCE approach are presented first. This is followed by a description of the model, discussion of the empirical results, and concluding remarks.

[3] This is sometimes referred to as the archetypal "make" or "buy" decision. Over the long-term, each firm must decide whether to procure inputs from the market, integrate vertically upstream through ownership by start-up or acquisition, or to expand internationally. Collectively over time, these decisions set the boundaries of the firm.

The Transaction Cost Economics Approach

A theoretical framework useful for explaining the economic drivers associated with equity versus debt financing of agribusiness firms is emerging from TCE. Williamson (1985, 1988) initially proposed the economic drivers associated with debt versus equity financing. He suggests that debt and equity not be viewed primarily as financial instruments but as governance structures. A fundamental concept in applying transaction cost logic to corporate capital structure decisions is that distinct governance structures emerge which differentially discipline sources of capital. Specifically, debt is a governance structure that is primarily disciplined by market rules while equity governance allows relatively greater administrative discretion in decision-making (Williamson, 1988).

Moreover, through the TCE lens the manner in which investment is financed is fundamentally dependent upon the nature of the assets. Specifically, the degree to which assets are nonredeployable. Williamson is unique in proposing that the realities of incomplete contracting, combined with asset specificity or idiosyncratic investment, have important implications for corporate finance decisions. Equity capital is better suited to projects where assets are relatively less redeployable. As such, there exists a close parallel between vertical integration and corporate finance in TCE logic. The decision in corporate finance among debt or equity to finance investment is another make or buy decision for the firm. The market-based decision to obtain debt financing outside the firm, instead of relying on an internal supply of equity, is relatively favorable for general

or non-idiosyncratic assets. The associated costs of doing so increase with contractual hazards.

Several important similarities and differences exist among the TCE logic and earlier models of capital structure. For example, both the TCE approach and the hierarchical or "pecking order" theory (Myers; Myers and Majluf) conclude that firms use equity financing as a last resort. However, the pecking order model does not explicitly consider the characteristics of the assets, and the preference for retained earnings over debt is justified through behavioral versus transaction cost considerations. Additionally, theories related to firms' investment opportunities (e.g., Myers 1977) suggest that firms whose opportunity sets consist primarily of growth options versus assets-in-place will avoid the use of debt capital due to potential conflicts with bondholders and shareholders. Though both the opportunity set and TCE approaches focus upon administrative discretion in decision-making, this approach differs from TCE in that it makes no distinction among asset/opportunity characteristics. Finally, the fundamental difference from earlier models is that the TCE approach suggests that debt (the "market" form) is the natural choice of financial capital while equity (the "administrative" form) is the instrument of last resort (Williamson, 1988). Other models of capital structure suggest equity capital as the firm's foundation with debt arising from special circumstances.

Model of Capital Structure

Existing theories have suggested a variety of potential determinants of capital structure, though their relevance to U.S. food processors remains an unanswered empirical question. Comparisons among empirical research relating to U.S. and international corporate data suffer from varying measures of leverage and key explanatory variables, divergent methodologies, and differing time periods. However, certain consistencies exist. According to Harris and Raviv, the consensus is that a firm's leverage increases with increases in the level of fixed assets, investment opportunities, and firm size and decreases with volatility, advertising expenditure, firm profitability, and the uniqueness of the firm's product.

We focus on several explanatory variables based on their consistent correlation with leverage in previous studies and on their importance in the context of U.S. food firms. Firm capital structure is modeled as follows:

$$LEVER_i = \alpha + \beta_1 INTANG_i + \beta_2 SIZE_i + \beta_3 PROFIT_i + \beta_4 INVEST_i + \beta_5 UNIQ_i + \varepsilon_i$$

where;

$LEVER_i$ = Firm leverage, measured as debt divided by total assets;

$INTANG_i$ = Ratio of total assets minus fixed assets divided by total assets[4]

$SIZE_i$ = Firm size, measured as the logarithm of net sales;

$PROFIT_i$ = Firm profitability, measured as earnings before interest, taxes and depreciation (EBITDA) divided by the book value of total assets;

[4] One minus Rajan and Zingales' measure of tangibility.

