How does the financial performance of sugar-using firms compare to other agribusinesses? An economic value added analysis

Carlos Trejo-Pech[1]
Karen L. DeLong
Department of Agricultural and Resource Economics, University of Tennessee, Knoxville

[1] Corresponding author: ctrejope@utk.edu

A Research Report Presented to the American Sugar Alliance

June 15, 2022

Table of Contents

How does the financial performance of sugar-using firms compare to other agribusinesses? An economic value added analysis

Abstract

Sugar-using firms (SUFs) utilize sucrose as a primary ingredient to produce sugar-containing products (SCPs). The multibillion-dollar SCP industry produces items ranging from candy bars to ice cream. SUFs claim that the US sugar program is a "bad deal for American food and beverage manufacturers." Therefore, this report analyzed the financial performance of publicly traded SUFs to determine if they are performing at a financial disadvantage compared to their publicly traded agribusiness peers and a benchmark of all US firms. In terms of various profitability and risk measures, SUFs outperformed their agribusiness peers and the general benchmark of all US firms. Furthermore, when compared to other US industries using the 17 French and Fama industry classifications, SUFs had the highest return on investment and economic value added margin, and the second-lowest weighted average cost of capital. This study found nothing to suggest that the US sugar policy is hindering the financial success of SUFs.

Keywords: Financial analysis, sugar-using firms, US sugar policy, risk-adjusted profitability, Economic Value Added

1. Introduction

Sugar-containing products (SCPs) are consumable goods made with sucrose. United States (US) SCP manufacturers (hereafter referred to as sugar-using firms (SUFs)) generate billions of dollars of revenue annually and produce products ranging from ice cream to candy bars. In the US, sucrose originates from both sugarcane and sugar beets. US sugar policy protects domestic sugar farmers from the subsidized world sugar market, which typically trades below a sugar farmer's cost of production (LMC International, 2021), to ensure at least a partial domestic supply of sugar can remain in production. According to the Sweetener Users Association (SUA) (2022), the US sugar program is a "bad deal for American food and beverage manufacturers" because it "restricts imports to keep domestic prices high." However, previous research has not found any evidence that the US sugar program harms the profitability of SUFs (Trejo-Pech et al., 2020). Further, DeLong & Trejo-Pech (2022) found that US sugar prices and relative US-to-world sugar prices were not relevant factors in the pricing of SCPs. This result was not unexpected since the surveyed SCPs had sugar costs representing, on average, 2.5% of the SCP's retail price despite representing nearly half of the SCPs' weight.

Despite sugar being a primary ingredient in many SCPs, Triantis (2016) found that the cost of sugar constitutes, on average, only 4% of the cost of producing highly-sweetened SCPs, and less-sweetened SCPs contained an even lower sugar-cost share. Therefore, it is possible that the US sugar policy does not negatively affect SUFs' financial performance, since sugar represents such a small share of their costs. One could even argue that the US sugar program provides a stable and reliable domestic supply of sugar that allows SUFs the ability to more accurately forecast sugar prices which reduces input volatility and risk. For example, Lewis and

Manfredo (2012) evaluated the United States Department of Agriculture (USDA) sugar production and consumption forecasts and found them to be efficient and unbiased most years.

The goal of this report is to analyze the financial performance of publicly traded SUFs to investigate how it compares to its peer group of other publicly traded agribusinesses and the overall performance of all US publicly traded companies, which serves as a US benchmark for financial performance. Ultimately, this study is concerned with the indirect effect of the US sugar program on the financial performance of US SUFs, which are enterprises processing and commercializing SCPs. If the US sugar program causes harm to SUFs, it is expected that their financial performance will be worse than other agribusinesses and US companies. However, if the financial performance of SUFs is similar to or better than other agribusinesses and US companies, then it is likely the US sugar program is not causing financial distress to SUFs, which is consistent with previous research (Trejo-Pech et al., 2020). Furthermore, if SUFs' financial performance is superior to their peers, this would also be counter to the SUA's long held accusation that the US sugar program is "a bad deal for American food and beverage manufacturers," since they are able to experience financial success while also operating within the context of the US sugar program which ensures a reliable and partial domestic supply of sugar.

This report provides a systematic financial analysis that compares the financial performance of SUFs publicly traded in US markets with the financial performance of their industry peers, and US companies in general, which serve as benchmarks for normal financial performance, during the 2010-2019 decade. The measure of financial performance utilized encompasses alternative proxies of profitability and risk.

2. Previous Literature

Trejo-Pech, Weldon, and House (2008) evaluated the relationships between profits, cash flows, and working capital items of publicly traded agribusinesses and all US firms from 1970 to 2004. They documented that while the profitability of agribusiness is slightly lower than the profitability of the US market, the cash flow of agribusiness is somewhat higher than that of all US firms. Overall, their findings suggested that the financial performance of agribusiness was similar to that of the entire US market during this period. Katchova and Enlow (2013) also compared the financial performance of publicly traded agribusinesses and all firms from 1961 to 2011, examining a large variety of financial ratios compared to the previous study. They concluded that agribusinesses outperformed the median sample of all firms in terms of profitability and market ratios but had slightly lower liquidity and debt ratios. No known research has systematically compared the financial performance of agribusiness and all US firms since their study.

Triantis (2016) and Trejo-Pech et al. (2020) have both analyzed financial aspects of SUFs, a subset of agribusinesses. Using panel regression analysis, Trejo-Pech et al. (2020) modeled SUFs' profitability from 2000 to 2017 as a function of sugar prices, firm expenses, firm efficiency, firm size, growth rate, and firm risk. They found that as the US-to-world sugar price ratio increased, SUF profitability was either unchanged or, counterintuitively, tended to increase. Their overall results suggested that the US sugar policy (i.e., US sugar prices) does not hurt the profitability of publicly traded SUFs. However, they did not evaluate SUFs' profitability over time or compared to peers; neither did they evaluate financial ratios other than profitability ratios.

More related to our study, Triantis (2016) examined whether the sugar policy has damaged the financial performance of SUFs. Triantis's (2016) financial section included an analysis of net margin, return on equity, stock price, beta risk factor, and a price-to-earnings ratio of SUFs compared to the food processing industry and the US market (for selected metrics) during 2001-2015. Triantis (2016) concluded that SUFs outperformed food processors and the US economy during this period. One limitation of Triantis (2016) is that the study analyzed only the largest nine publicly-traded firms in confectionery, breakfast cereal, and bread and bakery product sectors. In addition, Triantis (2016) calculated the abovementioned financial ratios for SUFs and compared them with corresponding ratios of the food processing industry and the US market computed by other authors. While nothing is wrong with this approach, it is unclear if the financial ratios for SUFs, food processors, and the US market are calculated following the same methodology (e.g., data curation, treatment of variables, etc.). Our study addresses these limitations by analyzing not only the largest SUFs but all publicly traded SUFs and calculating all metrics with the same methodology for SUFs and other industries, thus allowing for a consistent comparison of SUFs and peers. The financial metrics calculated in this study also differ from Triantis (2016) in several aspects. This study estimates alternative proxies of profitability rather than only one proxy, identifies drivers of profitability, evaluates the opportunity cost of capital and risk-adjusted profitability, and ranks SUFs' risk-adjusted profitability with other US industries. Finally, this study provides an updated analysis since it covers data over the past decade.