$INVEST_i$ = Firm investment or growth opportunities, measured by market-to-book value (i.e., ratio of book value of assets less the book value of equity plus the market value of equity, all divided by the book value of total assets);

$UNIQ_i$ = Uniqueness of the firm's assets, measured as the ratio of research and development expenditures to net sales.

Ordinary least squares regression analysis is used to estimate the model, using COMPUSTAT data from a cross-section of publicly-traded food processing firms in the United States, for the period from 1994 through 1998. The sample consists of firms with 1997 NAICS codes corresponding to 1987 SIC "code 20" companies.[5] The dependent variable is determined from 1998 data, while the explanatory variables are four-year averages (i.e., 1994 to 1997) to reduce noise and account for adjustment time. Further, the regressors are lagged one period to address the problem of endogeneity.

The expected sign on the INTANG coefficient estimate is negative. Lenders readily collateralize tangible assets, and the value of intangible assets is less transparent due to information asymmetries. Moreover, in the face of financial distress, intangible assets are likely to disappear. It is predicted that firms whose tangible assets comprise a greater proportion of their total assets will exhibit a higher capacity for debt capital use (Bradley, Jarrell, and Kim; Banerjee, Heshmati, and Wihlborg; Rajan and Zingales; Harris and Raviv). Tangibility is an important driver of interest in the TCE view of

[5] The North American Industry Classification System (NAICS) is a system of classifying establishments by the type of economic activity in which they are engaged. The U.S. Office of Management and Budget adopted it in 1997 to replace the 1987 Standard Industry Classification (SIC) coding system.

corporate capital structure. Tangible assets could be considered more redeployable, thus tangibility and asset specificity are related. However, Williamson reminds us that though an important correlation exists, the tangible-intangible distinction is an incomplete measure of asset specificity.

A priori, the relationship between firm size and leverage is indeterminate. On one hand, size may be a proxy for the inverse probability of bankruptcy. A larger firm is potentially more widely diversified, while direct bankruptcy costs represent a smaller portion of firm value (Titman and Wessels; Banerjee, Heshmati, and Wihlborg). These arguments suggest a positive relation between firm size and optimal leverage. In contrast, Rajan and Zingales suggest that larger firms may have less incentive to raise debt capital since they are less susceptible to the effects of asymmetric information, thus suggesting a negative relationship between size and leverage. This effect will be tested in the context of data from U.S.-based food processors.

The relationship between firm profitability and leverage is expected to be negative. In both pecking order theory (Myers and Majluf) and TCE logic (Williamson), firms should prefer internal financing to external financing. In other words, firms prefer to make versus buy. More profitable firms have greater internal capital available, ceteris paribus. This suggests a negative relationship between profitability and leverage. A negative relationship is consistent with the notion that managers prefer to avoid the disciplinary rules imposed through the buy decision, and to finance with equity where governance is more closely allied with administrative rule making. However, as Jensen suggests, firms may signal quality to the market where asymmetric information is present

by levering up, suggesting a positive relationship.[6] Again, this relationship is tested in this study using the ratio of EBITDA to total assets.

The INVEST regressor is intriguing. Due to the under investment problem articulated by Myers and Majluf, firms that expect significant growth in the future should use proportionally more equity capital. Titman and Wessels also suggest a negative relationship between expected growth and leverage, but for a different reason. Companies with better opportunities for growth may have greater flexibility to invest suboptimally and thereby extract wealth from shareholders and bondholders. Market-to-book value represents a measure of a firm's growth opportunities created by intangible assets, such as managerial skill and competence – a commonly used proxy in the literature for a company's "q-value." Under the logic of TCE, the theoretical notion embodied in this economic driver of capital structure is that, at the margin, preferences between equity and debt capital depend inherently on the extent to which management has autonomy in making new investments. Investment in new projects or growth opportunities, such as acquiring other firms or vertical integration, requires significant capital. Some firms are fortunate compared to their counterparts because they possess discretionary investment potential and expect future growth to be significant. Firms with substantial investment autonomy, thus, would prefer to use equity financing. TCE logic suggests a negative relationship between market-to-book value and leverage.