3. Data and Methods

3.1. Financial data

Financial accounting and market data at the firm level were obtained from databases maintained by Standard & Poor's. Financial accounting data included items from the income statement and balance sheet to compute the variables for the analysis. Financial market data had firm market capitalization or market value and the firm's risk factors or betas. The study is performed with annual data of nonfinancial American-based publicly traded firms from 2010 to 2019.[1] Foreign firms trading in American stock exchanges were removed from the databases, given that a relevant objective of this study is to evaluate the financial performance of SUFs purchasing sugar in the US.

3.2. Agribusiness, sugar-using firms, and other industries

We assigned each firm in the database an industry designation according to Fama and French's (F&F) 17 industries classification (Fama & French, 2021). F&F industry classifications are based on Standard Industry Classification (SIC) codes and are mainly used to create investment portfolios of similar firms. Fama and French classify firms according to 5, 10, 12, 17, 30, 38, 48, and 49 industries. We chose the 17 industries classification for this study because the sub-industries included in the "food" sector accurately portray agribusinesses. Industries in the F&F's 17 industries classification are (1) agribusiness (referred to as Food in the F&F classification), (2) automobiles, (3) banks, insurance companies, and other financials, (4) chemicals, (5) construction and construction materials, (6) consumer durables, (7) drugs, soap, perfumes, tobacco, (8) fabricated products, (9) machinery and business equipment, (10) mines

[1] Excluding data from financial reports filed after March 2020, when COVID was declared a pandemic.

mining and minerals, (11) oil and petroleum products, (12) other retail stores, (13) steel works, (14) textiles, apparel and footwear, (15) transportation, (16) utilities, and (17) other.[2]

Following standard practice in corporate finance research, we removed firms in the financial industry (e.g., banks, insurance companies, and other financials) from the database because the financial statements and financial ratios of nonfinancial and financial firms are not comparable. The agribusiness industry is composed of 31 subindustries, including agricultural producers, food and beverage manufacturers, food and beverage wholesales, and agricultural service providers (Appendix 1 provides a list of sub-industries with their respective SIC codes).

We further divided agribusiness firms into two groups, which we refer to as different industries in this study: SUFs and agribusinesses other than SUFs (AGB). Table 1 provides the number of observations in the database, separating agribusiness (accruing the F&F classification) into SUFs and AGB. SUFs and AGB are considered peers because both groups contain agribusinesses.

Table 1. Portfolios analyzed, 2010 to early 2019

Portfolios	N	Frequency (%)
Sugar-using firms (SUFs)	235	0.70
Agribusinesses other than SUFs (AGB)	980	2.92
The US market (ALL)	33,619	100.00

Portfolio SUFs contains firm/observations of agribusiness identified as sugar-using firms in this study. AGB has agribusiness other than SUFs. Firms/observations in SUFs plus firms/observations in AGB comprise the Agribusiness Industry, according to the Fama & French's 17 industries classification (Fama & French, 2021). Portfolio ALL contains

[2] Details of all F&F classifications are provided at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

firm/observations across all industries according to Fama & French's 17 industries classification with non-missing data for the relevant variables in this study.

Table 1 also shows the US market (ALL), the group formed by aggregating all firms/industries in the database. The US market group serves as the analysis' reference or overall benchmark. We refer to the group in Table 1 as portfolios. The number of observations shown in Table 1 refers to the total firm/annual observations in the database (the number of observations for specific variables with non-missing data to calculate the variables in the analysis is included in subsequent tables). Below we explain how firms in the SUFs' portfolio were identified.

3.3. SUFs

The SUFs portfolio was created with firms identified in prior research as agribusinesses for which sugar is a relevant input of production (DeLong & Trejo-Pech, 2022; Trejo-Pech et al., 2020; Triantis, 2016). Triantis (2016) evaluated the performance of selected financial ratios of the nine largest publicly traded firms in the confectionery, breakfast cereal, and bread and bakery industries. Trejo-Pech et al. (2020) modeled sugar-using firms' profitability as a function of sugar prices and other control variables of all sugar-using firms (not only the largest) in the industries referred to above and in the beverages industry. Trejo-Pech et al. (2020) identified sugar-using firms according to sugar industry reports by IBISWorld and by inspecting agribusinesses' annual reports (10K reports) filed with the US Securities and Exchange Commission (SEC). DeLong and Trejo-Pech (2022) modeled retail prices of selected sugar-using firms as a function of sugar prices and control variables. This study's sample contains all SUFs

identified in these previous studies. Table 2 lists the names of firms in our SUFs portfolio, indicating the number of observations in the database.

Further, to ensure that sugar is currently a raw ingredient in the production process of firms in the SUFs portfolio, we inspected the 2015 to 2020 10K reports of SUFs in the abovementioned studies, finding that, indeed, sugar was mentioned in the 10K reports of these firms. 10K reports were gathered from the Electronic Data Gathering, Analysis, and Retrieval System by the SEC.[3] Mentions of sugar were related to sugar as a relevant raw material purchased by these firms, sugar price as a source of commodity risk, and sugar consumption taxes as a potential source of revenue volatility, among others. Appendix 2 provides selected extracts with mentions of sugar. This confirms that firms in the sample were not only SUFs during the periods analyzed by previous studies, but they still consumed sugar as an important input in recent years.

This study uses historical financial files from Compustat, meaning that SUFs not currently listed in an exchange market but listed in any year between 2000 and early 2020 are included in the sample. For instance, Pinnacle Foods Inc. and Ralcorp Holdings Inc. traded as individual companies from 2008 to 2017 and 2000 to 2012, respectively, until both were acquired by Conagra Brands Inc. These three firms are part of the sample.

3.4. Methods for financial analysis

To evaluate financial performance, we conduct the following analyses: (1) compare alternative proxies of profitability across SUFs, AGB, and ALL portfolios, (2) compare key drivers of profitability across SUFs, AGB, and ALL portfolios, (3) compare risk metrics and profitability-

[3] Available at: https://www.sec.gov/edgar.shtml

adjusted metrics across SUFs, AGB, and ALL portfolios, (4) rank profitability and risk-adjusted metrics of SUFs, AGB, and ALL portfolios relative to 18 US industries, and (5) conduct trend analysis.

Proxies of profitability: Firm profitability is measured by dividing a profit value from the income statement by an investment value from the balance sheet. Widely used profitability ratios include the return on assets (*ROA*), return on equity (*ROE*), and return on investment (*ROI*). In this study, we calculate these financial ratios as follows:

$$ROA = \frac{Net\ income}{Assets} \quad (1)$$

$$ROE = \frac{Net\ income}{Equity} \quad (2)$$

$$ROI = \frac{NOPAT}{Invested\ Capital} = \frac{EBIT \times (1-tax)}{D+E}, \quad (3)$$

Unlike *ROA* and *ROE, ROI* relates profitability to capital components: equity (E) and debt (D). Net operating profits after taxes (*NOPAT*) captures firm profits after taxes (*tax*)—but before interest expenses—that are available to pay the financing cost of debt (*D*) and equity (*E*) capital. *NOPAT* is calculated by multiplying earnings before interest and taxes (*EBIT*) times *1-tax* to account for the tax-deductibility of interest expenses (Schill, 2017).

Since ROE and ROI are the most preferred profitability ratios by equity analysts covering publicly traded firms (Trejo-Pech et al., 2015), we focus the analysis on these two metrics. Specifically, we decompose ROE according to the DuPont model and compare ROI with the firm's opportunity cost of capital.

Drivers of profitability: According to the DuPont decomposition, *ROE* can be expressed in terms of relevant financial ratios as follows:

$$ROE = ROA \times \frac{Assets}{Equity} = \frac{Net\ income}{Assets} \times \frac{Assets}{Equity} = \frac{Net\ income}{Revenue} \times \frac{Revenue}{Assets} \times \frac{Assets}{Equity}. \quad (4)$$

The DuPont decomposition, equation (4), shows that *ROE* equals *ROA* multiplied by a leverage-related financial ratio (i.e., *ROA* is already contained into *ROE*) and is the product of net income margin (net income to revenue), asset turnover (revenue to assets), and leverage (assets to equity). More generally, profitability is decomposed into a margin, asset efficiency, and leverage ratio. We decompose *ROE* according to equation (4) to compare drivers of profitability of sugar-using firms with peers because this decomposition provides a parsimonious representation of drivers of firm profitability (i.e., decomposing one equation instead of calculating many financial ratios, yet providing an insightful decomposing of profits into margin, asset efficiency, and leverage).

Risk-adjusted profitability and risk metrics: *ROI* provides a rate of return that is a benchmark for the firm's opportunity cost of capital. This is because risk-adjusted profit (*NOPAT*) is measured in relation to debt plus equity, the same components used to estimate a firm's opportunity cost of capital. Previous studies indicate that most financial managers in the US use the weighted average cost of capital (*WACC)* as the proxy for the firm's opportunity cost of capital (Graham & Harvey, 2001; Jacobs & Shivdasani, 2012). As shown in equation (5), *WACC* considers the weights of debt and equity in the firm's capital structure and the tax-deductibility of interest expenses.

$$WACC = \left\{\frac{D}{D+E} \times d \times (1 - tax)\right\} + \left\{\frac{E}{D+E} \times e\right\}. \quad (5)$$

The first *WACC* component in equation (5) measures the cost of debt net of interest-related tax savings, with *d* capturing the cost of debt. The second term shows the cost of equity adjusted by the weight of equity in the capital structure. Upper-case *D* and *E* represent dollar values, whereas lower-case *d* and *e* represent the cost of debt and equity in annual rates. Surveyed managers in the US indicate they commonly apply the capital asset pricing model (CAPM) (Sharpe, 1964) to have an estimate (since this rate is unobservable) of equity investors' expected rate of return or cost of equity, *e* (Graham & Harvey, 2001). CAPM estimates the cost of equity by:

$$e = risk\ free\ rate + \beta \times (US\ market\ premium). \quad (6)$$

The risk-free rate is typically proxied by the annual rate of a US government long-term issued bond, and the US market risk premium is proxied by historical rate premia between the rate of return of a US well-diversified portfolio and the risk-free rate. The beta factor, β, specific for each firm and time period, is estimated by regressing the firm's historical stock returns on the corresponding market risk premia.

Equation (5) resembles equation (3) because both use the same investment base and consider the tax effect of interest expenses on profits. Subtracting the opportunity cost of capital, equation (5), from profitability, equation (2), gives the residual income relative to invested capital, also referred to as the Economic Value Added (EVA) margin:

$$EVA\% = ROIC - WACC \quad (7)$$

EVA margin can be rearranged and represented as

$$EVA\% = \frac{(EBIT - D \times d) \times (1 - t) - E \times e}{Invested\ Capital}, \quad (7a)$$

or, by defining earnings after interest and taxes $EAT = (EBIT - D \times d) \times (1 - t)$, as

$$EVA\% = \frac{EAT - E \times e}{Invested\ Capital}. \quad (7b)$$

The numerator of equation (7b) shows that when earnings (net of interest and tax payments), *EAT*, is equal to expected payments to equity investors (e.g., the second term), the *EVA* margin will be zero. At zero EVA margin, the firm generates just enough profits to pay both debt holders and equity holders the returns they expect for their investment according to the risk borne. In other words, a firm generating zero EVA margin will satisfy the expectation of debt and equity holders. Microeconomic theory predicts that in the long-term, firms yield zero residual income or zero EVA margin—according to this specific proxy—as they enter steady-state equilibrium. Positive and negative *EVA* margins are temporary deviations than tend to disappear as firms enter or exit industries due to competitive market adjustments.

Rankings of profitability and risk-adjusted metrics: *ROI*, *WACC*, and *EVA%* for SUFs and AGB are evaluated in relation to their position across all US industries (i.e., the F&F 17 industries— excluding the finance industry—, SUF, AGB, and ALL).

Trends: All the analysis above was conducted by comparing the median of financial metrics across portfolios during the decade of study. To evaluate whether the profitability and risk of the SUF portfolio are around a few years, we calculate and inspect metrics over time for the decade of study.

Table 2. List of sugar-using firms, 2010 to 2019

Company Name	Ticker	N
B&G Foods Inc	BGS	10
Campbell Soup Co	CPB	10
Coca Cola Consolidated Inc[1]	COKE	10
Coca-Cola Co[2]	KO	10
Conagra Brands Inc	CAG	9
Dean Foods Co[3]	DFODQ	8
Dr Pepper Snapple Group Inc[4]	DPS	8
Flowers Foods Inc	FLO	10
General Mills Inc	GIS	9
Hain Celestial Group Inc	HAIN	10
Hershey Co	HSY	10
J & J Snack Foods Corp	JJSF	10
Kellogg Co	K	10
Keurig Dr Pepper Inc	KDP	10
Kraft Foods Group Inc[5]	KRFT	4
Kraft Heinz Co	KHC	9
Mondelez International Inc	MDLZ	10
Monster Beverage Corp	MNST	10
Pepsico Inc	PEP	10
Pinnacle Foods Inc[6]	PF	8
Post Holdings Inc	POST	10
Ralcorp Holdings Inc[7]	RAH	3
Rocky Mountain Choc Fact Inc	RMCF	10
Smucker (JM) Co	SJM	9
Snyders-Lance Inc[8]	LNCE	8
Tootsie Roll Industries Inc	TR	10
Total		235

[1] This firm was called Coca-Cola Bottling Company Consolidated until 2019.

[2] Coca-Cola Company is the parent company of Coca Cola Consolidated Inc. (COKE).

[3] On November 12, 2019, Dean Foods Company filed a voluntary petition for reorganization under Chapter 11 (missing data for 2011).

[4] As of 2018, Dr Pepper Snapple Group, Inc was acquired by Keurig Dr Pepper Inc.

[5] Kraft Foods Group, Inc was acquired in 2015 by The Kraft Heinz Company (missing data for 2011).

[6] Pinnacle Foods was privately held until it went public in 2013. In 2017, it was acquired by Conagra.

[7] Ralcorp was acquired by Conagra in 2013.

[8] Snyder's-Lance, Inc. has operated as a subsidiary of Campbell Soup Company since 2018.

4. Results and Discussion

The financial metrics analyzed in this study are normalized to make these metrics comparable across firms regardless of firm size. This is because the financial ratios and the weighted average cost of capital are expressed in terms of proxies of firm size (e.g., total assets, market value, etc.) or because the beta risk factor is a normalized metric expressed in relation to the risk of a market portfolio. While we cured the data from outlier observations, as is common in corporate finance research, with a couple of exceptions, the distributions of the metrics are skewed rather than symmetrical. (Appendix 3 shows the distributions of the financial metrics for the portfolio of SUFs.) Because of this, we discuss median instead of mean values since using median values is more appropriate when financial ratios are aggregated at the industry level (WRDS Research Team, 2016).