In the TCE approach, as a firm's assets become more unique they are relatively less redeployable. All else equal, idiosyncratic or nonredeployable assets have lower

[6] Long and Malitz' paper suggests the same result, though the effect of size was not statistically significant.

salvage value. Unique assets experience thin markets, and the expected value recoverable by a lender in the event of bankruptcy is lower. The present analysis considers the ratio of the firm's R&D expenditures to sales as a measure of such uniqueness. Following the literature (Titman and Wessels; Banerjee, Heshmati, and Whilborg), a negative relationship between UNIQ and firm leverage is expected.

Results and Discussion

The results of the regression analysis are presented in Table 1. All coefficient estimates except UNIQ are statistically significant. Like similar models of optimal capital structure of U.S. business, this model explains about 20 percent of the variation in the capital structure of U.S.-based food processing firms. Consistent with a priori expectations, a negative relationship exists between firm leverage and the proportion of total assets that are intangible. As intangible assets such as rights, relationships, intellectual property, and unidentified intangibles comprise an increasing proportion of the assets of agribusinesses, it is expected that these firms would exhibit and increasing reliance on equity capital.

Though the existing literature shows mixed evidence of the effect of firm size on capital structure, this analysis suggests a positive relationship. Larger food firms may be more widely diversified than their smaller competitors, thus sustaining a greater debt-carrying capacity.

Consistent with TCE logic, the sign of the profitability coefficient is negative. Managers of more profitable U.S.-based food processing firms may prefer to avoid the

market-based rules governing debt capital use, when an adequate level of internal capital is available instead.

Again consistent with the TCE framework, firms with a greater degree of investment autonomy and greater opportunities for growth prefer to use equity capital to finance expansion. As anticipated, the sign on the INVEST coefficient is negative – greater market-to-book ratios correspond to lower individual firm leverage.

Finally, the direction of the effect and the lack of significance of the UNIQ coefficient are interesting. The current authors expected a negative relationship between uniqueness, measured by the ratio of research and development expenses to sales, and firm leverage. However, as pointed out by several previous analysts, the measure of uniqueness is problematic (e.g., Rajan and Zingales; Banerjee, Heshmati, and Wihlborg). For example, amortization and capitalization of R&D expenses on firms' income statements complicates the measure, while all firms with no such expenses do not necessarily exhibit the same level (or lack) of uniqueness.

Concluding Remarks

The results of this study demonstrate significant support for the importance of several key economic drivers in capital structure decisions of U.S.-based food processing firms. Of particular importance are the negative relationships between firm leverage and economic drivers such as intangible assets, profitability, and investment autonomy. As suggested by the relatively recent transaction cost perspective to corporate capital structure, in which debt and equity are viewed not as financial instruments but as

governance structures, equity governance provides for greater administrative discretion in decision-making and is important to investment in idiosyncratic assets. The empirical evidence shows a clear indication of managers' preference for equity capital financing, and is consistent with the hypothesis that distinct governance structures emerge which differentially discipline sources of capital among food processors.

Additional research should focus on the capital structure decisions of other U.S. agribusinesses using similar cross-sectional data. Furthermore, analysts should accept Williamson's challenge to develop a more precise theoretical notion of asset specificity, versus ad hoc proxy measures driven by data availability. In short, explaining the capital structure of agribusiness remains an important area for future study.

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Table 1. OLS Regression Results - Leverage of U.S.-based Food Processors (n=135)

Explanatory Variable	Coefficient Estimate
INTERCEPT	0.416*** (4.32)
INTANG	-0.215** (-2.20)
SIZE	0.085*** (3.35)
PROFIT	-0.434** (-2.05)
INVEST	-0.089*** (-3.34)
UNIQ	0.041 (.98)

Notes: Adjusted R^2 = 0. 0.191, Prob >F = 0.00, t-statistics are in parentheses. Asterisks indicate significance at the 10% (*), 5% (**), and 1% levels (***), respectively.