4.1. Profitability

Table 3 provides selected statistics of three proxies of firm profitability: return on assets, return on equity and return on investment (*ROA*, *ROE*, and *ROI*). The correlation coefficients amongst the three metrics are high, ranging from 0.65 to 0.84, which was expected given all three financial ratios are proxies of profitability. Profitability median returns are presented for the portfolio of SUFs, agribusinesses other than SUFs (AGB), and all firms in the US market (ALL). The profitability of SUFs is the highest across the three portfolios regardless of the financial ratio chosen to proxy profitability. During the 2010-2019 period (excluding the COVID pandemic period), the median *ROA* for SUFs was 6.3%, compared to 3.9% for AGB and 3.0% for the pool of all US publicly traded firms. Median *ROE* was 16.0% for SUFs, 8.1% for AGB, and 7.3% for ALL. Median *ROI* for SUFs, AGB, and ALL were 11.3%, 6.6%, and 6.1%, respectively. Table 3

also shows that SUFs' profitability ratios are statistically higher than the profitability ratios of the AGB portfolio, SUFs' closest peer, at a 1% significance level.

Table 3. Profitability financial ratios, median values from 2010 to 2019

	SUFs	AGB	ALL
ROA	0.063***	0.039	0.030
N	229	889	30,485
ROE	0.160***	0.081	0.073
N	229	889	30,485
ROI	0.113***	0.066	0.061
N	232	921	29,377

ROA is the return on assets, *ROE* is the return on equity, and *ROI* is the return on investment (equations (1), (2), and (3)). SUFs is a portfolio of SUFs, AGB contains agribusinesses other than SUFs, and ALL is the portfolio with all firms in the US market.
*** denotes a 1% significance level of a median equality Mann-Whitley test (Ho: SUFs = AGB).

4.2. Drivers of profitability: the DuPont decomposition

To understand what the drivers of firm profitability are, *ROE* is decomposed according to the DuPont model (equation (4)) into net income margin (net profits to revenue), assets turnover (revenue to assets), and the equity multiplier (assets to equity). Table 4 shows the *ROE* decomposition for the three portfolios of firms.

Results suggest that SUFs' net income margin is the primary driver of profits for SUFs compared to its peers because SUFs' net income margin, at 8.0% median, is by far higher than the net income margins of AGB (2.6%) and ALL (3.4%). SUFs' equity multiplier is also higher than AGB and ALL, suggesting that the median leverage for SUFs is higher than the leverage of its peers. However, the gap between leverage of SUFs, AGB, and ALL is not as large as the differences across net income margins. SUFs' median assets represent 2.8 times its equity,

compared to around two times for AGB and ALL. Regarding assets efficiency, while SUFs' median asset turnover is slightly higher than ALL (0.83 vs. 0.80), SUFs' asset efficiency is lower than AGB (0.83 vs. 1.45), indicating that sugar-using firms are less asset-efficient than other agribusinesses. Overall, results in Table 4 suggest that net income margin and leverage are the two main drives of the sugar-using firm's industry profitability. Still, net income margin is by far the main driver.

Table 4. *ROE* DuPont decomposition, median values from 2010 to 2019

	SUFs	AGB	ALL
Net income margin	0.080***	0.026	0.034
N	229	889	30,485
Asset turnover	0.833***	1.447	0.800
N	229	889	30,485
Equity multiplier	2.766***	1.998	2.075
N	229	889	30,485

ROE decomposition according to equation (4). Net income margin is calculated by dividing net profits by revenue, assets turnover is the ratio of revenue to total assets, and the equity multiplier is calculated by dividing total assets by equity.
SUFs is a portfolio of sugar-using firms, AGB contains agribusinesses other than SUFs, and ALL is the portfolio with all firms in the US market.
*** denotes a 1% significance level of a median equality Mann-Whitley test (Ho: SUFs = AGB).

4.3. Profitability and risk: Beta, WACC, and EVA

Unlike *ROA* and *ROE*, *ROI* is a profitability ratio providing a rate of return that can be used as a benchmark against the firm's opportunity cost of capital. The opportunity cost of capital is measured by the weighted average cost of capital (*WACC*, equation (5)). The Economic Value Added margin (*EVA%*), equation (7), represents the difference between *ROI* and *WACC*. Table 5

provides the statistics for *EVA%* and related financial metrics across portfolios. As expected, the median of beta, the firm systematic risk measure (equation (6)), is around 1.0 for our US market portfolio. According to asset pricing theory, beta=1.0 represents the market's average or baseline risk level, and betas below and above 1.0 are related to lower or higher than average risk levels. Theory prescribes that the risk of a well-diversified portfolio—containing firms from different industries—represents the baseline or average risk against the risk of specific firms or groups of firms that should be compared. Results in Table 5 indicate that the SUFs and AGB industries are at low-risk levels compared to the US market.

A firm's beta is only one factor affecting, through the cost of equity, the firm's *WACC*. *WACC* is a more comprehensive risk measure because, as shown in equation (5), a firm's *WACC* is a function of the cost of equity, cost of debt, a mix of debt and equity, and effective tax rates. Our estimations show that SUFs' risk proxied by *WACC* is also lower than the risk of its peers. Median *WACC* for SUF is 5.3%, compared to *WACC*=6.4% for *AGB* and *WACC*=8.7% for ALL (Table 5).

Since *WACC* represents the firm's opportunity cost of capital, the *WACC* rate indicates the profit rate of return the firm has to generate to satisfy debt and equity holders' expectations—according to the risk they undertake when investing in the specific firm. *ROI* is one measure that, when compared to *WACC,* indicates whether a firm can satisfy the expectations of capital providers. The *EVA%* shows the difference between *ROI* and *WACC* (equation (7)). A firm with *EVA%*=0 (or, more generally, with zero residual income) can satisfy the expectations of capital providers.

Our results, in Table 5, show that the combination of a low *WACC* and high *ROI* generates a relatively high *EVA%* median value equal to 6.1% for SUFs, in contrast with

EVA%=1.4% for AGB and *EVA%*=0.0% for the US market. This latter result is consistent with microeconomic theory predicting that in the long-term, firms in the market generate zero residual income since abnormal (different from zero) residual income will tend to disappear as firms enter and exit industries in the presence of positive or negative abnormal income. Overall, results indicate not only profitability (e.g., *ROA*, *ROE*, and *ROI*) but risk-adjusted profitability (*EVA%*) of SUFs is higher than their peers. These results are consistent with previous research documenting that publicly traded agribusinesses are less risky than the US market (Katchova & Enlow, 2013). One possible explanation of these results is that the price elasticity of demand for food products, and more specifically, SCPs, could be characterized as mostly inelastic. However, a review of literature on the price elasticity of demand for food categories, and specifically SCPs, shows mixed results with the price elasticity of demand for several food and SCP categories ranging from inelastic to elastic (Valizadeh and Ng, 2021; Okrent and Alston, 2012; Lakkakula et al., 2016). Future research could update these results and investigate this possibility more specifically within SCP categories. Overall, our results suggest that SUFs represent an agribusiness subsector most likely driving results in previous research that did not disaggregate agribusiness.

Table 5. Risk and Economic Value Added margin, median values from 2010 to 2019

	SUFs	AGB	ALL
Beta	0.455***	0.649	1.075
N	166	425	14,434
WACC	0.053***	0.064	0.087
N	156	386	12,820
EVA%	0.061***	0.014	-0.002
N	156	386	12,820

Beta is the firm's systematic market risk estimated according to equation (6), *WACC* is the firm weighted average cost of capital, estimated by equation (5), and *EVA%* is economic value added margin, calculated with equation (7).
SUFs is a portfolio of sugar-using firms, AGB contains agribusinesses other than SUFs, and ALL is the portfolio with all firms in the US market.
*** denotes a 1% significance level of a median equality Mann-Whitley test (Ho: SUFs = AGB).

4.4. Ranking positions of profitability and risk across industries

The previous analysis evaluated the profitability and risk metrics of SUFs relative to AGB and ALL. In this section, we further assessed selected profitability and risk metrics of the three portfolios in relation to their position relative to all US industries or portfolios (i.e., the F&F 17 industries—excluding the finance industry, SUFs, AGB, and ALL). 2010-2019 median *ROI* and *EVA%* values of portfolios were separately ranked from highest to lowest. Similarly, 2010-2019 median *WACC* industry values were ranked from lowest to highest since *WACC* represents risk. Table 6 provides the results.

SUFs ranked first in terms of *ROI* and *EVA%*, indicating that SUFs had the highest profitability and risk-adjusted profitability ratios across the 18 portfolios. Regarding *WACC*, SUFs' risk was the second-lowest, only above the utilities industry, across all industries as defined in this study. *ROI* and *EVA%* for agribusinesses other than SUFs ranked in the 13th and 10th positions, slightly above the middle of the 18 portfolios, and ranked as the 3rd lowest risk industry. Finally, the aggregate US market ranked between 12 and 14 across all industries. Thus, sugar-using firms are a group of highly attractive firms for US investors, yielding high profitability compared to the rest of the industries. Agribusinesses other than SUFs represent an 'average' industry in terms of profitability and risk-adjusted profitability but a low-risk industry.

Table 6. Ranking positions of profitability and risk metrics across portfolios, 2000-2019

	SUFs	AGB	ALL
ROI	1	13	14
WACC	2	3	13
EVA%	1	10	12

4.5. Trends

All the analysis above was conducted by comparing the median of financial metrics across portfolios during the decade of study. In this section, we asked whether the SUFs portfolio's high profitability and low risk are affected by high profits, particularly clustered around a few years. We calculated the median of ROI, WACC, and EVA% each year and plotted these metrics.

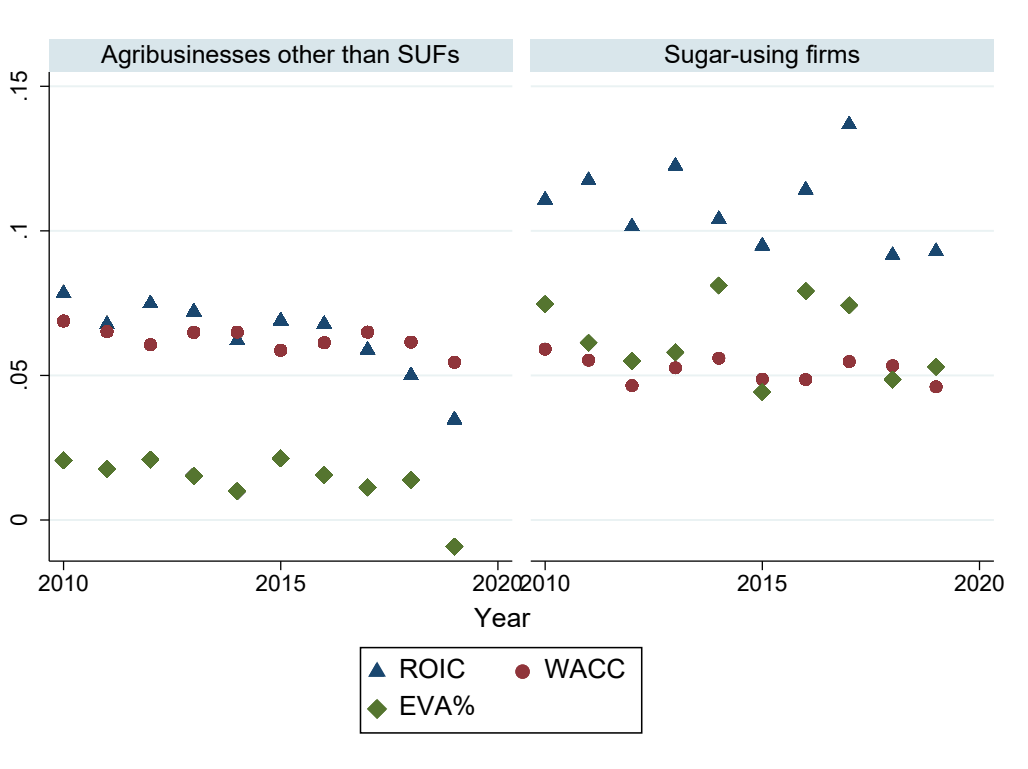


Figure 1. Profitability and risk metrics for SUF and AGB, 2000-2019

Figure 1 shows that, in general, profitability (*ROI*) for SUFs is above 10%, except for three years when ROI is slightly below 10%. This contrasts with median *ROI*s in AGB, which are between 5 and 10%, with one exception. *WACC* is relatively stable during the decade and similar for both SUFs and AGB. In addition, the *ROI* of SUFs is far above *WACC* every year (generating relatively high *EVA%*). In contrast, the *ROI* of AGB is some years similar or even slightly below *WACC* (generating EVA% around zero some years). Figure 1 confirms the previous results and shows that SUFs' financial performance has been solid and stable over the last decade.

4.6. Robustness tests

While soft drink firms use real sugar (sucrose) for some of their products, they also use high fructose corn syrup (HFCS) as a sweetener in many beverages. To test the robustness of our results and eliminate any possibility of HFCS being utilized primarily by companies rather than sugar, we removed soft drink companies from the SUFs portfolio and instead added them to the AGB portfolio and recomputed all financial metrics. Appendix 4 provides the results.

While the results changed a little, the quality of the overall conclusion remains the same for every financial metric. Specifically, profitability decreases a little for SUFs and increases for AGB. However, SUFs' profitability is still statistically higher, as shown in Table 3-A (e.g., SUFs' ROI moves from 11.1% to 10.3% and from 6.6% to 6.8% for AGB). Similarly, the net margin for SUFs decreases from 8.0% to 7.6% for SUFs and moves from 2.6% to 2.7% for AGB (similar minor changes are observed for other drivers of profitability, Table 4-A). EVA% margin goes down from 6.1% to 5.9% for SUFs and increases from 1.4% to 1.8% for AGB (Table 5-A). Regarding rankings of financial performance across industries, SUFs' positions do not change.

Still, the AGB portfolio improves a little when soft drink firms are included, moving from position 13 to 9 in terms of ROI, and from 10 to 8 in terms of EVA margin, remaining in position 3 in terms of cost of capital (Table 6-A). Finally, no changes in trend over time are distinguishable (Figure 1-A).

5. Conclusions

Domestic sugar farmers experience protections from the subsidized world sugar market, that often trades below the cost of production, through US sugar policy mechanisms. The SUA, which represents American food and beverage manufacturers who produce SCPs, contend that US sugar policy hinders their business. This study shows that SUFs represent a portfolio of highly profitable and low-risk firms relative to peers and the whole US market defined according to the F&F 17 industries classification.

This study's results are consistent with Triantis' (2016) analysis of a subset of SUFs which also revealed that the largest SUFs were a highly profitable sector compared to peers. With regards to US sugar policy, it appears to be successfully ensuring a partial domestic sugar supply while not impeding the financial performance and success of SUFs. A possible explanation for this is that sugar represents a low input cost for SCPs (DeLong and Trejo-Pech, 2022; Triantis, 2016) and since US sugar policy helps ensure a partial domestic production of sugar this creates predictability and reduced volatility in sugar prices. During 1980-2020, for instance, the coefficient of variation of US sugar prices, at 0.25, was lower than world sugar prices' coefficient of variation at 0.39. Low input costs and volatility yield high and more stable operating margins, which are attributes that capital markets value in charging low costs of capital when financing these firms. Given SUFs have low risk metrics and a higher net income margin,

this supports the notion that sugar may be a less risky input and relatively low cost. Untabulated results in this study confirmed that SUFs' gross margins are stable. SUFs gross margins varied no more than two percent points around the median, at 39.6%, over the 2010-2019 period of study.

From 2010-2019, sugar-using firms have enjoyed financial success all while operating within the context of the U.S. sugar program. Over this time period, they have had the highest ROI and EVA%, and the second lowest WACC, among all F&F industries, a robust result that has spanned across the decade. This implies that publicly traded SUFs have been able to yield high risk-adjusted profitability and capital providers charge a low cost of capital when financing these firms because they perceive this to be a low-risk industry.

References

DeLong, K. L., & Trejo-Pech, C. O. (2022). Factors Affecting Sugar-Containing-Product Prices. *Journal of Agricultural & Applied Economics*.

Fama, E., & French, K. (2021). *Data Library Current Research Returns*. Kenneth French's Website. http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics*, *60*(2), 187–243. https://doi.org/10.1016/S0304-405X(01)00044-7

Hodari, D. (2018). Sugar Low: Commodity Plummets on Surplus. *The Wall Street Journal, May 1, 2018*. https://blogs.wsj.com/moneybeat/2018/05/01/sugar-low-commodity-plummets-on-surplus/

Hudson, D. (2019). An Examination of Foreign Subsidies and Trade Policies for Sugar. *Texas Tech University*, *BP-19-01*, 1–32.

Jacobs, M., & Shivdasani, A. (2012). Do you know your cost of capital? *Harvard Business Review*, *July-August 2012*, 119–124.

Katchova, A. L., & Enlow, S. L. (2013). Financial performance of publicly-traded agribusinesses. *Agricultural Finance Review*, *73*(1), 58–73. https://doi.org/10.1108/00021461311321311

Lewis, K.E. and M.R. Manfredo. 2012. "An Evaluation of the USDA Sugar Production and Consumption Forecasts." *Journal of Agribusiness*, 30(2):155-172.

LMC International. World Sugar Prices vs Costs of Production. Oxford: LMC International, 2021

Lakkakula, P., Schmitz, A., & Ripplinger, D. (2016). US sweetener demand analysis: A QUAIDS model application. Journal of Agricultural and Resource Economics, 533-548.

Okrent, A., & Alston, J. (2012). The demand for disaggregated food-away-from-home and food-at-home products in the United States. USDA-ERS Economic Research Report, (139).

Schill, M. J. (2017). Business Valuation: Standard Approaches and Applications. *Darden Business Publishing, University of Virginia*, *UV6586*, 14.

Sharpe, W. (1964). Capital Asset Prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance*, *19*(3), 425–442. https://doi.org/10.2307/2977928

Sweetener Users Association. (2022). *US Sugar Program*. https://sweetenerusers.org/u-s-sugar-program/

Trejo-Pech, C., DeLong, K., Lambert, D., & Siokos, V. (2020). The impact of US sugar prices on the financial performance of US sugar-using firms. *Agricultural and Food Economics*, *8*(1), 16. https://doi.org/10.1186/s40100-020-00161-5

Trejo-Pech, C., Noguera, M., & White, S. (2015). Financial ratios used by equity analysts in Mexico and stock returns. *Contaduría y Administración*, *60*(3), 578–592. https://doi.org/10.1016/j.cya.2015.02.001

Trejo-Pech, C., Weldon, R., & House, L. (2008). Earnings, accruals, cash flows, and EBITDA for agribusiness firms. *Agricultural Finance Review*, *68*(2), 301–319. https://doi.org/10.1108/00214660880001232

Triantis, A. (2016). *Economic Effects of The U.S. Sugar Policy* (April 2016; pp. 1–52). American Sugar Alliance. https://sugaralliance.org/wp-content/uploads/2013/10/Triantis-Sugar-Policy-Study.pdf

USDA ERS. (2021, September 8). *Food Dollar Appreciation*. Economic Research Service. US Department of Agriculture. https://data.ers.usda.gov/reports.aspx?ID=17885

Valizadeh, P., & Ng, S. W. (2021). Would A National Sugar-Sweetened Beverage Tax in the United States Be Well Targeted?. American journal of agricultural economics, 103(3), 961-986.

WRDS Research Team. (2016). *WRDS Industry Financial Ratio. Financial Ratios: Industry Level*. https://wrds-www.wharton.upenn.edu/pages/grid-items/financial-ratio-industry-level/

Appendices

Appendix 1. The agribusiness industry by sub-industries according to Fama & French's 17 industries classification

SIC codes	Sub-industries
0100-0199	Agricultural production - crops
0200-0299	Agricultural production - livestock
0700-0799	Agricultural services
0900-0999	Fishing, hunting & trapping
2000-2009	Food and kindred products
2010-2019	Meat products
2020-2029	Dairy products
2030-2039	Canned & preserved fruits & vegetables
2040-2046	Flour and other grain mill products
2047-2047	Dog and cat food
2048-2048	Prepared feeds for animals
2050-2059	Bakery products
2060-2063	Sugar and confectionery products
2064-2068	Candy and other confectionery
2070-2079	Fats and oils
2080-2080	Beverages
2082-2082	Malt beverages
2083-2083	Malt
2084-2084	Wine
2085-2085	Distilled and blended liquors
2086-2086	Bottled-canned soft drinks
2087-2087	Flavoring syrup
2090-2092	Misc. food preparations and kindred products
2095-2095	Roasted coffee
2096-2096	Potato chips
2097-2097	Manufactured ice
2098-2099	Misc. food preparations
5140-5149	Wholesale - groceries & related products
5150-5159	Wholesale - farm product raw materials
5180-5182	Wholesale - beer, wine & distilled alcoholic beverages
5191-5191	Wholesale - farm supplies

Source: Fama and French's 17 industries classification. Available in:

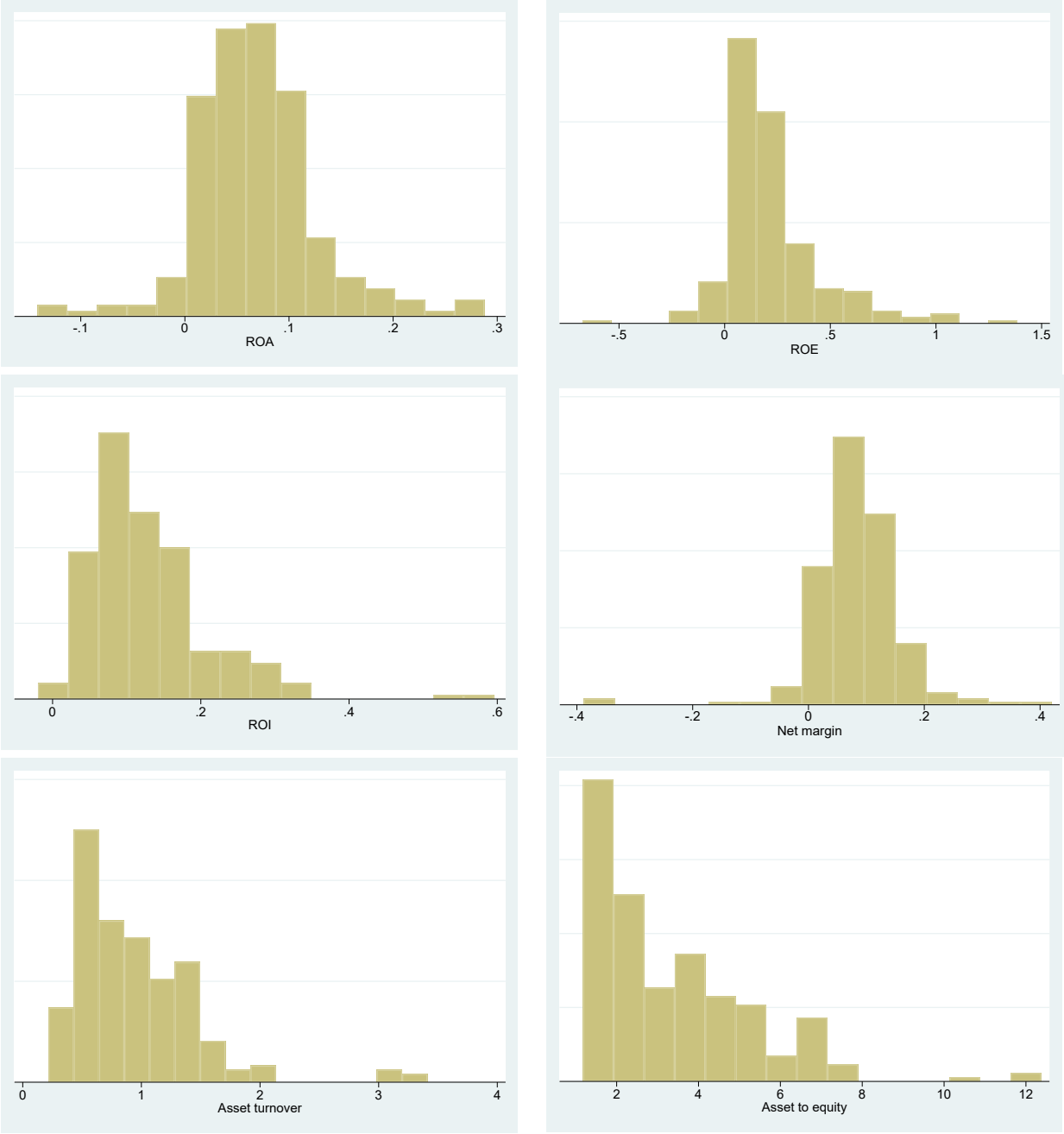
https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_17_ind_port.html

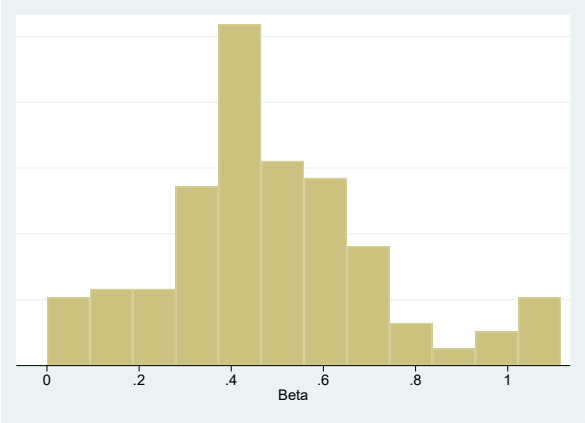
Appendix 2. Extracts of 10K selected reports and firms in this study on which SCP firms mention sugar as relevant for their business

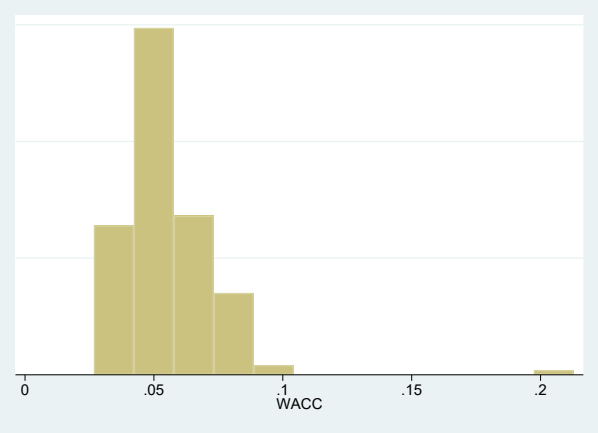
Name of Company	Extract from 10K report
B&G Foods Inc	"The principal raw materials for our products include corn, peas, broccoli, oils, beans, pepper, garlic, and other spices, maple syrup, wheat, corn, nuts, cheese, fruits, beans, tomatoes, peppers, meat, sugar, concentrates, molasses and corn sweeteners."
Coca Cola Consolidated Inc	"Certain jurisdictions in which our products are sold have imposed, or are considering imposing, taxes, labeling requirements or other limitations on, or regulations pertaining to, the sale of certain of our products, ingredients or substances contained in, or attributes of, our products or commodities used in the manufacture of our products, including certain of our products that contain added sugars or sodium, exceed a specified caloric count or include specified ingredients such as caffeine."
Conagra Brands Inc	"We purchase commodity inputs such as wheat, corn, oats, soybean meal, soybean oil, meat, dairy products, nuts, sugar, natural gas, electricity, and packaging materials to be used in our operations. These commodities are subject to price fluctuations that may create price risk."
Flowers Foods Inc	"Our primary baking ingredients are flour, sweeteners, shortening, yeast and water."
General Mills Inc	"The principal raw materials that we use are grains (wheat, oats, and corn), dairy products, sugar, fruits, vegetable oils, meats, nuts, vegetables, and other agricultural products."
Hershey Co	"We also use substantial quantities of sugar, corn products, Class II and IV dairy products, wheat products, peanuts, almonds and energy in our production process."
J & J Snack Foods Corp	"Our most significant raw material requirements include flour, packaging, shortening, corn syrup, sugar, juice, cheese, chocolate, and a variety of nuts."
Kellogg Co	"Agricultural commodities, including corn, wheat, rice, potato flakes, vegetable oils, sugar and cocoa, are the principal raw materials used in our products."
Kraft Heinz Co	"We purchase and use large quantities of commodities, including dairy products, meat products, coffee beans, soybean and vegetable oils, sugar and other sweeteners, tomatoes, potatoes, corn products, wheat products, nuts, and cocoa products, to manufacture our products."

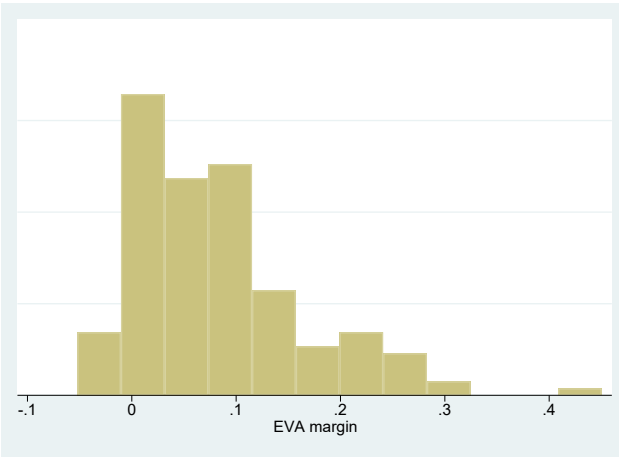
Mondelez International Inc	"We purchase and use large quantities of commodities, including cocoa, dairy, wheat, palm and other vegetable oils, sugar and other sweeteners, flavoring agents and nuts."
Monster Beverage Corp	"The principal raw materials used in the manufacturing of our products are aluminum cans, aluminum cap cans, sleek aluminum cans, aluminum cans with re-sealable ends, PET plastic bottles, caps, as well as flavors, juice concentrates, glucose, sugar, sucralose, milk, cream, protein, coffee, tea, supplement ingredients and other packaging materials, the costs of which are subject to fluctuations."
Post Holdings Inc	"The principal ingredients for most of our businesses are agricultural commodities, including wheat, oats, rice, corn, other grain products, vegetable oils, dairy- and vegetable-based proteins, sugar and other sweeteners, fruit and nuts."
Rocky Mountain Choc Fact Inc	"The principal ingredients used in our products are chocolate, nuts, sugar, corn syrup, cream and butter."

Appendix 3. Distributions of the financial metrics of SUFs




0
.2
.4
.6
.8
1
Beta


0
.05
.1
.15
.2
WACC


-.1
0
.1
.2
.3
.4
EVA margin

Appendix 4. Robustness test results (soft drink firms are part of AGB instead of SUFs). Tables 3-A through 6-A and Figure 1-A

Table 3-A. Profitability financial ratios, median values from 2010 to 2019

	SUFs	AGB	ALL
ROA	0.059***	0.041	0.030
N	184	934	30,485
ROE	0.135***	0.087	0.073
N	184	934	30,485
ROI	0.103***	0.068	0.061
N	186	967	29,377

SUFs is a portfolio of sugar-using firms (except soft drink firms), AGB contains agribusinesses (including soft drink firms) other than SUF, and ALL is the portfolio with all firms in the US market.

*** denotes a 1% significance level of a median equality Mann-Whitley test (Ho: SUFs = AGB).

Table 4-A. *ROE* DuPont decomposition, median values from 2010 to 2019

	SUFs	AGB	ALL
Net income margin	0.076***	0.027	0.034
N	184	934	30,485
Asset turnover	0.823***	1.378	0.800
N	184	934	30,485
Equity multiplier	2.416***	2.039	2.075
N	184	934	30,485

ROE decomposition according to equation (4). Net income margin is calculated by dividing net profits by revenue, assets turnover is the ratio of revenue to total assets, and the equity multiplier is calculated by dividing total assets by equity.
SUFs is a portfolio of sugar-using firms (except soft drink firms), AGB contains agribusinesses (including soft drink firms) other than SUF, and ALL is the portfolio with all firms in the US market.
*** denotes a 1% significance level of a median equality Mann-Whitley test (Ho: SUFs = AGB).

Table 5-A. Risk and Economic Value Added margin, median values from 2010 to 2019

	SUFs	AGB	ALL
Beta	0.449***	0.638	1.075
N	136	455	14,434
WACC	0.053***	0.063	0.087
N	126	416	12,820
EVA%	0.059***	0.018	-0.002
N	126	416	12,820

Beta is the firm's systematic market risk estimated according to equation (6), *WACC* is the firm weighted average cost of capital, estimated by equation (5), and *EVA%* is economic value added margin, calculated with equation (7).
SUFs is a portfolio of sugar-using firms (except soft drink firms), AGB contains agribusinesses (including soft drink firms) other than SUF, and ALL is the portfolio with all firms in the US market.
*** denotes a 1% significance level of a median equality Mann-Whitley test (Ho: SUFs = AGB).

Table 6-A. Ranking positions of profitability and risk metrics across portfolios, 2000-2019

	SUFs	AGB	ALL
ROI	1	9	14
WACC	2	3	13
EVA%	1	8	12

SUFs is a portfolio of sugar-using firms (except soft drink firms), AGB contains agribusinesses (including soft drink firms) other than SUFs, and ALL is the portfolio with all firms in the US market.

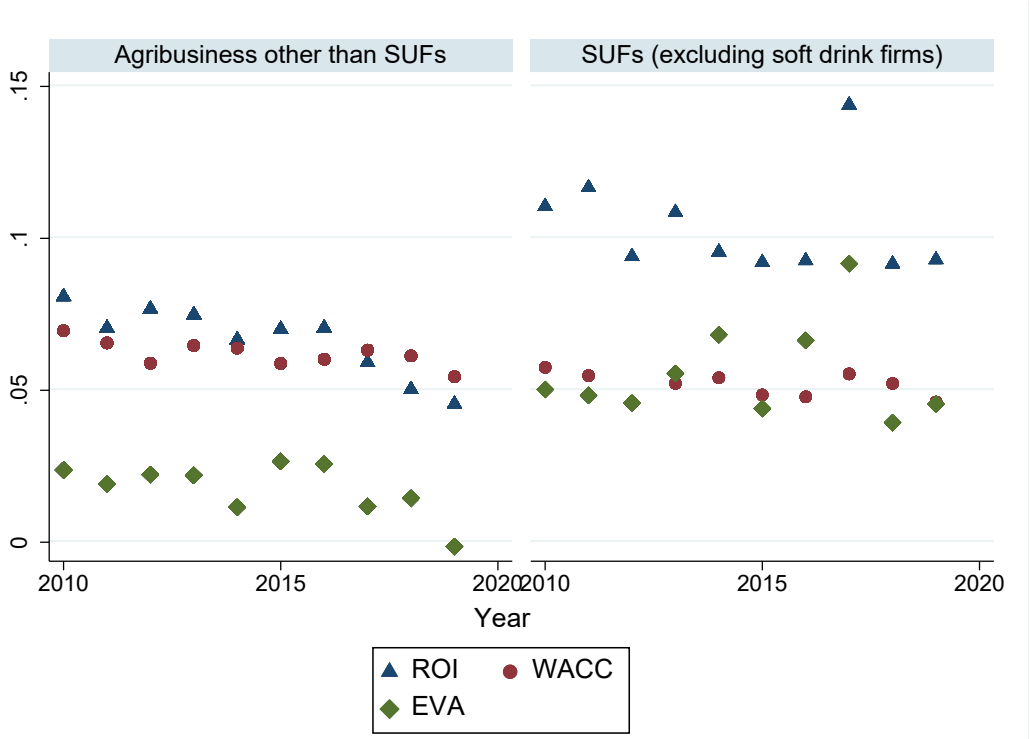


Figure 1-A. Profitability and risk metrics for SUF and AGB, 2000-2019

SUF is a portfolio of sugar-using firms (except soft drink firms), AGB contains agribusinesses (including soft drink firms) other than SUF.